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### Materials Usage in the United States Great Lakes Basin

Great Lakes Basin Commission

John Doneth

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**INTERNATIONAL REFERENCE GROUP  
ON GREAT LAKES POLLUTION  
FROM LAND USE ACTIVITIES**

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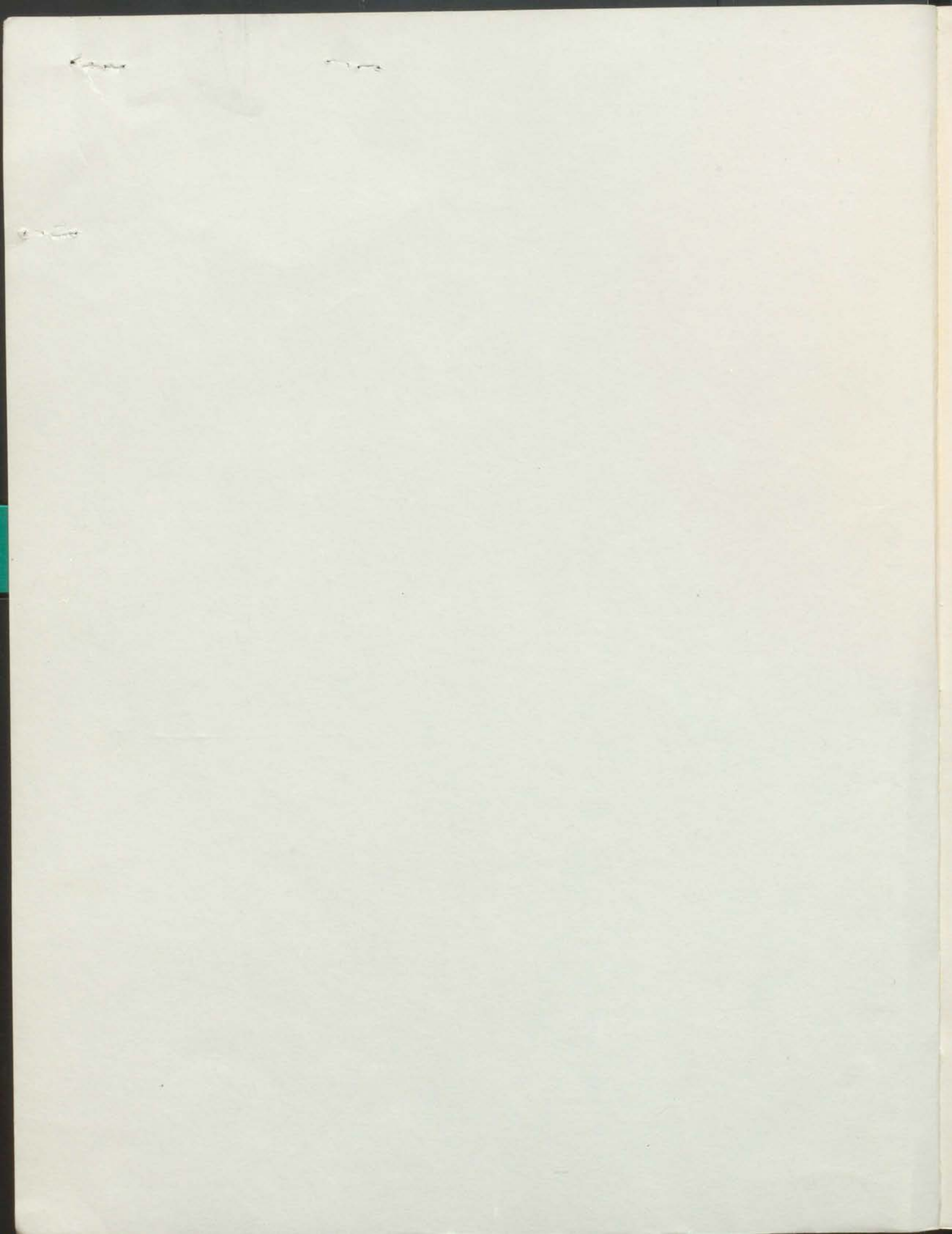


**INTERNATIONAL  
JOINT  
COMMISSION**

**MATERIALS USAGE  
IN THE UNITED STATES  
GREAT LAKES BASIN**

PREPARED BY UNITED STATES TASK GROUP B SEPTEMBER 1975

75-  
021



MATERIALS USAGE IN  
U.S. GREAT LAKES BASIN

prepared by  
JOHN DONETH,  
East Lansing, Michigan

in cooperation with  
GREAT LAKES BASIN COMMISSION  
Ann Arbor, Michigan

funded by  
U.S. DEPARTMENT OF AGRICULTURE  
Soil Conservation Service  
East Lansing, Michigan

prepared for  
the U.S. Section of Task Group B for the  
POLLUTION FROM LAND USE ACTIVITIES REFERENCE GROUP  
of the International Joint Commission...  
also partial fulfillment of  
U.S. Environmental Protection Agency  
Contract No. 68-01-1598 with the  
Great Lakes Basin Commission

September 1975

UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PLANT INDUSTRY

Prepared by  
J. H. HARRIS  
Plant Industry Station  
Beltsville, Maryland

In cooperation with  
THE UNITED STATES DEPARTMENT OF AGRICULTURE  
BUREAU OF PLANT INDUSTRY  
Beltsville, Maryland

Issued by  
U. S. DEPARTMENT OF AGRICULTURE  
BUREAU OF PLANT INDUSTRY  
Beltsville, Maryland

Approved for  
the U. S. Bureau of Plant Industry by  
J. H. HARRIS, Chief, Bureau of Plant Industry  
of the International Plant Quarantine  
also called attention to  
U. S. Department of Agriculture  
Bureau of Plant Industry  
Beltsville, Maryland

September 1955

## FOREWORD

This study on Materials Usage in the U.S. Great Lakes Basin has been funded by the United States Department of Agriculture - Soil Conservation Service in an Agreement with the Great Lakes Basin Commission. The study, the first of its kind in the Great Lakes region, has been of great personal interest and will provide background for further analyses of possible impacts to the Great Lakes.

I am particularly indebted to my son, Daniel Doneth, who spent innumerable hours in checking and cross-checking the many figures found in this report. I also wish to thank Suzanne Braley and Eugene Jarecki of the Great Lakes Basin Commission staff who spent many hours in planning and developing this report. Also, the various typists in the Soil Conservation Service East Lansing office who typed the tables have my thanks. Others greatly assisting were Robert Fellows, United States Department of Agriculture - Soil Conservation Service, James Dooley and Delbert Johnson of Michigan Department of Natural Resources, Robert Reed and Louis Meyer of the Great Lakes Basin Commission staff. To the many that I interviewed and who provided data and counseling on Materials Usage, I give my sincere appreciation.

Any conclusions, opinions and results found in the report are solely my responsibility.

John Doneth  
East Lansing, Michigan

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Section 1  
INTRODUCTION

1.1 Purpose and Scope

The Great Lakes Pollution from Land Use Activities Reference Group was organized under the aegis of the International Joint Commission to conduct a portion of the studies developing from the Canada-United States Agreement on Water Quality in the Great Lakes. Further background is shown in "Great Lakes Water Quality Agreement, with Annexes and Texts and Terms of Reference, Between the United States and Canada," signed at Ottawa, Canada, April 15, 1972, and "Study Plan to Assess Great Lakes Pollution from Land Use Activities," dated March 30, 1973, prepared and as further updated by the Pollution from Land Use Activities Reference Group of the International Joint Commission.

The geographical area of the study is defined as the "boundary waters of the Great Lakes System." The "boundary waters" means the Great Lakes themselves and the connecting channels as defined in the "Boundary Waters Treaty," January 11, 1909. In the United States portion, Lake Michigan is considered part of the boundary waters for the purposes of this study.

The purpose of this report on Materials Usage was to provide an up-to-date inventory of production and/or usage within the United States portion of the Great Lakes Basin of certain materials applied to land with the potential of reaching the Great Lakes System through land drainage. The data on selected materials was to be collected by county, planning subarea, lake drainage area and then combined to represent the total Great Lakes Basin. See Figure 1-1 for area of study.

1.2 Objectives

The study calculated the amounts of chemicals -- herbicides, insecticides, and fungicides -- used on crops. The types and acreage of various crops, pastures, vegetables and fruits were inventoried. The common rates of application were then applied to the acreage of each treated providing the calculations shown in this report.

The livestock manure produced was calculated. The amounts were based on an inventory of swine, cattle, sheep, horses, chickens and turkeys. The production in terms of nitrogen, phosphorous and potash were also calculated.

The commercial fertilizer used on farms was based on actual reports of use by state. Use by county was available for the corn belt states and was calculated for the other states. The amounts of nitrogen, phosphorus and potash in the fertilizer were likewise based on actual reports or calculated.

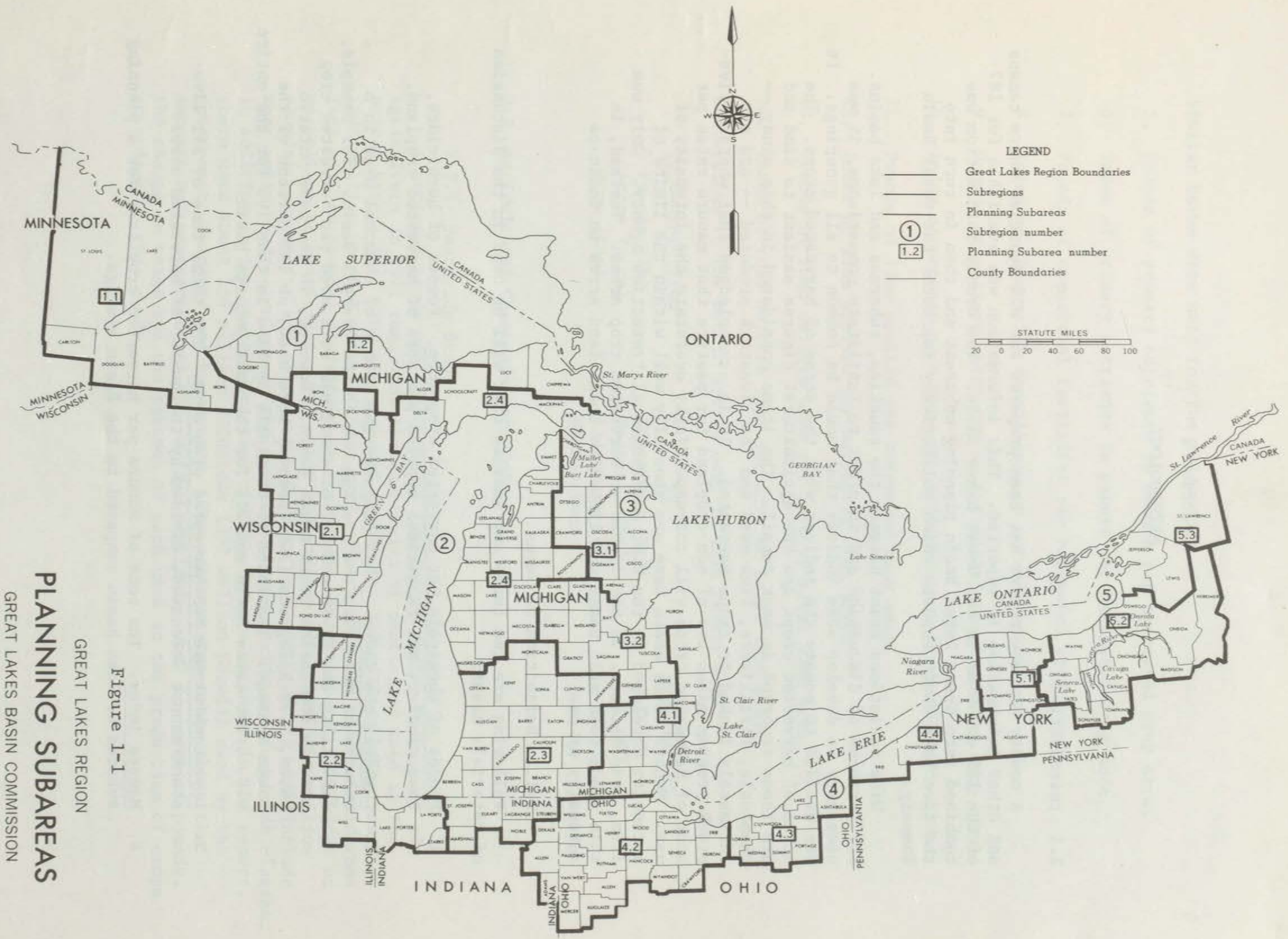
The amounts of lime applied were calculated based on actual use reports.

The salts (deicing compounds) applied to federal, state, county and municipal highways were calculated based on actual use reports.

### 1.3 Preparation and Review of the Report

The author, John Doneth, compiled the inventory of materials usage, developed the methodology and formulated the analysis. Office personnel from the Great Lakes Basin Commission at Ann Arbor, Michigan assisted in developing the format for the report, calculations, writing, typing of drafts and review. At various stages of report preparation, U.S. Task Group B representatives for the Pollution from Land Use Activities Reference Group, received and commented upon the study findings.

The accuracy of the inventory, the methodology, and the findings of the materials usage in the U.S. Great Lakes Basin are solely the responsibility of the author. The findings have not been reviewed by the International Joint Commission and do not necessarily have the concurrence of the Pollution from Land Use Activities Reference Group.



**PLANNING SUBAREAS**  
 GREAT LAKES BASIN COMMISSION

Figure 1-1

GREAT LAKES REGION

Section 2  
METHODOLOGY

2.1 Introduction

A county summary report has been prepared for all counties where census and other information is reported. This information was available for 187 of the 191 counties in the Great Lakes Basin. The county information was combined into Great Lakes Basin planning subareas and then in turn into the five Lake Basin reports which collectively represent the total Basin Summary.

Wide variations exist between the counties, subareas and lake basins. For purposes of discussion and in order to facilitate comparisons, it was necessary to develop some indices that would be common to all groupings. It was decided to equate the indices with the acres of harvested crops. The acres of harvested crops are the agricultural figures easiest to find and are those reported in most detail. The items considered in this study -- chemicals, fertilizers, lime used and the livestock produced -- are all intimately linked to crops harvested. It is acknowledged that where a livestock program makes use of non-cropland for pasture that manure rates per acre of harvested crops will correspondingly overstate the intensity of use. Manure rates shown here are generally well within the limits of intensity developed by the U.S. Environmental Protection Agency. Only one item, road deicers, is not linked to harvested crop areas. Instead, in this study road salt usage was linked to total land acres to indicate intensity of use.

2.1.1 Definition of Terms

Following are the terms and indices that will be used in the discussion of materials usage:

1. Pounds of chemicals per harvested crop acre. Pounds of herbicides, insecticides, and fungicides applied per acre of harvested cropland.
2. Chemical use index. This compares the pounds of chemical used in a subarea or area with the average use in the overall Basin. For example, 1.21 kilograms (2.66 pounds) of chemicals were used per harvested crop acre in the entire Great Lakes Basin. However, in the Lake Ontario basin, 1.38 kilograms (3.05 pounds) were used, or 115 percent of the Basin average. The index of chemicals applied is thus 100 for the entire U.S. Great Lakes Basin and 115 for the Lake Ontario basin.
3. Livestock manure per harvested crop acre. The total tons of all livestock manure defecated, divided by the number of harvested acres.
4. Manure index. The tons of manure per harvested crop acre for a planning subarea or lake basin compared to the Basin average.

Similar terms were used for the following:

5. Pounds of primary nutrients in manure per harvested crop acre.
6. Index of primary nutrients in manure per harvested crop acre.
7. Pounds of commercial fertilizer per harvested crop acre.
8. Index of commercial fertilizer use per harvested crop acre.
9. Pounds of primary nutrients in fertilizer per harvested crop acre.
10. Index of primary nutrients in fertilizer per harvested crop acre.
11. Pounds of lime applied per harvested crop acre.
12. Index of lime applied per harvested crop acre.
13. Pounds of road deicers used per acre of total land area.
14. Index of road deicers used per acre of total land area.

Conversions to the metric system used in this report were:

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Acres (acre)	Hectares (ha)	0.405
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 2.2 Agricultural Chemicals Methodology

### 2.2.1 Pesticide Study

A national study was conducted by the United States Department of Agriculture in 1971 regarding the quantities of pesticides used in the United States (1). The study showed a total of 376 million kilograms (828 million pounds) of pesticides used. There were 224 million kilograms (494 million pounds) classified as herbicides, insecticides, fungicides or miscellaneous pesticides. The other 152 million kilograms (334 million pounds) were sulfur and petroleum. Current pesticide reports will include most sulfur and petroleum in the herbicide, insecticide and fungicide classes. In addition to the above pesticides used by farmers as shown in the report, there were about 154 million kilograms (339 million pounds) used by the government, industry and homeowners. The accompanying table shows the amounts and percentages of the various pesticides used in terms of pounds, the change in usage and the percent of each used in the production of crops according to this study.

Table 2-1

QUANTITIES OF SELECTED PESTICIDES USED BY U.S. FARMERS, 1966 and 1971<sup>(1)</sup>

	1966		1971		
	Total Lbs (in millions)	Total Lbs (in millions)	Percent of Total	Percent Change From 1966	Percent of Total Used on Crops
Herbicides	116	228	27	+98	99
Insecticides	149	170	21	+14	91
Fungicides (excluding sulfur)	33	41	5	+27	95
Miscellaneous pesticides	56	55	7	-2	85
Sulfur	57	112	13	+96	100
Petroleum	92	222	27	+141	92
TOTAL	503	828	100	+65	92

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454

Herbicides are those pesticides used to destroy or inhibit plant growth, insecticides are those used to control insects, while fungicides are those pesticides used to control various fungi. The U.S.D.A. Study shows that herbicides represented 27 percent, insecticides 21 percent, and fungicides (excluding sulfur) 5 percent for a combined total of 53 percent of the total pesticides used by farmers in 1971.

#### 2.2.2 Chemical Usage in the Great Lakes Basin

Chemical usage in the 191 Great Lakes Basin counties shows substantial variances from the U.S.D.A. Study. Herbicides are widely used in the Basin in the production of two major crops, corn and soybeans, as well as in production of grains and special crops like field beans and sugar beets. Fungicides are used widely in the production of fruit, vegetable crops and potatoes, all of which are very important in certain Great Lakes Basin counties. Thus, the total Great Lakes Basin will show herbicides and fungicides in relatively greater use and insecticides in relatively lesser use than the U.S.D.A. Study.

The classification of chemicals used in the U.S. Great Lakes Basin study will be somewhat different from the U.S.D.A. Study. It is calculated, and this has been carefully checked with University pesticide authorities, that the combined herbicide, insecticide and fungicide usage as reported in this study for the Great Lakes Basin represents approximately two-thirds of all the chemicals used by farmers in the 191 counties. Some of the sulfur, petroleum and miscellaneous pesticides shown separately in the U.S.D.A. Study are included in the herbicide, insecticide and fungicide groups in this study.

Bacteriacides is a new group of chemicals, not mentioned in the Department of Agriculture study, but now coming into greater importance. These are largely included in the fungicides in this Basin study.

Most discussions and writings in regard to chemical usage by farmers emphasizes herbicides and insecticides. More is generally known about these. Fungicides and now the bacteriacides will be receiving increased attention. In the last decade herbicide usage has increased more rapidly than the other groups of pesticides. Herbicides have largely replaced more expensive mechanical and manual means for controlling weeds and are now used in the production of almost every major crop. Corn accounts for nearly one-half of all herbicide usage. Insecticides and fungicides assume relatively greater significance in the production of the fruit and vegetable crops.

Most published information showing quantities of pesticides used tend to be broad in scope. That is, the quantities shown are totals for a class of chemicals for a specific area or a certain crop. No county figures were available in the 1969 Census of Agriculture or elsewhere and rates per acre, if shown at all, are difficult to interpret or apply.

The situation is changing as increased attention is being focused on the use of chemicals, including their role in agriculture. One indication of this is the establishment of the National Pesticide Research Center, located at Michigan State University, with a staff of specialists. These specialists and those from other Michigan State University departments, as well as some from the Michigan Department of Agriculture, have provided substantial assistance in this study. The following were especially helpful:

Dr. Howard S. Potter - - - Botany & Plant Pathology

Dr. Alan L. Jones - - - Botany & Plant Pathology

Dr. Alan R. Putnam - - - Horticulture

Prof. Leyton V. Nelson - - - Crop & Soil Science

Dr. Wm. F. Meggitt - - - Crop & Soil Science

Dr. Donald C. Cress - - - Entomology

Dr. Donald C. Ramsdell - - - Botany & Plant Pathology

Dr. Robert F. Ruffel - - - Entomology

Mr. Frank E. Klackle - - - Cooperative Extension Service

Mr. Charles A. Hines - - - Michigan Department of Agriculture  
State Statistician in Charge

Specialists and pesticide authorities from the other Basin states also provided information. These combined efforts resulted in developing Table 2-2 showing the percent of acres treated, the rates applied per acre and the major chemicals used. The author, after consulting many reports and interviewing numerous authorities, concluded that the information had sufficient breath of relevancy to permit use in all of the 191 Basin counties. The acreages of the general farm crops were available, by county, from the reports



Table 2-2

CROPS, PERCENT OF ACRES TREATED WITH CHEMICALS,  
RATES AND KINDS OF CHEMICALS USED<sup>(1)</sup>

Crop(s)	H=Herbicide I=Insecticide F=Fungicide	Percent Acres Treated	Pounds Per Acre	Some of the Major Chemicals Used
Corn	H	90	2.75	Atrazine, Alachlor, 2,4-D, Butylate, MCPA
	I	20	1.50	Adrin, Bux, Chlordane, Carbofuron, Dyfonate
Grain (wheat, oats, barley, rye)	H	60	.50	2,4-D, MCPA, Dinoseb
	I	20	1.00	Carbaryl, Malathion
Soybeans	H	80	2.00	Trifluralin, Dinoseb, Fluorodifen, Chloramben, Linuron, Alachlor, Chlorbromuron
	I	5	1.00	Carbaryl, Malathion
Field beans	H	95	2.50	EPTC, Trifluralin, Chloramben, Fluorodifen
	I	5	1.00	Carbaryl, Malathion, Azinphosmethyl
Sugar Beets	H	95	3.00	Pyrazon, TCA, Phenmedipham, Dalapon, Endothal,
	I	5	1.00	Carbaryl, Patathion, Endosulfan
Hay or grass silage	H	30	1.00	EPTC, MCPA, 2,4-DB, Simazine
	I	25	1.00	Malathion, Methoxychlor, Diazinon, Carbaryl, Azinephosmethyl, Methyl Parathion, Imidan
Pastured cropland	H	25	1.00	2,4-D
	I	25	1.00	Carbaryl
Potatoes	H	90	3.00	Linuron, EPTC, Dinoseb
	I	100	11.50	Phorate, Disyston, Carbaryl, Malathion, Parathion, Azinphosmethyl
	F	100	15.00	Difolatan, Bravo, Dinoseb, Mancozek, Maneb, Zinc, (activated polyethylene thiram disulfide)
Apples	H	70	5.00	Simazine, Paraquat, Terbacil, Dichlobenil, 2,4-D
	I	80	11.75	Guthion, Imidan, Zolone, Sevin, Phosphamidon, Pluctran, Omite, Kelthane, Gardona
	F	80	32.00	Benlate, Cyrex, Captan, Difolatan, Polyram, Dikar, Maneb
Sweet cherries	H	75	4.00	Simazine, Paraquat, Dichlobenil
	I	81	5.00	Guthion, Sevin, Imidan, Parathion
	F	81	5.00	Difolatan, Captan, Dodine, Benomyl, Sulfur, Dichlone
Peaches	H	60	4.00	Simazine, Paraquat, Terbacil, Dichlobenil
	I	74	6.00	Guthion, Sevin, Parathion, Thiodan, Imidan
	F	74	6.00	Benomyl, Sulfur, Dichlone
Pears	H	40	5.00	Simazine, Paraquat, Dichlobenil, Diuron
	I	94	8.00	Guthion, Thiodan, Parathion, Imidan, Sevin, Perthane
	F	94	1.00	Ferbam, Streptomycin, Bordeaux (copper)
Prunes & plums	H	40	3.00	Simazine, Paraquat, Dichlobenil
	I	84	5.00	Guthion, Imidan, Parathion
	F	84	5.00	Benomyl, Dichlone, Sulfur
Strawberries	H	100	10.00	Dipenamid, DCPA, Chlorozuron
	I	90	12.50	Captan, Thiodan
	F	100	10.00	Captan, Benlate
Blueberries	H	85	5.00	Simazine, Diuron, Dichlobenil, Paraquat
	I	85	3.25	Guthion, Malathion
	F	100	41.00	Calcium, Cyanamid, DNOSBP
Grapes	H	80	4.00	Simazine, Paraquat, Diuron, Dichlobenil
	I	90	51.00	Folpet, Ferbam, Guthion, Captan, Parathion
	F	100	17.50	Ferbam, Phaltan
Sweet Corn	H	100	2.00	Atrazine, Alachlor, Butylate, Cyanazine, 2,4-D
	I	80	13.50	Parathion, Sevin, Lannate, Cardona, EPM, Dieldrin, Dylox
	F	100	.10	Thiram, Captan

<u>Crop(s)</u>	<u>H=Herbicide I=Insecticide F=Fungicide</u>	<u>Percent Acres Treated</u>	<u>Pounds Per Acre</u>	<u>Some of the Major Chemicals Used</u>
Cantaloupe	H	80	6.00	Naptalam, Bensulide
	I	50	2.00	Methoxychlor, Sevin, Thiodan, Phosphamidon
	F	90	10.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan
Asparagus	H	100	4.00	Sinazine, Diuron, Dalapon, 2,4-D
	I	90	3.00	Sevin, Dieldrin, Methoxychlor, Malathion
	F	50	5.00	Dithiocarbamates, Thiram, Caltan
Snap beans	H	90	2.00	EPTC, Trifluralin, Dinoseb, Chloramben
	I	50	6.00	Sevin, Patathion, Diazinon, Dimethoate
	F	75	5.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan
Cabbage	H	100	3.00	Trifluralin, Nitrofen, DCPA
	I	100	4.50	Guthion, Diazinon, Lannate, Monitor, Thiodan, BT
	F	75	7.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan
Carrots	H	100	2.00	Linuron, Nitrofen
	I	100	4.50	Sevin, Parathion, Diazinon
	F	75	10.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan
Cauliflower	H	100	3.00	Trifluralin, Nitrofen
	I	100	4.50	Guthion, Diazinon, Lannate, Monitor, Thiodan, BT
	F	75	7.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan
Cucumbers	H	100	6.00	Naptalam, Bensulide, Chloramben, Dinoseb
	I	50	3.00	Methoxychlor, Sevin, Dieldrin, Parathion
	F	50	10.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan
Lettuce	H	100	6.00	CDEC, Chlorpropham
	I	50	3.00	Sevin, Parathion, Lannate, Thiodan, BT
	F	75	8.00	Dithiocarbamates, Thiram, Captan
Onions	H	100	12.00	CDA, Chlorpropham, Nitrofen, Chloroxuron
	I	100	6.00	Dasanit, Dyfonate, Diazinon, Parathion, Matalhion
	F	75	10.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan
Green peppers	H	100	3.00	Trifluralin, Diphenamid
	I	100	35.00	Sevin, Dibrom, Systrox, Dimethoate, Diazinon
	F	50	10.00	Dithiocarbamates, Coppers, Thiram, Captan
Tomatoes	H	100	3.00	Trifluralin, Diphenamid, Chloramben
	I	25	1.50	Diazinon, Lannate, BT, Guthion, Thiodan
	F	90	10.00	Dithiocarbamates, Copper, Bravo
Celery	H	100	3.00	CDEC, Nitrofen, Prometryne, Linuron
	I	100	18.00	Sevin, Parathion, Systrox, Dibrom, Phosdrin
	F	100	16.00	Dithiocarbamates, Copper, Bravo, Dyrene
Green peas	H	100	2.00	Propachlor, Dinoseb, Trifluralin
	I	100	2.00	Parathion, Systrox, Dimethoate, Malathion, Diazinon
	F	50	6.00	Dithiocarbamates, Copper, Bravo
Watermelon	H	80	6.00	Naptalam, Bensulide
	I	50	2.00	Methoxychlor, Sevin, Thiodan, Phosphamidon
	F	50	10.00	Dithiocarbamates, Bravo, Coppers, Thiram, Captan

<sup>M</sup> Many chemical scientists believe that "carry over" in the use of herbicides and "persistence" in the use of insecticides may be largely eliminated in the next five years. This means that some chemicals now in common use will practically disappear and the new ones having low, if any, residues will be emerging.

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Acres (acre)	Hectare (ha)	0.405
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

of the State Statistical Reporting Services<sup>(2)</sup> except for pastured cropland for which the 1969 Census figures were the most recent available.<sup>(3)</sup> For vegetables, acreages were obtainable by state<sup>(4A)</sup> but not by county except in a few instances.<sup>(2A)</sup> For fruit crops, production figures were available by state but not by county; however, no acreage figures were shown except in a few isolated state reports.<sup>(2C,2D)</sup>

### 2.2.3 Chemical Application on Vegetables

The total acres of each of the important vegetable crops in each Basin state were multiplied by the chemical application rates per acre and then divided by the total acres of vegetables in that state obtaining a weighted chemical figure per acre for all vegetables in the state. Table 2-3 illustrates this procedure applied to Wisconsin.

Table 2-3

#### WISCONSIN VEGETABLE ACRES FOR 1972 AND CHEMICALS APPLIED

Vegetable	Total Acres	Total Pounds of Chemicals Applied at the Rates Shown in Rate Table 1/		
		Herbicides	Insecticides	Fungicides
Cantaloupe	500	2,400	500	4,500
Green Peas	122,200	244,400	244,400	366,600
Onions	1,500	18,000	9,000	11,250
Cucumbers	9,000	54,000	13,500	45,000
Cabbage	8,600	25,800	38,700	45,150
Sweet Corn	113,500	227,000	1,225,800	11,350
Tomatoes	1,000	3,000	375	9,000
Snap Beans	45,500	81,900	136,500	170,625
Carrots	2,300	4,600	20,125	17,250
Lettuce	900	5,400	17,100	5,400
TOTAL	305,000	666,500	1,706,000	686,125
Rate per acre, lbs	---	2.185	5.593	2.250

<sup>1/</sup> In determining the total amounts of herbicides, insecticides and fungicides used, the rates per acre shown in Table 2-2 have been applied only to those acres treated, not to total acres. The rates per acre shown in this table can be applied to total acres as these rates have been proportionately reduced.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.454
Acres (acre)	Hectare (ha)	0.405

The ratios of vegetable acreages in the Basin states in 1972 compared to 1969 were as follows: New York .85 [59,974 hectares (148,084 acres) in 1969, 51,150 hectares (126,300 acres) in 1972], Ohio .88, Indiana .82, Illinois .85, Minnesota 1.07, Wisconsin 1.00, Pennsylvania .72 and Michigan 1.07. The state ratio times the total vegetable acreage, shown in each county in the 1969 Census, times the composite vegetable chemical rates per acre for each state provides the pounds of herbicides, insecticides and fungicides respectively used on vegetables in each county in 1972.

#### 2.2.4 Chemical Application on Fruits

A similar procedure as used with vegetables was followed for fruit. The recent acres of fruit crops by county was available in Michigan and there was no fruit in the Minnesota counties. In the other states the fruit production figures, stated not in acres but in pounds or tons, were first converted to acres of fruit crops using average yields as the divisors. The chemical usage rates per acre were then applied to these acres to develop composite chemical use rate figures per acre by state for herbicides, insecticides and fungicides used on fruit.

The fruit acres in each county do not experience great fluctuations annually, like vegetable acreages. Therefore, it was assumed that fruit acres per county in 1972 were the same as in 1969. The composite chemical use rates per acre determined above were applied to the county fruit acreage to determine the total quantities of herbicides, insecticides and fungicides used in a county. The composite figures for the amounts of chemicals used per acre of bearing fruit are shown in Table 2-4.

Table 2-4

#### POUNDS OF CHEMICALS APPLIED PER ACRE BEARING FRUIT

<u>State</u>	<u>Herbicides</u>	<u>Insecticides</u>	<u>Fungicides</u>
New York	4.593	21.109	22.308
Pennsylvania	4.583	16.261	21.860
Illinois	4.800	10.400	25.800
Wisconsin	4.596	9.084	21.327
Ohio	4.663	18.444	25.156
Indiana	4.840	10.962	28.392

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Acres (acre)	Hectares (ha)	0.405

### 2.3 Animal Wastes Methodology

Farmers traditionally have regarded animal manures as useful by-products of livestock farming. Plentiful supplies of commercial fertilizers coupled with the higher costs of farm labor, power and machinery have raised serious economic questions in the minds of farmers as to manure value. An increasing number have been trying to determine how to dispose of their animal manure in the most efficient and least costly manner.

Society has become much more conscious of pollution and the entire area of waste disposal. Natural resource people first looked to the cities and communities with high population concentrations as the major sources for pollution. An increasing awareness has developed that pollution originating from so-called non-point sources may also be a major contributing factor.

One purpose of this study was to try and determine the tons of manure being produced by livestock--cattle, horses, hogs, sheep, chickens and turkeys--in the 191 counties comprising the Great Lakes Basin. For additional information, the amounts of primary nutrients--nitrogen, phosphorus and potash--contained in these manures were calculated.

Information from researchers showed the tons of manure defecated from a dairy cow of certain weight or a hog or a steer or a sheep of certain weights in a particular time span. The United States and State Census and Crop Reporting Publications provide information on livestock numbers.<sup>(10)(11)</sup> The development of manure factors for various kinds of livestock so that the livestock numbers shown in the Census-Crop Reporting Publications could be directly converted into total tons of manure defecated represents a major contribution of this study.

A careful review of the statistical information involved in this study indicated that if the 1969 Census information was used, conclusions in most instances would be somewhat inaccurate. Comparable information for 1973 or 1974 was not available for many series. The most complete and up-to-date information available for the Nation, states, and counties was for the year 1972. The figures for any one year are subject to limitations--sometimes overstating, sometimes understating. In most instances the statistics for 1972 represent reasonably well the situation today and were thus used in this study.

Animal and animal waste authorities do not share a unanimity of opinion on many items or factors relating to the manure from various classes of livestock. Assistance in this section was received from Dr. James B. Johnson, an Agricultural Economist with the Commodity Economic Division of the U.S.D.A. Economic Research Service.

Manure quantities for all kinds of livestock were first determined and then the quantities of primary nutrients--nitrogen, phosphorus and potash--in the manure were derived. This procedure was simplified some. The tons of animal manure for a livestock class were multiplied by the pounds of each primary nutrient in one ton of manure and then divided by 2000 to get the tons of primary nutrients. For example, the tons of swine manure times 10.0, 2.8 and 7.6 gave the pounds of nitrogen, phosphorus and potash respectively, which

divided by 2000 gave the tons of each in the swine manure. However, if the tons of swine manure were multiplied by 0.0050, 0.0014, and 0.0038 respectively the results represented the tons of nitrogen, phosphorus and potash in the manure. These multipliers are actually the tons of nitrogen, phosphorus and potash in one ton of swine manure. The procedure reduced the number of computations required.

Table 2-5 shows these multipliers for the three primary nutrients for each kind of livestock. These multipliers are not shown in the tables where methods of determining manure quantities for each type of livestock are illustrated. The pounds of primary nutrients are shown in these tables for the various livestock types in the following sections.

Table 2-5

MULTIPLIERS FOR PRIMARY NUTRIENTS

<u>Kind of Livestock</u>	<u>Tons of Manure Produced</u>	<u>X</u>	<u>Tons of Nutrient per Ton of Manure</u>	<u>=</u>	<u>Tons of Nutrients In Manure</u>
Swine	--	X	.0050	=	Tons of nitrogen
"	--	X	.0014	=	Tons of phosphorus
"	--	X	.0038	=	Tons of potash
Cattle	--	X	.0056	=	Tons of nitrogen
"	--	X	.0010	=	Tons of phosphorus
"	--	X	.0050	=	Tons of potash
Sheep	--	X	.0140	=	Tons of nitrogen
"	--	X	.0021	=	Tons of phosphorus
"	--	X	.0100	=	Tons of potash
Horses	--	X	.0069	=	Tons of nitrogen
"	--	X	.0010	=	Tons of phosphorus
"	--	X	.0060	=	Tons of potash
Poultry	--	X	.0156	=	Tons of nitrogen
"	--	X	.0140	=	Tons of phosphorus
"	--	X	.0035	=	Tons of potash

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	0.907
	Metric Tons	907.2

There are variables used in the following livestock tables that with more information or additional research may require adjustment. Some of these variables are livestock weights, days on feed, manure production as percent of body weight, and the rates of primary nutrients in the different livestock manures. In addition, changes in classifications or groupings for different kinds of livestock, and availability of better state and county livestock statistics may improve the results.

### 2.3.1 Cattle Manure Determination

The procedure outlined in Table 2-6 shows the methodology used to establish two cattle manure factors, one for the cows and heifers calved and the other for the heifers, steers, bulls and calves. The United States Department of Agriculture Statistical Yearbooks and the various State Crop Reporting Service Annual Reports show cattle numbers by states for these classes.

The cattle numbers for heifers, steers, bulls and calves were not available by county. Thus, as shown in Table 2-6 these were prorated to each county with 58 percent of the cattle other than cows and heifers allocated to heifers, steers and bulls over 230 kilograms (500 lbs) and 42 percent to calves under 230 kilograms (500 lbs). These same allocations were used for the counties in all the states involved in this study. Had separate factors for each state been developed, the manure factors for cows and heifers calved would have been identical for all eight states. The manure factors for heifers, steers, bulls and calves would have been practically identical for five states and about 2 to 3 percent higher in Ohio, Indiana and Illinois. Thus, the manure factors used for cattle are reasonable, and if anything slightly conservative.

Table 2-6

## STATISTICS AVAILABLE FOR DETERMINING MANURE FACTORS FOR CATTLE

<u>Item</u>	<u>Reference</u>	<u>State of Michigan</u>	<u>Ingham County, Michigan</u>
Statistics Available for all States and Counties			
Beef cows & heifers calved	(10A)	194,000	3,400
Milk cows & heifers calved	(10A)	430,000	11,800
Total cows & heifers calved	(10A)	624,000	15,200
Cattle other than cows & heifers	(10A)	952,000	25,400
All cattle & calves	(10A)	1,576,000	40,600
Statistics Available only on State Basis for Cattle other than Cows & Heifers			
Cattle other than cows & heifers		952,000	25,400
Over 500 lbs: Beef heifers	(10A)	44,000	County detailed figures not available. Obtained here by breaking down cattle other than cows in heifers in same pro- portion as for state.
Dairy heifers	(10A)	175,000	
Other heifers	(10A)	66,000	
Steers	(10A)	240,000	
Bulls	(10A)	24,000	
Total	(10A)	549,000	14,732
Percent		58%	58%
Calves under 500 lbs. - Total	(10A)	403,000	10,668
Percent		42%	42%

## Conversion of Cattle Numbers to Manure Quantities

Cows and heifers calved		624,000	15,200
Average weight per animal		1,200	1,200
Total lbs cows and heifers		748,800,000	18,240,000
Manure: lbs per day, 6% of body wt	(13)	.06	.06
Lbs. of manure per day		44,928,000	1,094,400
Tons of manure per day		22,464	547.2
Tons of manure per year		8,199,360	199,728
Tons per cow and heifer calved		13.14	13.14
Cattle over 500 lbs		549,000	14,732
Average weight per animal	(12)	800	800
Total lbs of cattle		439,200,000	11,785,600
Calves under 500 lbs		403,000	10,668
Average weight per animal	(12)	300	300
Total lbs of calves		120,900,000	3,200,400
Total lbs of other cattle		560,100,000	14,986,000
Manure: lbs per day, 6% of body wt	(13)	.06	.06
Lbs of manure per day		33,606,000	899,160
Tons of manure per day		16,803	449.58
Tons of manure per year		6,133,095	164,097
Cattle other than cows and heifers		952,000	25,400
Tons per animal		6.45	6.45

## Determining Quantities of Primary Nutrients in Wet Cattle Manure Defecated

Tons of wet manure defecated:	Cows:	8,199,360	199,728
	Other:	6,133,095	164,097
	Total:	14,332,455	363,825
Lbs. of nutrients per ton of wet cattle manure		<u>Tons of nutrients in manure</u>	
Nitrogen--N--11.2 lbs	N	80,262	2,037
Phosphorus--P <sub>2</sub> O <sub>5</sub> --2.0 lbs	P <sub>2</sub> O <sub>5</sub>	14,332	364
Potash--K <sub>2</sub> O--10.0 lbs	K <sub>2</sub> O	71,662	1,819

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907



### 2.3.2 Swine Manure Determination

The procedure outlined in Table 2-7 shows the methodology used to establish a manure factor for swine. Publications from the United States Department of Agriculture and the Statistical Reporting Services for the eight states, provided three swine figures by state and by county: hog and pig inventory on December 1, number of sows farrowing in the spring (December 1 through May 31) and the number of sows farrowing in the fall (June 1 through November 30). The swine manure factor was thus applied to the total number of litters farrowed in each county. The number of litters farrowed is the same as the number of sows farrowing.

Swine is the only livestock class for which different manure factors were determined for different states. The reason for this is that four states in the Basin had a significant in-shipment of feeder pigs in 1972: Minnesota, 154,000; Ohio, 336,000; Illinois, 362,000; and Indiana, 495,000. The four counties in Minnesota in the Basin have little swine so no adjustment was necessary. For Ohio, Illinois and Indiana adjustments were necessary. The manner in which these adjustments were handled is illustrated in the accompanying table where a manure factor for Lagrange County, Indiana, was determined. This county fed out 9,393 feeder pigs according to the calculations.

The highest manure factor was determined for Indiana-6.930 kilograms (7.636 tons) per litter. The average weight of hogs marketed in Indiana in 1972 was 115 kilograms (253 lbs), the highest for any Basin state, and the pigs weaned per litter averaged 7.4, as high as in any major swine state. These figures, coupled with the highest feeder pig in-shipment for any Basin state, resulted in the highest manure factor. The manure factor for Ohio was the highest at 7.450. The average weight of hogs marketed was only 104 kilograms (228 lbs), but pigs weaned per litter averaged 7.4 and feeder pig in-shipment was substantial. The manure factor for Illinois was 7.120, the lowest for any Basin state. This was surprising because the average weight of hogs marketed for Illinois was 113 kilograms (249 lbs) and the feeder pig in-shipment was substantial. However, the average number of pigs weaned per litter was just under 7.0, and thus Illinois was the only Basin state with average litter size under 7.0.

The swine manure factor for the other five states--Minnesota, Wisconsin, Michigan, New York and Pennsylvania--was calculated to be 6.560 kilograms (7.230 tons) per litter.

Table 2-7

## DETERMINING MANURE FACTOR FOR SWINE

<u>Item</u>	<u>Reference</u>	<u>Lagrange County, Indiana</u>
<u>Sows farrowing, 1972</u>	(11A)	18,369
Average number for year--50% of above		9,184
Days there		365
Total sow days		3,352,160
Average weight per sow-lbs.	(13)	425
Manure production: 6% of body weight per day	(13)	.06
Manure production: per sow per day--lbs		25.5
Manure production per year from sows--lbs		85,480,080
<hr/>		
<u>Pigs raised, 1972</u>		
Average number sows per yr. x 7.4 pigs per litter	(10B)	67,965
Days there		365
Total pig days		24,807,225
Average weight per market hog--lbs	(10C)	253
Average weight--birth to market weight--lbs		126
Manure production: 6% of body weight per day	(13)	.06
Manure production: per pig per day--lbs		7.56
Manure production per year from pigs raised--lbs		187,542.621
<hr/>		
<u>Feeder Pigs raised, 1972</u>		
Distribution of feeder pigs raised assumed to be same as for sows and pigs raised--for which county information is available.		
Sows farrowed, State of Indiana, 1972	(11A)	968,000
Sows farrowed, Lagrange County, 1972	(11A)	18,369
Percent farrowed in Lagrange County		.018976
Feeder pig in-shipment into Indiana in 1972	(10D)	495,000
Percent estimated fed out in Lagrange County		.018976
Number estimated fed out in Lagrange County, head		9393
Average weight per market hog--lbs	(10C)	253
Average weight--while on farm		127
Manure production: 6% of body weight per day	(13)	.06
Manure production: per hog per day--lbs		7.62
Head fed out in county		9393
Days on feed: estimated by swine specialists		105
Feeder hogs: days on feed		986,265
Manure production, per hog per day--lbs		7.62
Manure production from feeder pigs raised, lbs		7,515,339
<hr/>		
<u>Summary - 1972</u>		
Manure production from sows--lbs		85,480,080
Manure production from pigs raised--lbs		187,542,621
Manure production from feeders raised--lbs		7,515,339
Total manure production from all swine--lbs		280,538,040
Total manure production from all swine--tons		140,269
Litters farrowed in Lagrange County, 1972		18,369
Manure production--tons per litter farrowed		7.636

## Determining Quantities of Primary Nutrients in Wet Swine Manure Defecated

Tons of wet manure defecated	140,269
<u>Lbs. of nutrients per ton of wet swine manure</u>	<u>Tons of nutrients in manure</u>
Nitrogen--N--10.0 lbs	701
Phosphorus--P <sub>2</sub> O <sub>5</sub> --2.8 lbs	196
Potash--K <sub>2</sub> O--7.6 lbs	533

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Metric Tons	0.907

### 2.3.3 Sheep Manure Determination

Sheep do not represent a major type of livestock in the Great Lakes Basin. However, the process of determining a manure factor for sheep is no less complicated than for other livestock types. The procedure outlined in Table 2-9 shows the methodology used. The Statistical Reporting Services for each of the eight states showed a sheep and lamb inventory as of January 1 by counties. This was the only county figure available; thus, the sheep manure factor had to be developed from this figure. The United States Department of Agriculture provides a number of statistical series for sheep by states. The sheep and lamb inventory is a combination of stock sheep and sheep on feed. The lamb crop for each state can be computed by multiplying the percent of lambs saved times the ewes one year old and over. The lamb crop for each county can then be computed.

A different manure factor could have been determined for each state. The figures in Table 2-8 show substantial state variations in the percents of breeding stock and lamb crops in respective sheep and lamb inventories. Had this been done, the sheep manure factor for Ohio, the major sheep state in the Basin, would have been 1.52 kilograms (1.68 tons) of manure per sheep and lamb inventory animal instead of the 1.46 kilograms (1.61 tons), the manure factor used for sheep throughout the Basin.

Table 2-8

#### PERCENT OF BREEDING STOCK IN SHEEP AND LAMB INVENTORY

State	Sheep & Lamb Inventory Thousands	Breeding Stock		Lamb Crop	
		Number Thousands	Percent of Inventory	Number Thousands	Percent of Inventory
Ohio	627	519	83	479	76
Indiana	235	210	89	191	81
Illinois	275	230	84	198	72
Minnesota	437	330	76	332	76
Wisconsin	123	108	88	108	88
Michigan	221	176	80	154	70
New York	98	85	87	72	73
Pennsylvania	144	144	100	111	77

Michigan had the lowest percent figures for both breeding stock and lambs, thus the manure factor of 1.61 determined for Michigan and used for the other seven states was conservative--as low as any state would have factored out. On the other hand, the actual 1.68 figure for Ohio was only 4 percent higher than this, and no state would have run more than 5 percent higher.

Three states had more than 25,000 head of lambs shipped in to be fed out. These were not included in the determinants. Ohio had 36,000 head shipped in but this was not significant considering that the total breeding stock and lamb crop was about a million head. Minnesota had 147,000 head shipped in but these were not fed out in the Basin counties. Illinois shipped in 100,000 head. Had these been included the factor for Illinois would have been 1.540 kilograms (1.70 tons) per animal or about 5 percent higher than 1.61. However, there was no way to account for the location of where these were fed out in Illinois, their length of time there, or their weights.

Table 2-9

## DETERMINING MANURE FACTOR FOR SHEEP

<u>Item</u>	<u>Reference</u>	<u>State of Michigan</u>	<u>Ingham County, Michigan</u>
Sheep and lamb inventory--end of 1972	(10E)	221,000	9,100
<u>Breeding stock sheep</u>	(11B)	176,000	(computed) 7,280
Percent breeding stock is of inventory, %		80	80
Days breeding stock there		365	365
Breeding stock sheep days (stock sheep x 365)		64,240,000	2,657,200
Average weight of breeding stock, lbs	(16)	140	140
Manure per day per animal, % of body weight	(17)	.07	.07
Manure per animal per day, lbs		9.8	9.8
Manure from breeding stock, lbs		629,552,000	26,040,560
Manure from breeding stock, tons		314,776	13,020
Ewes, 1 year and over	(10F)	144,000	(computed) 5,953
Lambs saved as percent of ewes	(10G)	107	107
<u>Lamb crop saved</u>		154,080	(computed) 6,370
Percent lamb number is of inventory, %		70	70
Number of days average lamb on feed	(16)	150	150
Number of lamb days on feed		23,112,000	955,500
Weight of lamb sold, lbs.	(16)	100	100
Average weight during 150 day feeding period, lbs		50	50
Manure per lamb per day, % of body weight	(17)	.07	.07
Manure per lamb per day, lbs		3.5	3.5
Manure from lambs, lbs		80,892,000	3,342,250
Manure from lambs, tons		40,446	1,672
Manure from breeding stock, tons		314,776	13,020
Manure from lambs, tons		40,446	1,672
Manure from sheep and lambs, tons		355,222	14,694
Manure per sheep & lamb on inventory, tons		1.61	1.61
<u>Lbs of nutrients per ton wet sheep manure</u>	(14)	<u>Tons of nutrients in manure</u>	
Nitrogen--N-----28.0 lbs		4,973	206
Phosphorus--P <sub>2</sub> O <sub>5</sub> -----4.2 lbs		746	31
Potash--K <sub>2</sub> O-----20.0 lbs		3,552	147

To Convert From

Pounds (lb)

Tons (ton)

To

Kilograms (kg)

Kilograms (kg)

Metric Tons

Multiply By

0.454

907.2

0.907

#### 2.3.4 Horse Manure Determination

The process of determining manure quantities for horses was difficult because information regarding numbers of horses was extremely limited. The 1964 U.S. Agricultural Census did not show horse numbers. The figures in the 1969 Census included only those used on farms, thus numbers were substantially understated. The manure produced per horse is roughly comparable to that produced per cow. With each animal producing this quantity, the significance of having the horse numbers as accurate as possible is evident.

The horse numbers used were obtained in different ways for the respective states, and in a few instances different approaches were used for counties within a state.

Michigan: The Michigan State Crop Reporting Service in cooperation with the Horse Specialist at Michigan State University conducted a statewide equine survey in 1971 showing numbers by county. This survey included all horses both on and off the farm. The study was updated in 1972. This is probably the most complete and accurate information available, not only to show the location of all horses within the state but also to show the trend in horse numbers generally. The 1972 state total of all horses numbered 205,302 compared to 53,869 head of horses on farms as shown in the 1969 Census for Michigan. This is an increase of 3.81 times. County increases varied around this figure.

Illinois: The 1969 Census showed 72,501 horses on farms in Illinois with 7,982 in the six Basin counties. The Horse Extension Specialist at the University of Illinois estimates that there are now between 250,000 - 500,000 horses kept for all purposes in the state. He estimated that perhaps half of these might be in the six Basin counties. If this were true, it would mean that there are 30-60 times as many total horses now as the census figures showed on farms for 1969 in these counties. For this report, a mid-figure of 375,000 (halfway between 250,000 and 500,000) was used as the number of all horses for the state. These were then allocated to the respective six Basin counties at the same ratio to the state total as shown in the 1969 Census. This meant that 41,268 horses were assigned to these counties or 5.17 times as many as in the 1969 Census.

Ohio: The Horse Extension Specialist in Ohio conducted an equine survey for the state in 1971. The horse numbers shown for the Ohio counties are from this survey as of July, 1971. They are believed to be understated by at least 10 percent or more in this report.

Wisconsin: Dr. Ray Antoniewicz handles the horse projects for the University of Wisconsin Cooperative Extension and provided the estimates of horse numbers as shown for the Wisconsin counties.

Indiana: The 1972 Indiana Crop and Livestock Annual Summary showed the number of horses and ponies by county in 1972 assessed for taxation. The number of horses and ponies shown in this 1972 report for Starke County, for example, was 51. The number shown in the 1969 Census was 301. It was believed that

using the trend in horse numbers based on the Michigan study would better represent the Indiana situation than using the Indiana annual summary. The 1972 figures used for Indiana counties were those shown in the 1969 Census times 3.81 (based on the overall state increase for Michigan).

New York: Information for 12 counties was available through Dr. S. W. Sabin, Associate Professor of Animal Science Extension at Cornell, from information developed by County 4-H Extension Agents. These figures were used in this study. There were sufficient variations in the responses to suggest that it might be more reliable to use the Michigan study as a basis for the other thirteen New York counties where information was not provided by Extension Agents.

Pennsylvania: No information was available as to horse numbers in Erie County--the only Great Lakes Basin county in Pennsylvania. The Michigan study was used as the basis for determining the 1972 horse numbers in Erie County.

The procedure outlined in Table 2-10 shows the methodology used to determine a manure factor for horses.

Table 2-10

## DETERMINING MANURE FACTOR FOR EQUINE (HORSES AND PONIES)

<u>Item</u>	<u>Reference</u>	<u>State of Michigan</u>	<u>Ingham County Michigan</u>
Horses and ponies, 1972	(18)	205,302	5,028
Days there per year		365	365
Total horse days		74,935,230	1,835,220
Average weight per animal, lbs	(19)	1,000	1,000
Total horse lbs per year		74,935,230,000	1,835,220,000
Manure/horse/day: 7% of body wt	(19)	.07	.07
Manure, total lbs produced		5,245,466,100	128,465,400
Manure, total tons produced		2,622,733	64,233
Manure, tons per animal		12.78	12.78

## Determining Quantities of Primary Nutrients in Horse Manure

Tons of wet manure defecated		2,622,733	64,233
<u>Lbs. of nutrients per ton of horse manure (14)</u>		<u>Tons of nutrients in manure</u>	
Nitrogen--N-----13.8 lbs		18,097	443
Phosphorus--P <sub>2</sub> O <sub>5</sub> -----2.0 lbs		2,623	64
Potash--K <sub>2</sub> O-----12.0 lbs		15,736	385

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 2.3.5 Chicken Manure Determination

The procedure outlined in Table 2-11 shows the methodology used to establish a manure factor for chickens (hens, pullets, roasters, broilers). The U.S. Department of Agriculture and the Statistical Reporting Services for the eight states provided figures by state and by county showing the number of hens and pullets of laying age on farms. There were a number of other poultry series available by state but not by county. The manure factor for chickens was thus equated with the number of hens and pullets in this study.

There were sizable industries in some of the Basin states involving poultry meat production. Pennsylvania was by far the largest with 60 million broilers a year. However, only one Pennsylvania county is in the Basin. Ohio, Indiana,



Wisconsin and Minnesota each produced 11 to 14 million broilers a year and New York nearly two million. Only Illinois produced less than one-half million a year. While these numbers were substantial, they did not represent a major factor in overall chicken manure production because of the small amount produced per broiler. Had broiler numbers been included for the heavier Basin broiler states, the manure production shown at 37.6 kilograms (82.90 lbs) per bird would have increased no more than one-tenth pound, raising manure production per bird to 37.7 kilograms (83 lbs.). This does not represent a sufficient amount in terms of either manure or primary nutrient quantities to justify calculating different factors for each of the states.

Determining Quantities of Primary Nutrients in Poultry Manure

State	Total broilers (millions)	Total manure (kg)	Nutrient content (kg/ton)	
			Nitrogen	Phosphorus
Wisconsin	11.0	414,000	13.5	2.0
Minnesota	14.0	526,800	13.5	2.0
New York	1.8	67,680	13.5	2.0
Illinois	0.5	18,800	13.5	2.0
<b>Total</b>	<b>27.3</b>	<b>1,027,280</b>	<b>13.5</b>	<b>2.0</b>

The procedure outlined in Table 2-11 shows the methodology used to establish a manure factor for chicken (broiler, layer, turkey, etc.) manure. The U.S. Department of Agriculture and the National Extension Service for the eight states provided figures by state and by county for the number of hens and chicks of laying age on farms. There was a number of other poultry flocks available by state but not by county. The manure factor for chickens was then computed with the number of hens and chicks in this study.

There were similar industries in some of the South states including poultry meat production. Pennsylvania was by far the largest with 60 million broilers a year. However, only one Pennsylvania county is in the Basin. Ohio, Indiana,

Table 2-11

## DETERMINING MANURE FACTOR FOR CHICKENS

<u>Item</u>	<u>References</u>	<u>State of Michigan</u>
<u>Hens and pullets, 1972</u>	(10H)	6,621,000
Days there per year		365
Hen and pullet, days		2,416,665,000
Average weight per hen, lbs	(20)	4.5
Manure production: percent of body wt	(12)	.05
Manure production: lbs per bird per day		.225
Manure production: total lbs produced		543,749,625
Manure production: total tons produced		271,875
<u>Broilers and roasters, 1972</u>	(10H)	566,000
Days to raise		70
Broiler and roaster, days		39,620,000
Average wt per bird marketed, lbs	(20)	5.20
Average wt per bird during feeding period: 1/2 of above		2.60
Manure production: percent of body wt	(12)	.05
Manure production: lbs per bird per day		.13
Manure production: total lbs produced		5,150,600
Manure production: total tons produced		2,575
Manure: hens and pullets, total--lbs		543,749,625
Manure: broilers and roasters, total--lbs		5,150,600
Manure: total production--lbs		548,900,225
Manure: total production--tons		274,450
Manure: lbs per hen and pullet		82.90

## Determining Quantities of Primary Nutrients in Chicken Manure

Manure: total production--tons		274,450
<u>Lbs of nutrients per ton of chicken manure</u>	(14)	<u>Tons of nutrients in manure</u>
Nitrogen--N-----31.2 lbs		4,281
Phosphorus--P <sub>2</sub> O <sub>5</sub> -----8.0 lbs		1,098
Potash--K <sub>2</sub> O-----7.0		961

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

### 2.3.6. Turkey Manure Determination

The procedure outlined in Table 2-12 shows the methodology used to establish manure factors for turkey hens and for turkeys raised. The United States Department of Agriculture and the State Statistical Reporting Services provided numbers on these two series by state but not by county.

Letters were written to the Poultry Science Departments and the Agricultural Economics Departments at the land grant universities in each of the eight states requesting numbers of turkey hens and turkeys raised, especially by county. The following replied:

Lee F. Schraeder-----Purdue University, Indiana  
S. W. Sabin-----Cornell University, New York  
Melvin L. Hamre-----University of Minnesota, Minnesota  
Olan D. Forker-----Cornell University, New York  
Ralph L. Baker-----Ohio State University, Ohio  
Henry Larzelere-----Michigan State University, Michigan  
Hugh S. Johnson-----University of Illinois, Illinois  
Louis C. Arrington---University of Wisconsin, Wisconsin

Some showed a breakdown between turkey hens and turkeys raised. Others provided just one figure. A careful review of the statistics received, coupled with consultation with Michigan State University staff members, suggested using the following approach. If the authorities assigned no turkeys to a county we assigned no turkeys; if they showed a breakdown we used the breakdown provided; if they provided just one figure for the number of turkeys we used this figure for turkeys raised and added an additional ten percent of this number for turkey hens.

The manure from turkeys was not an important item for the Basin counties in general. It was an important factor in certain counties. For example, it was estimated that in Michigan about 45 percent of all turkeys were raised in Ottawa County, 25 percent or more in Allegan, about 10 percent in each of Barry and Antrim with the remaining 10 percent in all the other counties.

The manure production from turkeys was assumed to be 5 percent of body weight, the same as used for chickens. The weight per turkey raised, according to the statistics, showed variations in pounds per bird between the states. This difference did not appear to be sufficiently significant to be recognized in this report. All turkeys regardless of where raised were considered to be 10.9 kilograms (23.9 lbs) in weight.

Table 2-12

## DETERMINING MANURE FACTOR FOR TURKEYS

<u>Item</u>	<u>Reference</u>	<u>State of Michigan</u>
Turkey breeder hens, 1972	(10I)	90,000
Turkey hen days, per bird		365
Turkey hen days, total		32,850,000
Weight of breeding hen, average lbs	(20)	20
Manure production per hen: 5% of body wt	(21)	.05
Manure production per hen per day, lbs		1.00
Manure production, total lbs produced		32,850,000
Manure production, total tons produced		16,625
Manure production, lbs per hen per year		365
<u>Turkeys raised, number</u>	(10J)	1,089,000
Days to raise and finish		150
Turkeys raised, days		163,350,000
Weight per turkey raised, average lbs	(10J)	23.9
Average weight: hatching to market, lbs		11.95
Turkeys raised, total lbs		1,952,032,500
Manure production, % of body weight	(21)	.05
Manure production, tons per year		48,801
Manure production, lbs per bird per year		89.63
Manure production, total tons		65,226
<u>Lbs of nutrients per ton of turkey manure</u>	(21)	<u>Tons of nutrients in manure</u>
Nitrogen--N-----31.2 lbs		1,081
Phosphorus--P <sub>2</sub> O <sub>5</sub> -----8.0 lbs		261
Potash--K <sub>2</sub> O-----7.0 lbs		228

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 2.4 Commercial Fertilizer Methodology

Commercial fertilizer consumption, as used in this study, represents all commercial fertilizer materials and products sold or shipped for farm and non-farm use as fertilizer. Materials used in the manufacture of registered mixes or for uses other than fertilizer are excluded.

There were 2.49 million metric tons (2,744,528 tons) of commercial fertilizer or about 7 percent of the United States tonnage consumed in the 191 Great Lakes Basin counties in 1972<sup>(22)</sup>. This study showed the relative amounts that were solid and liquid. It also showed the amounts of primary nutrients--namely, nitrogen (N), phosphorus ( $P_2O_5$ ) and potash ( $K_2O$ )-- in the fertilizer. The amounts of micronutrients sold for fertilizer in the Basin counties were not known. If the percentage relative to national consumption was the same as for all commercial fertilizers, the following estimates would have been reasonable--copper - 50 tons; iron - 100 tons; manganese - 800 tons; zinc - 1300 tons; and molybdenum - 10 tons. (One ton = 0.907 metric ton)

The United States Department of Agriculture and the eight State Statistical Reporting Service Annual Summaries provided fertilizer statistics nationally and for a number of series by state. For five states -- Illinois, Indiana, Ohio, Pennsylvania and Minnesota -- county fertilizer information was available. For the other three states -- Wisconsin, New York and Michigan -- the 1972 county information had to be calculated.

Illinois: Two fertilizer tonnage reports were published--one showing information for January - June, 1972 and the other for July - December, 1972. These showed total tons, tons liquid and tons of respective primary nutrients by county.<sup>(23)</sup>

Indiana: Two fertilizer tonnage reports were published, one showing ratios and grades by county for the spring and the other for the fall of 1972. These reports showed total tons, tons liquid and tons of respective primary nutrients by county.<sup>(24)</sup>

Ohio: An annual fertilizer sales report was published showing total tons of fertilizer used by county as well as the tons liquid and the tons of respective primary nutrients.<sup>(25)</sup>

Pennsylvania: A report was available showing total tons of fertilizer used in Erie County in 1972 as well as the tons of respective primary nutrients. The percent liquid was calculated from the Pennsylvania State Summary provided by the Tennessee Valley Authority.

Minnesota: Information on total tons was provided from the Minnesota Statistical Reporting Service. The percent liquid and the amounts of primary nutrients were provided by the United States Department of Agriculture and the Tennessee Valley Authority.

Wisconsin, New York, Michigan: Fertilizer usage by county had to be calculated for these three states. The procedure for calculating the information was important because 73 percent of all Great Lakes Basin counties are located in these states.

The fertilizer used on Class I-V farms in 1969 by county was available for all states in the United States Agricultural Census. The fertilizer used in 1972 by state was available from both the United States Department of Agriculture and the Tennessee Valley Authority. The manner of distribution - whether bagged, bulk or liquid - as well as the amounts of primary nutrients in the fertilizer were also available by state.

This made it possible to calculate the tons of fertilizer used, the amounts liquid and the amounts of primary nutrients by county in the three Basin states where county information was not available. The figures for these three states are shown in Table 2-13.

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Table 2-13

## TONS OF FERTILIZER USED AND TONS OF PRIMARY NUTRIENTS, 1972

<u>Item</u>	<u>Reference</u>	<u>Wisconsin</u>		<u>New York</u>		<u>Michigan</u>	
On I-V Farms, 1969, tons	(27)	606,648		391,436		595,179	
On All Farms, 1972, tons	(28)	942,189		624,551		942,565	
		<u>Tons</u>	<u>Percent</u>	<u>Tons</u>	<u>Percent</u>	<u>Tons</u>	<u>Percent</u>
Bagged -----	(29)	260000	28	442000	71	302000	32
Bulk -----	(29)	501000	53	137000	22	488000	52
Liquid -----	(29)	181000	19	45000	7	152000	16
Tons used in 1972/ton in 1969		1.55		1.60		1.60	
<u>Primary nutrients:</u>							
Percent of total fertilizer		52		39		50	
Primary nutrients, tons	(28)	492,583		245,741		467,521	
		<u>Tons</u>	<u>Percent</u>	<u>Tons</u>	<u>Percent</u>	<u>Tons</u>	<u>Percent</u>
Nitrogen - N	(28)	129,089	26	77,197	31	153,744	33
Phosphorus - P <sub>2</sub> O <sub>5</sub>	(28)	135,847	28	90,468	37	148,185	22
Potash - K <sub>2</sub> O	(28)	227,647	46	78,076	32	165,592	35

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Tons (ton)	Kilograms (kg)	907.2
	Metric tons	0.907

## 2.5 Lime Methodology

The amount of agricultural limestone used in the United States in 1972 was 21.4 million metric tons (23.6 million tons).<sup>(30)</sup> Thirty-three percent of this was used in the eight Great Lakes Basin states. The actual tonnage used in the 191 Basin counties was less than this, of course. The National Limestone Institute, with a possible biased view, states that the State Agricultural Extension Services and the United States Department of Agriculture Soil Conservation Service list 80.3 million metric tons (88.5 million tons) as the annual amount actually needed on our land. This represents a quantity 375 percent of our present annual use.

It would seem that lime usage information might be readily available but this is not the situation. No meaningful limestone information is available from either the United State Department of Agriculture agricultural statistics reports or from most of the State Statistical Reporting Services. The United States Department of Agriculture Agricultural Stabilization and Conservation offices provided information showing the tons that the government cost-shared only but not the total tons applied.

Ohio: This state was an exception. Information was available showing the total tons of liming materials distributed by county for each of the three years 1971, 1972 and 1973<sup>(31)</sup>. These figures are shown for each of the Ohio counties in the Ohio county inventory tables. Table 2-14 shows the tonnage grades for the liming materials used in Ohio for 3 years.



Table 2-14

## LIME TONNAGE DISTRIBUTED IN OHIO

<u>Grade</u>	<u>1971</u>		<u>1972</u>		<u>1974</u>	
	<u>Tons</u>	<u>Percent</u>	<u>Tons</u>	<u>Percent</u>	<u>Tons</u>	<u>Percent</u>
Screenings	36,661	3	47,607	5	37,575	3
Meal	55,452	4	49,104	5	72,713	5
Ground	894,859	65	618,695	61	800,010	62
Pulverized	372,977	27	272,058	27	361,232	28
Superfine	8,793	.1	13,217	1	10,482	1
Hydrate	4,298	0	6,345	1	7,480	1
TOTAL	1,373,040	100	1,007,026	100	1,289,492	100

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

Michigan: Liming material applied by county was obtained from the Michigan Agricultural Stabilization and Conservation Office<sup>(32)</sup>. The tons cost-shared and not cost-shared were available by county for the one year only, namely, 1972. Table 2-15 shows the kinds of liming materials applied. Ground limestone represented 82 percent of the total, marl 16 percent and the other forms 2 percent

Table 2-15

## LIMING MATERIALS APPLIED IN MICHIGAN, 1972

Kind	Tons of Limestone Equivalent		
	Cost-Shared	Not Cost-Shared	Total
Ground Limestone	202,619	140,011	342,630
Marl	39,574	26,849	66,423
Other:			
Calcareous earth	0	750	750
Papermill refuse	1,152	5	1,157
Carbite refuse lime (CHL)	649	1,617	2,266
Carbite hydrated lime (CH)	852	272	1,124
Sugar refuse lime	515	496	1,011
Other Total	3,168	3,140	6,308
TOTAL	245,361	170,000	415,361
Percent	59%	41%	100%

To Convert From	To	Multiply By
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

Minnesota and Pennsylvania: S. N. Peterson, Minnesota, and Kenneth Boger, Pennsylvania, representing their Agricultural Stabilization and Conservation Service offices provided the lime tonnages used in 1972 for these states.

Wisconsin, Indiana, Illinois, New York: The lime tonnages were shown in the 1969 county census reports for all the Basin counties. It was necessary to use this information in these four states only. The county tonnages were multiplied by a ratio figure for each state representing the state tonnages in 1972 compared to the census tonnages in 1969. For example, the Illinois State Tonnage for 1972 was 3.0 million metric tons (3.3 million tons) compared to 2.5 million metric tons (2.8 million tons) in the 1969 Census--giving a ratio of 1.177. Similar factors for other states were: Wisconsin--1.167; New York--1.080; and Indiana--1.100. William F. Johnson, Indiana, and Raymond D. Lett, Illinois State Agricultural Stabilization and Conservation offices, provided the cost-shared lime tons for their Basin counties.

## 2.6 Road Deicing Salts Methodology

Information showing the quantities of salts used for road deicing on a county basis is difficult to find or to arrive at. The salt companies would not provide any information as to the quantities of salts used. The Road and Highway Library publications provided no recent statistics<sup>(33)</sup>. The County Road Association could provide no help or figures. Information and general guidance on how to proceed with this study was received from staff people in the Michigan State Highway Department.

The following persons in the State Highway or State Departments of Transportation provided a tabulation of salts applied to the Basin counties in their respective states:

Louis G. O'Brien	-	Pennsylvania
George M. Briggs	-	New York
Ronald Zook	-	Ohio
P. F. Gibson	-	Indiana
Edward J. Kehl	-	Illinois
G. T. Landness	-	Wisconsin
Frank W. Kuhfold	-	Minnesota

Each letter, however, contained a statement something like this, "This tabulation is for salt applied to state highways only. Salt applied to county and town or municipal highways is not included as this information is not available to this office."

The Michigan Highway Department provided information from their files showing the tons of road deicing salts purchased through the Michigan State Highway Department and used in each of the 83 Michigan counties for year 1972-73. It was a consensus opinion on the part of staff people contacted there that this tonnage represented 100 percent of the salts used by the State on Federal and State highways in each county, about half of that used by the counties on Federal and State highways in their counties and about thirty percent of that used by municipalities within the counties. For example, the total salts purchased through the Michigan State Highway Department for 1972-73 (season usually December 1 through April) were: State purchases--238.8 metric tons (263,251 tons), County purchases--80.3 metric tons (88,494 tons) and Municipal purchases--33.7 metric tons (37,164 tons) for a total of 352.8 metric tons (388,909 tons). When the County purchases were doubled and the Municipal purchases multiplied by 3-1/3, it gave a total of 511.7 metric tons (564,119 tons). The Michigan Highway officials felt that this represented the most likely tonnage applied.

It was possible to obtain county information for Michigan for 3 years, 1970-71, 1971-72, and 1972-73. It was also possible to obtain the "Tons of Salts Applied Per 'E' miles of Highway" for each of these 3 years. An "E" mile of highway is equivalent to a mile of two-lane highway.

Information was provided by each of the other Basin states as to the quantities of salts applied to state highways only by county.

The same procedure as used in Michigan to determine the total salt tons applied per county was used in the other Basin states. It is believed that the results represented to a reasonable degree the road salts applied in the Great Lakes Basin. The index developed to show the amount of road salts applied in each area or subarea, as compared to the U.S. Great Lakes Basin as a whole, used the amount per acre for the total land acres and not for the harvested acres.

## Section 3

### MATERIALS USAGE IN THE GREAT LAKES BASIN

#### 3.1 Study Area

The Great Lakes Basin representing the United States side encompasses 191 counties located in eight states. The Agricultural Census for the United States either does not provide the data or combines the information so that census statistics for four counties in the Basin are not reported as such. These counties are: Keweenaw and Crawford in Michigan, Cook in Minnesota and Menominee in Wisconsin. Thus, the information presented in this report is based on 187 counties, rather than the total 191 counties. The Basin is divided into five major areas, one for each of the five Great Lakes. Those counties bordering on or draining into Lake Superior are in Plan Area 1.0; similarly, Lake Michigan counties are in 2.0; Lake Huron 3.0; Lake Erie 4.0, and those bordering or draining into Lake Ontario area 5.0.

Each Lake Basin Plan Area is further divided into Planning Subareas as follows: Area 1.0 is divided into Subarea 1.1 and Subarea 1.2; Area 2.0 into four Subareas: 2.1, 2.2, and 2.3 and 2.4; Area 3.0 into two Subareas: 3.1 and 3.2; Area 4.0 into four Subareas: 4.1, 4.2, 4.3 and 4.4; and Area 5.0 into three Subareas: 5.1, 5.2, and 5.3. This means the Great Lakes Basin is divided into 5 major Plan Areas which in turn are subdivided into 15 Planning Subareas. The Subareas are then represented by the 191 counties.

##### 3.1.1 Agricultural Characteristics

Agriculture within the Basin is widely varied. The land area in the Great Lakes Basin (187 counties) encompasses over 33 million total hectares (82 million acres), with 13 million hectares (33 million acres) in farmland, 10 million hectares (24 million acres) in farm cropland and 7 million hectares (17 million acres) in harvested farm cropland. This vast and varied expanse of land begins with the cut-over and forest lands on the Canadian border at the west end of Lake Superior. It extends south through Wisconsin dairy land into the cornbelt then northeast including all of Michigan and east through Indiana and Ohio. Finally, it hugs the Lakes continuing through the dairy, fruit and vegetable regions of Pennsylvania and New York, ending at the Adirondacks. With this type of situation, generalizations are hard to provide, and summaries and comparisons are very difficult to make representative and meaningful. The trends and projections provided could have been improved if time and resources had permitted greater input on the part of the respective states people and on the part of competent and knowledgeable personnel at the local and county levels.

### 3.1.2 Materials Usage

An inventory and analysis on materials usage was made based on personal interviews, correspondence and statistics as available from agricultural statistics, census information, state highway departments, universities, private companies, and state and federal agencies.<sup>(1)</sup> Background for the analysis is presented in the methodology section. Tables 3-1 to 3-5 summarize the findings of this inventory and analysis. Detailed statistics are shown on Table 3-6.

#### 3.1.2.1 Agricultural Chemicals

Higher labor and machinery costs have been important factors in encouraging farmers to increase the use of chemicals in the eradication or control of weeds, insects and diseases. This use of chemicals in agricultural production has been of major concern and on occasion has prompted severe criticism.

One of the major criticisms of chemical use has been the amount of residues remaining after certain chemicals have been used. It is believed now that "carry over" in the use of herbicides, and "persistence" in the use of insecticides will be progressively reduced and largely eliminated in the next 5 years. Some of the chemicals now in common use will practically disappear while those with very low if any residues will be emerging.

For the Basin as a whole, there was a total of 20,588,677 kilograms (45,449,620 lbs). Herbicides accounted for 60 percent, insecticides 25 percent, and fungicides 15 percent of the chemicals used. This amounts to 1.02 kilograms (2.66 lbs) of chemicals applied per acre of harvested cropland. This index was compared to each lake basin and it was determined that Lake Michigan and Ontario basins were the only ones above the average amount of 1.02 kilograms (2.66 lbs), Lake Michigan using 1.24 kilograms (2.75 lbs) and Ontario 1.38 kilograms (3.05 lbs).

#### 3.1.2.2 Animal Wastes

It is estimated that the amount of wet manure produced annually in the Great Lakes Basin is approximately 52,389,331 metric tons (57,748,381 tons). Of this amount, cattle produce 79 percent, horses 10 percent, swine 6 percent, sheep 2 percent, and poultry the remaining 3 percent. The amount of primary nutrients in this manure amounts to 1.2 percent of the total, or 640,513 metric tons (706,033 tons).

As an overall average, there are 3057 kilograms (3.37 tons) of manure per harvested acre in the Basin and 37.1 kilograms (82 lbs) of primary nutrients per harvested acre. Lake Ontario basin has the highest average using this index, followed in descending order by the Lake Superior, Michigan, Huron, and Erie basins.

Table 3-1

## CHEMICALS USED BY CLASS AND BY HARVESTED CROPLAND ACRE

Subarea and Area	Herbicides		Chemicals Used				Total Chemicals Used			Chemicals per harvest acre	
	CWT	%	Insecticides CWT	%	Fungicide CWT	%	CWT	Pounds	Tons	Pounds	Index
1.1	955.4	46	898.6	43	219.4	11	2073.4	207340	104	1.18	44
1.2	400.0	39	458.0	44	177.0	17	1035.0	103500	52	1.16	44
1.0	1355.4	44	1356.6	44	396.4	12	3108.4	310840	156	1.18	44
2.1	25860.5	53	16359.7	33	6759.2	14	48979.4	4897940	2449	2.20	83
2.2	34250.9	77	7897.4	18	2239.7	5	44388.0	4438880	2219	2.21	83
2.3	52864.7	57	23620.0	26	16078.5	17	92563.2	9256320	4628	3.27	123
2.4	7499.2	34	6866.4	31	7630.4	35	21996.0	2199600	1100	4.45	168
2.0	120475.3	58	54743.5	26	32707.8	16	207926.6	20792660	10396	2.75	103
3.1	2174.9	55	1129.7	29	643.6	16	3948.2	394820	198	2.02	76
3.2	29407.5	79	5204.8	14	2433.9	7	37046.2	3704620	1852	2.52	95
3.0	31582.4	77	6334.5	15	3077.5	8	40994.4	4099440	2050	2.46	92
4.1	17625.7	75	4513.5	19	1458.7	6	23597.9	2359790	1180	2.21	83
4.2	66023.3	83	10168.9	13	3350.6	4	79542.8	7954280	3977	2.09	79
4.3	3772.0	54	1876.8	27	1378.0	19	7026.8	702680	351	2.25	85
4.4	6393.7	20	16097.5	50	9786.8	30	32278.0	3227800	1614	6.82	256
4.0	93814.7	66	32656.7	23	15974.1	11	142445.5	14244550	7122	2.52	95
5.1	7035.9	40	5070.8	29	5583.5	31	17690.2	1769020	885	3.11	117
5.2	12956.2	35	12744.2	34	11727.5	31	37424.9	3742490	1871	3.78	142
5.3	3146.0	64	1683.2	34	74.0	2	4903.2	490320	245	1.19	45
5.0	23138.1	39	19498.2	32	17385.0	29	60021.3	6002130	3001	3.05	115
BASIN	270365.9	60	114589.5	25	69540.8	15	454496.2	45449620	22725	2.66	100

To Convert From

Pounds (lb)

Tons (ton)

To

Kilograms (kg)

Kilograms (kg)

Metric Tons

Multiply By

0.453

907.2

0.907

Table 3-2

## LIVESTOCK MANURE IN GREAT LAKES BASIN BY AREA AND SUBAREA

Total Tonnage and Percent of Total By Kind of Livestock

Subarea and Area	Cattle		Horses		Chickens		Swine		Sheep		Turkeys		Total tons of manure
	tons manure	%	tons manure	%	tons manure	%	tons manure	%	tons manure	%	tons manure	%	
1.1	731205	87	83211	10	9904	1	4700	1	4509	1	503	0	834031
1.2	299130	85	44768	13	2983	1	1764	0	4245	1	0	0	352890
1.0	1030335	87	127979	11	12887	1	6464	0	8754	1	503	0	1186921
2.1	9571400	93	143762	1	61470	1	518536	5	24118	0	3750	0	10323056
2.2	4127793	76	730518	13	109267	2	425978	8	37568	1	2570	0	5433964
.23	7319800	69	1552233	14	197756	2	1244456	12	222789	2	132180	1	10669214
2.4	1797969	83	284496	13	31746	1	41572	2	18490	1	6307	0	2180580
2.0	22816962	80	2711009	9	400239	1	2230542	8	302965	1	144807	1	28606524
39 3.1	789999	85	101486	11	6323	1	15291	2	10465	1	00	0	923564
3.2	2812566	82	413101	12	65025	2	121681	3	35581	1	00	0	3447954
3.0	3602565	82	514587	12	71348	2	136972	3	46046	1	00	0	4371518
4.1	2583516	72	715630	20	37987	1	145323	4	113344	3	00	0	3595530
4.2	3956796	63	526447	8	268180	4	1161675	19	265830	4	134360	2	6313288
4.3	1278460	76	326503	19	30638	2	30262	2	14651	1	7542	0	1688056
4.4	2195089	85	331283	13	28280	1	16108	1	15332	0	3928	0	2590020
4.0	10013861	71	1899593	13	365085	3	1353368	9	409157	3	144420	1	
5.1	1877209	84	266195	12	27498	1	21704	1	48617	2	503	0	2241728
5.2	3930238	86	460834	10	93364	2	31581	1	46109	1	4468	0	4566594
5.3	2420802	93	148695	6	9818	1	4584	0	2571	0	3142	0	2589612
5.0	8228249	88	875724	9	130680	2	57869	1	97299	1	8113	0	9397934
BASIN	45691972	79	6128892	10	980239	2	3785215	6	864221	2	297842	1	57748381

To Convert From

Tons (ton)

ToKilograms (kg)  
Metric TonsMultiply By907.2  
0.907



Table 3-3

## HARVESTED ACRE MANURE INTENSITY, PRIMARY NUTRIENTS (IN MANURE) INTENSITY

Subarea and Area	Harvested cropland acres	Tons of livestock manure	Tons manure per harvested cropland acre	Manure pro- duction index	Tons of primary nutrients in manure			Tons primary nutrients in manure	Lbs	
					(N)	(P <sub>2</sub> O <sub>5</sub> )	(K <sub>2</sub> O)		Primary nutrients per harvest crop. acre	Manure primary nutrients index
1.1	175073	834031	4.76	141	4916	872	4255	10043	115	140
1.2	88955	352890	3.97	118	2097	370	1822	4289	96	117
1.0	264028	1186921	4.50	134	7013	1242	6077	14332	109	133
2.1	2226946	10323056	4.64	138	58541	10753	51159	120453	108	132
2.2	2009410	5433694	2.70	80	32560	5981	27409	65950	66	80
2.3	2830585	10669214	3.77	112	66190	12402	54020	132612	94	115
2.4	493782	2180580	4.42	131	13092	2331	11173	26596	108	132
2.0	7560723	28606524	3.78	112	170383	31467	143762	345612	91	111
40 3.1	195595	923564	4.72	140	5441	959	4745	11145	114	139
3.2	1469446	3447954	2.35	70	20722	3734	17583	42039	57	70
3.0	1665041	4371518	2.63	78	26168	4692	22331	53191	64	78
4.1	1068323	3595530	3.37	100	22308	3893	19028	45229	85	104
4.2	3802981	6313288	1.66	49	41708	8332	31419	81459	43	52
4.3	312904	1688056	5.39	160	10364	1830	8746	20940	134	163
4.4	473598	2590020	5.47	162	15377	2711	13290	31378	133	162
4.0	5657806	14185484	2.51	74	89735	16729	72480	178944	63	77
5.1	567936	2241728	3.95	117	13576	2387	11649	27612	97	118
5.2	990426	4566594	4.61	137	27519	4923	23340	55782	113	138
5.3	411461	2589612	6.29	187	14843	2633	13084	30560	149	182
5.0	1969823	9397934	4.77	142	55937	9944	48073	113954	116	141
BASIN	17117421	57748381	3.37	100	349236	64074	292723	706033	82	100

To Convert From

Pounds (lb)

Tons (ton)

To

Kilograms (kg)

Kilograms (kg)

Metric Tons

Multiply By

0.453

907.2

0.907

Table 3-4  
COMMERCIAL FERTILIZER USED, INTENSITY OF USE AND NUTRIENT INTENSITY

Subarea and Area	Comm. fert., tons	Percent liquid	Lbs. comm. fert. per harvest acre	Index comm. fert. use	Primary nutrients in commercial fertilizer						Tons primary nutrients total	Lbs Primary nutri. per harvest crop acre	Primary nutrient index per harvest acre
					(N)		(P <sub>2</sub> O <sub>5</sub> )		(K <sub>2</sub> O)				
					tons	%	tons	%	tons	%			
1.1	12820	24	146	45	2734	39	2036	29	2289	32	7068	81	53
1.2	4040	16	91	28	652	33	633	32	695	35	1980	45	29
1.0	16860	22	128	40	3386	37	2669	30	2993	33	9048	69	45
2.1	234908	19	211	66	31936	26	34278	28	55741	46	121955	110	72
2.2	348908	37	347	108	60938	36	45217	27	61903	37	168058	167	109
2.3	487799	24	345	107	75312	33	73002	32	79295	35	227609	161	105
2.4	75771	16	307	96	12252	33	11880	32	12996	35	37128	150	98
2.0	1147386	26	304	95	180438	32	164377	30	209935	38	554750	147	96
3.1	20784	16	213	66	3327	33	3226	32	3530	35	10083	103	67
3.2	292473	16	398	124	47293	33	45861	32	50159	35	143313	195	127
3.0	313257	16	376	117	50620	33	49087	32	53689	35	153396	184	120
4.1	197618	16	370	115	31956	33	30986	32	33891	35	96833	181	118
4.2	651276	28	343	107	103808	31	105889	32	122129	37	331826	175	114
4.3	42726	2	273	85	5925	28	7047	34	7980	38	20952	134	88
4.4	71332	8	301	94	8401		10102	37	8950	32	27453	116	76
4.0	962952	23	340	106	150090	32	154024	32	172950	36	477064	169	110
5.1	108277	7	381	119	13092	31	15624	37	13512	32	42228	149	97
5.2	168436	7	340	106	20366	31	24304	37	21020	32	65690	133	87
5.3	27360	7	133	41	3308	31	3948	37	3414	32	10670	52	34
5.0	304073	7	309	96	36766	31	43876	37	37946	32	118588	120	78
BASIN	2744528	22	321	100	421300	32	414033	32	477513	36	1312876	153	100

To Convert From

Pounds (lb)

Tons (ton)

To

Kilograms (kg)

Kilograms (kg)

Metric Tons

Multiply By

0.453

907.2

0.907

TABLE 3-5

## LIME AND ROAD DE-ICERS USED

Total, Per Harvested Acre and Index of Use

Subarea and Area	Total tons	Lime		Total tons	Road De-Icers	
		Per harvested Pounds	crop acre Index		Per acre total Pounds	land area Index
1.1	24369	278	164	20266	4.7	11
1.2	7737	174	102	46183	15.1	36
1.0	32106	243	143	66449	9.0	22
2.1	81475	73	43	86379	16.5	40
2.2	230117	229	135	319912	122	292
2.3	321666	227	134	189667	42.1	101
2.4	59474	241	142	64813	15.9	38
2.0	692732	183	108	660771	41	98
3.1	6281	64	38	34294	18.6	45
3.2	22290	30	18	71909	32.2	77
3.0	28571	34	20	106203	26.1	63
4.1	48932	92	54	175619	87.9	211
4.2	306809	161	95	115170	36.4	87
4.3	75890	485	285	136046	117.5	282
4.4	78788	333	196	116582	75.9	184
4.0	510419	180	106	543417	69.1	166
5.1	66825	235	138	185592	150.4	360
5.2	93608	189	111	123561	43.3	109
5.3	34740	169	99	29863	17.4	42
5.0	195173	198	116	339016	59.7	143
BASIN	1459001	170	100	1715856	41.7	100

To Convert From

Pounds (lb)

To

Kilograms (kg)

Kilograms (kg)

Metric Tons

Multiply By

0.453

907.2

0.907



### 3.1.2.3 Commercial Fertilizers

For many years it was common to recommend using more fertilizer for better agricultural production. Farmers responded accordingly and have been using more fertilizer. At the same time the amount of primary nutrients in fertilizer, namely: nitrogen, phosphorus and potash--have been increasing. In 1955 nutrients represented 33 percent of fertilizer composition; in 1970 they were 46 percent. These actions produced large amounts of nutrients that have been applied to croplands in the Basin. A total of 2,489,836 metric tons (2,744,528 tons) of commercial fertilizers were applied to crops in the Great Lakes Basin in 1972. This includes 1,191,041 metric tons (1,312,879 tons) of primary nutrients. The average amount of commercial fertilizer per harvested acre is 145 kilograms (321 lbs), and primary nutrients averaged 69 kilograms (153 lbs) per harvested acre. The lake basin with the highest average was Lake Huron. Lake Erie was second, followed closely by Lakes Michigan and Ontario. Lake Superior basin uses the least amount of commercial fertilizers, averaging only 40 percent of the index for fertilizer and 69 percent of the average nutrient amount.

### 3.1.2.4 Lime

Lime as applied to croplands is important in terms of its water quality impacts due to its effects on the pH level of water and subsequent effects on the waters' acid-base relationships. The possibility of precipitating phosphorous in the water and altering calcium content is also likely.

A total of 1,323,606 metric tons (1,459,001 tons) of limestone was used in the Great Lakes Basin in 1972. The average amount of lime used per harvested acre was 170 pounds for the Basin (31 kilograms/harvested hectare). Lake Superior basin used the greatest amount 44.5 kilograms/harvested hectare (243 lbs/harvested acre), with Lake Ontario being second. Lake Michigan and Erie basins followed closely with Lake Huron basin using the least amount of lime on croplands 6.2 kilograms/harvested hectare (34 lbs/harvested acre).

### 3.1.2.5 Salts

Due to climatic conditions in the Basin, road deicing salts are required to keep major roadways clear during the winter. However, the use of salts may have an impact upon ground and surface water areas. Assuming that chlorides are conservative and that ion exchange between chlorides and various soil types are minimal, most of the chlorides will eventually reach ground and surface water areas. Alternative substances have been sought, but none have proven economically feasible. Methods of conserving the amounts used are also being implemented.

The 1972-73 application of road salts totaled 1,556,625 metric tons (1,715,856 tons) that were used. The lake basin using the greatest amount was Lake Erie which used more than one and a half times the Basin average [31.3 kilograms (69.1 lbs) per acre of total land area]. Lake Ontario basin was second followed closely by the Lake Michigan, Huron and Superior basins.

## 3.2 Trends and Projections

### 3.2.1 Agricultural Chemicals

It is projected that total amounts of insecticide used may be no larger in 10 years than now. Insecticide use may even decrease as much as 5 to 50 percent in this time period. However, a leveling out is more likely to occur. The use of fungicides will likely increase 10 to 15 percent in the next 10 years. Herbicides are projected to increase the most, approximately 20 to 25 percent. Combined this represents a projected overall increase in chemical tonnage of 12 to 18 percent in the next 10 years for the entire Great Lakes Basin.

Future use of agricultural chemicals will also be affected by new research and technology. There will be developments that provide more combination herbicide treatments--an application or two of a combined chemical serving several purposes. Biological methods or the development of insect populations to counter undesirable insects have not had much effect to date and probably will not have much more success in the next 10 years.

### 3.2.2 Animal Wastes

It is projected that manure production from cattle will increase 5 percent in the next 10 years. Beef-cows will be replacing dairy cows and more young cattle will be retained to be fed out. Horse numbers will be increasing 50 percent and swine numbers 20 percent, increasing manure production proportionately. Turkey increases will not affect manure production nor will sheep decreases, so far as the entire Basin is concerned. It thus appears that total manure production from livestock should be projected to increase 5 to 10 percent in the next 10 years. More significant than the total increase in amounts will be the concentration of livestock production--a big decrease in the number of farm units but a big increase in the amount of livestock kept per unit.

### 3.2.3 Commercial Fertilizers

Authorities differ as to what would represent reasonable future estimates for commercial fertilizers. Most projections fall within these ranges: phosphorus 0 to 15 percent increase in the next 10 years, potash 10 to 25 percent increase and nitrogen 20 to 35 percent increase. If these percentage figures are applied to the present total amount for nutrients of 1,191,154 metric tons (1,313,000 tons) it would give a range of from 1,313,626 to 1,489,622 metric tons (1,448,000 to 1,642,000 tons) in another 10 years. This represents an overall increase at the rate of about one percent a year.

### 3.2.4 Lime

Most soil scientists feel that the amount of lime applied from year to year will vary. They project that the annual amount 10 years from now may be about the same as at present.

### 3.2.5 Salts

In recent years the trend has been to increase the amount of salts used. This is in part due to the fact that the public has looked with favor on what is termed the "bare pavement policy." However, the cost of salt has been increasing substantially and the budgets for road deicing have tended to remain about the same.

Therefore, it is projected that the amount of salts applied will most likely remain at approximately present rates over the next 10 years. It is felt that some tonnage increases will probably occur, but will be only in proportion to the increase in road mileage.

## Section 4

### MATERIALS USAGE IN THE LAKE SUPERIOR BASIN

#### 4.1 Basin Characteristics

The Lake Superior basin is comprised of seventeen counties; four in Minnesota, four in Wisconsin and nine in Michigan. Complete census information for Cook County, Minnesota and Keweenaw County, Michigan was not available. The other 15 counties have a total land area of 5,996,700 hectares (14,806,592 acres) with about 90 percent in forests, 3 percent in urban areas, about 6 percent (365,300 hectares or 902,034 acres) in farms, in cropland and pasture, and the remainder in other land. The area is generally better known for its recreation, tourism, fishing, and forestry than for its agricultural activities.

##### 4.1.1 Agricultural Characteristics

Soil and climate conditions limit agricultural activities. Most of the cropland is used for hay and pasture. Corn, where grown, is usually for silage and is raised primarily along the southern edges of the western counties. Oats is the major grain crop with the greatest acreage in Chippewa County, Michigan. The major potato county is Houghton in Michigan. Dairy cattle, and to a lesser extent beef cows, dominate the livestock production throughout the area. The most important agricultural products are potatoes, clover seed and dairy products, although such fruits as apples, blueberries, cranberries, and strawberries are grown along the southern shores of Lake Superior.

No major increases in crop production or livestock numbers are expected in the next 10 years. Agricultural opportunities will continue. The economic outlook, together with climatic factors, distances to markets, and population declines will not result in much, if any, expansion. The greatest likelihood for livestock is that they will decrease in number during the next decade.

Table 4-1 indicates the relative proportions of materials usage in the Lake Superior basin as compared to the total U.S. Great Lakes Basin.



Table 4-1

## MATERIALS USAGE BASIN RELATIONSHIP--LAKE SUPERIOR 1.0 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Lake Superior basin</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	1.18	2.66
Index of chemicals used	44	100
Tons of livestock manure defecated	4.50	3.37
Index of manure defecated	134	100
Lbs primary nutrients in livestock manure	109	82
Index of primary nutrients in manure	133	100
Lbs commercial fertilizer applied	128	321
Percent liquid fertilizer applied	22	22
Index commercial fertilizer applied	40	100
Lbs primary nutrients in commercial fertilizer	69	153
Index primary nutrients in commercial fertilizer	45	100
Lbs of lime applied	243	170
Index of lime applied	143	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	8.98	41.74
Index road salts used	22	100

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Ton	0.907

## 4.1.2 Materials Usage

An inventory and analysis on materials usage was made based on personal interviews, correspondence and statistics as available from agricultural statistics, census information, state highway departments, universities, private companies, and state and federal agencies. Background for the analysis is presented in the Methodology Section. Table 4-2 summarizes the findings of this inventory and analysis. Detailed statistics are shown in Table 4-3.

Table 4-2

MATERIALS USAGE  
(in 1972)

<u>Area</u>	Chemicals	Livestock	Commercial	Limestone	Salts
	Applied to Crops (100 lbs)	Manure (tons)	Fertilizer on Cropland (tons)	Purchased or Applied (tons)	Applied to all Highways (tons)
Lake Superior basin	3,108	1,186,918	16,860	32,106	66,449
PSA 1.1	2,073	834,028	12,820	24,369	20,266
PSA 1.2	1,035	352,890	4,040	7,737	46,183

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Ton	0.907

#### 4.1.2.1 Agricultural Chemicals

There was a total of 141,000 kilograms (310,840 pounds) of agricultural chemicals spread on agricultural lands in the Lake Superior basin in 1972. Herbicides accounted for 44 percent, insecticides 44 percent, and fungicides 12 percent of the chemicals used. This amounts to 0.54 kilograms (1.18 pounds) of chemicals applied per acre of harvested cropland. Harvested cropland acres represented about 29 percent of all land in farms. Had the total chemical usage been equated in terms of all farmland, 365,000 hectares (902,034 acres), the rate would have been 0.15 kilograms (0.34 pounds) of chemicals applied per acre. Had it been equated in terms of the total land area, it would have amounted to only 0.004 kilograms per hectare (0.02 pounds per acre).

Herbicide usage is expected to increase about 10 percent and fungicide usage about 5 percent in the next ten years. Most chemical authorities expect that insecticide usage may not be any greater and perhaps even decrease in the next 10 years. However, insecticide usage is expected to increase in the next five years, but to decrease progressively after that.

One of the problems concerning the use of chemicals, even if effective in performing their functional roles is that some residues will remain in the soils. In the case of herbicides, this is known as "carryover" and in the case of insecticides as "persistence". It is believed that the persistence associated with insecticides will be almost entirely eliminated in the future and that carryover in herbicides will be greatly reduced, if not also eliminated.

#### 4.1.2.2 Animal Wastes

It is calculated that 1,076,800 metric tons (1,186,922 tons) of wet manure are produced annually in the Lake Superior basin. Of this amount, 87 percent is produced from cattle, 11 percent from horses and the remaining 2 percent from other types of livestock. Nitrogen, phosphorous and potash combined comprise 1.2 percent of the total manure defecated.

#### 4.1.2.3 Commercial Fertilizers

A total of 15,295 metric tons (16,860 tons) of commercial fertilizers were applied to crops in the Lake Superior basin in 1972. Primary nutrients of nitrogen, phosphorus and potash comprise 8,208 metric tons (9,048 tons), or 54 percent of the tonnage. Nitrogen accounts for 37 percent, phosphorous 30 percent and potash 33 percent of the primary nutrient content by weight.

Commercial fertilizer use may continue at about present levels. Farming will tend to be concentrated on fewer, but larger farms. Commercial fertilizer use on these larger farms will increase, as will the percent applied in liquid form. However, overall rates of application per acre of total farmland and especially per unit of total land area will not increase.

#### 4.1.2.4 Lime

A total of 29,130 metric tons (32,106 tons) of limestone was used in the Lake Superior basin in 1972. Lime is important in terms of its water quality impacts due to its effects on the pH level of water

and subsequent effects on water's acid - base relationships. The possibility of precipitating phosphorous in the water and altering the calcium content is also likely.

The usage of lime in agricultural operations is not likely to increase in the future. This is partly predicated on the expectation that the Federal government will not increase its lime cost-sharing agreements with farmers. Even if the cost-sharing agreements increase, it is not expected to significantly affect lime usage rates.

#### 4.1.2.5 Salts

Because of severe climatic conditions during winter and the resultant heavy snowfalls, road de-icing salts are required to keep major roadways open. The mileage of major highways for this area is modest relative to the total land area, explaining the low de-icer index. It is calculated that 60,280 metric tons (66,449 tons) were applied to highways in the Lake Superior basin in the 1972-73 winter. The primary impact upon ground and surface waters resulting from road de-icing salts comes from chloride discharges which can, over time, affect the salinity of nearby wells and open water areas. The 1972-73 application would produce 44,725 metric tons (49,300 tons) of chlorides. Assuming that chlorides are conservative and that ion exchange between chlorides and various soil types are minimal, most of the chlorides will eventually reach ground and surface water areas.

Road de-icing salt usage will increase in approximate proportion to road mileage increases. The so-called bare-pavement policy will likely continue to be demanded by the public for the major highways. This may be offset by slightly lower or less frequent applications on lesser traveled highways.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-3

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

Minnesota, Wisconsin,

PLANNING AREA: Lake Superior 1.0

STATE: Michigan

PLANNING SUBAREA: West 1.1, East 1.2

COUNTY: 17 County Totals (Minnesota-4, Wisconsin-4, Michigan-9) (1)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	2025	55.4	450	6.7		
Grains	19589	96.9	6529	64.3		
Hay or Grass Silage	78624	785.1	65520	655.5		
Pastured Cropland	33575	333.2	33575	333.2		
Other Field Crops	1868	54.1	1992	228.0	1987	297.0
Vegetables	296	6.2	296	21.8	296	3.9
Orchards						
Berries	426	24.5	488	47.1	497	95.5
Nursery, Greenhouse						
Other Crops						
Totals	136403	1355.4	108850	1356.6	2780	396.4
Total Herbicides, Insecticides, Fungicides: 100 lbs 248033 3108.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	5017	391	318	709
1969	3941	396	292	688
1972	5363	486	408	894
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				6464
Nutrients in Wet Manure: Nitrogen, tons				32
Phosphorus, tons				9
Potash, tons				25

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	143846	69191	74655
1969	95268	47169	48099
1972	108400	49500	58900
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		650430	379905
Wet Manure Defecated: Tons, 1972 Combined:		1030335	
Nutrients in Wet Manure: Nitrogen, tons		5770	
Phosphorus, tons		1030	
Potash, tons		5152	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		9155	
1969		6701	2635
1972		5437	10014
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		8794	127979
Nutrients in Wet Manure: Nitrogen, Tons		123	883
Phosphorus, Tons		18	128
Potash, Tons		87	768

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		244362		
1969		165695		
1972		310900	800	8000
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		12887		
Nutrients in Wet Manure: Nitrogen, tons		201	8	503
Phosphorus, tons		52	2	
Potash, tons		45	2	

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1974	244	1	245
GRAINS	29687	2801	17	2818
Wheat	606	38	1	39
Oats	27116	2554	16	2570
Barley	736	77		77
Rye	308	33		33
OTHER FIELD CROPS	2278	1159		1159
Soybeans	100			
Potatoes	2095	1076		1076
Sugar beets				
Field beans	1993	78	1	79
HAY OR GRASS SILAGE	178035	1227	3	1230
PASTURED CROPLAND	103677	704		704
Cropland used for pasture	93895	611		611
Improved pasture	9782	93		93
VEGETABLES, SWEET CORN, MELONS	315	76		76
ORCHARDS	533	74	2	76
BERRIES	259	47	1	48
NURSERY & GREENHOUSE PRODUCTS	169	50	1	51
OTHER CROPS	47			
Total Fertilizer Used, Tons		6460	26	6486
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	13178
Liquid	3782
Total	16860
Primary Nutrients in Fertilizer	9048
Nitrogen	3386
Phosphorus	2669
Potash	2993

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			32106
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	45814	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		66449

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1355.4	1356.6	396.4	3108.4
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	6464	32	9	25
Cattle: Table 3	1030335	5770	1030	5152
Sheep: Table 4	8754	123	18	87
Horses: Table 4	127979	883	128	768
Chickens: Table 5	12887	201	52	45
Turkeys: Table 5	503	8	2	2
Total from Livestock, Tons	1186922	7017	1239	6079
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	16860	3386	2669	2993
Lime: Limestone equivalent purchased or applied, tons: Table 8 32106				
Salts: Applied on all highways, tons: Table 9 66449				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) Total are for 15 counties as information Cook county, Minnesota and Keweenaw county, Michigan are not available.

(2) County, land area, acres includes water areas under 40 acres in size.

#### 4.2 Planning Subarea 1.1

Eight counties, four in Minnesota; Carlton, Cook, Lake, St. Louis, and four in Wisconsin; Ashland, Bayfield, Douglas, Iron, comprise the planning subarea. Census information for Cook County is not available. The other counties have a total land area of 3,513,600 hectares (8,682,000 acres). Farm land equals 246,420 hectares (608,900 acres) or 7 percent of the total land area. National forests and recreation areas are the predominant land use in this area. Although PSA 1.1 has a relatively limited agricultural base, it is the major agricultural region in the Lake Superior basin.

##### 4.2.1 Agricultural Characteristics

From an agricultural viewpoint, the eight counties are quite similar. Practically all of the cropland is used for hay and pasture. Ashland, Bayfield and Carlton are the only counties growing 160 hectares (400 acres) or more of corn, and along with St. Louis County, are the only counties with more than 600 hectares (1,500 acres) used for grain production.

Table 4-4 indicates the relative proportions of materials usage in the planning subarea as compared to the total U.S. Great Lakes Basin.

Table 4-4

MATERIALS USAGE BASIN RELATIONSHIP -- PSA 1.1 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 1.1</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	1.18	2.66
Index of chemicals used	44	100
Tons of livestock manure defecated	4.76	3.37
Index of manure defecated	141	100
Lbs primary nutrients in livestock manure	115	82
Index of primary nutrients in manure	140	100
Lbs commercial fertilizer applied	146	321
Percent liquid fertilizer applied	24	22
Index commercial fertilizer applied	45	100
Lbs primary nutrients in commercial fertilizer	82	153
Index primary nutrients in commercial fertilizer	54	100
Lbs of lime applied	278	170
Index of lime used	164	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	4.67	41.74
Index road salts used	11	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 4.2.2 Materials Usage

The following table summarizes by county the material usage inventory for PSA 1.1. Detailed statistics are shown in Tables 4-6 to 4-14.

Table 4-5  
MATERIALS USAGE  
(in 1972)

PSA 1.1	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>Minnesota</u>					
Ashland	211	100,305	657	2,745	2,901
Bayfield	453	138,551	870	4,237	2,972
Carlton	480	231,853	4,384	6,739	754
Cook	9	1,314	-----	85	5,179
<u>Wisconsin</u>					
Douglas	220	99,872	731	2,825	3,426
Iron	123	21,634	554	820	3,060
Lake	20	9,521	71	299	157
St. Louis	557	230,978	5,553	6,619	1,817
TOTAL	2,073	834,028	12,820	24,369	20,266

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

##### 4.2.2.1 Agricultural Chemicals

Agricultural chemicals used in PSA 1.1 accounted for 67 percent of the total amount of agricultural chemicals used on croplands in the Lake Superior basin. The major use was on crops of grains, hay or grass silage or on pastured cropland with only a small amount applied to vegetable and fruit crops.

There were 94,050 kilograms (207,340 pounds) of agricultural chemicals used in 1972. Herbicides represented 46 percent of the total, insecticides 43 percent and fungicides, 11 percent. It is expected that herbicide use may increase 10-25 percent in the next 10 years and fungicide use 5-10 percent. Insecticide use on grain and forage crops may increase 30-40 percent in the next 5 years and decrease to levels below present usage in 10 years.

##### 4.2.2.2 Animal Wastes

There were 34,000 head of cows and heifers calved and 44,100 head of other types of cattle in 1972. Cattle account for 87 percent of the livestock manure produced; horses, 10 percent; and chickens, swine, and sheep 1 percent each.

The total livestock manure produced in PSA 1.1 was 756,620 metric tons (834,028 tons). This represented 70 percent of the total manure produced in the Lake Superior basin.

Livestock numbers are not likely to change significantly in the next 10 years. There are no indicators suggesting any major shifts or upward changes. Manure production from livestock may continue at about present levels or show some decrease.

#### 4.2.2.3 Commercial Fertilizers

Currently 11,630 metric tons (12,820 tons) of commercial fertilizers are applied to croplands in PSA 1.1 with primary nutrients representing 6,412 metric tons (7,068 tons) or 55 percent of the total. Nitrogen comprises 39 percent, phosphorus 29 percent, and potash 32 percent of the primary nutrients by weight. Commercial fertilizer usage in PSA 1.1 accounted for 76 percent of the total amount of commercial fertilizers used in the Lake Superior basin.

Because crop production rates are not expected to change significantly in the next ten years, nitrogen fertilizer use may increase modestly with other fertilizer nutrient levels continuing at about present rates. The percent applied in liquid form may increase slightly.

#### 4.2.2.4 Lime

There were 22,107 metric tons (24,369 tons) of lime purchased or applied in PSA 1.1. This accounts for 76 percent of the total limestone purchased or applied in the Lake Superior basin.

Liming amounts and rates are not likely to change much in spite of the tremendous increase in needs projected by the National Limestone Institute. Even government cost-sharing programs, if operating, will not change this greatly.

#### 4.2.2.5 Salts

There were 18,385 metric tons (20,266 tons) of road de-icing salt applied in PSA 1.1. This represented 30 percent of all road de-icing salts applied in the Lake Superior basin. The major amounts of salts were used in heavily urbanized areas, mainly around the Duluth-Superior portion of the Lake Superior basin. The amounts of road de-icing salts may increase in proportion to increases in road mileage. However, increasing salt costs will limit expanded usage.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 4-6

PLANNING AREA: Lake Superior 1.0 STATE: Minnesota and Wisconsin  
 PLANNING SUBAREA: West 1.1 COUNTY: 8 County Totals (1)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	2025	55.4	450	6.7		
Grains	11231	55.9	3743	37.3		
Hay or Grass Silage	57830	578.1	48175	481.5		
Pastured Cropland	21242	212.2	21242	212.2		
Other Field Crops	800	23.1	805	92.0	800	120.0
Vegetables	296	6.2	296	21.8	296	3.9
Orchards						
Berries	426	24.5	488	47.1	497	95.5
Nursery, Greenhouse						
Other Crops						
Totals	93830	955.4	75199	898.6	1593	219.4
Total Herbicides, Insecticides, Fungicides: 100 lbs					170622	2073.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	3711	289	282	571
1969	2803	280	165	445
1972	4240	372	278	650
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		4700		
Nutrients in Wet Manure: Nitrogen, tons		23		
Phosphorus, tons		7		
Potash, tons		78		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	103927	48103	55824
1969	67580	33011	34569
1972	78100	34000	44100
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		446760	284445
Wet Manure Defecated: Tons, 1972 Combined:		731205	
Nutrients in Wet Manure: Nitrogen, tons		4094	
Phosphorus, tons		731	
Potash, tons		3656	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		7120	
1969		3480	1740
1972		2800	6511
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		4508	83210
Nutrients in Wet Manure: Nitrogen, Tons		63	574
Phosphorus, Tons		9	83
Potash, Tons		45	499

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		135924		
1969		101935		
1972		238900	800	8000
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		9902		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		154	503	8
Phosphorus, tons		40	2	
Potash, tons		35	2	

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1446	177	0	177
GRAINS	16359	1572	9	1581
Wheat	471	26	0	26
Oats	14972	1441	9	1450
Barley	384	46	0	46
Rye	42	4	0	4
OTHER FIELD CROPS	1003	568	0	568
Soybeans	100	0	0	0
Potatoes	902	568	0	568
Sugar beets	0	0	0	0
Field beans	1208	2	0	2
HAY OR GRASS SILAGE	123827	910	3	913
PASTURED CROPLAND	67932	473	0	473
Cropland used for pasture	59489	396	0	396
Improved pasture	8443	77	0	77
VEGETABLES, SWEET CORN, MELONS	278	68	0	68
ORCHARDS	466	54	2	56
BERRIES	93	13	0	13
NURSERY & GREENHOUSE PRODUCTS	82	39	1	120
OTHER CROPS	144	0	0	0
Total Fertilizer Used, Tons		3876	15	3891
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	9684
Liquid	3136
Total	12820
Primary Nutrients in Fertilizer	7068
Nitrogen	2734
Phosphorus	2036
Potash	2298

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			24369
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	13973	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		20266

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	955.4	898.6	219.4	2073.4
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	4700	23	7	18
Cattle: Table 3	731205	4094	731	3656
Sheep: Table 4	4508	63	9	45
Horses: Table 4	83210	574	83	499
Chickens: Table 5	9902	154	40	35
Turkeys: Table 5	503	8	2	2
Total from Livestock, Tons	834028	4916	872	4255
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	12820	2734	2036	2298
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	24369			
Salts: Applied on all highways, tons: Table 9				
	20266			

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 907.2

- (1) The totals are for 7 counties as information for Cook county, Minnesota is not available.  
 (2) County, land area, acres includes water under 40 acres in size.



TABLE 4-7

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Minnesota

PLANNING SUBAREA: West 1.1 COUNTY: Carlton

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	360	9.9	80	1.2		
Grains	1800	9.0	600	6.0		
Hay or Grass Silage	13830	138.3	11525	115.2		
Pastured Cropland	4811	48.1	4811	48.1		
Other Field Crops	350	9.7	305	30.6	300	45.0
Vegetables	137	2.8	137	10.3	137	1.7
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	21268	217.8	17458	215.4	437	46.7
Total Herbicides, Insecticides, Fungicides: 100 lbs						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	501	65	53	118
1969	752	55	54	109
1972 (1)	1380	99	101	200

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 1416  
Nutrients in Wet Manure: Nitrogen, tons 7  
Phosphorus, tons 2  
Potash, tons 6

(1) Farrowing trends applied to obtain 1972 inventory.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	24820	11398	13422
1969	17190	8333	8857
1972	21400	10500	10900

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 137970 70305  
Wet Manure Defecated: Tons, 1972 Combined: 208275  
Nutrients in Wet Manure: Nitrogen, tons 1166  
Phosphorus, tons 208  
Potash, tons 1041

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2483	
1969		1131	382
1972		700	1455

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 1127 18595  
Nutrients in Wet Manure: Nitrogen, Tons 16 126  
Phosphorus, Tons 2 19  
Potash, Tons 11 112

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		15884		
1969		5637		
1972		46000	800	8000

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
Wet Manure Defecated: Tons, 1972 1907  
Nutrients in Wet Manure: Nitrogen, tons 30 8 503  
Phosphorus, tons 8 2  
Potash, tons 7 2

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	396	78	0	78
GRAINS	2905	235	0	235
Wheat	0	0	0	0
Oats	2814	221	0	221
Barley	66	12	0	12
Rye	25	2	0	2
OTHER FIELD CROPS	442	224	0	224
Soybeans				
Potatoes	442	224	0	224
Sugar beets				
Field beans	30	2	0	2
HAY OR GRASS SILAGE	28498	280	0	280
PASTURED CROPLAND	17510	113	0	113
Cropland used for pasture	14633	83	0	83
Improved pasture	2877	30	0	30
VEGETABLES, SWEET CORN, MELONS	128	44	0	44
ORCHARDS	0	0	0	0
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	2	1	0	1
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		977	0	977
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	3244
Liquid	1140
Total	4384
Primary Nutrients in Fertilizer	2455
Nitrogen	1031
Phosphorus	712
Potash	712

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	6126	613	6739
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	520	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 754		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	217.8	215.4	46.7	479.9
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1416	7	2	6
Cattle: Table 3	208275	1166	208	1041
Sheep: Table 4	1127	16	2	11
Horses: Table 4	18595	128	19	112
Chickens: Table 5	1907	30	8	7
Turkeys: Table 5	503	8	2	2
Total from Livestock, Tons	231853	1355	241	1176
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		Potash
		Nitrogen	Phosphorus	
Applied on Cropland: Table 7	4384	1031	712	712
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	6739			
Salts: Applied on all highways, tons: Table 9 754				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-8

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Minnesota

PLANNING SUBAREA: West 1.1 COUNTY: Cook (Little information shown for Cook County.)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains						
Hay or Grass Silage	510	5.1	425	4.2		
Pastured Cropland						
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	510	5.1	425	4.2		
Total Herbicides, Insecticides, Fungicides: 100 lbs 935 9.3						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964				
1969				
1972				
Wet Manure Factor: Tons per litter farrowed -				
Wet Manure Defecated: Tons, 1972 -				
Nutrients in Wet Manure: Nitrogen, tons -				
Phosphorus, tons -				
Potash, tons -				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964			
1969			
1972	100	100	
Wet Manure Factor: Tons Per Animal 13.14			
Wet Manure Defecated: Tons, 1972 1314			
Wet Manure Defecated: Tons, 1972 Combined: 1314			
Nutrients in Wet Manure: Nitrogen, tons 7			
Phosphorus, tons 1			
Potash, tons 7			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964			
1969			
1972			
Wet Manure Factor: Tons per animal -			
Wet Manure Defecated: Tons, 1972 -			
Nutrients in Wet Manure: Nitrogen, Tons -			
Phosphorus, Tons -			
Potash, Tons -			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964				
1969				
1972				
Wet Manure Factor: Lbs. per bird -				
Wet Manure Defecated: Tons, 1972 -				
Nutrients in Wet Manure: Combined -				
Nitrogen, tons -				
Phosphorus, tons -				
Potash, tons -				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)		Number I-V farms		
Number of farms		Acres in I-V farms		
Acres in farms		Cropland I-V farms		
Cropland in farms		Harvested cropland		
Harvested cropland in farms		I-V farms		
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN				
GRAINS				
Wheat				
Oats				
Barley				
Rye				
OTHER FIELD CROPS				
Soybeans				
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE				
PASTURED CROPLAND				
Cropland used for pasture				
Improved pasture				
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons				
Percent of Fertilizer Used				

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	-
Liquid	-
Total	-
Primary Nutrients in Fertilizer	-
Nitrogen	-
Phosphorus	-
Potash	-

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	77	8	85
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3571	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5179		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	5.1	4.2	0	9.3
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	-	-	-	-
Cattle: Table 3	1314	7	1	7
Sheep: Table 4	-	-	-	-
Horses: Table 4	-	-	-	-
Chickens: Table 5	-	-	-	-
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	1314	7	1	7
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7	-	Nitrogen	Phosphorus	Potash
		-	-	-
Lime: Limestone equivalent purchased or applied, tons: Table 8 85				
Salts: Applied on all highways, tons: Table 9 5179				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 4-9

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Minnesota

PLANNING SUBAREA: West 1.1 COUNTY: Lake

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains						
Hay or Grass Silage	810	8.1	675	6.7		
Pastured Cropland	263	2.6	263	2.6		
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	1073	10.7	938	9.3		
Total Herbicides, Insecticides, Fungicides: 100 lbs					2011	20.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	5	0	0	0
1969	20	1	0	1
1972	-	-	-	-
Wet Manure Factor: Tons per litter farrowed -				
Wet Manure Defecated: Tons, 1972 -				
Nutrients in Wet Manure: Nitrogen, tons -				
Phosphorus, tons -				
Potash, tons -				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	762	296	466
1969	335	86	249
1972	400	200	200
Wet Manure Factor: Tons Per Animal			
		13.14	6.45
Wet Manure Defecated: Tons, 1972			
		2628	1290
Wet Manure Defecated: Tons, 1972 Combined: 3918			
Nutrients in Wet Manure: Nitrogen, tons 22			
Phosphorus, tons 4			
Potash, tons 20			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		280	
1969		166	88
1972		100	335
Wet Manure Factor: Tons per animal			
		1.61	12.78
Wet Manure Defecated: Tons, 1972			
		161	4281
Nutrients in Wet Manure: Nitrogen, Tons 2			
Phosphorus, Tons 0			
Potash, Tons 2			

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		1529		
1969		5993		
1972		28000		
Wet Manure Factor: Lbs. per bird				
		82.9		
Wet Manure Defecated: Tons, 1972				
		1161		
Nutrients in Wet Manure:				
			Combined	
		18		
		5		
		4		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	0	0	0	0
GRAINS	0	0	0	0
Wheat				
Oats				
Barley				
Rye				
OTHER FIELD CROPS	0	0	0	0
Soybeans				
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	635	0	0	0
PASTURED CROPLAND	547	1	0	1
Cropland used for pasture	547	1	0	1
Improved pasture	0	0	0	0
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons		2	0	2
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	53
Liquid	18
Total	71
Primary Nutrients in Fertilizer	40
Nitrogen	16
Phosphorus	12
Potash	12

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	272	27	299
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	108	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 157		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	10.7	9.3	-	20.0
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Swine: Table 2	-	-	-	-
Cattle: Table 3	3918	22	4	20
Sheep: Table 4	161	2	0	2
Horses: Table 4	4281	30	4	26
Chickens: Table 5	1161	18	5	4
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	9521	72	13	52
Fertilizers: Tons of Commercial Fertilizers Applied				
Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	71	16	12	12
Lime: Limestone equivalent purchased or applied, tons: Table 8 299				
Salts: Applied on all highways, tons: Table 9 157				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-10

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Minnesota

PLANNING SUBAREA: West 1.1 COUNTY: St. Louis

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	180	1.9	10	.6		
Grains	3650	18.3	1220	12.2		
Hay or Grass Silage	171.30	171.3	11525	115.2		
Pastured Cropland	6396	63.9	6396	63.9		
Other Field Crops	180	5.1	200	23.0	200	30.0
Vegetables	138	2.9	138	10.4	138	1.7
Orchards						
Berries	0					
Nursery, Greenhouse						
Other Crops						
Totals	27984	269.7	22519	255.3	338	31.7
Total Herbicides, Insecticides, Fungicides: 100 lbs 50817 556.7						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2111	110	129	269
1969	1370	98	35	133
1972 (1)	2055	118	52	200
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 1116				
Nutrients in Wet Manure: Nitrogen, tons 7				
Phosphorus, tons 2				
Potash, tons 5				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	28328	12620	15708
1969	16319	7753	8566
1972	19200	9000	10200
Wet Manure Factor: Tons Per Animal 13.11 6.45			
Wet Manure Defecated: Tons, 1972 118260 65790			
Wet Manure Defecated: Tons, 1972 Combined: 181050			
Nutrients in Wet Manure: Nitrogen, tons 1031			
Phosphorus, tons 181			
Potash, tons 920			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2025	
1969		1113	763
1972		1000	3021
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 1610 38608			
Nutrients in Wet Manure: Nitrogen, Tons 23 266			
Phosphorus, Tons 3 39			
Potash, Tons 16 232			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		72623		
1969		61915		
1972		127000		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 5264				
Nutrients in Wet Manure: Nitrogen, tons 82 Combined				
Phosphorus, tons 21				
Potash, tons 18				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	82	7	0	7
GRAINS	4804	450	9	459
Wheat	104	7	0	7
Oats	4172	384	9	393
Barley	67	8	0	8
Rye	1	0	0	0
OTHER FIELD CROPS	238	69	0	69
Soybeans	100	0	0	0
Potatoes	137	69	0	69
Sugar beets				
Field beans	87	0	0	0
HAY OR GRASS SILAGE	38355	396	0	396
PASTURED CROPLAND	17693	117	0	117
Cropland used for pasture	14953	136	0	136
Improved pasture	2740	11	0	11
VEGETABLES, SWEET CORN, MELONS	129	20	0	20
ORCHARDS	0	0	0	0
BERRIES	2	0	0	0
NURSERY & GREENHOUSE PRODUCTS	10	3	1	4
OTHER CROPS	21	0	0	0
Total Fertilizer Used, Tons		1092	10	1102
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	4109
Liquid	1111
Total	5553
Primary Nutrients in Fertilizer	3110
Nitrogen	1306
Phosphorus	902
Potash	902

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	6017	602	6619
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1253	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 1817		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	269.7	255.3	31.7	556.7
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1116	7	2	5
Cattle: Table 3	181050	1031	181	920
Sheep: Table 4	1610	23	3	16
Horses: Table 4	38608	266	39	232
Chickens: Table 5	5264	82	21	18
Turkeys: Table 5				
Total from Livestock, Tons	230978	1109	219	1191
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	5553	1306	902	902
Lime: Limestone equivalent purchased or applied, tons: Table 8 6619				
Salts: Applied on all highways, tons: Table 9 1817				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 4-11

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Wisconsin

PLANNING SUBAREA: West 1.1 COUNTY: Ashland

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	810	22.2	180	2.7		
Grains	1813	9.0	604	6.0		
Hay or Grass Silage	6570	65.7	3475	54.7		
Pastured Cropland	2524	25.2	2524	25.2		
Other Field Crops						
Vegetables	1	-	1	-	1	-
Orchards						
Berries	1	.1	2	.1	2	.3
Nursery, Greenhouse						
Other Crops						
Totals	11719	122.2	8786	88.7	3	.3
Total Herbicides, Insecticides, Fungicides: 100 lbs					20508	211.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	361	30	30	60
1969	195	18	24	42
1972	250	25	25	50
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		361		
Nutrients in Wet Manure:		Nitrogen, tons		2
		Phosphorus, tons		1
		Potash, tons		1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves		
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves	
1964	12744	6222	5922	
1969	8711	4517	4194	
1972	9500	4200	5300	
Wet Manure Factor: Tons Per Animal		13.14	6.45	
Wet Manure Defecated: Tons, 1972		55188	34185	
Wet Manure Defecated: Tons, 1972 Combined:		89373		
Nutrients in Wet Manure:		Nitrogen, tons		500
		Phosphorus, tons		89
		Potash, tons		447

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies	
1964		219		
1969		207	152	
1972		200	800	
Wet Manure Factor: Tons per animal		1.61	12.78	
Wet Manure Defecated: Tons, 1972		322	10224	
Nutrients in Wet Manure:		Nitrogen, Tons		5
		Phosphorus, Tons		1
		Potash, Tons		3

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised	
1964		8173			
1969		4010			
1972		600			
Wet Manure Factor: Lbs. per bird		82.9			
Wet Manure Defecated: Tons, 1972		25			
Nutrients in Wet Manure:		Combined			
		Nitrogen, tons			0
		Phosphorus, tons			0
		Potash, tons			0

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	661192	Number I-V farms	227
Number of farms	341	Acres in I-V farms	62647
Acres in farms	79697	Cropland I-V farms	25884
Cropland in farms	31799	Harvested cropland	
Harvested cropland in farms	19863	I-V farms	17099

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	403	42	0	42
GRAINS	2623	289	0	289
Wheat	3	0	0	0
Oats	2548	281	0	281
Barley	72	8	0	8
Rye	0	0	0	0
OTHER FIELD CROPS	1	1	0	1
Soybeans				
Potatoes	1	1	0	1
Sugar beets				
Field beans	295	0	0	0
HAY OR GRASS SILAGE	13729	63	3	66
PASTURED CROPLAND	8637	25	0	25
Cropland used for pasture	7662	23	0	23
Improved pasture	975	2	0	2
VEGETABLES, SWEET CORN, MELONS	1	0	0	0
ORCHARDS	2	0	0	0
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		420	3	423
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	532
Liquid	125
Total	657
Primary Nutrients in Fertilizer	342
Nitrogen	89
Phosphorus	96
Potash	157

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			2745
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "g" Mile
1970-71		
1971-72		
1972-73	2000	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
2901		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	122.2	88.7	.3	211.2
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	361	2	1	1
Cattle: Table 3	89373	500	89	447
Sheep: Table 4	322	5	1	3
Horses: Table 4	10224	71	10	61
Chickens: Table 5	25	0	0	0
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	100305	578	101	512
Fertilizers: Tons of Commercial Fertilizers Applied				
	Primary Nutrients			
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	657	89	96	157
Lime: Limestone equivalent purchased or applied, tons: Table 8				
2745				
Salts: Applied on all highways, tons: Table 9				
2901				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-12

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Wisconsin

PLANNING SUBAREA: West 1.1 COUNTY: Bayfield

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	360	9.9	80	1.2		
Grains	2719	13.5	206	2.0		
Hay or Grass Silage	9840	98.4	8200	82.0		
Pastured Cropland	3706	37.0	3706	37.0		
Other Field Crops	45	1.3	50	5.7	50	7.5
Vegetables	13	.3	13	.7	13	.3
Orchards						
Berries	368	18.8	435	40.6	438	89.5
Nursery, Greenhouse						
Other Crops						
Totals	17051	179.2	13390	176.2	501	97.3
Total Herbicides, Insecticides, Fungicides: 100 lbs						
30942 452.7						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	181	15	23	38
1969	141	24	17	41
1972	200	30	30	60

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 434  
 Nutrients in Wet Manure: Nitrogen, tons 2  
 Phosphorus, tons 1  
 Potash, tons 2

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	19463	9470	9993
1969	13067	6402	6665
1972	14500	6100	8400

Wet Manure Factor: Tons Per Animal 13.44 6.45  
 Wet Manure Defecated: Tons, 1972 80154 54180  
 Wet Manure Defecated: Tons, 1972 Combined: 134334  
 Nutrients in Wet Manure: Nitrogen, tons 752  
 Phosphorus, tons 134  
 Potash, tons 572

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1043	
1969		376	120
1972		350	200

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 564 2556  
 Nutrients in Wet Manure: Nitrogen, Tons 8 18  
 Phosphorus, Tons 1 3  
 Potash, Tons 6 15

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		21077		
1969		10028		
1972		16000		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 663  
 Nutrients in Wet Manure: Nitrogen, tons 10  
 Phosphorus, tons 3  
 Potash, tons 2

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	278	29	0	29
GRAINS	3621	310	0	310
Wheat	308	12	0	12
Oats	3206	285	0	285
Barley	88	12	0	12
Rye	16	2	0	2
OTHER FIELD CROPS	12	3	0	3
Soybeans				
Potatoes	12	3	0	3
Sugar beets				
Field beans	530	0	0	0
HAY OR GRASS SILAGE	20731	65	0	65
PASTURED CROPLAND	11299	78	0	78
Cropland used for pasture	10776	78	0	78
Improved pasture	523	0	0	0
VEGETABLES, SWEET CORN, MELONS	13	3	0	3
ORCHARDS	463	54	2	56
BERRIES	35	7	0	7
NURSERY & GREENHOUSE PRODUCTS	36	9	0	9
OTHER CROPS	20	0	0	0
Total Fertilizer Used, Tons		558	2	560
Percent of Fertilizer Used		100	0	100

COUNTY, land area, acres (1) 23,272 Number I-V farms 306  
 Number of farms 422 Acres in I-V farms 20222  
 Acres in farms 104912 Cropland I-V farms 38493  
 Cropland in farms 48933 Harvested cropland  
 Harvested cropland in farms 30476 I-V farms 25320

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	705
Liquid	165
Total	870
Primary Nutrients in Fertilizer	453
Nitrogen	118
Phosphorus	127
Potash	208

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			4237
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2049	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2972		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	179.2	176.2	97.3	452.7
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	434	2	1	2
Cattle: Table 3	134334	752	134	572
Sheep: Table 4	564	8	1	6
Horses: Table 4	2556	18	3	15
Chickens: Table 5	663	10	1	2
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	138551	790	142	697
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	870	118	127	208
Lime: Limestone equivalent purchased or applied, tons: Table 8 4237				
Salts: Applied on all highways, tons: Table 9 2972				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 4-13

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Wisconsin

PLANNING SUBAREA: West 1.1 COUNTY: Douglas

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	90	2.4	20	.3		
Grains	755	3.7	252	2.5		
Hay or Grass Silage	7250	72.6	6050	60.5		
Pastured Cropland	3020	30.2	3020	30.2		
Other Field Crops						
Vegetables	4	.1	4	.2	4	.1
Orchards						
Berries	56	5.6	50	6.3	56	5.6
Nursery, Greenhouse						
Other Crops						
Totals	11185	111.6	9396	100.0	60	5.7
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					20641	220.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	517	37	46	83
1969	322	84	35	119
1972	325	60	60	120
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				868
Nutrients in Wet Manure: Nitrogen, tons				4
Phosphorus, tons				1
Potash, tons				3

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	15770	6859	8911
1969	10205	4985	5220
1972	11000	3000	8000
Wet Manure Factor: Tons Per Animal		13.74	6.45
Wet Manure Defecated: Tons, 1972		39420	51600
Wet Manure Defecated: Tons, 1972 Combined:		91020	
Nutrients in Wet Manure: Nitrogen, tons		510	
Phosphorus, tons		91	
Potash, tons		455	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1000	
1969		457	187
1972		450	500
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		724	6390
Nutrients in Wet Manure: Nitrogen, Tons		10	44
Phosphorus, Tons		2	6
Potash, Tons		7	38

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		14390		
1969		13849		
1972		21000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		870		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		44		
Phosphorus, tons		3		
Potash, tons		3		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	83	4	0	4
GRAINS	1700	228	0	228
Wheat	51	7	0	7
Oats	1579	210	0	210
Barley	45	6	0	6
Rye	0	0	0	0
OTHER FIELD CROPS	11	7	0	7
Soybeans	0	0	0	0
Potatoes	11	7	0	7
Sugar beets	0	0	0	0
Field beans	258	0	0	0
HAY OR GRASS SILAGE	19249	101	0	101
PASTURED CROPLAND	10469	98	0	98
Cropland used for pasture	9258	68	0	68
Improved pasture	1211	30	0	30
VEGETABLES, SWEET CORN, MELONS	4	1	0	1
ORCHARDS	0	0	0	0
BERRIES	56	6	0	6
NURSERY & GREENHOUSE PRODUCTS	34	26	0	26
OTHER CROPS	3	0	0	0
Total Fertilizer Used, Tons		471	0	471
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	592
Liquid	139
Total	731
Primary Nutrients in Fertilizer	380
Nitrogen	99
Phosphorus	106
Potash	175

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			2825
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2362	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
	3426	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	111.6	100.0	5.7	220.3
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	868	4	1	3
Cattle: Table 3	91020	510	91	455
Sheep: Table 4	724	10	2	7
Horses: Table 4	6390	44	6	38
Chickens: Table 5	870	44	3	3
Turkeys: Table 5				
Total from Livestock, Tons	99872	582	103	506
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	731	99	106	175
Lime: Limestone equivalent purchased or applied, tons: Table 8	2825			
Salts: Applied on all highways, tons: Table 9				
	3426			

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Wisconsin

PLANNING SUBAREA: West 1.1 COUNTY: Iron

TABLE 4-14

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	225	6.1	50	.7		
Grains	484	2.4	161	1.6		
Hay or Grass Silage	1560	15.6	1300	13.0		
Pastured Cropland	522	5.2	522	5.2		
Other Field Crops	225	6.7	250	28.7	250	37.5
Vegetables	3	.1	3	.2	3	.1
Orchards						
Berries	1	0	1	.1	1	.1
Nursery, Greenhouse						
Other Crops						
Totals	3020	36.1	2287	49.5	254	37.7
Total Herbicides, Insecticides, Fungicides: 100 lbs					5561	123.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	35	2	1	3
1969	3	0	0	0
1972	30	10	10	20

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 145  
 Nutrients in Wet Manure: Nitrogen, tons 1  
 Phosphorus, tons 0  
 Potash, tons 1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	2640	1238	1402
1969	1753	935	818
1972	2000	900	1100

Wet Manure Factor: Tons Per Animal 13.14  
 Wet Manure Defecated: Tons, 1972 11826  
 Wet Manure Defecated: Tons, 1972 Combined: 18921  
 Nutrients in Wet Manure: Nitrogen, tons 106  
 Phosphorus, tons 19  
 Potash, tons 95

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		0	
1969		0	48
1972		0	200

Wet Manure Factor: Tons per animal 1.61  
 Wet Manure Defecated: Tons, 1972 12.78  
 Wet Manure Defecated: Tons, 1972 2556  
 Nutrients in Wet Manure: Nitrogen, Tons 0  
 Phosphorus, Tons 0  
 Potash, Tons 0

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		2248		
1969		503		
1972		300		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 12  
 Nutrients in Wet Manure: Nitrogen, tons 0  
 Phosphorus, tons 0  
 Potash, tons 0

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	204	17	0	17
GRAINS	706	60	0	60
Wheat	7	0	0	0
Oats	653	60	0	60
Barley	46	0	0	0
Rye	0	0	0	0
OTHER FIELD CROPS	299	264	0	264
Soybeans				
Potatoes	299	264	0	264
Sugar beets				
Field beans	8	0	0	0
HAY OR GRASS SILAGE	2830	5	0	5
PASTURED CROPLAND	1777	11	0	11
Cropland used for pasture	1560	7	0	7
Improved pasture	117	4	0	4
VEGETABLES, SWEET CORN, MELONS	3	0	0	0
ORCHARDS	1	0	0	0
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	0			
OTHER CROPS	0			
Total Fertilizer Used, Tons		357	0	357
Percent of Fertilizer Used		100	0	100

COUNTY, land area, acres (1) 478016  
 Number I-V farms 40  
 Acres in I-V farms 13984  
 Acres in farms 18275  
 Cropland I-V farms 6306  
 Cropland in farms 7835  
 Harvested cropland I-V farms 4063  
 Harvested cropland in farms 5023

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	449
Liquid	105
Total	554
Primary Nutrients in Fertilizer	288
Nitrogen	75
Phosphorus	81
Potash	132

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			820
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2110	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3060		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	36.1	49.5	37.7	123.3
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure	Nitrogen	Phosphorus	Potash	
Swine: Table 2	145	1	0	1
Cattle: Table 3	18921	106	19	95
Sheep: Table 4	0	0	0	0
Horses: Table 4	2556	14	3	13
Chickens: Table 5	12	0	0	0
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	21634	121	22	109
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	554	75	81	132
Lime: Limestone equivalent purchased or applied, tons: Table 8 820				
Salts: Applied on all highways, tons: Table 9 3060				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



#### 4.3 Planning Subarea 1.2

Nine Michigan counties (Alger, Baraga, Chippewa, Houghton, Gogebic, Keweenaw, Luce, Marquette and Ontonagon), all of which border on the south shores of Lake Superior, comprise the planning subarea. Census information for Keweenaw County is not available. Total land area for the other eight counties equals 2,478,600 hectares (6,124,544 acres) with land in farms equaling 118,600 hectares (293,116 acres) or 5 percent of the total land area. National and state forests and recreation areas typify the area.

##### 4.3.1 Agricultural Characteristics

Agriculture tends to be concentrated in selected locations rather than generally spread throughout PSA 1.2. Most of the cropland is used for hay and pasture. Oats is the major grain crop, especially in Chippewa County which grows more oats than the other eight counties combined.

Table 4-15 indicates the relative proportions of materials usage in the planning subarea as compared to the total U.S. Great Lakes Basin.

Table 4-15

#### MATERIALS USAGE BASIN RELATIONSHIP -- PSA 1.2 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 1.2</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	1.16	2.66
Index of chemicals used	44	100
Tons of livestock manure defecated	3.97	3.37
Index of manure defecated	118	100
Lbs primary nutrients in livestock manure	96	82
Index of primary nutrients in manure	117	100
Lbs commercial fertilizer applied	91	321
Percent liquid fertilizer applied	16	22
Index commercial fertilizer applied	28	100
Lbs primary nutrients in commercial fertilizer	45	153
Index primary nutrients in commercial fertilizer	29	100
Lbs of lime applied	174	170
Index of lime used	102	100
<hr/>		
<u>Per acre of total land area</u>		
Lbs road salts used	15.08	41.74
Index road salts used	36	100
<hr/>		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

### 4.3.2 Materials Usage

The following table summarizes by county the material usage inventory for PSA 1.2. Tables 4-17 to 4-25 display detailed information.

Table 4-16  
MATERIALS USAGE  
(in 1972)

PSA 1.2	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>Michigan</u>					
Alger	56	37,220	282	1,565	5,909
Baraga	49	28,625	226	1,008	4,529
Chippewa	311	116,677	1,237	1,750	9,844
Gogebic	28	16,673	-----	490	5,142
Houghton	289	46,598	1,206	490	3,524
Keweenaw	---	-----	-----	-----	517
Luce	84	14,338	149	68	1,820
Marquette	116	33,925	632	711	8,221
Ontonagon	102	58,704	238	1,655	7,194
TOTAL	1,035	352,890	4,040	7,737	46,700

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 4.3.2.1 Agricultural Chemicals

There were 47,000 kilograms (103,500 pounds) of agricultural chemicals used in PSA 1.2. Herbicides represented 39 percent of the total, insecticides 44 percent, and fungicides 17 percent. The increased use of fungicide compared to PSA 1.1 was primarily for potatoes grown in Houghton and Marquette Counties. Herbicide use may increase about 10-15 percent in the next 10 years and fungicide use about 5-12 percent. Insecticide use on grain and forage crops may increase 30-40 percent in the next 5 years but decrease below present levels within 10 years.

#### 4.3.2.2 Animal Wastes

There were 15,500 head of cows and heifers calved, and 14,800 head of other cattle in 1972. Cattle defecates 85 percent of the manure, horses 13 percent, and chickens and sheep 1 percent each. There were 320,136 metric tons (352,890 tons) of wet manure produced from livestock in PSA 1.2. This represents 30 percent of the total livestock manure produced in the Lake Superior basin. Nitrogen, phosphorus, and potash combined comprise 1.2 percent of the total manure tonnage. It is expected that livestock numbers will not change significantly in the next 10 years. If there are changes, it is most likely that the numbers will experience some decline. The manure production will continue at about the present levels or decline if livestock numbers continue to decrease.

TABLE 4-17

**GREAT LAKES BASIN MATERIAL USAGE INVENTORY**  
 Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds  
 PLANNING AREA: Lake Superior 1.0 STATE: Michigan  
 PLANNING SUBAREA: East 1.2 COUNTY: 9 County Totals (1)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	8358	41	2786	27	0	
Hay or Grass Silage	20814	207	17345	174	0	
Pastured Cropland	12333	121	12333	121	0	
Other Field Crops	1068	31	1187	136	1187	177
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	42573	400	33651	458	1187	177
Total Herbicides, Insecticides, Fungicides: 100 lbs					77411	1035

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1306	102	36	138
1969	1138	116	127	243
1972	1123	114	130	244
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 1764				
Nutrients in Wet Manure: Nitrogen, tons 9				
Phosphorus, tons 2				
Potash, tons 7				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	39919	21088	18831
1969	27688	14158	13530
1972	30300	15500	14800
Wet Manure Factor: Tons Per Animal 13.14			
Wet Manure Defecated: Tons, 1972 203670			
Wet Manure Defecated: Tons, 1972 Combined: 299130			
Nutrients in Wet Manure: Nitrogen, tons 1674			
Phosphorus, tons 301			
Potash, tons 1196			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2035	
1969		3221	895
1972		2637	3503
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 4245 44768			
Nutrients in Wet Manure: Nitrogen, Tons 59 309			
Phosphorus, Tons 8 45			
Potash, Tons 41 268			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		108438		
1969		61760		
1972		72000		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 2983				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 46				
Phosphorus, tons 74				
Potash, tons 10				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (2)	6124544	Number I-V farms	665	
Number of farms	1239	Acres in I-V farms	203152	
Acres in farms	293116	Cropland I-V farms	114909	
Cropland in farms	159739	Harvested cropland I-V farms	70055	
Harvested cropland in farms	88955			
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	528	67	1	68
GRAINS	13328	1229	8	1237
Wheat	135	12	1	13
Oats	1214	1113	7	1120
Barley	352	31	0	31
Rye	266	29	0	29
OTHER FIELD CROPS	1275	591	0	591
Soybeans	0	0	0	0
Potatoes	1193	508	0	508
Sugar beets				
Field beans	785	76	1	77
HAY OR GRASS SILAGE	54208	317	0	317
PASTURED CROPLAND	35745	231	0	231
Cropland used for pasture	34406	215	0	215
Improved pasture	1339	16	0	16
VEGETABLES, SWEET CORN, MELONS	37	8	0	8
ORCHARDS	67	20	0	20
BERRIES	166	34	1	35
NURSERY & GREENHOUSE PRODUCTS	87	11	0	11
OTHER CROPS	3	0	0	0
Total Fertilizer Used, Tons		2574	11	2525
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	3394
Liquid	616
Total	4010
Primary Nutrients in Fertilizer	1980
Nitrogen	652
Phosphorus	633
Potash	695

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	7647	90	7737
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	23792	20.5
1971-72	27039	23.4
1972-73	32197	25.7
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 46700		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	400	458	177	1035	
Manure: Kind of Livestock					
		Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2		1764	9	2	7
Cattle: Table 3		299130	1674	301	1496
Sheep: Table 4		4245	59	8	41
Horses: Table 4		44768	309	45	268
Chickens: Table 5		2983	46	11	10
Turkeys: Table 5		0			
Total from Livestock, Tons		352890	2097	370	1822
Fertilizers: Tons of Commercial Fertilizers Applied					
		Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7		4010	652	633	695
Lime: Limestone equivalent purchased or applied, tons: Table 8 7737					
Salts: Applied on all highways, tons: Table 9 46700					

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) The totals are for 8 counties as information for Keweenaw county, Michigan is not available.

(2) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-18

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan

PLANNING SUBAREA: East 1.2 COUNTY: Alger

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	630	3	210	2		
Hay or Grass Silage	1609	16	1311	13		
Pastured Cropland	1107	11	1107	11		
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	3346	30	2658	26		
Total Herbicides, Insecticides, Fungicides: 100 lbs 6004 56						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	69	16	3	19
1969	78	6	11	17
1972	78	6	11	17
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				123
Nutrients in Wet Manure:				
Nitrogen, tons				1
Phosphorus, tons				0
Potash, tons				0

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	3850	1870	1980
1969	3458	1366	2092
1972	3800	1500	2300
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		19710	14835
Wet Manure Defecated: Tons, 1972 Combined:		34545	
Nutrients in Wet Manure: Nitrogen, tons		193	
Phosphorus, tons		35	
Potash, tons		173	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		52	
1969		92	63
1972		92	158
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		148	2019
Nutrients in Wet Manure: Nitrogen, Tons		2	14
Phosphorus, Tons		0	2
Potash, Tons		1	12

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		16758		
1969		8346		
1972		9300		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		385		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		6		
Phosphorus, tons		2		
Potash, tons		1		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	578880	Number I-V farms	63
Number of farms	104	Acres in I-V farms	12683
Acres in farms	25146	Cropland I-V farms	9908
Cropland in farms	13081	Harvested cropland I-V farms	6131
Harvested cropland in farms	6857		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	152	13	0	13
GRAINS	1171	113	0	113
Wheat	0			
Oats	1091	105	0	105
Barley	45	8	0	8
Eye	0	0	0	0
OTHER FIELD CROPS	8	4	0	4
Soybeans				
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	4796	25	0	25
PASTURED CROPLAND	3740	16	0	16
Cropland used for pasture	3423	14	0	14
Improved pasture	317	2	0	2
VEGETABLES, SWEET CORN, MELONS	0	0	0	0
ORCHARDS	7	0	0	0
BERRIES	24	4	0	4
NURSERY & GREENHOUSE PRODUCTS	11	1	0	1
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		176	0	176
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	237
Liquid	45
Total	282
Primary Nutrients in Fertilizer	138
Nitrogen	46
Phosphorus	44
Potash	48

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1565	0	1565
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3151	25.7
1971-72	3229	26.5
1972-73	4074	31.1
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5909		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
	Herbicides	Insecticides	Fungicides	Total
Table 1	30	26	0	56
Manure: Kind of Livestock				
		Tons of Materials in Wet Manure Defecated		
		Manure	Nitrogen	Phosphorus
Swine: Table 2		123	1	0
Cattle: Table 3		34545	193	35
Sheep: Table 4		148	2	0
Horses: Table 4		2019	14	2
Chickens: Table 5		385	6	2
Turkeys: Table 5		0	0	0
Total from Livestock, Tons		37220	216	39
Fertilizers: Tons of Commercial Fertilizers Applied				
		Primary Nutrients		
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	282	46	44	48
Lime: Limestone equivalent purchased or applied, tons:				
Table 8		1565		
Salts: Applied on all highways, tons: Table 9 5909				

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 4-19

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan

PLANNING SUBAREA: East 1.2 COUNTY: Baraga

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	240	1	80	1		
Hay or Grass Silage	1307	13	1089	11		
Pastured Cropland	952	10	952	10		
Other Field Crops	9	0	10	1	10	2
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	2508	24	2131	23	10	2
Total Herbicides, Insecticides, Fungicides: 100 lbs 4249 49						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	10	2	0	2
1969	20	0	0	0
1972	20	0	0	0
Wet Manure Factor: Tons per litter farrowed 0				
Wet Manure Defecated: Tons, 1972 0				
Nutrients in Wet Manure: Nitrogen, tons 0				
Phosphorus, tons 0				
Potash, tons 0				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	3363	1897	1466
1969	2107	1232	875
1972	2300	1400	900
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 18396 5805			
Wet Manure Defecated: Tons, 1972 Combined: 24201			
Nutrients in Wet Manure: Nitrogen, tons 135			
Phosphorus, tons 24			
Potash, tons 121			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		7	
1969		5	55
1972		5	331
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 8 4230			
Nutrients in Wet Manure: Nitrogen, Tons 0 29			
Phosphorus, Tons 0 4			
Potash, Tons 0 25			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		3697		
1969		4603		
1972		4500		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 186				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 3				
Phosphorus, tons 1				
Potash, tons 1				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1) 576512				
Number of farms 742				
Acres in farms 24952				
Cropland in farms 10879				
Harvested cropland in farms 5127				
Number I-V farms 147				
Acres in I-V farms 13228				
Cropland I-V farms 6252				
Harvested cropland I-V farms 3100				
CORN	2	0	0	0
GRAINS	566	58	0	58
Wheat				
Oats	493	56	0	56
Barley	73	2	0	2
Rye				
OTHER FIELD CROPS	10	7	0	7
Soybeans				
Potatoes	10	7	0	7
Sugar beets				
Field beans	10	0	0	0
HAY OR GRASS SILAGE	2519	7	0	7
PASTURED CROPLAND	2440	67	0	67
Cropland used for pasture	2202	63	0	63
Improved pasture	238	4	0	4
VEGETABLES, SWEET CORN, MELONS	6	2	0	2
ORCHARDS	11	0	0	0
BERRIES	5	0	0	0
NURSERY & GREENHOUSE PRODUCTS	0			
OTHER CROPS	0			
Total Fertilizer Used, Tons		111	0	111
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	190
Liquid	36
Total	226
Primary Nutrients in Fertilizer	111
Nitrogen	36
Phosphorus	36
Potash	39

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1008	0	1008
Tonages for Other Recent Years -			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2119	20.2
1971-72	3086	29.6
1972-73	3122	28.7
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 4529		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	24	23	2	49
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	0	0	0	0
Cattle: Table 3	24201	135	24	121
Sheep: Table 4	8	0	0	0
Horses: Table 4	4230	29	4	25
Chickens: Table 5	186	3	1	1
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	28625	167	29	147
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	226	36	36	39
Lime: Limestone equivalent purchased or applied, tons: Table 8 1008				
Salts: Applied on all highways, tons: Table 9 4529				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-20

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan  
 PLANNING SUBAREA: East 1.2 COUNTY: Chippewa

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	4572	23	1524	15		
Hay or Grass Silage	9333	23	7778	78		
Pastured Cropland	5068	51	5068	51		
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	18973	167	11370	144		
Total Herbicides, Insecticides, Fungicides: 100 lbs					3334.7	311

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	621	32	9	41
1969	509	66	74	140
1972	500	65	75	140
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 1012				
Nutrients in Wet Manure: Nitrogen, tons 5				
Phosphorus, tons 1				
Potash, tons 4				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	12535	6281	6254
1969	9215	4581	4634
1972	10100	5000	5100
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 65700 32895			
Wet Manure Defecated: Tons, 1972 Combined: 98595			
Nutrients in Wet Manure: Nitrogen, tons 552			
Phosphorus, tons 99			
Potash, tons 493			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1741	
1969		2759	457
1972		2200	1028
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 3542 13138			
Nutrients in Wet Manure: Nitrogen, Tons 50 21			
Phosphorus, Tons 7 13			
Potash, Tons 35 79			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		33400		
1969		8823		
1972		9400		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 390				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 6				
Phosphorus, tons 2				
Potash, tons 7				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)		Number I-V farms 208		
Number of farms 401		Acres in I-V farms 68209		
Acres in farms 96495		Cropland I-V farms 49913		
Cropland in farms 67650		Harvested cropland		
Harvested cropland in farms 39636		I-V farms 31335		
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	24	2	1	3
GRAINS	6375	532	6	538
Wheat	89	8	0	8
Oats	5805	471	6	477
Barley	102	10	0	10
Rye	0			
OTHER FIELD CROPS	10	5	0	5
Soybeans				
Potatoes	5	4	0	4
Sugar beets				
Field beans	666	8	1	9
HAY OR GRASS SILAGE	24533	147	0	147
PASTURED CROPLAND	14858	71	0	71
Cropland used for pasture	14656	71	0	71
Improved pasture	202	0	0	0
VEGETABLES, SWEET CORN, MELONS	0	0	0	0
ORCHARDS	0	0	0	0
BERRIES	3	0	0	0
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		765	8	773
Percent of Fertilizer Used		99	;	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1039
Liquid	198
Total	1237
Primary Nutrients in Fertilizer	606
Nitrogen	200
Phosphorus	194
Potash	212

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1700	50	1750
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3451	13.5
1971-72	4420	17.1
1972-73	6787	25.1
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 9844		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	167	144	0	311
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1012	5	1	4
Cattle: Table 3	98595	552	99	493
Sheep: Table 4	3542	50	7	35
Horses: Table 4	13138	21	13	79
Chickens: Table 5	390	6	2	1
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	116677	704	122	612
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7		Nitrogen	Phosphorus	Potash
	1237	200	194	212
Lime: Limestone equivalent purchased or applied, tons: Table 8 1750				
Salts: Applied on all highways, tons: Table 9 9844				

To Convert From                      To                      Multiply By  
 Pounds (lb)                              Kilograms (kg)                      0.453  
 Acres (acre)                              Hectare (ha)                        .4047  
 Tons (ton)                                 Kilograms (kg)                      907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 4-21

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan

PLANNING SUBAREA: East 1.2 COUNTY: Gogebic

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	120	1	110	0	0	
Hay or Grass Silage	1035	10	862	9	0	
Pastured Cropland	119	1	119	1	0	
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	1604	15	1351	13	-	-
Total Herbicides, Insecticides, Fungicides: 100 lbs 2955 28						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	111	3	2	5
1969	2	0	0	0
1972	0	0	0	0
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 0				
Nutrients in Wet Manure: Nitrogen, tons 0				
Phosphorus, tons 0				
Potash, tons 0				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	2378	1179	1199
1969	1159	657	502
1972	1300	700	600
Wet Manure Factor: Tons Per Animal 13.11 6.45			
Wet Manure Defecated: Tons, 1972 9198 3870			
Wet Manure Defecated: Tons, 1972 Combined: 13068			
Nutrients in Wet Manure: Nitrogen, tons 73			
Phosphorus, tons 13			
Potash, tons 65			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2	
1969		0	112
1972		0	251
Wet Manure Factor: Tons per animal 0 12.78			
Wet Manure Defecated: Tons, 1972 0 3591			
Nutrients in Wet Manure: Nitrogen, Tons 0 25			
Phosphorus, Tons 0 1			
Potash, Tons 0 22			

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		5185		
1969		2000		
1972		3500		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 115				
Nutrients in Wet Manure:				
Nitrogen, tons 2				
Phosphorus, tons 1				
Potash, tons 1				

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	24	4	0	4
GRAINS	229	27	0	27
Wheat				
Oats	213	25	0	25
Barley				
Rye				
OTHER FIELD CROPS	4	1	0	1
Soybeans				
Potatoes	1	1	0	1
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	2321	10	0	10
PASTURED CROPLAND	1054	2	0	2
Cropland used for pasture	1039	2	0	2
Improved pasture	15	0	0	0
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons		44	0	44
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	59
Liquid	11
Total	70
Primary Nutrients in Fertilizer	34
Nitrogen	11
Phosphorus	11
Potash	12

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	490	0	490
Tonnages for Other Recent Years -			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1660	11.5
1971-72	1811	12.9
1972-73	3545	23.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5112		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Table 1	15	13	0	28
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	0	0	0	0
Cattle: Table 3	13068	73	13	65
Sheep: Table 4	0	0	0	0
Horses: Table 4	3591	25	1	22
Chickens: Table 5	115	2	1	1
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	16803	100	18	88
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	70	11	11	12
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	490			
Salts: Applied on all highways, tons: Table 9 5112				

To Convert From                      To                      Multiply By

Pounds (lb)                              Kilograms (kg)                      0.453

Acres (acre)                              Hectare (ha)                        .4047

Tons (ton)                                Kilograms (kg)                      907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-22

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan  
 PLANNING SUBAREA: East 1.2 COUNTY: Houghton

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	1296	6	432	4	0	
Hay or Grass Silage	2625	26	2187	22	0	
Pastured Cropland	1164	12	1164	12	0	
Other Field Crops	639	19	710	82	710	106
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	3324	63	1493	120	710	106
Total Herbicides, Insecticides, Fungicides: 100 lbs						
8527 289						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	37	3	2	5
1969	23	3	5	8
1972	20	3	4	7

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 51  
 Nutrients in Wet Manure: Nitrogen, tons 0  
 Phosphorus, tons 0  
 Potash, tons 0

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	6447	4021	2420
1969	3447	1987	1454
1972	3700	2200	1500

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 28908 9675  
 Wet Manure Defecated: Tons, 1972 Combined: 38583  
 Nutrients in Wet Manure: Nitrogen, tons 216  
 Phosphorus, tons 39  
 Potash, tons 123

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		101	
1969		321	10
1972		300	515

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 483 6582  
 Nutrients in Wet Manure: Nitrogen, Tons 7 45  
 Phosphorus, Tons 1 7  
 Potash, Tons 5 39

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		26005		
1969		19470		
1972		21700		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 899  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 14  
 Phosphorus, tons 4  
 Potash, tons 3

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1) 650880		Number I-V farms 135		
Number of farms	274	Acres in I-V farms 29345		
Acres in farms	45906	Cropland I-V farms 35693		
Cropland in farms	22944	Harvested cropland I-V farms 9863		
Harvested cropland in farms	12782			

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	67	13	0	13
GRAINS	2079	264	1	265
Wheat	21	4	0	4
Oats	1975	248	1	249
Barley	74	10	0	10
Rye	9	1	0	1
OTHER FIELD CROPS	777	368	0	368
Soybeans				
Potatoes	708	358	0	358
Sugar beets				
Field beans	50	0	0	0
HAY OR GRASS SILAGE	6756	23	0	23
PASTURED CROPLAND	1309	16	0	16
Cropland used for pasture	3963	10	0	10
Improved pasture	346	6	0	6
VEGETABLES, SWEET CORN, MELONS	4	0	0	0
ORCHARDS	8	0	0	0
BERRIES	123	28	1	29
NURSERY & GREENHOUSE PRODUCTS	30	10	0	10
OTHER CROPS				
Total Fertilizer Used, Tons		752	2	754
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1013
Liquid	193
Total	1206
Primary Nutrients in Fertilizer	591
Nitrogen	195
Phosphorus	189
Potash	207

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	490	0	490
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1871	16.2
1971-72	2366	20.6
1972-73	2430	19.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3524

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	63	120	106	289

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	51	0	0	0
Cattle: Table 3	38583	216	39	193
Sheep: Table 4	483	7	1	5
Horses: Table 4	6582	45	7	39
Chickens: Table 5	899	14	4	3
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	46598	282	51	240

Fertilizers: Applied on Cropland: Table 7	Tons of Commercial Fertilizers Applied			
	Total	Nitrogen	Phosphorus	Potash
	1206	195	189	207

Lime: Limestone equivalent purchased or applied, tons: Table 8 490  
 Salts: Applied on all highways, tons: Table 9 3524

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 4-23

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan

PLANNING SUBAREA: East 1.2 COUNTY: Keweenaw (Census Information not Tabulated)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains						
Hay or Grass Silage						
Pastured Cropland						
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals						
Total Herbicides, Insecticides, Fungicides: 100 lbs						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964				
1969				
1972				
Wet Manure Factor: Tons per litter farrowed				
Wet Manure Defecated: Tons, 1972				
Nutrients in Wet Manure: Nitrogen, tons				
Phosphorus, tons				
Potash, tons				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964			
1969			
1972			
Wet Manure Factor: Tons Per Animal			
Wet Manure Defecated: Tons, 1972			
Wet Manure Defecated: Tons, 1972 Combined:			
Nutrients in Wet Manure: Nitrogen, tons			
Phosphorus, tons			
Potash, tons			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964			
1969			
1972			
Wet Manure Factor: Tons per animal			
Wet Manure Defecated: Tons, 1972			
Nutrients in Wet Manure: Nitrogen, Tons			
Phosphorus, Tons			
Potash, Tons			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964				
1969				
1972				
Wet Manure Factor: Lbs. per bird				
Wet Manure Defecated: Tons, 1972				
Nutrients in Wet Manure:				
Nitrogen, tons				
Phosphorus, tons				
Potash, tons				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN				
GRAINS				
Wheat				
Oats				
Barley				
Rye				
OTHER FIELD CROPS				
Soybeans				
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE				
PASTURED CROPLAND				
Cropland used for pasture				
Improved pasture				
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons				
Percent of Fertilizer Used				

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	
Liquid	
Total	
Primary Nutrients in Fertilizer	
Nitrogen	
Phosphorus	
Potash	

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73		
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure				
Nitrogen				
Phosphorus				
Potash				
Swine: Table 2				
Cattle: Table 3				
Sheep: Table 4				
Horses: Table 4				
Chickens: Table 5				
Turkeys: Table 5				
Total from Livestock, Tons				
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Nitrogen				
Phosphorus				
Potash				
Applied on Cropland: Table 7				
Lime: Limestone equivalent purchased or applied, tons: Table 8				
Salts: Applied on all highways, tons: Table 9				

To Convert From                      To                      Multiply By

Pounds (lb)                              Kilograms (kg)                      0.453

Acres (acre)                              Hectare (ha)                      .4047

Tons (ton)                                  Kilograms (kg)                      907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-24

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan  
 PLANNING SUBAREA: East 1.2 COUNTY: Lapeer

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	60	0	20	0	0	
Hay or Grass Silage	805	8	671	7	0	
Pastured Cropland	679	7	679	7	0	
Other Field Crops	171	5	190	22	190	28
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	1715	20	1560	36	190	28
Total Herbicides, Insecticides, Fungicides: 100 lbs						
3465 84						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	81	5	8	13
1969	29	2	0	2
1972	25	2	0	2
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 14				
Nutrients in Wet Manure: Nitrogen, tons 0				
Phosphorus, tons 0				
Potash, tons 0				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	1176	817	659
1969	1064	558	506
1972	1200	600	600
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 7884 3870			
Wet Manure Defecated: Tons, 1972 Combined: 11754			
Nutrients in Wet Manure: Nitrogen, tons 66			
Phosphorus, tons 12			
Potash, tons 59			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		21	
1969		22	28
1972		20	173
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 32 2211			
Nutrients in Wet Manure: Nitrogen, Tons 0 15			
Phosphorus, Tons 0 2			
Potash, Tons 0 13			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		5699		
1969		6000		
1972		7900		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 327				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 5				
Phosphorus, tons 1				
Potash, tons 1				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1) 580096				
Number of farms 29				
Number I-V farms 22				
Acres in I-V farms 10536				
Acres in farms 12305				
Cropland in farms 6891				
Harvested cropland I-V farms 2786				
Harvested cropland in farms 3219				
CORN				
GRAINS				
Wheat	286	19	1	20
Oats	23	0	1	1
Barley	161	19	0	19
Rye	50	0	0	0
OTHER FIELD CROPS	52	0	0	0
Soybeans	190	68	0	68
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	2232	0	0	0
PASTURED CROPLAND	1921	0	0	0
Cropland used for pasture	1904	0	0	0
Improved pasture	17	0	0	0
VEGETABLES, SWEET CORN, MELONS	22	5	0	5
ORCHARDS	10	0	0	0
BERRIES	2	0	0	0
NURSERY & GREENHOUSE PRODUCTS	45	0	0	0
OTHER CROPS				
Total Fertilizer Used, Tons		92	1	93
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	125
Liquid	21
Total	149
Primary Nutrients in Fertilizer	73
Nitrogen	24
Phosphorus	23
Potash	26

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	68	0	68
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1116	15.4
1971-72	1117	15.6
1972-73	1255	16.4
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 1820		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	20	36	28	84
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	14	0	0	0
Cattle: Table 3	11754	66	12	59
Sheep: Table 4	32	0	0	0
Horses: Table 4	2211	15	2	13
Chickens: Table 5	327	5	1	1
Turkeys: Table 5	0			
Total from Livestock, Tons	14338	86	15	73
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	149	24	23	26
Lime: Limestone equivalent purchased or applied, tons: Table 8 68				
Salts: Applied on all highways, tons: Table 9 1820				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 4-25

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan

PLANNING SUBAREA: East 1.2 COUNTY: Ontonagon

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	840	4	280	3	0	
Hay or Grass Silage	2985	30	2487	25	0	
Pastured Cropland	1980	20	1980	20	0	
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	5805	54	4747	48	0	0
Total Herbicides, Insecticides, Fungicides: 100 lbs						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	113	11	5	16
1969	129	12	8	20
1972	100	10	10	20
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				145
Nutrients in Wet Manure: Nitrogen, tons				1
Phosphorus, tons				0
Potash, tons				1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	7114	3816	3628
1969	5015	2692	2323
1972	5500	2900	2600
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		38106	16770
Wet Manure Defecated: Tons, 1972 Combined:		54876	
Nutrients in Wet Manure: Nitrogen, tons		307	
Phosphorus, tons		55	
Potash, tons		274	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8	
1969		2	23
1972		0	248
Wet Manure Factor: Tons per animal		0	12.78
Wet Manure Defecated: Tons, 1972		0	3169
Nutrients in Wet Manure: Nitrogen, Tons		0	22
Phosphorus, Tons		0	3
Potash, Tons		0	19

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		10765		
1969		11289		
1972		12400		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		514		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		8		
Phosphorus, tons		2		
Potash, tons		2		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	16	0	0	0
GRAINS	1429	126	0	126
Wheat	1	0	0	0
Oats	1375	121	0	121
Barley	8	1	0	1
Rye	45	5	0	5
OTHER FIELD CROPS	4	2	0	2
Soybeans				
Potatoes	4	2	0	2
Sugar beets				
Field beans	52	0	0	0
HAY OR GRASS SILAGE	8278	9	0	9
PASTURED CROPLAND	5716	8	0	8
Cropland used for pasture	5544	6	0	6
Improved pasture	172	2	0	2
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS	6	2	0	2
BERRIES	8	2	0	2
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons		149	0	149
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	200
Liquid	38
Total	238
Primary Nutrients in Fertilizer	117
Nitrogen	38
Phosphorus	37
Potash	42

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1615	40	1655
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3543	21.3
1971-72	4043	24.6
1972-73	4960	28.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		7194

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	54	48	0	102
Manure: Kind of Livestock				
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	145	1	0	1
Cattle: Table 3	54876	307	55	274
Sheep: Table 4	0			
Horses: Table 4	3169	22	3	19
Chickens: Table 5	514	8	2	2
Turkeys: Table 5	0			
Total from Livestock, Tons	58704	338	60	296
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
	238	Nitrogen	Phosphorus	Potash
Applied on Cropland:				
Table 7	238	38	37	42
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	1655			
Salts: Applied on all highways, tons: Table 9				
				7194

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 4-26

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Superior 1.0 STATE: Michigan

PLANNING SUBAREA: East 1.2 COUNTY: Marquette

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	600	3	200	2	0	
Hay or Grass Silage	1116	11	930	9	0	
Pastured Cropland	634	6	634	6	0	
Other Field Crops	245	7	272	31	272	41
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	2595	27	2036	48	272	41
Total Herbicides, Insecticides, Fungicides: 100 lbs 4903 116						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	401	32	7	39
1969	368	27	29	56
1972	400	28	30	58
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 419				
Nutrients in Wet Manure: Nitrogen, tons 2				
Phosphorus, tons 1				
Potash, tons 2				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	2432	1207	1225
1969	2229	1085	1144
1972	2400	1200	1200
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 15768 7740			
Wet Manure Defecated: Tons, 1972 Combined: 23508			
Nutrients in Wet Manure: Nitrogen, tons 132			
Phosphorus, tons 24			
Potash, tons 118			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		20	
1969		20	178
1972		20	769
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 32 9828			
Nutrients in Wet Manure: Nitrogen, Tons 0 68			
Phosphorus, Tons 0 10			
Potash, Tons 0 59			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		6629		
1969		3229		
1972		3300		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 137				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 2				
Phosphorus, tons 1				
Potash, tons 0				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres <sup>(1)</sup>	1169920			
Number of farms	97			
Acres in farms	27393			
Cropland in farms	10243			
Harvested cropland in farms	5814			
Number I-V farms	46			
Acres in I-V farms	19788			
Cropland I-V farms	7735			
Harvested cropland I-V farms	4497			
CORN	243	35	0	35
GRAINS	1193	90	0	90
Wheat	1	0	0	0
Oats	1031	68	0	68
Barley				
Rye	160	23	0	23
OTHER FIELD CROPS	272	136	0	136
Soybeans				
Potatoes	272	136	0	136
Sugar beets				
Field beans	7	0	0	0
HAY OR GRASS SILAGE	2773	96	0	96
PASTURED CROPLAND	1707	19	0	19
Cropland used for pasture	1675	19	0	19
Improved pasture	32	0	0	0
VEGETABLES, SWEET CORN, MELONS	5	1	0	1
ORCHARDS	25	18	0	18
BERRIES	1	0	0	0
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS	3	0	0	0
Total Fertilizer Used, Tons		395	0	395
Percent of Fertilizer Used		100	0	0

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	531
Liquid	101
Total	632
Primary Nutrients in Fertilizer	310
Nitrogen	102
Phosphorus	99
Potash	109

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	711	0	711
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	6514	39.8
1971-72	6527	40.1
1972-73	5668	32.6
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 8221		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	27	48	41	116
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	419	2	1	2
Cattle: Table 3	23508	132	24	118
Sheep: Table 4	32	0	0	0
Horses: Table 4	9828	68	10	59
Chickens: Table 5	137	2	1	0
Turkeys: Table 5	0			
Total from Livestock, Tons	33925	204	36	179
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	632	102	99	109
Lime: Limestone equivalent purchased or applied, tons: Table 8 711				
Salts: Applied on all highways, tons: Table 9 8221				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

#### 4.3.2.3 Commercial Fertilizers

Currently a total of 3,665 metric tons (4,040 tons) of commercial fertilizers are applied to croplands in PSA 1.1, with primary nutrients representing 1,796 metric tons (1,980 tons) or 49 percent of the total. Nitrogen, phosphorus, and potash are almost equal in tonnages.

There are no factors suggesting major changes in crop production in the next 10 years. The greatest likelihood is that there may be a continuing decrease in agricultural activities. Fertilizer levels therefore are expected to remain constant, although the percent applied in liquid form may increase slightly.

#### 4.3.2.4 Lime

There were 7,018 metric tons (7,737 tons) of lime purchased or applied to croplands in PSA 1.2. This represents 24 percent of the total amount of limestone applied in the Lake Superior basin. Based on present usage rates, liming rates will remain relatively unchanged. Government cost-sharing programs, if operative, will not significantly affect the rates.

#### 4.3.2.5 Salts

It is calculated that 42,357 metric tons (46,700 tons) of road de-icing salts are applied to all highways in PSA 1.2. This represents about 70 percent of all salts applied in the Lake Superior basin. The greater proportion of salts utilized reflects the larger amount of road mileage existing in this area as compared to PSA 1.1 and the increased utilization of this region in winter for recreational and tourist purposes. Road de-icing salts will increase in proportion to road mileage increases. There will be changes and improvements in usage; however, application rates are not likely to increase.

## Section 5

### MATERIALS USAGE IN THE LAKE MICHIGAN BASIN

#### 5.1 Basin Characteristics

The Lake Michigan basin is comprised of 86 counties; 43 in Michigan, 27 in Wisconsin, 10 in Indiana, and 6 in Illinois. The counties have a total land area of 13,043,293 hectares (32,229,536 acres). The northern portion of the area (PSA's 2.1 and 2.4) is over 50 percent forested, with only relatively small, but significant, agricultural areas. In contrast, the southern portion of the area is largely cropland, with minor contributions from forest and pasture lands.

##### 5.1.1 Agricultural Characteristics

The Lake Michigan basin ranks first in agricultural production accounting for about 45 percent of the land in farms in the entire Great Lakes Basin. Livestock production is important. Production levels are projected to remain fairly stable. Planning Subarea 2.1 is a particularly important agricultural area, ranking first in the Great Lakes Basin in the production of beef and dairy products. Related to these levels of livestock production are high levels of feed crop production. The basin produces substantial shares of other crops as well. Over half of the basin's fruit output is grown in this lake basin, primarily in Planning Subareas 2.3 and 2.4. Potato and commercial vegetable production are also significant, and this basin's share is expected to increase.

Table 5-1 indicates the relative proportions of materials usage in the Lake Michigan basin as compared to the total U.S. Great Lakes Basin.

Table 5-1

## MATERIALS USAGE BASIN RELATIONSHIP--LAKE MICHIGAN 2.0 to GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Lake Michigan basin</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.75	2.66
Index of chemicals used	103	100
Tons of livestock manure defecated	3.78	3.37
Index of manure defecated	112	100
Lbs primary nutrient in livestock manure	91	82
Index primary nutrients in manure	110	100
Lbs commercial fertilizer applied	304	321
Percent liquid fertilizer applied	26	22
Index commercial fertilizer applied	94	100
Lbs primary nutrients in commercial fertilizer	147	153
Index primary nutrients in commercial fertilizer	96	100
Lbs of lime applied	183	170
Index of lime applied	107	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	41.0	41.74
Index road salts used	98	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 5.1.2 Materials Usage

An inventory and analysis of materials usage was made based on personal interviews, correspondence and statistics as available from agricultural statistics, census information, state highway departments, universities, private companies, and state and federal agencies.<sup>(1)</sup> Background for the analysis is presented in a later section. Table 5-2 summarizes the findings of this inventory and analysis. Detailed statistics are shown in Table 5-3.

Table 5-2  
MATERIALS USAGE  
(in 1972)

<u>Area</u>	<u>Chemicals Applied to Crops (100 lbs)</u>	<u>Livestock Manure (tons)</u>	<u>Commercial Fertilizer on Cropland (tons)</u>	<u>Limestone Purchased or Applied (tons)</u>	<u>Salts Applied on all Highways (tons)</u>
Lake Michigan basin	207,927	28,607,808	1,147,386	692,732	660,771
PSA 2.1	48,980	10,323,057	234,908	81,475	86,379
PSA 2.2	44,388	5,433,693	348,908	230,117	319,912
PSA 2.3	92,563	10,669,722	487,799	321,666	189,667
PSA 2.4	21,966	2,181,336	75,771	59,474	64,813
-----					
<u>To Convert From</u>	<u>To</u>		<u>Multiply By</u>		
Pounds (lb)	Kilograms (kg)		0.454		
Tons (ton)	Kilograms (kg)		907.2		
	Metric Tons		0.907		

#### 5.1.2.1 Agricultural Chemicals

There was a total of 7,431,300 kilograms (20,792,660 pounds) of agricultural chemicals spread on agricultural lands in the Lake Michigan basin in 1972. Herbicides accounted for 58 percent, insecticides 26 percent, and fungicides 16 percent of the chemicals used. This amounts to 1.25 kilograms (2.75 pounds) of chemicals applied per acre of harvested cropland. Harvested cropland acres represent about 51 percent of all land in farms. Had the total chemical usage been equated in terms of all farmland, 6,001,200 hectares (14,828,769 acres), the rate would have been 0.64 kilograms (1.4 pounds) of chemicals applied per acre. Had it been equated in terms of the total land area, it would have amounted to 0.29 kilograms (0.65 pounds) of chemicals applied per acre.

Herbicide usage is expected to increase about 10 percent and fungicide usage about 5 percent in the next ten years in the basin as a whole. Most chemical authorities expect that insecticide usage may not be greater and perhaps even decrease in the next ten years. However, insecticide usage is expected to increase in the next five years but to decrease progressively after that.

One of the problems concerning the use of chemicals, even if effective in performing their functional roles, is that some residue will remain in the soils. In the case of herbicides, this is known as "carryover" and in the case of insecticides as "persistence." It is believed that the persistence associated with insecticides will be almost entirely eliminated in the future, and that carryover in herbicides will be greatly reduced, if not also eliminated.

#### 5.1.2.2 Animal Wastes

It is calculated that 25,947,280 metric tons (28,607,808 tons) of wet manure are produced annually. Of this amount 80 percent is produced from cattle, 9 percent from horses, 8 percent from swine, and the remaining 3 percent from other types of livestock. Nitrogen, phosphorous and potash combined comprise 1.2 percent of the total manure defecated. Total livestock numbers, and hence manure production levels, are not likely to decrease.

#### 5.1.2.3 Commercial Fertilizers

A total of 1,040,909 metric tons (1,147,386 tons) of commercial fertilizers were applied to crops in the Lake Michigan basin in 1972. Primary nutrients of nitrogen, phosphorus and potash comprise 503,188 metric tons (554,783 tons) or 48 percent of the total tonnage. Nitrogen accounts for 33 percent, phosphorus 30 percent, and potash 37 percent of the primary nutrient content by weight.

Commercial fertilizer use may continue at about present levels. Farming will tend to be concentrated on fewer, but larger farms. Commercial fertilizer use on these larger farms will increase, as will the percent applied in liquid form. Overall, fertilizer rates will probably continue to increase modestly, with the greatest increase in nitrogen usage.

#### 5.1.2.4 Lime

A total of 628,436 metric tons (692,732 tons) of limestone was used in the Lake Michigan basin in 1972. Lime is important in terms of its water quality impacts due to its effects on the pH level of water and subsequent



effects on water's acid-base relationships. The possibility of precipitating phosphorous in the water and altering calcium content are also likely.

The usage of lime is not likely to increase in the future in agricultural operations. This is partially predicated on the expectation that the federal government will not increase its lime cost-sharing agreements with farmers. Even if cost sharing agreement increase, it is not expected to significantly affect usage rates.

#### 5.1.2.5 Salts

Because of severe climatic conditions during winter months and the resultant heavy snowfalls, road de-icing salts are required to keep major roadways open. It is calculated that 599,440 metric tons (660,771 tons) of salts were applied to highways in the Lake Michigan basin in the 1972-1973 winter. The primary impact upon ground and surface waters resulting from road de-icing salts comes from chloride discharges which can, over time, effect the salinity of nearby wells and open water areas. The 1972-1973 application would produce around 445,000 metric tons (490,000 tons) of chlorides. Assuming that chlorides are conservative and that ion exchange between chlorides and various soil types are minimal, most of the chlorides will eventually reach ground and surface water areas.

Road de-icing salts will likely increase in use in approximate proportion to road mileage increases. The so called bare-pavement policy will likely continue to be demanded by the public for major highways. This may be offset by slightly lower or less frequent applications on less traveled highways.



## 5.2 Planning Subarea 2.1

A total of 23 counties, including 20 in Wisconsin and 3 in Michigan, comprise Planning Subarea 2.1. The counties have a total land area of 3,989,800 hectares (9,858,656 acres). Farm land equals 1,772,500 hectares (4,379,800 acres), or 44 percent of the total land area. This subarea is particularly important in agricultural production, particularly in livestock production.

### 5.2.1 Agricultural Characteristics

Corn, oats, and hay or grass silage are the predominant crops in this planning subarea. Potatoes are important in Waushara and Lake County, Wisconsin, and 86 percent of the total orchard acreage in this planning subarea is in Door County, Wisconsin.

Table 5-4 indicates the relative proportions of materials usage in the planning subarea in comparison with the total Great Lakes Basin.

Table 5-4

#### MATERIALS USAGE BASIN RELATIONSHIP--PSA 2.1 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 2.1</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.20	2.66
Index of chemicals used	83	100
Tons of livestock manure defecated	4.64	3.37
Index of manure defecated	138	100
Lbs primary nutrients in livestock manure	108	82
Index of primary nutrients in manure	132	100
Lbs commercial fertilizer applied	211	321
Percent liquid fertilizer applied	19	22
Index commercial fertilizer applied	66	100
Lbs primary nutrients in commercial fertilizer	110	153
Index primary nutrients in commercial fertilizer	72	100
Lbs of lime applied	74	170
Index of lime used	44	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	16.5	41.74
Index road salts used	40	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

### 5.2.2 Materials Usage

The following table summarizes by county the material usage inventory for PSA 2.1. Tables 5-6 to 5-24 display the detailed statistics.

Table 5-5

#### MATERIALS USAGE (in 1972)

PSA 2.1	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>Michigan</u>					
Dickinson	452	48,981	1,839	391	5,773
Iron	174	30,737	771	910	4,767
Menominee	323	228,570	4,035	351	2,587
<u>Wisconsin</u>					
Brown	2,540	847,952	11,376	3,322	5,954
Calumet	2,131	609,582	7,117	1,012	2,706
Door	3,003	346,595	6,990	335	2,548
Florence	128	38,772	885	689	2,737
Fond du Lac	7,252	1,148,132	32,677	7,272	8,363
Forest	120	49,230	691	1,756	4,595
Green Lake	2,230	412,231	11,963	3,783	1,498
Kewaunee	1,531	593,972	8,076	647	2,305
Langlade	2,951	254,828	11,795	9,751	3,511
Manitowoc	3,131	909,692	12,646	1,795	4,148
Marinette	1,110	296,463	6,226	2,090	4,370
Marquette	1,222	207,886	7,361	4,180	1,900
Menominee	-----	-----	-----	-----	-----
Oconto	2,385	600,923	14,401	2,076	4,564
Outagamie	3,778	982,197	25,014	4,753	3,272
Shawano	2,299	457,327	15,483	8,337	3,773
Sheboygan	3,101	727,760	10,863	2,580	6,316
Waupaca	2,539	723,786	15,841	8,556	3,070
Waushara	3,908	284,141	15,538	14,003	2,076
Winnebago	2,672	523,300	13,320	2,886	5,546
<b>TOTAL</b>	<b>48,979</b>	<b>10,323,057</b>	<b>234,908</b>	<b>81,475</b>	<b>86,379</b>
	<u>To Convert From</u>		<u>To</u>		<u>Multiply By</u>
	Pounds (lb)		Kilograms (kg)		0.454
	Tons (ton)		Kilograms (kg)		907.2
			Metric Tons		0.907

#### 5.2.2.1 Agricultural Chemicals

There were 2,221,656 kilograms (4,897,940 pounds) of agricultural chemicals used in 1972. The major use was on crops of corn, hay or grass silage, and grain, with smaller amounts applied to pastured cropland and vegetables. Little is applied to fruit crops. Herbicides represented 53 percent of the total, insecticides 33 percent, and fungicides, 14 percent. Herbicide use may increase about 20 percent in the next 10 years and fungicide use about 10 percent. Insecticide use on grain and forage crops may increase 30-40 percent in the next 5 years, and then decrease to levels around present usage in 10 years.

#### 5.2.2.2 Animal Wastes

Planning Subarea 2.1 ranks first in the Great Lakes in the production of beef and dairy products. There were 478,050 head of cows and heifers calved and 510,050 head of other types of cattle. In 1972, cattle accounted for 93 percent of the livestock manure produced and swine 5 percent. The total livestock manure produced in PSA 2.1 was 9,365,077 metric tons (10,323,057 tons). This represented 36 percent of the total manure produced in the Lake Michigan basin. Ninety-three percent of the manure in PSA 2.1 was produced by cattle, primarily dairy type.

Dairy cow numbers have declined about 20 percent and total cattle numbers 10 percent in the last 8 years. This decline is expected to continue, with manure production decreasing accordingly.

#### 5.2.2.3 Commercial Fertilizers

There were 213,105 metric tons (234,908 tons) of commercial fertilizer applied to croplands in PSA 2.1 in 1972. Primary nutrients represented 110,636 metric tons (121,955 tons) or 52 percent of the total. Nitrogen comprised 26 percent, phosphorus 28 percent, and potash 46 percent of the total amount of primary nutrients applied in the Lake Michigan basin.

Because crop production rates are expected to change only slightly in the next 10 years, usage of commercial fertilizers will remain at about the same level or increase slightly. The percent applied in liquid form may increase slightly.

#### 5.2.2.4 Lime

There were 73,913 metric tons (81,475 tons) of lime purchased or applied in PSA 2.1. This accounts for 12 percent of the total limestone purchased or applied in the Lake Michigan basin.

Liming amounts and rates will remain relatively unchanged. Government cost-sharing programs, if operative will not significantly affect the rates.

#### 5.2.2.5 Salts

There were 78,362 metric tons (86,379 tons) of road de-icing salts applied in PSA 2.1 in 1972-73 representing 13 percent of all road de-icing salts used in the Lake Michigan basin. The amounts of road de-icing salts may increase in proportion to increases in road mileage. However, increasing salt costs will limit expanded usage.









TABLE 5-9

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Door

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	8010	220.2	1780	26.7		
Grains	18128	90.6	6043	60.4		
Hay or Grass Silage	13620	136.2	11350	113.5		
Pastured Cropland	5331	53.3	5331	53.3		
Other Field Crops	180	5.4	200	23.0	200	30.0
Vegetables	764	16.7	764	42.7	764	17.2
Orchards						
Berries	5460	254.7	6070	558.7	6134	1300.3
Nursery, Greenhouse						
Other Crops						
Totals	51493	777.1	31538	878.3	7098	1347.5
Total Herbicides, Insecticides, Fungicides: 100 lbs					90129	3002.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	4587	1036	1036	2072
1969	3679	714	757	1471
1972	3000	800	800	1600
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				11568
Nutrients in Wet Manure: Nitrogen, tons				58
Phosphorus, tons				16
Potash, tons				44

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	37485	20340	17145
1969	31672	16844	14828
1972	34000	16300	17700
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		214182	114165
Wet Manure Defecated: Tons, 1972 Combined:		328347	
Nutrients in Wet Manure: Nitrogen, tons		1839	
Phosphorus, tons		328	
Potash, tons		1642	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		134	
1969		144	376
1972		150	400
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		242	5112
Nutrients in Wet Manure: Nitrogen, tons		3	35
Phosphorus, tons		1	5
Potash, tons		2	31

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		37422		
1969		20170		
1972		32000	---	---
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1326		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		21		
Phosphorus, tons		5		
Potash, tons		5		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	7433	865	25	890
GRAINS	28073	1516	0	1516
Wheat	628	46	0	46
Oats	27049	1455	0	1455
Barley	333	14	0	14
Rye	29	0	0	0
OTHER FIELD CROPS	239	114	0	114
Soybeans	20	3	0	3
Potatoes	218	109	0	109
Sugar beets				
Field beans	357	0	0	0
HAY OR GRASS SILAGE	37340	793	0	793
PASTURED CROPLAND	18324	113	0	113
Cropland used for pasture	17671	105	0	105
Improved pasture	653	8	0	8
VEGETABLES, SWEET CORN, MELONS	764	94	0	94
ORCHARDS	7486	836	35	871
BERRIES	70	23	1	24
NURSERY & GREENHOUSE PRODUCTS	155	86	0	86
OTHER CROPS	10	0	0	0
Total Fertilizer Used, Tons		4440	61	4501
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	5662
Liquid	1328
Total	6990
Primary Nutrients in Fertilizer	3635
Nitrogen	945
Phosphorus	1018
Potash	1672

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			335
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1757	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		2548

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	777.1	878.3	1347.5	3002.9
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	11568	58	16	44
Cattle: Table 3	328347	1839	328	1642
Sheep: Table 4	242	3	1	2
Horses: Table 4	5112	35	5	31
Chickens: Table 5	1326	21	5	5
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	346595	1956	355	1724
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	6990	945	1018	1672
Lime: Limestone equivalent purchased or applied, tons:				
Table 8				335
Salts: Applied on all highways, tons: Table 9				2548

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-10

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Florence

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	540	14.8	120	1.8		
Grains	544	2.7	181	1.8		
Hay or Grass Silage	1710	17.1	1425	14.2		
Pastured Cropland	859	8.5	859	8.5		
Other Field Crops	180	5.4	200	23.0	200	30.0
Vegetables	3	.1	3	.2	3	.1
Orchards						
Berries	0	0	0	0	0	0
Nursery, Greenhouse						
Other Crops						
Totals	3836	48.6	2788	49.5	203	30.1
Total Herbicides, Insecticides, Fungicides: 100 lbs						6827 128.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	61	8	0	8
1969	213	16	63	79
1972	1000	100	100	200
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				1446
Nutrients in Wet Manure: Nitrogen, tons				7
Phosphorus, tons				2
Potash, tons				5

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	4158	2089	2069
1969	3331	1438	1893
1972	3700	1200	2500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		15768	16125
Wet Manure Defecated: Tons, 1972 Combined:		31893	
Nutrients in Wet Manure: Nitrogen, tons		179	
Phosphorus, tons		32	
Potash, tons		159	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		43	
1969		0	74
1972		45	400
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		72	5112
Nutrients in Wet Manure: Nitrogen, Tons		1	35
Phosphorus, Tons		0	5
Potash, Tons		1	31

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		6263		
1969		3683		
1972		6000	---	---
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		249		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		4		
Phosphorus, tons		1		
Potash, tons		1		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	311936	Number I-V farms	68
Number of farms	104	Acres in I-V farms	21753
Acres in farms	27903	Cropland I-V farms	9637
Cropland in farms	13261	Harvested cropland	
Harvested cropland in farms	8522	I-V farms	5738

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	466	65	0	65
GRAINS	1033	118	2	120
Wheat	14	2	0	2
Oats	876	107	2	109
Barley	33	3	0	3
Rye	110	6	0	6
OTHER FIELD CROPS	437	287	0	287
Soybeans				
Potatoes	437	287	0	287
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	3816	78	0	78
PASTURED CROPLAND	3386	19	0	19
Cropland used for pasture	3015	13	0	13
Improved pasture	371	6	0	6
VEGETABLES, SWEET CORN, MELONS	3	1	0	1
ORCHARDS	0	0	0	0
BERRIES	0			
NURSERY & GREENHOUSE PRODUCTS	0			
OTHER CROPS	0			
Total Fertilizer Used, Tons		568	2	570
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	717
Liquid	168
Total	885
Primary Nutrients in Fertilizer	460
Nitrogen	120
Phosphorus	129
Potash	211

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			689
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "g" Mile
1970-71		
1971-72		
1972-73	1887	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		2737

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	48.6	49.5	30.1	128.2
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1446	7	2	5
Cattle: Table 3	31893	179	32	159
Sheep: Table 4	72	1	0	1
Horses: Table 4	5112	35	5	31
Chickens: Table 5	249	4	1	1
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	38772	226	40	197
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	885	120	129	211
Lime: Limestone equivalent purchased or applied, tons: Table 8				689
Salts: Applied on all highways, tons: Table 9				2737

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-11

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Fond du Lac

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	18180	2249.7	18180	272.7		
Grains	30517	152.5	10172	101.7		
Hay or Grass Silage	25740	257.4	21450	214.5		
Pastured Cropland	8861	88.6	8861	88.6		
Other Field Crops	1610	33.1	195	12.4	100	15.0
Vegetables	37092	810.5	37092	2074.6	37092	834.6
Orchards						
Berries	128	8.5	133	13.6	138	23.9
Nursery, Greenhouse						
Other Crops						
Totals	185758	3600.3	96083	2778.1	37330	873.5
Total Herbicides, Insecticides, Fungicides:		100 lbs		319171		7251.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	56537	6648	6279	12927
1969	58673	5935	6125	12060
1972	52000	6000	6300	12300
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				88929
Nutrients in Wet Manure:				
Nitrogen, tons				445
Phosphorus, tons				125
Potash, tons				338

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	108715	58972	49743
1969	98377	51484	46893
1972	10800	49800	58200
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		654372	375390
Wet Manure Defecated: Tons, 1972 Combined:		1029762	
Nutrients in Wet Manure:			
Nitrogen, tons		5767	
Phosphorus, tons		1030	
Potash, tons		5149	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3013	
1969		2260	740
1972		2200	1300
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3542	16614
Nutrients in Wet Manure:			
Nitrogen, Tons		50	115
Phosphorus, Tons		7	17
Potash, Tons		35	100

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		196295		
1969		175214		
1972		224000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		9285		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		145		
Phosphorus, tons		37		
Potash, tons		32		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	80907	9778	1729	11507
GRAINS	55290	2193	24	2217
Wheat	576	23	2	25
Oats	53000	2087	18	2105
Barley	1331	70	5	75
Rye	26	1	0	1
OTHER FIELD CROPS	2279	133	0	133
Soybeans	1914	67	0	67
Potatoes	31	24	0	24
Sugar beets				
Field beans	754	9	0	9
HAY OR GRASS SILAGE	73478	1719	10	1729
PASTURED CROPLAND	35075	143	8	151
Cropland used for pasture	32797	139	8	147
Improved pasture	2278	4	0	4
VEGETABLES, SWEET CORN, MELONS	37092	4227	1035	5262
ORCHARDS	110	6	0	6
BERRIES	49	13	0	13
NURSERY & GREENHOUSE PRODUCTS	22	6	0	6
OTHER CROPS	87	8	0	8
Total Fertilizer Used, Tons		18235	2806	21041
Percent of Fertilizer Used		87	13	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	26468
Liquid	6209
Total	32677
Primary Nutrients in Fertilizer	16992
Nitrogen	4418
Phosphorus	4758
Potash	7816

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			7272
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	5766	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		8363

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3600.3	2778.1	873.5	7251.9
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	88929	445	125	338
Cattle: Table 3	1029762	5767	1030	5149
Sheep: Table 4	3542	50	7	35
Horses: Table 4	16614	115	17	100
Chickens: Table 5	9285	145	37	32
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	1148132	6522	1216	5654
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland:		Nitrogen	Phosphorus	Potash
Table 7	32677	4418	4758	7816
Lime: Limestone equivalent purchased or applied, tons: Table 8 7272				
Salts: Applied on all highways, tons: Table 9 8363				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-12

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Forest

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	225	6.1	50	.7		
Grains	997	4.9	332	3.3		
Hay or Grass Silage	2970	29.7	2475	24.7		
Pastured Cropland	1753	17.5	1753	17.5		
Other Field Crops	45	1.3	50	5.7	50	7.5
Vegetables	2	0	2	.1	2	0
Orchards						
Berries	1	.1	2	.1	2	.3
Nursery, Greenhouse						
Other Crops						
Totals	5993	59.6	4664	52.1	54	7.8
Total Herbicides, Insecticides, Fungicides: 100 lbs 10711 119.5						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	101	12	9	21
1969	113	6	12	18
1972	500	50	50	100
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				723
Nutrients in Wet Manure: Nitrogen, tons				4
Phosphorus, tons				1
Potash, tons				3

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	5813	3161	2652
1969	4652	2277	2375
1972	5000	1900	3100
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		24966	19995
Wet Manure Defecated: Tons, 1972 Combined:		44961	
Nutrients in Wet Manure: Nitrogen, tons		252	
Phosphorus, tons		45	
Potash, tons		225	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		205	
1969		12	286
1972		100	200
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2	18
Nutrients in Wet Manure: Nitrogen, Tons		0	3
Phosphorus, Tons		2	15
Potash, Tons			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		6996		
1969		13594		
1972		20000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		829		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		13		
Phosphorus, tons		3		
Potash, tons		3		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	177	30	0	30
GRAINS	1426	197	5	202
Wheat	0	0	0	0
Oats	1328	188	4	192
Barley	6	0	1	1
Rye				
OTHER FIELD CROPS	128	63	0	63
Soybeans				
Potatoes	128	63	0	63
Sugar beets				
Field beans	44	0	0	0
HAY OR GRASS SILAGE	5049	142	0	142
PASTURED CROPLAND	5861	8	0	8
Cropland used for pasture	5493	7	0	7
Improved pasture	368	1	0	1
VEGETABLES, SWEET CORN, MELONS	2	0	0	0
ORCHARDS	2	0	0	0
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		440	5	445
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	560
Liquid	131
Total	691
Primary Nutrients in Fertilizer:	
Nitrogen	93
Phosphorus	101
Potash	165

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			1756
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3168	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4595

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	59.6	52.1	7.8	119.5
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	723	4	1	3
Cattle: Table 3	44961	252	45	225
Sheep: Table 4	161	2	0	2
Horses: Table 4	2556	18	3	15
Chickens: Table 5	829	13	3	3
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	49230	289	52	248
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland:				
Table 7	691	93	101	165
Lime: Limestone equivalent purchased or applied, tons:				
Table 8				1756
Salts: Applied on all highways, tons: Table 9				
				4595

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.











TABLE 5-17

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Marinette

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	14850	408.3	3300	49.5		
Grains	7463	37.3	2488	24.8		
Hay or Grass Silage	11280	112.8	9400	94.0		
Pastured Cropland	5678	56.7	5678	56.7		
Other Field Crops	170	4.3	100	11.5	100	15.0
Vegetables	2313	50.5	2313	129.4	2313	52.0
Orchards						
Berries	22	2.0	21	2.4	23	2.8
Nursery, Greenhouse						
Other Crops						
Totals	41776	671.9	23300	368.3	2436	69.8
Total Herbicides, Insecticides, Fungicides: 100 lbs 67512 1110.0						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	4668	955	929	1884
1969	3981	814	803	1617
1972	3700	850	850	1700
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				12291
Nutrients in Wet Manure: Nitrogen, tons				61
Phosphorus, tons				17
Potash, tons				47

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	34389	19069	15320
1969	27155	14393	12762
1972	28300	13800	14500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		181332	93525
Wet Manure Defecated: Tons, 1972 Combined:		274857	
Nutrients in Wet Manure: Nitrogen, tons		1539	
Phosphorus, tons		275	
Potash, tons		1374	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		470	
1969		226	361
1972		225	600
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		362	7668
Nutrients in Wet Manure: Nitrogen, Tons		5	53
Phosphorus, Tons		1	8
Potash, Tons		4	46

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		35138		
1969		21590		
1972		31000	---	---
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1285		
Nutrients in Wet Manure: Nitrogen, tons		20	Combined	
Phosphorus, tons		5		
Potash, tons		4		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	11955	1518	77	1595
GRAINS	12804	1175	0	1175
Wheat	114	6	0	6
Oats	12461	1160	0	1160
Barley	119	8	0	8
Rye	47	1	0	1
OTHER FIELD CROPS	250	96	0	96
Soybeans	50	0	0	0
Potatoes	200	94	0	94
Sugar beets				
Field beans	737	4	0	4
HAY OR GRASS SILAGE	25429	598	0	598
PASTURED CROPLAND	17719	110	4	114
Cropland used for pasture	16937	98	4	102
Improved pasture	782	12	0	12
VEGETABLES, SWEET CORN, MELONS	2313	318	79	397
ORCHARDS	6	0	0	0
BERRIES	18	3	0	3
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	118	27	0	27
Total Fertilizer Used, Tons		3849	160	4009
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	5043
Liquid	1183
Total	6226
Primary Nutrients in Fertilizer	3238
Nitrogen	842
Phosphorus	907
Potash	1489

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			2090
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3013	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4370

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
	Herbicides	Insecticides	Fungicides	Total
Table 1	671.9	368.3	69.8	1110.0
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	12291	61	17	47
Cattle: Table 3	274857	1539	275	1374
Sheep: Table 4	362	5	1	4
Horses: Table 4	7668	53	8	46
Chickens: Table 5	1285	20	5	4
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	296463	1678	306	1475
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7		Nitrogen	Phosphorus	Potash
	6226	842	907	1489
Lime: Limestone equivalent purchased or applied, tons: Table 8				2090
Salts: Applied on all highways, tons: Table 9				4370

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-18

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Marquette

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	20610	566.7	4580	68.7		
Grains	3445	17.2	1148	11.4		
Hay or Grass Silage	7230	72.3	6025	60.2		
Pastured Cropland	3389	33.8	3389	33.8		
Other Field Crops	755	18.2	378	40.4	350	52.5
Vegetables	2368	51.7	2368	132.4	2368	53.3
Orchards						
Berries	25	1.8	26	2.7	27	4.6
Nursery, Greenhouse						
Other Crops						
Totals	37822	761.7	17914	349.6	2745	110.4
Total Herbicides, Insecticides, Fungicides: 100 lbs					58481	1221.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	14435	2070	1882	3952
1969	14030	1680	1560	3240
1972	12500	1250	1300	2550
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				18436
Nutrients in Wet Manure: Nitrogen, tons				92
Phosphorus, tons				26
Potash, tons				70

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	20979	9799	11180
1969	18873	8405	10468
1972	20500	7000	13500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		91980	87075
Wet Manure Defecated: Tons, 1972 Combined:		179055	
Nutrients in Wet Manure: Nitrogen, tons		1003	
Phosphorus, tons		179	
Potash, tons		895	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2692	
1969		3077	375
1972		2200	400
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3542	5112
Nutrients in Wet Manure: Nitrogen, Tons		50	35
Phosphorus, Tons		7	5
Potash, Tons		35	31

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		73264		
1969		30158		
1972		42000	---	---
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1741		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		27		
Phosphorus, tons		7		
Potash, tons		6		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	16598	1904	330	2234
GRAINS	6649	479	0	479
Wheat	183	6	0	6
Oats	5883	453	0	453
Barley	0	0	0	0
Rye	569	19	0	19
OTHER FIELD CROPS	2649	584	10	594
Soybeans	273	25	0	25
Potatoes	281	17	10	27
Sugar beets				
Field beans	601	0	0	0
HAY OR GRASS SILAGE	21173	446	1	447
PASTURED CROPLAND	11725	77	1	78
Cropland used for pasture	9789	75	1	76
Improved pasture	1936	2	0	2
VEGETABLES, SWEET CORN, MELONS	2368	767	25	792
ORCHARDS	20	0	0	0
BERRIES	11	4	0	4
NURSERY & GREENHOUSE PRODUCTS	516	100	12	112
OTHER CROPS	4	0	0	0
Total Fertilizer Used, Tons		4361	379	4740
Percent of Fertilizer Used		92	8	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	5963
Liquid	1398
Total	7361
Primary Nutrients in Fertilizer	3828
Nitrogen	995
Phosphorus	1072
Potash	1761

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			4180
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1310	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		1900

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	761.7	349.6	110.4	1221.7
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	18436	92	26	70
Cattle: Table 3	179055	1003	179	895
Sheep: Table 4	3542	50	7	35
Horses: Table 4	5112	35	5	31
Chickens: Table 5	1741	27	7	6
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	207886	1207	224	1037
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	7361	995	1072	1761
Lime: Limestone equivalent purchased or applied, tons: Table 8				4180
Salts: Applied on all highways, tons: Table 9				1900

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-19

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Menominee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains						
Hay or Grass Silage						
Pastured Cropland						
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals						
Total Herbicides, Insecticides, Fungicides: 100 lbs						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964				
1969				
1972				

Wet Manure Factor: Tons per litter farrowed  
 Wet Manure Defecated: Tons, 1972  
 Nutrients in Wet Manure: Nitrogen, tons  
 Phosphorus, tons  
 Potash, tons

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964			
1969			
1972	42000	23050	18950

Wet Manure Factor: Tons Per Animal  
 Wet Manure Defecated: Tons, 1972  
 Wet Manure Defecated: Tons, 1972 Combined:  
 Nutrients in Wet Manure: Nitrogen, tons  
 Phosphorus, tons  
 Potash, tons

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964			
1969			
1972			200

Wet Manure Factor: Tons per animal  
 Wet Manure Defecated: Tons, 1972  
 Nutrients in Wet Manure: Nitrogen, tons  
 Phosphorus, tons  
 Potash, tons

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964				
1969				
1972				

Wet Manure Factor: lbs. per bird  
 Wet Manure Defecated: Tons, 1972  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons  
 Phosphorus, tons  
 Potash, tons

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)		Number I-V Farms		
Number of farms		Acres in I-V farms		
Acres in farms		Cropland I-V farms		
Cropland in farms		Harvested cropland		
Harvested cropland in farms		I-V farms		
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
OSDN				
GRAINS				
Wheat				
Oats				
Barley				
Rye				
OTHER FIELD CROPS				
Soybeans				
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE				
PASTURED CROPLAND				
Cropland used for pasture				
Improved pasture				
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons				
Percent of Fertilizer Used				

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	
Liquid	
Total	
Primary Nutrients in Fertilizer	
Nitrogen	
Phosphorus	
Potash	

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73		
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Swine: Table 2	Manure	Nitrogen	Phosphorus	Potash
Cattle: Table 3				
Sheep: Table 4				
Horses: Table 4				
Chickens: Table 5				
Turkeys: Table 5				
Total from Livestock, Tons				
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7				
Lime: Limestone equivalent purchased or applied, tons: Table 8				
Salts: Applied on all highways, tons: Table 9				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-20

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin  
 PLANNING SUBAREA: Northwest 2.1 COUNTY: Oconto

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	31770	873.6	7060	105.9		
Grains	12720	63.6	4240	42.4		
Hay or Grass Silage	18150	181.5	15125	151.2		
Pastured Cropland	8537	85.3	8537	85.3		
Other Field Crops	220	6.2	202	23.0	200	30.0
Vegetables	2160	156.4	2160	400.5	2160	161.1
Orchards						
Berries	57	5.2	53	6.3	58	7.1
Nursery, Greenhouse						
Other Crops						
Totals	78614	1371.8	42377	814.6	7418	198.2
Total Herbicides, Insecticides, Fungicides: 100 lbs				128409		2384.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	8183	1663	1573	3236
1969	8829	1207	1251	2458
1972	7900	1400	1400	2800
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				20244
Nutrients in Wet Manure: Nitrogen, tons				101
Phosphorus, tons				28
Potash, tons				77

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	63569	36358	27211
1969	53423	29379	24044
1972	58000	29700	28300
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		390258	182535
Wet Manure Defecated: Tons, 1972 Combined:		572793	
Nutrients in Wet Manure: Nitrogen, tons		3208	
Phosphorus, tons		573	
Potash, tons		2864	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		831	
1969		687	554
1972		500	300
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		805	3834
Nutrients in Wet Manure: Nitrogen, Tons		11	26
Phosphorus, Tons		2	4
Potash, Tons		8	23

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		54008		
1969		38175		
1972		48000	2000	20000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		1990		
Nutrients in Wet Manure: Combined		1257		
Nitrogen, tons		20		
Phosphorus, tons		8		
Potash, tons		7		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	28754	1776	347	4123
GRAINS	23497	2081	6	2089
Wheat	93	9	0	9
Oats	23042	2056	6	2062
Barley	141	11	0	11
Rye	136	1	0	1
OTHER FIELD CROPS	433	169	0	169
Soybeans	0			
Potatoes	242	132	0	132
Sugar beets				
Field beans	736	3	0	3
HAY OR GRASS SILAGE	47844	1483	9	1492
PASTURED CROPLAND	29509	277	9	286
Cropland used for pasture	28301	256	9	265
Improved pasture	1208	21	0	21
VEGETABLES, SWEET CORN, MELONS	7160	1030	67	1097
ORCHARDS	14	1	0	1
BERRIES	47	11	0	11
NURSERY & GREENHOUSE PRODUCTS	0			
OTHER CROPS	2	2	0	2
Total Fertilizer Used, Tons		8835	438	9273
Percent of Fertilizer Used		95	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	11665
Liquid	2736
Total	14401
Primary Nutrients in Fertilizer	7489
Nitrogen	1947
Phosphorus	2097
Potash	3445

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			2076
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "r" Mile
1970-71		
1971-72		
1972-73	3147	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4564

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1371.8	814.6	198.2	2384.6
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	20244	101	88	77
Cattle: Table 3	572793	3208	573	2864
Sheep: Table 4	805	11	2	8
Horses: Table 4	3834	26	4	23
Chickens: Table 5	1990	31	8	7
Turkeys: Table 5	1257	20	5	4
Total from Livestock, Tons	600923	3397	680	2983
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	14401	1947	2097	3445
Lime: Limestone equivalent purchased or applied, tons: Table 8				
				2076
Salts: Applied on all highways, tons: Table 9				4564

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-22

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin  
 PLANNING SUBAREA: Northwest 2.1 COUNTY: Shawano

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	42660	1173.1	9480	142.2		
Grains	20733	103.6	6911	69.1		
Hay or Grass Silage	26610	266.1	22175	221.7		
Pastured Cropland	9421	94.2	9421	94.2		
Other Field Crops	175	4.8	150	17.2	150	22.5
Vegetables	851	18.6	851	47.6	851	19.1
Orchards						
Berries	15	1.2	15	1.7	16	2.5
Nursery, Greenhouse						
Other Crops						
Totals	100465	1661.6	49003	593.7	1017	44.1
Total Herbicides, Insecticides, Fungicides:		100 lbs		150485		2299.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	14405	2553	2157	4710
1969	9576	1825	1714	3539
1972	8200	1650	1650	3300

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 23859  
 Nutrients in Wet Manure: Nitrogen, tons 119  
 Phosphorus, tons 33  
 Potash, tons 91

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	92333	54323	38010
1969	76920	43442	33478
1972	42000	23050	18950

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 302877 122228  
 Wet Manure Defecated: Tons, 1972 Combined: 425105  
 Nutrients in Wet Manure: Nitrogen, tons 2381  
 Phosphorus, tons 425  
 Potash, tons 2126

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1318	
1969		619	566
1972		500	400

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 805 5112  
 Nutrients in Wet Manure: Nitrogen, Tons 11 35  
 Phosphorus, Tons 2 5  
 Potash, Tons 8 31

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		80089		
1969		49332		
1972		59000	---	---

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 2446  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 38  
 Phosphorus, tons 10  
 Potash, tons 9

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	33316	3938	311	4249
GRAINS	31132	2875	10	2885
Wheat	237	24	0	24
Oats	30556	2828	10	2838
Barley	195	18	0	18
Rye	104	5	0	5
OTHER FIELD CROPS	177	73	0	73
Soybeans	47	4	0	4
Potatoes	128	66	0	66
Sugar beets				
Field beans	440	5	0	5
HAY OR GRASS SILAGE	70370	2324	2	2326
PASTURED CROPLAND	35227	295	0	295
Cropland used for pasture	32967	292	0	292
Improved pasture	2260	3	0	3
VEGETABLES, SWEET CORN, MELONS	851	126	9	135
ORCHARDS	9	1	0	1
BERRIES	9	1	0	1
NURSERY & GREENHOUSE PRODUCTS	21	0	0	0
OTHER CROPS	17	0	0	0
Total Fertilizer Used, Tons		9638	332	9970
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12542
Liquid	2941
Total	15483
Primary Nutrients in Fertilizer	8051
Nitrogen	2093
Phosphorus	2254
Potash	3704

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			8337

Tonnages for Other Recent Years

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2601	

Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3773

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1661.6	593.7	44.1	2299.4

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	23859	119	33	91
Cattle: Table 3	425105	2381	425	2126
Sheep: Table 4	805	11	2	8
Horses: Table 4	5112	35	5	31
Chickens: Table 5	2446	38	10	9
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	457327	2584	475	2265

Fertilizers:	Tons of Commercial Fertilizers Applied				
	Item	Total	Primary Nutrients Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7		15483	2093	2254	3704

Lime: Limestone equivalent purchased or applied, tons: Table 8 8337  
 Salts: Applied on all highways, tons: Table 9 3773

To Convert From: Pounds (lb), Acres (acre), Tons (ton)  
 To: Kilograms (kg), Hectare (ha), Kilograms (kg)  
 Multiply By: 0.453, .4047, 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-23

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Sheboygan

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	42570	1170.6	9460	141.9		
Grains	22328	111.6	7443	74.4		
Hay or Grass Silage	21840	218.4	18200	182.0		
Pastured Cropland	5984	59.8	5984	59.8		
Other Field Crops	205	4.5	60	5.8	50	7.5
Vegetables	10203	222.9	10203	570.7	10203	229.6
Orchards						
Berries	109	5.4	121	11.2	122	25.2
Nursery, Greenhouse						
Other Crops						
Totals	103239	1793.2	51471	1045.8	103275	262.3
Total Herbicides, Insecticides, Fungicides:		100 lbs		165085		3101.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	18745	3647	3398	7045
1969	16416	2600	2678	5278
1972	14500	3000	3100	6100
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				44103
Nutrients in Wet Manure: Nitrogen, tons				221
Phosphorus, tons				62
Potash, tons				168

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	74099	39909	34190
1969	66203	34637	31566
1972	70000	33000	37000
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		433620	238650
Wet Manure Defecated: Tons, 1972 Combined:		672270	
Nutrients in Wet Manure: Nitrogen, tons		3765	
Phosphorus, tons		672	
Potash, tons		3361	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1813	
1969		850	946
1972		500	400
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		805	5112
Nutrients in Wet Manure: Nitrogen, Tons		11	35
Phosphorus, Tons		2	5
Potash, Tons		8	31

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		151595		
1969		102122		
1972		132000	---	---
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		5471		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		85		
Phosphorus, tons		22		
Potash, tons		19		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	34835	3482	239	3721
GRAINS	36541	1152	3	1155
Wheat	1402	57	0	57
Oats	34573	1072	3	1075
Barley	229	15	0	15
Rye	55	1	0	1
OTHER FIELD CROPS	306	25	0	25
Soybeans	189	14	0	14
Potatoes	32	7	0	7
Sugar beets				
Field beans	779	6	0	6
HAY OR GRASS SILAGE	61198	755	7	762
PASTURED CROPLAND	23321	95	4	99
Cropland used for pasture	21991	91	4	95
Improved pasture	1330	4	0	4
VEGETABLES, SWEET CORN, MELONS	10203	1141	61	1202
ORCHARDS	142	16	1	17
BERRIES	7	1	0	1
NURSERY & GREENHOUSE PRODUCTS	14	5	0	5
OTHER CROPS	29	2	0	2
Total Fertilizer Used, Tons		6680	315	6995
Percent of Fertilizer Used		95	5	0

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	8799
Liquid	2064
Total	10863
Primary Nutrients in Fertilizer	5649
Nitrogen	1469
Phosphorus	1582
Potash	2598

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			2580
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4355	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		6316

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1793.2	1045.8	262.3	3101.3
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Swine: Table 2	44103	221	62	168
Cattle: Table 3	672270	3765	672	3361
Sheep: Table 4	805	11	2	8
Horses: Table 4	5112	35	5	31
Chickens: Table 5	5471	85	22	19
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	727761	4117	763	3587
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	10863	5649	1582	2598
Lime: Limestone equivalent purchased or applied, tons: Table 8				
				2580
Salts: Applied on all highways, tons: Table 9				
				6316

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.





TABLE 5-25

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Waushara

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	27630	759.8	6140	92.1		
Grains	4592	22.9	1531	15.3		
Hay or Grass Silage	10200	102.0	8500	85.0		
Pastured Cropland	4774	47.7	4774	47.7		
Other Field Crops	2930	81.1	2542	287.9	2500	375.0
Vegetables	19721	430.9	19721	1103.0	19721	433.7
Orchards						
Berries	77	7.6	69	8.7	77	7.8
Nursery, Greenhouse						
Other Crops						
Totals	69924	1452.0	43277	1639.7	22298	816.5
Total Herbicides, Insecticides, Fungicides: 100 lbs					139499	3908.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	13550	1882	1818	3700
1969	8944	1359	1418	2777
1972	6500	1400	1450	2850
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				20606
Nutrients in Wet Manure:				
Nitrogen, tons				103
Phosphorus, tons				29
Potash, tons				78

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	30238	14928	15310
1969	26216	11793	14423
1972	27500	12000	15500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		157680	99975
Wet Manure Defecated: Tons, 1972 Combined:		257655	
Nutrients in Wet Manure:			
Nitrogen, tons		1443	
Phosphorus, tons		258	
Potash, tons		1288	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		994	
1969		780	372
1972		700	200
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1127	2556
Nutrients in Wet Manure:			
Nitrogen, Tons		16	18
Phosphorus, Tons		2	3
Potash, Tons		11	15

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		69518		
1969		40570		
1972		53000	---	---
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		2197		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		34		
Phosphorus, tons		9		
Potash, tons		8		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	25206	3181	652	3833
GRAINS	10297	701	9	710
Wheat	79	7	0	7
Oats	9212	651	7	658
Barley	10	0	0	0
Rye	938	41	2	43
OTHER FIELD CROPS	2128	891	96	987
Soybeans	606	63	1	64
Potatoes	1512	825	95	920
Sugar beets				
Field beans	1681	12	0	12
HAY OR GRASS SILAGE	24213	560	0	560
PASTURED CROPLAND	14847	77	4	81
Cropland used for pasture	13685	66	4	70
Improved pasture	1162	11	0	11
VEGETABLES, SWEET CORN, MELONS	19721	3545	241	3786
ORCHARDS	1	0	0	0
BERRIES	76	20	4	24
NURSERY & GREENHOUSE PRODUCTS	61	10	0	10
OTHER CROPS	30	2	0	2
Total Fertilizer Used, Tons		8999	1006	10005
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	12586
Liquid	2952
Total	15538
Primary Nutrients in Fertilizer	8080
Nitrogen	2101
Phosphorus	2262
Potash	3717

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			14003
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1431	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
		2076

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1452.0	1639.7	816.5	3908.2
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	20606	103	29	78
Cattle: Table 3	257655	1443	258	1288
Sheep: Table 4	1127	16	2	11
Horses: Table 4	2556	18	3	15
Chickens: Table 5	2197	34	9	8
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	28414	1614	301	1400
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	15538	2101	2262	3717
Lime: Limestone equivalent purchased or applied, tons:				
Table 8				14003
Salts: Applied on all highways, tons: Table 9				
				2076

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-26

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Northwest 2.1 COUNTY: Winnebago

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	45810	1259.7	10180	152.7		
Grains	16406	82.0	5469	54.6		
Hay or Grass Silage	14850	148.5	12375	123.7		
Pastured Cropland	4274	42.7	4274	42.7		
Other Field Crops	4445	89.3	325	8.4	50	7.5
Vegetables	6288	137.4	6288	351.7	6288	141.5
Orchards						
Berries	77	3.8	84	7.9	85	17.5
Nursery, Greenhouse						
Other Crops						
Totals	92150	1763.4	38995	741.7	6423	166.5
Total Herbicides, Insecticides, Fungicides: 100 lbs				137568		2671.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	17076	2167	1975	4142
1969	11784	1416	1270	2686
1972	10000	1800	1900	3700
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				26751
Nutrients in Wet Manure: Nitrogen, tons				134
Phosphorus, tons				37
Potash, tons				102

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	56505	29740	26765
1969	47101	24053	23048
1972	49000	24500	24500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		321930	158025
Wet Manure Defecated: Tons, 1972 Combined:		479955	
Nutrients in Wet Manure: Nitrogen, tons		2688	
Phosphorus, tons		480	
Potash, tons		2400	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2504	
1969		1798	574
1972		1400	600
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2254	7668
Nutrients in Wet Manure: Nitrogen, Tons		32	53
Phosphorus, Tons		5	8
Potash, Tons		23	46

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		160055		
1969		128932		
1972		161000	---	---
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6673		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		104		
Phosphorus, tons		27		
Potash, tons		23		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	36947	4619	861	5480
GRAINS	24159	1153	10	1163
Wheat	857	26	0	26
Oats	22545	1054	10	1064
Barley	516	70	0	70
Rye	30	0	0	0
OTHER FIELD CROPS	5066	254	0	254
Soybeans	4967	240	0	240
Potatoes	43	9	0	9
Sugar beets				
Field beans	461	0	0	0
HAY OR GRASS SILAGE	40782	735	0	735
PASTURED CROPLAND	16213	35	0	35
Cropland used for pasture	15056	33	0	33
Improved pasture	1157	2	0	2
VEGETABLES, SWEET CORN, MELONS	6288	775	96	871
ORCHARDS	98	5	0	5
BERRIES	6	2	0	2
NURSERY & GREENHOUSE PRODUCTS	125	22	0	22
OTHER CROPS	99	10	0	10
Total Fertilizer Used, Tons		7610	967	8577
Percent of Fertilizer Used		89	11	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	10789
Liquid	2531
Total	13320
Primary Nutrients in Fertilizer	6927
Nitrogen	1801
Phosphorus	1940
Potash	3186

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			2886
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3824	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5546

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Table 1	1763.4	741.7	166.5	2671.6
Manure: Kind of Livestock				
Table 2	Table 3	Table 4	Table 5	Table 5
Swine: Table 2	26751	134	37	102
Cattle: Table 3	479955	2688	480	2400
Sheep: Table 4	2254	32	5	23
Horses: Table 4	7668	53	8	46
Chickens: Table 5	6673	104	27	23
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	523301	3011	557	2594
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7				
Item	Total	Nitrogen	Phosphorus	Potash
Table 7	13320	1801	1940	3186
Lime: Limestone equivalent purchased or applied, tons: Table 8				2886
Salts: Applied on all highways, tons: Table 9				5546

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-27

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northwest 2.1 COUNTY: Dickinson

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	---	---	---	---		
Grains	1086	5.4	362	3.6		
Hay or Grass Silage	1843	18.4	1536	15.3		
Pastured Cropland	1216	12.1	1216	12.1		
Other Field Crops	1188	35.6	1320	151.8	1320	198.0
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	5333	71.5	4434	182.8	1320	198.0
Total Herbicides, Insecticides, Fungicides: 100 lbs					11087	452.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	213	16	23	39
1969	19	5	4	9
1972	20	5	4	9
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				65
Nutrients in Wet Manure: Nitrogen, tons				0
Phosphorus, tons				0
Potash, tons				0

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	4758	2515	2243
1969	3880	2202	1678
1972	4200	2400	1800
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		31536	11610
Wet Manure Defecated: Tons, 1972 Combined:		43146	
Nutrients in Wet Manure: Nitrogen, tons		242	
Phosphorus, tons		43	
Potash, tons		216	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		62	
1969		4	90
1972		0	445
Wet Manure Factor: Tons per animal		---	12.78
Wet Manure Defecated: Tons, 1972		---	5687
Nutrients in Wet Manure: Nitrogen, Tons		---	39
Phosphorus, Tons		---	6
Potash, Tons		---	34

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		3850		
1969		1865		
1972		2000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		83		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		1		
Phosphorus, tons		0		
Potash, tons		0		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1)	484608			
Number of farms	162			90
Acres in farms	39749			28967
Cropland in farms	17705			13662
Harvested cropland in farms	10248			8859
CORN	632	83	0	83
GRAINS	1601	132	2	134
Wheat	1466	113	2	115
Oats	89	14	0	14
Barley	46	5	0	5
Rye				
OTHER FIELD CROPS	1320	763	30	793
Soybeans				
Potatoes	1320	763	30	793
Sugar beets				
Field beans	10	0	0	0
HAY OR GRASS SILAGE	5056	54	0	54
PASTURED CROPLAND	3228	57	0	57
Cropland used for pasture	2984	55	0	55
Improved pasture	244	2	0	2
VEGETABLES, SWEET CORN, MELONS	109	28	0	28
ORCHARDS	5	0	0	0
BERRIES	12	0	0	0
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons		1117	32	1149
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1545
Liquid	294
Total	1839
Primary Nutrients in Fertilizer	901
Nitrogen	297
Phosphorus	288
Potash	316

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	391	0	391
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2403	34.1
1971-72	3061	43.7
1972-73	3980	53.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5773

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	71.5	182.8	198.0	452.3
Manure: Kind of Livestock				
Manure:	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	65	1	0	0
Cattle: Table 3	43146	242	43	216
Sheep: Table 4	0	0	0	0
Horses: Table 4	5687	39	6	34
Chickens: Table 5	83	1	0	0
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	48981	283	49	250
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	1839	297	288	316
Lime: Limestone equivalent purchased or applied, tons: Table 8				391
Salts: Applied on all highways, tons: Table 9				5773

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-28

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northwest 2.1 COUNTY: Iron

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	---	---	---	---		
Grains	600	3.0	200	2.0		
Hay or Grass Silage	1114	11.1	928	9.2		
Pastured Cropland	601	6.0	601	6.0		
Other Field Crops	422	12.6	469	53.9	469	70.3
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	2737	32.7	2198	71.1	469	70.3
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					5404	174.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	23	1	2	3
1969	69	5	6	11
1972	65	5	6	11
Wet Manure Factor: Tons per litter farrowed				
Wet Manure Defecated: Tons, 1972				
Nutrients in Wet Manure:				
Nitrogen, tons				
Phosphorus, tons				
Potash, tons				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	3839	1949	1890
1969	2373	1139	1234
1972	2600	1200	1400
Wet Manure Factor: Tons Per Animal			
Wet Manure Defecated: Tons, 1972			
Wet Manure Defecated: Tons, 1972 Combined:			
Nutrients in Wet Manure:			
Nitrogen, tons			
Phosphorus, tons			
Potash, tons			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		6	
1969		0	70
1972		0	438
Wet Manure Factor: Tons per animal			
Wet Manure Defecated: Tons, 1972			
Nutrients in Wet Manure:			
Nitrogen, Tons			
Phosphorus, Tons			
Potash, Tons			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		9971		
1969		5768		
1972		6300		
Wet Manure Factor: Lbs. per bird				
Wet Manure Defecated: Tons, 1972				
Nutrients in Wet Manure:				
Nitrogen, tons				
Phosphorus, tons				
Potash, tons				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>		Number I-V farms	
749440		56	
Number of farms		106	
Acres in farms		19343	
Cropland in farms		7422	
Harvested cropland in farms		4427	

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	18	4	0	4
GRAINS	1153	111	0	111
Wheat	0			
Oats	1094	103	0	103
Barley	42	8	0	8
Rye	17	0	0	0
OTHER FIELD CROPS	469	321	0	321
Soybeans				
Potatoes	469	321	0	321
Sugar beets				
Field beans	174	3	0	3
HAY OR GRASS SILAGE	2638	31	0	31
PASTURED CROPLAND	1706	12	---	12
Cropland used for pasture	1454	9	0	9
Improved pasture	252	3	0	3
VEGETABLES, SWEET CORN, MELONS	1	0	0	0
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons		482	0	482
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	648
Liquid	123
Total	771
Primary Nutrients in Fertilizer	378
Nitrogen	125
Phosphorus	121
Potash	132

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	910	0	910
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2288	22.2
1971-72	2403	23.4
1972-73	3286	29.4
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
4767		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	32.7	71.1	70.3	174.1
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure	Nitrogen	Phosphorus	Potash	
Swine: Table 2	80	1	0	0
Cattle: Table 3	24798	139	25	124
Sheep: Table 4	0	0	0	0
Horses: Table 4	5598	39	6	34
Chickens: Table 5	261	4	1	1
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	30737	183	32	159
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	771	125	121	132
Lime: Limestone equivalent purchased or applied, tons: Table 8				
910				
Salts: Applied on all highways, tons: Table 9				
4767				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-29

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northwest 2.1 COUNTY: Menominee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	---	---	---	---		
Grains	6546	32.7	2182	21.8		
Hay or Grass Silage	9058	90.5	7548	75.4		
Pastured Cropland	4253	42.5	4253	42.5		
Other Field Crops	61	1.8	61	7.0	61	9.1
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	19918	167.5	14044	146.7	61	9.1
Total Herbicides, Insecticides, Fungicides: 100 lbs					34023	323.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	431	33	52	85
1969	385	113	107	220
1972	400	100	100	200
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				1446
Nutrients in Wet Manure: Nitrogen, tons				7
Phosphorus, tons				2
Potash, tons				5

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	23894	12706	11188
1969	19458	10322	9136
1972	21300	11200	10100
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		147168	65145
Wet Manure Defecated: Tons, 1972 Combined:		212313	
Nutrients in Wet Manure: Nitrogen, tons		1189	
Phosphorus, tons		212	
Potash, tons		1062	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		233	
1969		59	218
1972		50	1066
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		81	13623
Nutrients in Wet Manure: Nitrogen, Tons		1	94
Phosphorus, Tons		0	14
Potash, Tons		0	82

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		32164		
1969		24337		
1972		26700		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1107		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		17		
Phosphorus, tons		4		
Potash, tons		4		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	4398	657	0	657
GRAINS	9696	1042	0	1042
Wheat	56	3	0	3
Oats	8767	919	0	919
Barley	855	119	0	119
Rye	18	2	0	2
OTHER FIELD CROPS	68	27	2	29
Soybeans				
Potatoes	68	27	2	29
Sugar beets				
Field beans	35	0	0	0
HAY OR GRASS SILAGE	26605	554	3	557
PASTURED CROPLAND	12968	227	0	227
Cropland used for pasture	12578	225	0	225
Improved pasture	390	2	0	2
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS	5	0	0	0
BERRIES				
NURSERY & GREENHOUSE PRODUCTS	5	0	2	2
OTHER CROPS	65	8	0	8
Total Fertilizer Used, Tons		2515	7	2522
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	3389
Liquid	646
Total	4035
Primary Nutrients in Fertilizer	1977
Nitrogen	652
Phosphorus	633
Potash	692

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	326	25	351
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1638	14.7
1971-72	1705	15.4
1972-73	1784	15.1
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		2587

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	167.51	146.7	9.1	323.3
Manure: Kind of Livestock				
Swine: Table 2	Manure	Nitrogen	Phosphorus	Potash
	1446	23	6	5
Cattle: Table 3	212313	1189	212	1062
Sheep: Table 4	81	1	0	0
Horses: Table 4	13623	94	14	82
Chickens: Table 5	1107	17	4	4
Turkeys: Table 5	---	---	---	---
Total from Livestock, Tons	228570	1324	236	1153
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	4035	652	633	692
Lime: Limestone equivalent purchased or applied, tons: Table 8				351
Salts: Applied on all highways, tons: Table 9				2587

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)  
To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)  
Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

### 5.3 Planning Subarea 2.2

Planning Subarea 2.2 includes a total of 17 counties in Illinois, Indiana, and Wisconsin. Total land area equals 2,122,600 hectares (5,244,864 acres), with lands in farms equalling 1,221,300 hectares (3,017,892 acres) or about 55 percent of the total land area. Twenty-three percent of the land area in this planning subarea is devoted to urban uses.

#### 5.3.1 Agricultural Characteristics

Most of the cropland in this planning subarea is used for corn, soybeans and hay or silage. Nursery and greenhouse products are also important due to the large urban population.

Table 5-30 indicates the relative proportions of materials usage in PSA 2.2 as compared to the total Great Lakes Basin.

Table 5-30

#### MATERIALS USAGE BASIN RELATIONSHIP -- PSA 2.2 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 2.2</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.21	2.66
Index of chemicals used	83	100
Tons of livestock manure defecated	2.70	3.37
Index of manure defecated	80	100
Lbs primary nutrients in livestock manure	66	82
Index of primary nutrients in manure	80	100
Lbs commercial fertilizer applied	347	321
Percent liquid fertilizer applied	37	22
Index commercial fertilizer applied	108	100
Lbs primary nutrients in commercial fertilizer	167	153
Index primary nutrients in commercial fertilizer	109	100
Lbs of lime applied	229	170
Index of lime used	135	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	121.99	41.74
Index road salts used	292	100
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

### 5.3.2 Materials Usage

The following table lists by county the materials usage inventory for PSA 2.2.

Table 5-31  
MATERIALS USAGE  
(in 1972)

<u>PSA 2.2</u>	<u>Chemicals Applied to Crops (100 lbs)</u>	<u>Livestock Manure (tons)</u>	<u>Commercial Fertilizer on Croplands (tons)</u>	<u>Limestone Purchased or Applied (tons)</u>	<u>Salts Applied to all Highways (tons)</u>
<u>Illinois</u>					
Cook	1387	152435	20315	4135	114495
Du Page	899	59380	8719	2926	10588
Kane	4114	684426	28892	29120	7745
Lake	1249	264826	6813	1844	21024
McHenry	4149	769863	27277	21160	6179
Will	5866	455059	30754	56750	18130
<u>Indiana</u>					
Lake	2798	195889	19608	14022	28496
LaPorte	4817	295107	44602	38108	11297
Porter	2534	184506	30673	17919	10594
Starke	2287	105599	36763	14158	5794
<u>Wisconsin</u>					
Kenosha	1796	234233	12377	3258	5886
Milwaukee	268	19186	1008	6	40861
Ozaukee	1684	253274	7501	783	2038
Racine	2153	239902	16122	3329	6377
Walworth	4499	599690	33402	17512	6620
Washington	2121	512837	11888	1332	9776
Waukesha	1767	407481	12194	3757	14012
TOTAL	44388	5433693	348908	230117	319912

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 5.3.2.1 Agricultural Chemicals

There were 2,013,400 kilograms (4,438,800 pounds) of agricultural chemicals used in Planning Subarea 2.2 in 1972. Herbicides represented 77 percent of the total, insecticides 18 percent, and fungicides 5 percent. Herbicide use may increase about 10-25 percent in the next 10 years and fungicide use about 5-15 percent. Insecticide use on grain and forage crops may increase 30-40 percent in the next 5 years, but decrease to about present levels within 10 years.

#### 5.3.2.2 Animal Wastes

There were about 173,341 head of cows and heifers calved, and 286,836 head of cattle in 1972. Cattle defecates 76 percent of the manure, horses 13, swine 8, chickens 2 and sheep 1 percent. Approximately 4,929,446 metric tons (5,433,693 tons) of wet manure are produced from all livestock in PSA 2.2. One reason that the manure index is relatively low for the subarea is that cow numbers are less, and numbers of other kinds of livestock, especially hogs and feeding cattle, are greater, in relation to the other planning subareas.

Livestock numbers are expected to remain at about the same levels over the next ten years. Manure production will correspond in level.

#### 5.3.2.3 Commercial Fertilizers

Currently a total of 316,529 metric tons (348,908 tons) of commercial fertilizers are applied to croplands in Planning Subarea 2.2. This represents 30 percent of the total amount of commercial fertilizers applied in the Lake Michigan basin. Primary nutrients account for 152,420 metric tons (168,048 tons), or 48 percent of the total amount applied in PSA 2.2. Nitrogen represents 36 percent of the primary nutrients applied, phosphorus 27 percent, and potash 37 percent.

Commercial fertilizer usage will continue to increase in this subarea because of the high value of crop production per acre, justifying even greater quantities than now used. The percent applied in liquid form, already the highest of any subarea in the Great Lakes Basin, will increase modestly in the next decade.

#### 5.3.2.4 Lime

A total of 208,762 metric tons (230,117 tons) of lime was purchased or applied to croplands in PSA 2.2 in 1972. This represents 33 percent of the total amount of limestone applied in the Lake Michigan basin. Based on present usage rates, liming rates will remain relatively unchanged. They may decrease slightly as forages assume less overall significance in crop production areas.

#### 5.3.2.5 Salts

At the present time about 290,224 metric tons (319,912 tons) of road de-icing salts are applied to highways in PSA 2.2. This accounts for 48 percent of all salts applied in the Lake Michigan basin. This is due to the urban areas and the demand for a "dry-pavement" policy in those areas. Road de-icing salts will increase about in proportion to road mileage increases. There will be changes and improvements in usage; however, application rates are not likely to increase.



TABLE 5-32

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Illinois, Indiana, and Wisconsin

PLANNING SUBAREA: Southwest 2.2 COUNTY: 17 County Totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	844,896	23234.2	187755	2816.2		
Grains	118569	5924.4	39523	394.9		
Hay or Grass Silage	91860	918.6	76590	765.1		
Pastured Cropland	43526	435.3	43526	435.3		
Other Field Crops	323160	7895.4	27970	657.3	3600	540.0
Vegetables	42664	1012.6	42664	2521.6	42664	10541.7
Orchards						
Berries	2805	163.3	2929	307.9	2995	645.6
Nursery, Greenhouse						
Other Crops						
Totals	1537180	34250.9	1120917	7897.4	19259	2239.7
Total Herbicides, Insecticides, Fungicides: 100 lbs					2007656	44388.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	343686	34721	29707	64428
1969	280750	26851	24721	51572
1972	277595	27594	30939	58533

Wet Manure Factor: Tons per litter farrowed  
 Wet Manure Defecated: Tons, 1972 425978  
 Nutrients in Wet Manure: Nitrogen, tons 2132  
 Phosphorus, tons 596  
 Potash, tons 1620

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	542119	238118	304271
1969	430881	186621	244260
1972	460177	173311	286866

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 2277701 1850092  
 Wet Manure Defecated: Tons, 1972 Combined: 4127793  
 Nutrients in Wet Manure: Nitrogen, tons 23116  
 Phosphorus, tons 4128  
 Potash, tons 20639

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		39800	
1969		28750	15074
1972		23334	57161

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 37568 730518  
 Nutrients in Wet Manure: Nitrogen, tons 526 5041  
 Phosphorus, tons 79 730  
 Potash, tons 376 4383

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		184715		
1969		2431565		
1972		2636101	4090	40900

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
 Wet Manure Defecated: Tons, 1972 109266  
 Nutrients in Wet Manure: Nitrogen, tons 1705 40  
 Phosphorus, tons 438 10  
 Potash, tons 382 2

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	875899	112342	56994	169336
GRAINS	245714	15445	1990	17435
Wheat	76358	7626	1419	9045
Oats	157641	6997	557	7554
Barley	9177	682	8	690
Rye	1851	109	3	112
OTHER FIELD CROPS	431838	17061	2369	19430
Soybeans	418891	12738	2038	14776
Potatoes	6507	3013	54	3067
Sugar beets				
Field beans	2378	32	20	52
HAY OR GRASS SILAGE	262211	6576	229	6805
PASTURED CROPLAND	178947	2716	225	2941
Cropland used for pasture	149813	1898	209	2107
Improved pasture	29134	818	16	834
VEGETABLES, SWEET CORN, MELONS	45362	10969	860	11829
ORCHARDS	2918	364	18	382
BERRIES	666	137	2	139
NURSERY & GREENHOUSE PRODUCTS	11276	3727	248	3975
OTHER CROPS	1211	39	7	146
Total Fertilizer Used, Tons		169408	62962	232370
Percent of Fertilizer Used		73	27	100

COUNTY, land area, acres (1) 524,864 Number I-V farms 12344  
 Number of farms 17027 Acres in I-V farms 2750836  
 Acres in farms 3017892 Cropland I-V farms 2338128  
 Cropland in farms 2463742 Harvested cropland I-V farms 1863065  
 Harvested cropland in farms 2009410

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	221335
Liquid	127573
Total	348908
Primary Nutrients in Fertilizer	168048
Nitrogen	60938
Phosphorus	45217
Potash	61903

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			230117
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "e" Mile
1970-71		
1971-72		
1972-73	220567	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		319912

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	34250.9	7897.4	2239.7	44388.0
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	425978	2132	596	1620
Cattle: Table 3	4127793	23116	4128	20639
Sheep: Table 4	37568	526	79	376
Horses: Table 4	730518	5041	730	4383
Chickens: Table 5	109266	1705	438	382
Turkeys: Table 5	2570	40	10	2
Total from Livestock, Tons	5433693	32560	5981	27409
Fertilizers: Tons of Commercial Fertilizers Applied				
	Primary Nutrients			
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	348908	60938	45217	61903
Lime: Limestone equivalent purchased or applied, tons: Table 8 230120				
Salts: Applied on all highways, tons: Table 9 319912				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-33

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lakes Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Southwest 2.2 COUNTY: Kenosha

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	27630	759.8	6110	92.1		
Grains	5046	25.2	1682	16.8		
Hay or Grass Silage	5580	55.8	4650	46.5		
Pastured Cropland	2043	20.4	2043	20.4		
Other Field Crops	8945	188.3	1550	125.7	1050	157.5
Vegetables	1735	37.9	1735	97.0	1735	39.0
Orchards						
Berries	319	22.0	329	34.0	342	57.6
Nursery, Greenhouse						
Other Crops						
Totals	51298	1109.4	18129	432.5	3127	254.1
Total Herbicides, Insecticides, Fungicides: 100 lbs 72554 1796.0						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	9015	968	756	1724
1969	8077	798	796	1594
1972	7500	600	600	1200

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 8676  
 Nutrients in Wet Manure: Nitrogen, tons 43  
 Phosphorus, tons 12  
 Potash, tons 33

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	20987	11972	9015
1969	18199	10122	8077
1972	22500	9500	13000

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 124830 83850  
 Wet Manure Defecated: Tons, 1972 Combined: 208680  
 Nutrients in Wet Manure: Nitrogen, tons 1169  
 Phosphorus, tons 209  
 Potash, tons 1043

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1970	
1969		1276	479
1972		1000	600

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1610 7668  
 Nutrients in Wet Manure: Nitrogen, Tons 23 53  
 Phosphorus, Tons 3 8  
 Potash, Tons 16 46

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		94681		
1969		120064		
1972		153000	2000	20000

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
 Wet Manure Defecated: Tons, 1972 6342  
 Nutrients in Wet Manure: Nitrogen, tons 99 Combined 1257  
 Phosphorus, tons 25 20  
 Potash, tons 22 4

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1)	174272			
Number of farms	699			
Acres in farms	108745			
Cropland in farms	87548			
Harvested cropland in farms	66518			
Number I-V farms	525			
Acres in I-V farms	98437			
Cropland I-V farms	80226			
Harvested cropland I-V farms	62840			
CORN	25619	3792	911	4733
GRAINS	10904	843	8	851
Wheat	2112	209	2	211
Oats	7593	502	6	508
Barley	1137	124	0	124
Rye	0	0	0	0
OTHER FIELD CROPS	9027	1087	10	1097
Soybeans	7623	435	5	440
Potatoes	1116	581	5	586
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	15863	472	21	493
PASTURED CROPLAND	8057	37	0	37
Cropland used for pasture	7184	33	0	33
Improved pasture	873	4	0	4
VEGETABLES, SWEET CORN, MELONS	1735	638	3	641
ORCHARDS	256	63	0	63
BERRIES	135	30	0	30
NURSERY & GREENHOUSE PRODUCTS	52	23	0	23
OTHER CROPS	67	2	0	2
Total Fertilizer Used, Tons		6987	983	7970
Percent of Fertilizer Used		88	12	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	10025
Liquid	2352
Total	12377
Primary Nutrients in Fertilizer	6436
Nitrogen	1673
Phosphorus	1802
Potash	2961

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3258
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4058	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5886		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1109.4	432.5	254.1	1796.0
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	8676	43	12	33
Cattle: Table 3	208680	1169	209	1043
Sheep: Table 4	1610	23	3	16
Horses: Table 4	7668	53	8	46
Chickens: Table 5	6342	99	25	22
Turkeys: Table 5	1257	20	5	4
Total from Livestock, Tons	234233	1407	262	1164
Fertilizers:	Tons of Commercial Fertilizers Applied			
Table 7	Total	Primary Nutrients		
Applied on Cropland:		Nitrogen	Phosphorus	Potash
Table 7	12377	1673	1802	2961
Lime: Limestone equivalent purchased or applied, tons: Table 8 3258				
Salts: Applied on all highways, tons: Table 9 5886				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-34

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Southwest 2.2 COUNTY: Milwaukee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	2070	56.9	460	6.9		
Grains	1783	8.9	594	5.9		
Hay or Grass Silage	690	6.9	575	5.7		
Pastured Cropland	222	2.2	222	2.2		
Other Field Crops	1645	33.3	150	6.7	50	7.5
Vegetables	1037	22.7	1037	58.0	1037	23.3
Orchards						
Berries	61	4.7	62	6.6	65	10.0
Nursery, Greenhouse						
Other Crops						
Totals	7508	135.6	3100	92.0	1152	40.8
Total Herbicides, Insecticides, Fungicides: 100 lbs					11760	268.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1954	112	116	228
1969	630	78	66	144
1972	500	50	50	100

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 723  
Nutrients in Wet Manure: Nitrogen, tons 4  
Phosphorus, tons 1  
Potash, tons 3

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	2338	1223	1115
1969	1166	612	554
1972	1200	400	800

Wet Manure Factor: Tons Per Animal 13.14  
Wet Manure Defecated: Tons, 1972 5256  
Wet Manure Defecated: Tons, 1972 Combined: 10416  
Nutrients in Wet Manure: Nitrogen, tons 58  
Phosphorus, tons 10  
Potash, tons 52

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		82	
1969		22	138
1972		25	500

Wet Manure Factor: Tons per animal 1.61  
Wet Manure Defecated: Tons, 1972 40  
Nutrients in Wet Manure: Nitrogen, Tons 1  
Phosphorus, Tons 0  
Potash, Tons 0

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		22661		
1969		27852		
1972		39000		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 1617  
Nutrients in Wet Manure: Nitrogen, tons 25  
Phosphorus, tons 6  
Potash, tons 6

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1116	127	24	151
GRAINS	2070	135	0	135
Wheat	723	48	0	48
Oats	1258	84	0	84
Barley	89	4	0	4
Rye	0	0	0	0
OTHER FIELD CROPS	1214	67	0	67
Soybeans	1172	44	0	44
Potatoes	42	23	0	23
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	1410	1	0	1
PASTURED CROPLAND	386	3	0	3
Cropland used for pasture	337	3	0	3
Improved pasture	49	0	0	0
VEGETABLES, SWEET CORN, MELONS	1037	239	0	239
ORCHARDS	38	3	0	38
BERRIES	34	12	0	12
NURSEERY & GREENHOUSE PRODUCTS	81	34	4	38
OTHER CROPS	0			
Total Fertilizer Used, Tons		621	28	649
Percent of Fertilizer Used		95	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	816
Liquid	192
Total	1008
Primary Nutrients in Fertilizer	524
Nitrogen	136
Phosphorus	147
Potash	241

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			6
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	28172	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 40861		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	135.6	92.0	40.8	268.4
Manure: Kind of				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Livestock	723	4	1	3
Swine: Table 2	10416	58	10	52
Cattle: Table 3	40	1	0	0
Sheep: Table 4	6390	44	6	38
Horses: Table 4	1617	25	6	6
Chickens: Table 5				
Turkeys: Table 5				
Total from Livestock, Tons	19186	132	23	99
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland:	1008	136	147	241
Lime: Limestone equivalent purchased or applied, tons: Table 8 6				
Salts: Applied on all highways, tons: Table 9 40861				

To Convert From                      To                      Multiply By

Pounds (lb)                              Kilograms (kg)                      0.453

Acres (acre)                              Hectare (ha)                        .4047

Tons (ton)                                 Kilograms (kg)                      907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-35

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Southwest 2.2 COUNTY: Ozaukee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	18090	497.4	4020	60.3		
Grains	8309	41.5	2770	27.7		
Hay or Grass Silage	7740	77.4	6450	64.5		
Pastured Cropland	2016	20.1	2016	20.1		
Other Field Crops	980	21.4	250	23.5	200	30.0
Vegetables	6646	145.2	6646	371.7	6646	149.5
Orchards						
Berries	347	16.9	386	35.6	389	80.8
Nursery, Greenhouse						
Other Crops						
Totals	14128	819.9	22538	603.4	7235	260.3
Total Herbicides, Insecticides, Fungicides: 100 lbs					73901	1683.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	9121	1495	1556	3051
1969	8730	1085	1098	2183
1972	8000	1200	1200	2400

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 17352  
 Nutrients in Wet Manure: Nitrogen, tons 87  
 Phosphorus, tons 24  
 Potash, tons 66

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	26711	14551	12160
1969	24012	12500	11512
1972	24000	10500	13500

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 137970 87075  
 Wet Manure Defecated: Tons, 1972 Combined: 225045  
 Nutrients in Wet Manure: Nitrogen, tons 1260  
 Phosphorus, tons 225  
 Potash, tons 1125

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		770	
1969		1006	251
1972		500	600

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 805 7668  
 Nutrients in Wet Manure: Nitrogen, Tons 11 53  
 Phosphorus, Tons 2 8  
 Potash, Tons 8 46

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		65635		
1969		40218		
1972		58000		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 2404  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 38  
 Phosphorus, tons 10  
 Potash, tons 8

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	17262	2088	464	2552
GRAINS	16097	517	5	522
Wheat	1230	55	0	55
Oats	14103	458	5	463
Barley	314	11	0	11
Rye	3	0	0	0
OTHER FIELD CROPS	430	133	0	133
Soybeans	153	14	0	14
Potatoes	276	118	0	118
Sugar beets				
Field beans	201	0	0	0
HAY OR GRASS SILAGE	23470	406	6	412
PASTURED CROPLAND	7389	18	0	18
Cropland used for pasture	6999	16	0	16
Improved pasture	390	2	0	2
VEGETABLES, SWEET CORN, MELONS	6546	1027	60	1087
ORCHARDS	458	57	2	59
BERRIES	17	10	0	10
NURSERY & GREENHOUSE PRODUCTS	137	7	0	7
OTHER CROPS	0			
Total Fertilizer Used, Tons		4293	537	4830
Percent of Fertilizer Used		89	11	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	6076
Liquid	1425
Total	7501
Primary Nutrients in Fertilizer	3901
Nitrogen	1014
Phosphorus	1092
Potash	1795

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			783

Tonnages for Other Recent Years

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1405	

Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2038

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	819.9	603.4	260.3	1683.6

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	17352	87	24	66
Cattle: Table 3	225045	1260	225	1125
Sheep: Table 4	805	11	2	8
Horses: Table 4	7668	53	8	46
Chickens: Table 5	2404	38	10	8
Turkeys: Table 5				
Total from Livestock, Tons	253274	1449	269	1253

Fertilizers:	Tons of Commercial Fertilizers Applied			
	Item	Total	Primary Nutrients	
Nitrogen			Phosphorus	Potash
Applied on Cropland: Table 7	7501	1014	1092	1795

Lime: Limestone equivalent purchased or applied, tons: Table 8 783  
 Salts: Applied on all highways, tons: Table 9 2038

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-36

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Southwest 2.2 COUNTY: Racine

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	30960	851.4	6880	103.2		
Grains	8551	42.7	2850	28.5		
Hay or Grass Silage	5520	55.2	4600	46.0		
Pastured Cropland	2076	20.7	2076	20.7		
Other Field Crops	13285	276.9	2010	151.3	1250	187.5
Vegetables	3341	73.0	3341	186.9	3341	75.2
Orchards						
Berries	94	6.1	98	9.9	101	17.7
Nursery, Greenhouse						
Other Crops						
Totals	63827	1326.0	21855	546.5	4692	280.4
Total Herbicides, Insecticides, Fungicides: 100 lbs					90374	2152.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	15438	1210	1127	2337
1969	13293	1136	1105	2241
1972	12000	950	950	1900
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				13737
Nutrients in Wet Manure: Nitrogen, tons				69
Phosphorus, tons				19
Potash, tons				52

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	26516	12906	13610
1969	24273	10515	13758
1972	24300	8000	16300
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		105120	105135
Wet Manure Defecated: Tons, 1972 Combined:		210255	
Nutrients in Wet Manure: Nitrogen, tons		1177	
Phosphorus, tons		210	
Potash, tons		1051	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3521	
1969		2781	742
1972		2000	500
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3220	6390
Nutrients in Wet Manure: Nitrogen, tons		45	44
Phosphorus, tons		7	6
Potash, tons		32	38

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		118105		
1969		118024		
1972		152000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6300		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		98		
Phosphorus, tons		25		
Potash, tons		22		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	28956	3957	1194	5151
GRAINS	15795	1371	40	1411
Wheat	3824	418	25	443
Oats	9328	647	13	660
Barley	2571	303	2	305
Rye	44	2	0	2
OTHER FIELD CROPS	14016	1198	10	1208
Soybeans	12659	441	6	447
Potatoes	1447	757	4	761
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	16380	509	3	512
PASTURED CROPLAND	8387	47	1	48
Cropland used for pasture	7404	39	1	40
Improved pasture	983	8	0	8
VEGETABLES, SWEET CORN, MELONS	3341	1081	33	1114
ORCHARDS	83	8	0	8
BERRIES	34	10	0	10
NURSERY & GREENHOUSE PRODUCTS	1650	919	0	919
OTHER CROPS	9	0	0	0
Total Fertilizer Used, Tons		9100	1281	10381
Percent of Fertilizer Used		88	12	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	13059
Liquid	3063
Total	16122
Primary Nutrients in Fertilizer	8383
Nitrogen	2180
Phosphorus	2347
Potash	3856

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3326
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4397	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		6377

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1326.0	546.5	280.4	2152.9
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
Swine: Table 2	Manure	Nitrogen	Phosphorus	Potash
Cattle: Table 3	13737	69	19	52
Sheep: Table 4	210255	1177	210	1051
Horses: Table 4	3220	45	7	32
Chickens: Table 5	6390	44	6	38
Turkeys: Table 5	6300	98	25	22
Total from Livestock, Tons	239902	1433	267	1195
Fertilizers:	Tons of Commercial Fertilizers Applied			
Table 7	Item	Total	Primary Nutrients	
			Nitrogen	Phosphorus
Applied on Cropland:				Potash
Table 7		16122	2180	2347
Lime: Limestone equivalent purchased or applied, tons: Table 8 3329				
Salts: Applied on all highways, tons: Table 9 6377				

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-37

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Southwest 2.2 COUNTY: Walworth

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	8950	2462.6	19900	298.5		
Grains	8671	43.3	2890	28.9		
Hay or Grass Silage	12480	124.8	10400	104.0		
Pastured Cropland	4431	44.3	4431	44.3		
Other Field Crops	9090	186.3	1040	62.9	500	75.0
Vegetables	10079	220.2	10079	563.7	10079	226.8
Orchards						
Berries	35	1.6	39	3.5	39	8.3
Nursery, Greenhouse						
Other Crops						
Totals	134336	3083.1	48779	1105.8	10618	310.1
Total Herbicides, Insecticides, Fungicides: 100 lbs					193733	4499.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	36309	3162	2844	6006
1969	29364	2665	2241	4906
1972	28000	2000	2100	4100
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				29643
Nutrients in Wet Manure: Nitrogen, tons				11.8
Phosphorus, tons				4.2
Potash, tons				11.3

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	80081	40017	40064
1969	58135	28780	29355
1972	58500	25700	32800
Wet Manure Factor: Tons Per Animal		13.11	6.45
Wet Manure Defecated: Tons, 1972		337698	211560
Wet Manure Defecated: Tons, 1972 Combined:		549258	
Nutrients in Wet Manure: Nitrogen, tons		3076	
Phosphorus, tons		549	
Potash, tons		2746	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		6489	
1969		3420	1124
1972		2700	800
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		4347	10224
Nutrients in Wet Manure: Nitrogen, Tons		61	71
Phosphorus, Tons		9	10
Potash, Tons		43	61

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		159445		
1969		114299		
1972		150000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6218		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		97		
Phosphorus, tons		25		
Potash, tons		22		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	85538	11335	4767	16102
GRAINS	21330	767	27	794
Wheat	983	47	1	48
Oats	17829	632	22	654
Barley	2419	88	3	91
Rye	69	0	0	0
OTHER FIELD CROPS	10708	1064	36	1100
Soybeans	8590	420	21	441
Potatoes	571	303	0	303
Sugar beets				
Field beans	192	24	20	44
HAY OR GRASS SILAGE	36580	1047	30	1077
PASTURED CROPLAND	18060	335	3	338
Cropland used for pasture	15784	308	2	310
Improved pasture	2276	27	1	28
VEGETABLES, SWEET CORN, MELONS	10079	1498	292	1790
ORCHARDS	48	0	7	7
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	387	191	60	251
OTHER CROPS	80	5	0	5
Total Fertilizer Used, Tons		16266	5242	21508
Percent of Fertilizer Used		76	24	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	27056
Liquid	6246
Total	33402
Primary Nutrients in Fertilizer	17369
Nitrogen	4516
Phosphorus	4863
Potash	7990

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			17512
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4564	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		6620

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3083.1	1105.8	310.1	4499.0
Manure: Kind of Livestock				
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2964.3	14.8	4.2	11.3
Cattle: Table 3	54925.8	3076	549	2746
Sheep: Table 4	4347	61	9	43
Horses: Table 4	10224	71	10	61
Chickens: Table 5	6218	97	25	22
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	599690	3453	635	2985
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	33402	4516	4863	7990
Lime: Limestone equivalent purchased or applied, tons:				
Table 8 17512				
Salts: Applied on all highways, tons: Table 9 6620				

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-38

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0

STATE: Wisconsin

PLANNING SUBAREA: Southwest 2.2

COUNTY: Washington

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	38880	1069.2	8640	129.6		
Grains	14714	73.5	4905	49.0		
Hay or Grass Silage	13800	138.0	11500	115.0		
Pastured Cropland	4127	41.2	4127	41.2		
Other Field Crops	500	11.8	220	23.2	200	30.0
Vegetables	3581	78.2	3581	200.3	3581	80.6
Orchards						
Berries	110	6.9	117	11.6	120	21.7
Nursery, Greenhouse						
Other Crops						
Totals	75712	1118.8	33090	569.9	3901	132.3
Total Herbicides, Insecticides, Fungicides:		100 lbs		100 lbs		100 lbs
				112703		2121.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	16180	2531	2390	4921
1969	14399	2094	2150	4244
1972	12500	1900	2000	3900
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				28197
Nutrients in Wet Manure: Nitrogen, tons				141
Phosphorus, tons				39
Potash, tons				107

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	53977	29431	24546
1969	47184	26262	20922
1972	48500	23500	25000
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		308790	161250
Wet Manure Defecated: Tons, 1972 Combined:		470040	
Nutrients in Wet Manure: Nitrogen, tons		2632	
Phosphorus, tons		470	
Potash, tons		2350	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		852	
1969		824	643
1972		800	500
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1288	6390
Nutrients in Wet Manure: Nitrogen, Tons		18	14
Phosphorus, Tons		3	6
Potash, Tons		13	38

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		151125		
1969		131370		
1972		167000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6922		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		108		
Phosphorus, tons		28		
Potash, tons		24		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	33844	4198	646	4844
GRAINS	25942	1032	23	1055
Wheat	1360	78	1	79
Oats	24318	940	22	962
Barley	123	10	0	10
Rye	64	2	0	2
OTHER FIELD CROPS	600	107	8	115
Soybeans	467	42	0	42
Potatoes	133	64	8	72
Sugar beets				
Field beans	584	2	0	2
HAY OR GRASS SILAGE	40240	715	7	722
PASTURED CROPLAND	15197	60	0	60
Cropland used for pasture	11110	58	0	58
Improved pasture	1057	2	0	2
VEGETABLES, SWEET CORN, MELONS	3581	645	54	699
ORCHARDS	106	7	2	9
BERRIES	34	23	0	23
NURSERY & GREENHOUSE PRODUCTS	431	126	0	126
OTHER CROPS	5	0	0	0
Total Fertilizer Used, Tons		6915	740	7655
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	9629
Liquid	2259
Total	11888
Primary Nutrients in Fertilizer	6182
Nitrogen	1607
Phosphorus	1731
Potash	2844

TABLE 8--GROUND LIMESTONE EQUIVALENT  
APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			1332
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	6740	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 9776		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1118.8	569.9	132.3	2121.0
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	28197	141	39	107
Cattle: Table 3	470040	2632	470	2350
Sheep: Table 4	1288	18	3	13
Horses: Table 4	6390	44	6	38
Chickens: Table 5	6922	108	28	24
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	512837	2943	546	2532
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland:	11888	1607	1731	2844
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	1332			
Salts: Applied on all highways, tons: Table 9 9776				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-39

PLANNING AREA: Lake Michigan 2.0 STATE: Wisconsin

PLANNING SUBAREA: Southwest 2.2 COUNTY: Waukesha

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	32850	903.3	7300	109.5		
Grains	7402	37.0	2467	24.6		
Hay or Grass Silage	10170	101.7	8475	84.7		
Pastured Cropland	3835	38.3	3835	38.3		
Other Field Crops	2715	57.4	500	41.7	350	52.5
Vegetables	1791	39.1	1791	100.2	1791	40.3
Orchards						
Berries	257	13.0	284	26.5	286	58.5
Nursery, Greenhouse						
Other Crops						
Totals	59020	1189.8	24652	425.5	2427	151.3
Total Herbicides, Insecticides, Fungicides: 100 lbs 86099 1765.6						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	10309	608	625	1233
1969	5645	486	508	994
1972	3500	800	800	1600
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				11568
Nutrients in Wet Manure: Nitrogen, tons				58
Phosphorus, tons				16
Potash, tons				44

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	15243	24382	20861
1969	35235	18318	17617
1972	37000	14800	22200
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		194472	143190
Wet Manure Defecated: Tons, 1972 Combined:		337662	
Nutrients in Wet Manure: Nitrogen, tons		1891	
Phosphorus, tons		338	
Potash, tons		1688	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2826	
1969		1714	1494
1972		1700	4000
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2737	51120
Nutrients in Wet Manure: Nitrogen, Tons		38	353
Phosphorus, Tons		6	51
Potash, Tons		27	307

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		154385		
1969		75552		
1972		106000		
Wet Manure Factor: Lbs. per bird		82.7		
Wet Manure Defecated: Tons, 1972		4394		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		69		
Phosphorus, tons		18		
Potash, tons		15		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	30591	1091	1317	5108
GRAINS	13582	491	12	503
Wheat	900	39	0	39
Oats	12510	450	12	1462
Barley	83	1	0	1
Rye	25	0	0	0
OTHER FIELD CROPS	3968	460	2	1462
Soybeans	3474	221	2	223
Potatoes	553	238	0	238
Sugar beets				
Field beans	249	2	0	2
HAY OR GRASS SILAGE	29842	575	21	596
PASTURED CROPLAND	15886	253	3	256
Cropland used for pasture				
Improved pasture	13169	102	3	105
Other pasture	2717	151	0	151
VEGETABLES, SWEET CORN, MELONS	1791	332	7	339
ORCHARDS	326	62	6	68
BERRIES	22	8	0	8
NURSERY & GREENHOUSE PRODUCTS	602	308	0	308
OTHER CROPS	217	2	0	2
Total Fertilizer Used, Tons		6584	1368	7952
Percent of Fertilizer Used		84	16	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	9877
Liquid	2317
Total	12194
Primary Nutrients in Fertilizer	6341
Nitrogen	1649
Phosphorus	1775
Potash	2917

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3757
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	9661	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		14012

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1189.6	425.5	151.3	1766.6
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	11568	58	16	44
Cattle: Table 3	337662	1891	338	1688
Sheep: Table 4	2737	38	6	27
Horses: Table 4	51120	353	51	307
Chickens: Table 5	4394	69	18	15
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	407481	2409	429	2081
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	12194	1649	1775	2917
Lime: Limestone equivalent purchased or applied, tons: Table 8 3757				
Salts: Applied on all highways, tons: Table 9 14012				

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 5-40

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Illinois  
 PLANNING SUBAREA: Southwest 2.2 COUNTY: Cook

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	13950	383.6	3100	46.5		
Grains	2820	14.1	940	9.4		
Hay or Grass Silage	2010	20.1	1675	16.7		
Pastured Cropland	1396	13.9	1396	13.9		
Other Field Crops	20800	416.0	1300	13.0		
Vegetables	3655	87.9	3655	295.1	3655	56.4
Orchards	1	0	1	.1	1	.2
Berries						
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>44632</b>	<b>935.6</b>	<b>12067</b>	<b>394.7</b>	<b>3656</b>	<b>56.6</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs 60355 1386.9						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	12081	662	537	1199
1969	5250	424	321	745
1972	6000	400	700	1100
Wet Manure Factor: Tons per litter farrowed				7.12
Wet Manure Defecated: Tons, 1972				7832
Nutrients in Wet Manure: Nitrogen, tons				39
Phosphorus, tons				11
Potash, tons				30

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	7098	3027	4071
1969	6892	2715	4177
1972	5300	2300	3000
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		30222	19350
Wet Manure Defecated: Tons, 1972 Combined:		49572	
Nutrients in Wet Manure: Nitrogen, tons		278	
Phosphorus, tons		50	
Potash, tons		248	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		655	
1969		235	1350
1972		235	6980
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		378	89204
Nutrients in Wet Manure: Nitrogen, Tons		5	616
Phosphorus, Tons		1	89
Potash, Tons		4	535

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		66590		
1969		53548		
1972		126900	300	3000
Wet Manure Factor: Lbs. per bird		82.9	355	89.63
Wet Manure Defecated: Tons, 1972		5260		
Nutrients in Wet Manure: Combined		189		
Nitrogen, tons		3		
Phosphorus, tons		1		
Potash, tons		1		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	21472	2907	1373	4274
GRAINS	5743	259	115	374
Wheat	2146	124	89	213
Oats	3454	124	26	150
Barley	140	11	0	11
Rye	2	0	0	0
OTHER FIELD CROPS	19135	404	100	504
Soybeans	19125	402	100	502
Potatoes	10	3	0	3
Sugar beets	0	0	0	0
Field beans	0	0	0	0
HAY OR GRASS SILAGE	14317	84	3	87
PASTURED CROPLAND	6460	51	0	51
Cropland used for pasture	4537	49	0	49
Improved pasture	1923	2	0	2
VEGETABLES, SWEET CORN, MELONS	4300	1334	79	1413
ORCHARDS	1	0	0	0
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	2235	464	3	467
OTHER CROPS	3	0	0	0
Total Fertilizer Used, Tons		5497	1673	7170
Percent of Fertilizer Used		77	23	100

TABLE 7--FERTILIZER USED IN 1972 (From Illinois Fertilizer Report Pt 10 & 11)

Item	Tons
Fertilizer Used on Crops: Solid	18487
Liquid	1828
Total	20315
Primary Nutrients in Fertilizer	7184
Nitrogen	4126
Phosphorus	1582
Potash	1476

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	150	3985	4135
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	78940	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		114495

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
	Herbicides	Insecticides	Fungicides	Total
Table 1	935.6	394.7	56.6	1386.9
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	7832	39	11	30
Cattle: Table 3	49572	278	50	248
Sheep: Table 4	378	5	1	4
Horses: Table 4	89204	616	89	535
Chickens: Table 5	5260	82	21	18
Turkeys: Table 5	189	3	1	1
Total from Livestock, Tons	152435	1023	173	836
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Primary Nutrients			
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	20315	4126	1582	1476
Lime: Limestone equivalent purchased or applied, tons: Table 8	4135			
Salts: Applied on all highways, tons: Table 9	114495			

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-41

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Illinois

PLANNING SUBAREA: Southwest 2.2 COUNTY: DuPage

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	14850	408.3	3300	49.5		
Grains	2220	11.1	740	7.4		
Hay or Grass Silage	960	9.6	800	8.0		
Pastured Cropland	683	6.8	683	6.8		
Other Field Crops	15840	316.8	990	9.9		
Vegetables	475	11.4	475	38.4	475	7.3
Orchards	17	.8	20	2.1	20	5.2
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	35015	764.8	7008	122.1	495	12.5
Total Herbicides, Insecticides, Fungicides:		100 lbs		42548	899.4	

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	10391	1152	872	2024
1969	5247	449	395	844
1972	1400	400	600	1000

Wet Manure Factor: Tons per litter farrowed 7.12  
 Wet Manure Defecated: Tons, 1972 7120  
 Nutrients in Wet Manure: Nitrogen, tons 36  
 Phosphorus, tons 10  
 Potash, tons 27

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	7805	2835	4970
1969	2932	1140	1792
1972	2500	900	1600

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 11826 10320  
 Wet Manure Defecated: Tons, 1972 Combined: 22146  
 Nutrients in Wet Manure: Nitrogen, tons 124  
 Phosphorus, tons 22  
 Potash, tons 111

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		636	
1969		132	439
1972		200	2270

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 322 29011  
 Nutrients in Wet Manure: Nitrogen, Tons 5 200  
 Phosphorus, Tons 1 29  
 Potash, Tons 3 174

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		61548		
1969		37893		
1972		18700	10	100

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
 Wet Manure Defecated: Tons, 1972 775  
 Nutrients in Wet Manure: Combined 6  
 Nitrogen, tons 12 0  
 Phosphorus, tons 3 0  
 Potash, tons 3 0

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>		Number I-V farms	
211840		296	
Number of farms		470	
Acres in farms		66017	
Cropland in farms		60405	
Harvested cropland in farms		52196	

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	24898	2559	1299	3858
GRAINS	4896	321	43	364
Wheat	2838	270	43	313
Oats	1962	51	0	51
Barley	53	0	0	0
Rye	43	0	0	0
OTHER FIELD CROPS	18980	261	5	266
Soybeans	18975	261	5	266
Potatoes	5	0	0	0
Sugar beets	0	0	0	0
Field beans	0	0	0	0
HAY OR GRASS SILAGE	2133	51	0	51
PASTURED CROPLAND	2462	10	0	10
Cropland used for pasture	2400	7	0	7
Improved pasture	62	3	0	3
VEGETABLES, SWEET CORN, MELONS	559	113	0	113
ORCHARDS	26	1	0	1
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	1083	258	5	263
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		3574	1352	4926
Percent of Fertilizer Used		73	27	100

TABLE 7--FERTILIZER USED IN 1972 (From Illinois Fertilizer Report) #10 & 11

Item	Tons
Fertilizer Used on Crops:	
Solid	7324
Liquid	1395
Total	8719
Primary Nutrients in Fertilizer	
Nitrogen	3725
Phosphorus	1572
Potash	1014

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972		2926	2926
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	7300	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 10588		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides 764.5	Insecticides 122.1	Fungicides 12.5	Total 899.4
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
Swine: Table 2	Manure 7120	Nitrogen 36	Phosphorus 10	Potash 27
Cattle: Table 3	22146	124	22	111
Sheep: Table 4	322	5	1	3
Horses: Table 4	29011	200	29	174
Chickens: Table 5	775	12	3	3
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	59380	377	65	218
Fertilizers:	Tons of Commercial Fertilizers Applied			
Table 7	Total 8719	Nitrogen 1572	Phosphorus 1139	Potash 1014
Lime: Limestone equivalent purchased or applied, tons: Table 8 2926				
Salts: Applied on all highways, tons: Table 9 10588				

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-42

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2,0 STATE: Illinois

PLANNING SUBAREA: Southwest 2,2 COUNTY: Kane

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides		
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	
Corn	93600	2574.0	20800	332.0			
Grains	7860	39.3	2620	26.2			
Hay or Grass Silage	5310	53.7	11125	111.2			
Pastured Cropland	2918	29.4	2948	29.4			
Other Field Crops	42480	849.6	2655	26.5			
Vegetables	949	22.8	949	76.6	949	11.7	
Orchards							
Berries	48	4.4	45	5.5	49	6.1	
Nursery, Greenhouse							
Other Crops							
Totals	153195	3572.6	34142	520.4	998	21.1	
Total Herbicides, Insecticides, Fungicides: 100 lbs						188635	1774.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	57297	5712	4190	2902
1969	46269	3976	3295	7271
1972	49900	4500	5800	10300
Wet Manure Factor: Tons per litter farrowed				7.12
Wet Manure Defecated: Tons, 1972				73336
Nutrients in Wet Manure:				
Nitrogen, tons				367
Phosphorus, tons				103
Potash, tons				279

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	81601	18504	63097
1969	60010	13794	46216
1972	66900	13100	53800
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		172134	347010
Wet Manure Defecated: Tons, 1972 Combined:		519144	
Nutrients in Wet Manure:			
Nitrogen, tons		2907	
Phosphorus, tons		519	
Potash, tons		2596	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2749	
1969		2662	1328
1972		1600	6866
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2576	87747
Nutrients in Wet Manure:			
Nitrogen, Tons		36	605
Phosphorus, Tons		5	88
Potash, Tons		26	526

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		98508		
1969		59638		
1972		39000	70	100
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		1617		
Nutrients in Wet Manure:			Combined 6	
Nitrogen, tons		25	0	
Phosphorus, tons		6	0	
Potash, tons		6	0	

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	332800	Number I-V farms	1036
Number of farms	1210	Acres in I-V farms	26243
Acres in farms	275228	Cropland I-V farms	230715
Cropland in farms	238038	Harvested cropland	
Harvested cropland in farms	192963	I-V farms	188516

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	110936	11379	7139	21518
GRAINS	17733	583	72	655
Wheat	14508	295	60	355
Oats	12945	281	12	293
Barley	278	6	0	6
Rye	2	0	0	0
OTHER FIELD CROPS	43226	1190	102	1292
Soybeans	43104	1169	101	1270
Potatoes	37	21	1	22
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	15509	354	10	364
PASTURED CROPLAND	12432	197	11	208
Cropland used for pasture	10282	102	6	108
Improved pasture	2150	95	5	100
VEGETABLES, SWEET CORN, MELONS	1116	112	38	150
ORCHARDS	12	0	0	0
BERRIES	40	2	0	2
NURSERY & GREENHOUSE PRODUCTS	1009	275	103	378
OTHER CROPS	130	0	0	0
Total Fertilizer Used, Tons		17092	7475	24567
Percent of Fertilizer Used		70	30	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	13868
Liquid	15024
Total	28892
Primary Nutrients in Fertilizer:	
Nitrogen	6877
Phosphorus	3199
Potash	3813

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	2000	27120	29120
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	5340	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		7745

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3572.6	520.4	21.1	4114.1
Manure: Kind of Livestock				
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	73336	367	103	279
Cattle: Table 3	519144	2907	519	2596
Sheep: Table 4	2576	36	5	26
Horses: Table 4	87747	605	88	526
Chickens: Table 5	1617	25	6	6
Turkeys: Table 5	6	0	0	0
Total from Livestock, Tons	684426	3940	721	3433
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	28892	6877	3199	3813
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	29120			
Salts: Applied on all highways, tons: Table 9 7745				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Illinois  
 PLANNING SUBAREA: Southwest 2.2 COUNTY: Lake

TABLE 5-43

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	16,770	152.9	3660	51.9		
Grains	5280	25.4	1760	17.6		
Hay or Grass Silage	2730	27.3	2275	22.7		
Pastured Cropland	2458	24.5	2458	24.5		
Other Field Crops	16320	325.4	1020	10.2		
Vegetables	1503	36.1	1503	121.4	1503	23.2
Orchards						
Berries	178	9.7	202	21.5	204	19.4
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>111939</b>	<b>903.3</b>	<b>12878</b>	<b>272.8</b>	<b>1707</b>	<b>72.6</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs 59524 1248.7						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	10054	1072	788	1860
1969	7508	659	793	1352
1972	7200	700	1200	1900

Wet Manure Factor: Tons per litter farrowed 7.12  
 Wet Manure Defecated: Tons, 1972 13528  
 Nutrients in Wet Manure: Nitrogen, tons 68  
 Phosphorus, tons 19  
 Potash, tons 51

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	11804	6305	8499
1969	11892	5099	6793
1972	13900	5100	8800

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 67014 56760  
 Wet Manure Defecated: Tons, 1972 Combined: 123774  
 Nutrients in Wet Manure: Nitrogen, tons 693  
 Phosphorus, tons 124  
 Potash, tons 619

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2207	
1969		2131	1713
1972		1200	8856

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1932 113180  
 Nutrients in Wet Manure: Nitrogen, Tons 27 781  
 Phosphorus, Tons 4 113  
 Potash, Tons 19 679

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		106305		
1969		70287		
1972		298700	50	500

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
 Wet Manure Defecated: Tons, 1972 12381  
 Nutrients in Wet Manure:  
 Nitrogen, tons 193 31  
 Phosphorus, tons 50 0  
 Potash, tons 43 0

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1) <u>292608</u> Number I-V farms <u>401</u>				
Number of farms <u>660</u> Acres in I-V farms <u>96584</u>				
Acres in farms <u>110669</u> Cropland I-V farms <u>81116</u>				
Cropland in farms <u>90367</u> Harvested cropland <u>I-V farms 59773</u>				
Harvested cropland in farms <u>64233</u>				
CORN	20915	2804	824	3628
GRAINS	10694	678	49	727
Wheat	5227	347	11	388
Oats	4965	290	7	297
Barley	487	42	1	43
Rye	15	0	0	0
OTHER FIELD CROPS	17990	712	19	731
Soybeans	17910	670	19	689
Potatoes	66	41	0	41
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	7421	178	1	179
PASTURED CROPLAND	9084	246	55	301
Cropland used for pasture	7879	186	55	241
Improved pasture	1205	60	0	60
VEGETABLES, SWEET CORN, MELONS	1768	140	20	160
ORCHARDS	235	26	1	27
BERRIES	21	1	0	1
NURSERY & GREENHOUSE PRODUCTS	1760	273	4	277
OTHER CROPS	30	0	0	0
Total Fertilizer Used, Tons		5358	983	6341
Percent of Fertilizer Used				

TABLE 7--FERTILIZER USED IN 1972

(From Illinois Fertilizer Report) P 10 &

Item	Tons
Fertilizer Used on Crops: Solid	4224
Liquid	2589
<b>Total</b>	<b>6813</b>
Primary Nutrients in Fertilizer	2533
Nitrogen	1093
Phosphorus	757
Potash	683

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	20	1824	1844

Tonnages for Other Recent Years

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	11495	

Total Estimated Tons Applied on All Highways in 1972-73, As Computed 21024

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Table 1	903.3	272.8	72.6	1248.7

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	13528	68	19	51
Cattle: Table 3	123774	693	124	619
Sheep: Table 4	1932	27	4	19
Horses: Table 4	113180	781	113	679
Chickens: Table 5	12381	193	50	43
Turkeys: Table 5	31	0	0	0
Total from Livestock, Tons	<u>264826</u>	<u>1762</u>	<u>310</u>	<u>1111</u>

Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	6813	1093	757	683

Lime: Limestone equivalent purchased or applied, tons:  
 Table 8 1844

Salts: Applied on all highways, tons: Table 9 21024

To Convert From                      To                      Multiply By

Pounds (lb)                      Kilograms (kg)                      0.453

Acres (acre)                      Hectare (ha)                      .4047

Tons (ton)                      Kilograms (kg)                      907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-44

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Illinois

PLANNING SUBAREA: Southwest 2.2 COUNTY: McHenry

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	92070	2531.9	201.60	306.9		
Grains	9510	17.7	3180	31.8		
Hay or Grass Silage	10560	105.6	8800	88.0		
Pastured Cropland	4834	48.3	4834	48.3		
Other Field Crops	27120	542.4	1695	16.9		
Vegetables	2973	71.6	2973	240.1	2973	45.9
Orchards						
Berries	57	3.9	61	6.7	63	12.7
Nursery, Greenhouse						
Other Crops						
Totals	117154	3351.1	12003	738.7	3036	58.6
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					192193	1118.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	11796	4537	3828	8365
1969	32872	3282	2877	6159
1972	31500	4100	4100	8200
Wet Manure Factor: Tons per litter farrowed				7.12
Wet Manure Defecated: Tons, 1972				58384
Nutrients in Wet Manure: Nitrogen, tons				292
Phosphorus, tons				82
Potash, tons				222

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	70242	34124	36118
1969	58263	25692	32571
1972	66100	26800	39300
Wet Manure Factor: Tons Per Animal		13.24	6.45
Wet Manure Defecated: Tons, 1972		352152	253485
Wet Manure Defecated: Tons, 1972 Combined:		605637	
Nutrients in Wet Manure: Nitrogen, tons		3392	
Phosphorus, tons		606	
Potash, tons		3028	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3486	
1969		2164	7130
1972		1500	7393
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2415	92483
Nutrients in Wet Manure: Nitrogen, Tons		34	652
Phosphorus, Tons		5	24
Potash, Tons		24	567

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		86091		
1969		340384		
1972		288200	500	5000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		8630		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		135	5	
Phosphorus, tons		35	1	
Potash, tons		30	1	

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	99172	13292	5318	18610
GRAINS	19469	896	36	932
Wheat	2628	210	12	222
Oats	15901	633	24	657
Barley	914	52	0	52
Rye	26	1	0	1
OTHER FIELD CROPS	28991	1325	204	1529
Soybeans	28983	1322	204	1526
Potatoes	7	2	0	2
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	28574	754	13	767
PASTURED CROPLAND	20253	335	9	344
Cropland used for pasture				
Improved pasture	17385	119	9	128
VEGETABLES, SWEET CORN, MELONS	2868	216	0	216
ORCHARDS	3498	699	118	817
BERRIES	52	2	0	2
NURSERY & GREENHOUSE PRODUCTS	22	0	0	0
OTHER CROPS	829	438	0	438
TOTAL FERTILIZER USED, TONS	41	0	0	0
Percent of Fertilizer Used	1771	5698	23439	100

TABLE 7--FERTILIZER USED IN 1972 (From Illinois Fertilizer Report F110 &amp; F111)

Item	Tons
Fertilizer Used on Crops: Solid	18003
Liquid	9274
Total	27277
Primary Nutrients in Fertilizer	13690
Nitrogen	4655
Phosphorus	3771
Potash	5264

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	500	20660	21160
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4260	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 6179		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3351.4	738.7	58.6	4148.7
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	58384	292	82	222
Cattle: Table 3	605637	3392	606	3028
Sheep: Table 4	2415	34	5	24
Horses: Table 4	92483	652	24	567
Chickens: Table 5	8630	135	35	30
Turkeys: Table 5	34	5	1	1
Total from Livestock, Tons	769863	4510	823	3872
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	27277	4655	3771	5264
Lime: Limestone equivalent purchased or applied, tons: Table 8 21160				
Salts: Applied on all highways, tons: Table 9 6179				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-45

PLANNING AREA: Lake Michigan 2.0 STATE: Illinois

PLANNING SUBAREA: Southwest 2.2 COUNTY: Will

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	114030	3135.8	25340	380.1		
Grains	10140	50.7	3380	33.8		
Hay or Grass Silage	4440	44.4	3700	37.0		
Pastured Cropland	3700	37.0	3700	37.0		
Other Field Crops	23520	1870.4	5845	58.4		
Vegetables	1480	35.6	1480	119.5	1480	22.9
Orchards						
Berries	11	1.0	10	1.2	11	1.2
Nursery, Greenhouse						
Other Crops						
Totals	227321	5174.9	143455	667.0	1491	24.1
Total Herbicides, Insecticides, Fungicides: 100 lbs					272267	5866.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	33272	3234	2966	6200
1969	31228	2664	2889	5553
1972	27900	2900	3300	6200

Wet Manure Factor: Tons per litter farrowed 7.12  
 Wet Manure Defecated: Tons, 1972 44744  
 Nutrients in Wet Manure: Nitrogen, tons 221  
 Phosphorus, tons 62  
 Potash, tons 168

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	34998	12684	22314
1969	27149	10121	17028
1972	31000	10400	20600

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 136656 132870  
 Wet Manure Defecated: Tons, 1972 Combined: 269526  
 Nutrients in Wet Manure: Nitrogen, tons 1509  
 Phosphorus, tons 270  
 Potash, tons 1348

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5139	
1969		2597	1722
1972		3100	8903

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 4991 113780  
 Nutrients in Wet Manure: Nitrogen, Tons 70 785  
 Phosphorus, Tons 10 114  
 Potash, Tons 50 683

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		147715		
1969		544273		
1972		538100	500	5000

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
 Wet Manure Defecated: Tons, 1972 22304  
 Nutrients in Wet Manure: Combined 314  
 Nitrogen, tons 348 5  
 Phosphorus, tons 89 1  
 Potash, tons 78 1

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)		Number I-V farms		
Crops	Crop Acres	Dry	Liquid	Total
	542336	1519		
Number of farms	1845	Acres in I-V farms	374472	
Acres in farms	393460	Cropland I-V farms	333064	
Cropland in farms	294048	Harvested cropland		
Harvested cropland in farms	347451	I-V farms	286114	

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	111636	13752	11247	24999
GRAINS	26157	1403	535	1938
Wheat	7401	646	228	874
Oats	18409	734	304	1038
Barley	217	16	2	18
Rye	130	8	0	8
OTHER FIELD CROPS	103119	1072	323	1395
Soybeans	102110	961	253	1214
Potatoes	0	0	0	0
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	14951	483	22	505
PASTURED CROPLAND	19865	189	11	203
Cropland used for pasture	13473	164	8	172
Improved pasture	6392	25	6	31
VEGETABLES, SWEET CORN, MELONS	1741	426	38	464
ORCHARDS	1	0	0	0
BERRIES	10	2	0	2
NURSERY & GREENHOUSE PRODUCTS	308	113	40	153
OTHER CROPS	32	9	0	9
Total Fertilizer Used, Tons		17449	12219	29668
Percent of Fertilizer Used		59	41	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	11379
Liquid	19375
Total	30754
Primary Nutrients in Fertilizer	13025
Nitrogen	6100
Phosphorus	3656
Potash	3269

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	100	56650	56750
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	12500	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 18130		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	5174.9	667.0	24.1	5866.0

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	44744	221	62	168
Cattle: Table 3	269526	1509	270	1348
Sheep: Table 4	4991	70	10	50
Horses: Table 4	113780	785	114	683
Chickens: Table 5	22304	348	89	78
Turkeys: Table 5	344	5	1	1
Total from Livestock, Tons	455059	2928	546	2328

Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	30754	6100	3656	3269

Lime: Limestone equivalent purchased or applied, tons:	
Table 8	56750

Salts: Applied on all highways, tons: Table 9	
	18130

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-47

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southwest 2.2 COUNTY: La Porte

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	95360	2622.4	21191	317.8		
Grains	11207	56.0	3736	37.3		
Hay or Grass Silage	4020	40.2	3350	33.5		
Pastured Cropland	3026	30.2	3026	30.2		
Other Field Crops	4904.0	980.8	3065	30.6		
Vegetables	1433	51.9	1433	22.1	1433	104.4
Orchards						
Berries	1073	56.1	1081	120.1	1098	280.8
Nursery, Greenhouse						
Other Crops						
Totals	165159	3840.6	36882	591.6	2531	385.2
Total Herbicides, Insecticides, Fungicides: 100 lbs						
204572 4817.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	29157	2854	2592	5446
1969	26947	2484	2075	4559
1972 (1)	25869	1848	2524	4372

Wet Manure Factor: Tons per litter farrowed 7.636  
 Wet Manure Defecated: Tons, 1972 33385  
 Nutrients in Wet Manure: Nitrogen, tons 167  
 Phosphorus, tons 47  
 Potash, tons 127

(1) Farrowing trends applied to obtain Hog & Pig Inventory for 1972.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	27419	10044	17375
1969	22734	8657	14077
1972 (1)	24242	(1) 9231	(1) 15011

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 121295 96821  
 Wet Manure Defecated: Tons, 1972 Combined: 218116  
 Nutrients in Wet Manure: Nitrogen, tons 1221  
 Phosphorus, tons 218  
 Potash, tons 1091

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3255	
1969		2613	577
1972		(1) 2273	2198

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 3660 28090  
 Nutrients in Wet Manure: Nitrogen, Tons 51 194  
 Phosphorus, Tons 8 28  
 Potash, Tons 37 169

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Bens	Turkeys Raised
1964		144325		
1969		343408		
1972		(1) 286025		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 11856  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 185  
 Phosphorus, tons 47  
 Potash, tons 41

(1) State trends applied to county as county figures for 1972 not available.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)		Number I-V farms	
388608		951	
Number of farms 1371		Acres in I-V farms 269583	
Acres in farms 293428		Cropland I-V farms 232005	
Cropland in farms 248446		Harvested cropland	
Harvested cropland in farms 182446		I-V farms 175111	

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	83440	11905	6869	18774
GRAINS	22445	2580	351	2931
Wheat	17834	2133	337	2470
Oats	4085	415	11	426
Barley	206	11	0	11
Rye	311	21	0	21
OTHER FIELD CROPS	57225	2457	451	2908
Soybeans	55902	2113	315	2428
Potatoes	512	213	33	246
Sugar beets				
Field beans	765	0	0	0
HAY OR GRASS SILAGE	10520	393	34	427
PASTURED CROPLAND	12104	279	10	289
Cropland used for pasture	10580	211	10	221
Improved pasture	1524	68	0	68
VEGETABLES, SWEET CORN, MELONS	1748	1554	0	1554
ORCHARDS	1177	117	0	117
BERRIES	168	17	0	17
NURSERY & GREENHOUSE PRODUCTS	270	127	0	127
OTHER CROPS	246	11	7	18
Total Fertilizer Used, Tons		19440	7722	27162
Percent of Fertilizer Used		72	28	100

TABLE 7--FERTILIZER USED IN 1973 (From Indiana Fertilizer Reports--Spring & Fall 1973)

Fertilizer Used on Crops:	Total Tons
Solid	25853
Liquid	18749
Total	44602
Primary Nutrients in Fertilizer	22749
Nitrogen	8445
Phosphorus	5831
Potash	8483

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1652	3656	5308
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	7789	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 11297		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3840.6	591.6	385.2	4817.4
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure	Nitrogen	Phosphorus	Potash	
Swine: Table 2	33385	47	127	
Cattle: Table 3	218116	1221	218	1091
Sheep: Table 4	3660	51	8	37
Horses: Table 4	28090	194	28	169
Chickens: Table 5	11856	185	47	141
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	295107	1818	348	1465
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	44602	8445	5831	8483
Lime: Limestone equivalent purchased or applied, tons: Table 8 38108				
Salts: Applied on all highways, tons: Table 9 11297				



TABLE 5-48

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southwest 2.2 COUNTY: Porter

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	53855	1181.0	11968	179.5		
Grains	7205	36.0	2402	24.0		
Hay or Grass Silage	2310	23.1	1925	19.2		
Pastured Cropland	1906	19.0	1906	19.0		
Other Field Crops	33120	662.4	2070	20.7		
Vegetables	104	4.0	104	1.6	104	7.6
Orchards						
Berries	82	5.0	89	10.0	91	22.2
Nursery, Greenhouse						
Other Crops						
Totals	98582	2230.5	20464	274.0	195	29.8
Total Herbicides, Insecticides, Fungicides: 100 lbs				11924.1		2534.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	21106	2326	1988	4314
1969	18343	1803	1740	3543
1972 (1)	22987	2297	2143	4440

Wet Manure Factor: Tons per litter farrowed 7.636  
Wet Manure Defecated: Tons, 1972 33904  
Nutrients in Wet Manure: Nitrogen, tons 170  
Phosphorus, tons 47  
Potash, tons 129

(1) Farrowing trends applied to obtain 1972 Inventory.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	18631	6678	11953
1969	11715	4590	7125
1972 (1)	12492	(1) 4895	(1) 7597

Wet Manure Factor: Tons Per Animal 13.14  
Wet Manure Defecated: Tons, 1972 64320  
Wet Manure Defecated: Tons, 1972 Combined: 113321  
Nutrients in Wet Manure: Nitrogen, tons 635  
Phosphorus, tons 113  
Potash, tons 567

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2970	
1969		2836	605
1972		(1) 2468	2305

Wet Manure Factor: Tons per animal 1.61  
Wet Manure Defecated: Tons, 1972 3973  
Nutrients in Wet Manure: Nitrogen, Tons 56  
Phosphorus, Tons 8  
Potash, Tons 40

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		112785		
1969		109137		
1972		(1) 91067	120	1200

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 3775  
Nutrients in Wet Manure: Nitrogen, tons 59  
Phosphorus, tons 15  
Potash, tons 11

(1) State trends applied to obtain 1972 county figures.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	52988	7038	5013	12051
GRAINS	15846	1794	248	2042
Wheat	11794	1433	206	1639
Oats	3879	350	39	389
Barley	20	0	0	0
Eye	153	11	2	13
OTHER FIELD CROPS	34451	1302	240	1542
Soybeans	34374	1291	235	1526
Potatoes	14	5	0	5
Sugar beets				
Field beans	344	0	0	0
HAY OR GRASS SILAGE	5511	119	35	154
PASTURED CROPLAND	7624	207	53	260
Cropland used for pasture	6191	166	49	215
Improved pasture	1433	41	4	45
VEGETABLES, SWEET CORN, MELONS	127	61	7	68
ORCHARDS	90	18	0	18
BERRIES	20	6	2	8
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	39	0	0	0
Total Fertilizer Used, Tons		10575	5598	16173
Percent of Fertilizer Used		65	35	100

TABLE 7--FERTILIZER USED IN 1973 (Spring &amp; Fall 1973 Indiana Fertilizer Tonnage Reports) Item

Item	Tons
Fertilizer Used on Crops: Solid	17448
Liquid	13225
Total	30673
Primary Nutrients in Fertilizer	11651
Nitrogen	5165
Phosphorus	4065
Potash	5421

(1) Full year information available for only 1973.

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972		17919	17919
Tonnages for Other Recent Years			

Total Estimated Tons Applied on All Highways in 1972-73, As Computed 10594

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	7304	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2230.5	274.0	29.8	2534.3
Manure: Kind of Manure				
Tons of Materials in Wet Manure Defecated				
Table 2	Nitrogen	Phosphorus	Potash	Total
Livestock	33904	170	47	129
Swine: Table 2	113321	635	113	567
Cattle: Table 3	3973	56	8	40
Sheep: Table 4	29458	203	29	177
Horses: Table 4	3775	59	15	13
Chickens: Table 5	75	1	0	0
Turkeys: Table 5				
Total from Livestock, Tons	184506	1124	212	926
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	30673	5165	4065	5421
Lime: Limestone equivalent purchased or applied, tons: Table 8	17919			
Salts: Applied on all highways, tons: Table 9 10594				

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-49

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southwest 2.2 COUNTY: Starke

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	51,040	1486.1	12009	180.1		
Grains	1601	8.0	534	5.3		
Hay or Grass Silage	1050	10.5	875	8.7		
Pastured Cropland	1109	11.0	1109	11.0		
Other Field Crops	25110	508.8	1590	15.9		
Vegetables	66	2.5	66	1.0	66	1.8
Orchards						
Berries	86	8.5	78	9.7	86	9.1
Nursery, Greenhouse						
Other Crops						
Totals	83692	2038.1	16561	231.7	152	13.9
Total Herbicides, Insecticides, Fungicides: 100 lbs 100405 2287.0						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	16228	1668	1100	3068
1969	13412	1517	1267	2784
1972 (1)	15912	1726	1577	3303
Wet Manure Factor: Tons per litter farrowed				7.636
Wet Manure Defecated: Tons, 1972				25222
Nutrients in Wet Manure: Nitrogen, tons				126
Phosphorus, tons				35
Potash, tons				96

(1) Farrowing trends applied to obtain 1972 Inventory.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	6299	2529	3770
1969	6162	2227	3935
1972	(1) 6571	(1) 2375	(1) 4196
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		31208	27064
Wet Manure Defecated: Tons, 1972 Combined:		58272	
Nutrients in Wet Manure: Nitrogen, tons		326	
Phosphorus, tons		58	
Potash, tons		291	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		917	
1969		917	301
1972		(1) 824	1147
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1327	14659
Nutrients in Wet Manure: Nitrogen, Tons		19	101
Phosphorus, Tons		3	15
Potash, Tons		13	88

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		113555		
1969		172237		
1972		(1) 147621		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6119		
Nutrients in Wet Manure: Nitrogen, tons		95	Combined	
Phosphorus, tons		24		
Potash, tons		21		

(1) State trends applied to obtain 1972 county figure.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crop	Acres	Tons of Fertilizer Used
		Dry Liquid Total
CORN	111117	7235 4003 11238
GRAINS	4505	534 65 599
Wheat	3394	438 64 502
Oats	359	39 0 39
Barley	4	0 0 0
Rye	748	56 1 57
OTHER FIELD CROPS	35987	3014 633 3677
Soybeans	31897	1830 557 2387
Potatoes	1665	625 0 625
Sugar beets		
Field beans		
HAY OR GRASS SILAGE	2607	155 0 155
PASTURED CROPLAND	5635	197 51 248
Cropland used for pasture	4135	112 51 163
Improved pasture	1500	85 0 85
VEGETABLES, SWEET CORN, MELONS	80	31 6 37
ORCHARDS	3	0 0 0
BERRIES	81	12 0 12
NURSERY & GREENHOUSE PRODUCTS	17	0 0 0
OTHER CROPS	237	10 0 10
Total Fertilizer Used, Tons		11218 4758 15976
Percent of Fertilizer Used		70 30 100

TABLE 7--FERTILIZER USED IN 1973 (Spring & Fall 1973 Indiana Fertilizer Tonnage Reports)

Item	Tons
Fertilizer Used on Crops: Solid	17408
Liquid	19355
Total	36763
Primary Nutrients in Fertilizer	18661
Nitrogen	7315
Phosphorus	4931
Potash	6415

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	222	13937	14159
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3995	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5794

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2038.1	231.7	13.9	2287.0
Manure: Kind of Livestock				
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	25222	126	35	96
Cattle: Table 3	58272	326	58	291
Sheep: Table 4	1327	19	3	13
Horses: Table 4	14659	101	15	88
Chickens: Table 5	6119	95	24	21
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	105599	667	135	509
Fertilizers: Tons of Commercial Fertilizers Applied				
Table	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	36763	7315	4931	6415
Lime: Limestone equivalent purchased or applied, tons: Table 8 14159				
Salts: Applied on all highways, tons: Table 9 5794				

(1) County, land area, acres includes water areas under 40 acres in size.

#### 5.4 Planning Subarea 2.3

Planning Subarea 2.3 contains 6 Indiana and 19 Michigan counties. The total land area is 3,645,130 hectares (9,000,320 acres). Land in farms totals 2,303,370 hectares (5,884,857 acres) or 65 percent of the total.

##### 5.4.1 Agricultural Characteristics

Agricultural activities are very important in PSA 2.3. This subarea, together with PSA 2.4, produces about one half the Great Lakes Basin's fruit output. Corn, hay or grass silage, wheat and soybeans are important crops.

Table 5-50 indicates the relative proportions of materials usage in the planning subarea as compared to the total Great Lakes Basin.

Table 5-50

#### MATERIALS USAGE BASIN RELATIONSHIP -- PSA 2.3 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 2.3</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applies	3.27	2.66
Index of chemicals used	113	100
Tons of livestock manure defecated	3.77	3.37
Index of manure defecated	112	100
Lbs primary nutrients in livestock manure	94	82
Index of primary nutrients in manure	115	100
Lbs commercial fertilizer applied	345	321
Percent liquid fertilizer applied	24	22
Index commercial fertilizer applied	107	100
Lbs primary nutrients in commercial fertilizer	161	153
Index primary nutrients in commercial fertilizer	105	100
Lbs of lime applied	227	170
Index of lime used	134	100
<hr/>		
<u>Per acre of total land area</u>		
Lbs road salts used	42.15	41.74
Index road salts used	101	100
<hr/>		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

### 5.4.2 Materials Usage

The following table lists by county the materials usage inventory for PSA 2.3.

Table 5-51  
MATERIALS USAGE  
(in 1972)

PSA 2.3	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Croplands (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>Indiana</u>					
Elkhart	3292	666549	22251	11224	3094
Lagrange	2142	770583	24513	8022	3443
Marshall	3342	460483	36225	15463	6943
Noble	2534	442088	18492	5783	5699
St. Joseph	2716	238487	20446	11719	11954
Steuben	1445	293804	12471	2665	3366
<u>Michigan</u>					
Allegan	4788	615448	24253	16590	9925
Barry	1607	389470	10186	14480	5983
Berrien	12104	201212	25483	14374	10722
Branch	3031	337563	17594	10598	7829
Calhoun	2982	487747	19309	15600	7827
Cass	2556	365178	14810	29198	6572
Clinton	3063	520553	24211	7881	3701
Eaton	3084	407995	17648	8232	5983
Hillsdale	2963	436822	17514	13857	4666
Ingham	2686	477692	19955	9098	7976
Ionia	3693	557067	21106	7733	8193
Jackson	2313	531824	15382	7238	11013
Kalamazoo	2182	291468	12344	12469	9925
Kent	6609	466069	17032	13647	27853
Montcalm	5139	301338	23073	29115	3384
Ottawa	3236	475138	14827	6096	1340
St. Joseph	2467	341669	16942	25499	6572
Shiawassee	2944	344926	20274	4542	4980
Van Buren	9645	248549	21458	20543	10724
TOTAL	92563	10669722	487799	321666	189667

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 5.4.2.1 Agricultural Chemicals

There were 4,198,500 kilograms (9,256,320 pounds) of agricultural chemicals used in PSA 2.3. Herbicides represented 57 percent of the total, insecticides 17 percent, and fungicides 26 percent. Herbicide use may increase about 10-25 percent in the next 10 years and fungicide use about 5-10 percent. Insecticide use may increase only slightly.

TABLE 5-52

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana &amp; Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: 25 County Totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1290569	35489.9	286792	4301.5		
Grains	280775	1103.2	93591	935.5		
Hay or Grass Silage	172337	1722.7	143636	1435.5		
Pastured Cropland	119881	1197.7	119881	1197.7		
Other Field Crops	393076	8397.9	37974	1956.5	13556	2033.1
Vegetables	33924	1658.4	21046	1398.9	23773	1727.8
Orchards						
Berries	63722	2994.9	76540	12394.4	78195	12317.6
Nursery, Greenhouse						
Other Crops						
Totals	2354284	52864.7	782440	23620.0	115524	16078.5
Total Herbicides, Insecticides, Fungicides: 100 lbs						
235228.8						
92563.2						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	718974	72291	72952	145243
1969	744126	66577	73061	139638
1972	811784	84552	84118	168670

Wet Manure Factor: Tons per litter farrowed (combination factor) 7.38  
Wet Manure Defecated: Tons, 1972 1244456  
Nutrients in Wet Manure: Nitrogen, tons 6224  
Phosphorus, tons 1743  
Potash, tons 4725

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	830664	328967	501697
1969	747020	287785	459235
1972	812011	311260	500751

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 4089957 3229844  
Wet Manure Defecated: Tons, 1972 Combined: 7319801  
Nutrients in Wet Manure: Nitrogen, tons 40990  
Phosphorus, tons 7320  
Potash, tons 36599

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		197313	
1969		167611	34729
1972		138378	121458

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 222789 1552233  
Nutrients in Wet Manure: Nitrogen, tons 3119 10710  
Phosphorus, tons 467 1552  
Potash, tons 2228 9313

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		5527147		
1969		5869412		
1972		4770947	211830	2103360

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
Wet Manure Defecated: Tons, 1972 197756  
Nutrients in Wet Manure: Nitrogen, tons 3085 Combined 132687  
Phosphorus, tons 791 2069  
Potash, tons 622 531 464

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	9000320	Number I-V farms	23755
Number of farms	41911	Acres in I-V farms	4573299
Acres in farms	5884857	Cropland I-V farms	3567494
Cropland in farms	4415831	Harvested cropland	
Harvested cropland in farms	2830585	I-V farms	2476345

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	982562	122639	37411	160050
GRAINS	156478	17154	2755	50209
Wheat	256485	29396	2005	31404
Oats	166320	15112	44	16056
Barley	7268	786	46	832
Rye	15113	866	32	898
OTHER FIELD CROPS	396634	33298	4208	37506
Soybeans	291984	15920	1822	17742
Potatoes	16621	7516	1511	9030
Sugar beets				
Field beans	23248	121		121
HAY OR GRASS SILAGE	475088	11252	537	11789
PASTURED CROPLAND	404686	4600	250	4850
Cropland used for pasture	364471	3725	230	3955
Improved pasture	40215	875	20	895
VEGETABLES, SWEET CORN, MELONS	38227	11118	625	11743
ORCHARDS	102987	14992	468	15460
BERRIES	12174	2613	35	2648
NURSERY & GREENHOUSE PRODUCTS	7921	2110	95	2205
OTHER CROPS	3476	190	15	205
Total Fertilizer Used, Tons		250387	46399	296786
Percent of Fertilizer Used		84	16	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	371888
Liquid	115911
Total	487799
Primary Nutrients in Fertilizer	227609
Nitrogen	75312
Phosphorus	73002
Potash	79295

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	158961	162705	321666
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	110174	540.2
1971-72	106340	521.0
1972-73	130770	510.9
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 189667		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	52864.7	23620.0	16078.5	92563.2
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1244456	6224	1743	4725
Cattle: Table 3	7319801	40990	7320	36599
Sheep: Table 4	222789	3119	467	2228
Horses: Table 4	1552233	10710	1552	9313
Chickens: Table 5	197756	3085	791	692
Turkeys: Table 5	132687	2069	531	464
Total from Livestock, Tons	10669722	66197	12404	54021
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	487799	75312	73002	79295
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	321666			
Salts: Applied on all highways, tons: Table 9 189667				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-53

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southeast 2.3 COUNTY: Elkhart

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	7094.0	1950.8	1576.1	236.4		
Grains	1194.6	59.7	3982	39.8		
Hay or Grass Silage	5880	58.8	4900	49.0		
Pastured Cropland	4713	47.1	4713	47.1		
Other Field Crops	30960	619.2	1935	19.3		
Vegetables	220	8.4	220	3.4	220	16.0
Orchards	289	16.1	321	35.8	325	85.0
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	12494.8	2760.1	31835	430.8	545	101.0
Total Herbicides, Insecticides, Fungicides: 100 lbs						
				157328		3291.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	42611	4510	4553	9063
1969	47746	3862	4051	7916
1972 (1)	56582	4009	5372	9381
Wet Manure Factor: Tons per litter farrowed 7.636				
Wet Manure Defecated: Tons, 1972 71633				
Nutrients in Wet Manure: Nitrogen, tons 358				
Phosphorus, tons 100				
Potash, tons 272				

(1) 1972 Hog & Pig Inventory for Indiana not available by county. Calculated

TABLE 3--MANURE FROM CATTLE here at same rate as litters farrowed.

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	40357	15757	24600
1969	38619	15532	23087
1972 (1)	41181	(1) 16563	(1) 24618
Wet Manure Factor: Tons Per Animal			
		13.14	6.45
Wet Manure Defecated: Tons, 1972			
		217638	158786
Wet Manure Defecated: Tons, 1972 Combined: 376424			
Nutrients in Wet Manure: Nitrogen, tons 2108			
Phosphorus, tons 376			
Potash, tons 1882			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5746	-
1969		5406	2407
1972	(1)	4703	9171
Wet Manure Factor: Tons per animal			
		1.61	12.78
Wet Manure Defecated: Tons, 1972			
		7572	117201
Nutrients in Wet Manure: Nitrogen, Tons			
		106	809
Phosphorus, Tons			
		15	117
Potash, Tons			
		76	703

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		422495		
1969		844845		
1972	(1)	703671	102720	1027200
Wet Manure Factor: Lbs. per bird				
		82.90	365.0	89.63
Wet Manure Defecated: Tons, 1972				
		29167		
Nutrients in Wet Manure:				
	Nitrogen, tons	455	1007	64552
	Phosphorus, tons	117	258	
	Potash, tons	102	226	

(1) State trends applied to county as county figures for 1972 not available.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	60863	6438	3817	10255
GRAINS	18363	1792	273	2065
Wheat	12627	1282	250	1532
Oats	5283	472	22	494
Barley	107	9	1	10
Rye	199	11	0	11
OTHER FIELD CROPS	28184	1082	391	1473
Soybeans	2749	946	336	1282
Potatoes	12	3	0	3
Sugar beets				
Field beans	403	0	0	0
HAY OR GRASS SILAGE	18455	118	65	483
PASTURED CROPLAND	18852	202	39	241
Cropland used for pasture	17033	177	37	214
Improved pasture	1819	25	2	27
VEGETABLES, SWEET CORN, MELONS	267	64	56	120
ORCHARDS	361	21	20	47
BERRIES	40	4	1	5
NURSERY & GREENHOUSE PRODUCTS	356	31	2	33
OTHER CROPS	120	18	0	18
Total Fertilizer Used, Tons		10070	4664	14734
Percent of Fertilizer Used		68	32	100

TABLE 7--FERTILIZER USED IN 1973

Item	Tons
Fertilizer Used on Crops: Solid	12962
Liquid	9289
Total	22251
Primary Nutrients in Fertilizer	9401
Nitrogen	3235
Phosphorus	3086
Potash	3080

(1) Full year information available for only 1973.

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1183	9711	11224
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2133	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3094		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2760.1	430.8	101.0	3291.9
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	71633	358	100	272
Cattle: Table 3	376424	2108	376	1882
Sheep: Table 4	7572	106	16	76
Horses: Table 4	117201	809	117	703
Chickens: Table 5	29167	455	117	102
Turkeys: Table 5	64552	1007	258	226
Total from Livestock, Tons	666549	4843	984	3261
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	22251	3235	3086	3080
Lime: Limestone equivalent purchased or applied, tons: Table 8 11224				
Salts: Applied on all highways, tons: Table 9 3094				

TABLE 5-54

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southeast 2.3 COUNTY: Lagrange

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1,939.7	1358.4	1,097.7	761.6		
Grains	11,761	58.8	3,920	39.2		
Hay or Grass Silage	7,320	73.2	6,100	61.0		
Pastured Cropland	6,811	68.1	6,811	68.1		
Other Field Crops	1,032.0	206.4	84.5	6.4		
Vegetables	68	2.6	68	1.0	68	5.0
Orchards	79	6.6	75	9.0	82	13.5
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	85,756	1,774.1	28,526	349.3	150	18.5
Total Herbicides, Insecticides, Fungicides: 100 lbs 114,502 2,111.9						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	53342	6179	6322	12501
1969	67663	6494	7020	13514
1972 (1)	91971	9756	8613	18369
Wet Manure Factor: Tons per litter farrowed		7.636		
Wet Manure Defecated: Tons, 1972		11,0266		
Nutrients in Wet Manure:		Nitrogen, tons 701		
		Phosphorus, tons 196		
		Potash, tons 533		

(1) Farrowing trends applied to Inventory figures to get 1972 number--not now available

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	37272	13379	23893
1969	39138	13123	26015
1972 (1)	117735	(1) 13994	(1) 27741
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		183881	178929
Wet Manure Defecated: Tons, 1972 Combined:		362810	
Nutrients in Wet Manure:		Nitrogen, tons 2032	
		Phosphorus, tons 362	
		Potash, tons 1874	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		11049	-
1969		7177	4723
1972		(1) 6244	17995
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		10053	229971
Nutrients in Wet Manure:		Nitrogen, Tons 341	
		Phosphorus, Tons 21	
		Potash, Tons 101	

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		1,56385		
1969		54,1508		
1972		(1) 1,51022	15000	135000
Wet Manure Factor: Lbs. per bird		82.9	365.00	89.63
Wet Manure Defecated: Tons, 1972		18695		
Nutrients in Wet Manure:		Combined 8788		
		Nitrogen, tons 292		
		Phosphorus, tons 75		
		Potash, tons 65		

(1) State trends applied to county as county figures for 1972 not available.

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	42302	3773	1964	5737
GRAINS	20719	1564	216	1880
Wheat	11167	923	216	1139
Oats	8755	584	98	682
Barley	162	21	0	21
Rye	371	17	2	19
OTHER FIELD CROPS	13276	666	211	877
Soybeans	11683	488	188	676
Potatoes	36	11	0	11
Sugar beets				
Field beans	895	0	0	0
HAY OR GRASS SILAGE	21636	337	72	409
PASTURED CROPLAND	27245	184	29	213
Cropland used for pasture	24248	170	24	194
Improved pasture	2997	14	5	19
VEGETABLES, SWEET CORN, MELONS	83	26	1	27
ORCHARDS	36	1	1	2
BERRIES	54	0	0	0
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	149	30	0	30
Total Fertilizer Used, Tons		6581	2594	9175
Percent of Fertilizer Used		72	28	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	13990
Liquid	10523
Total	24513
Primary Nutrients in Fertilizer	10653
Nitrogen	3458
Phosphorus	3658
Potash	3537

(1) Full year information available for only 1973.

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	2596	5426	8022
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2374	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3443

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1774.1	349.3	18.5	2111.9
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	11,0266	701	196	533
Cattle: Table 3	362810	2032	362	1874
Sheep: Table 4	10053	341	21	101
Horses: Table 4	229971	1587	230	1380
Chickens: Table 5	18695	292	75	65
Turkeys: Table 5	8788	137	35	31
Total from Livestock, Tons	770583	4890	919	3924
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	24513	3458	3658	3537
Lime: Limestone equivalent purchased or applied, tons: Table 8 8022				
Salts: Applied on all highways, tons: Table 9 3443				

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-55

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southeast 2.3 COUNTY: Marshall

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	70660	1943.1	15702	235.5		
Grains	7513	37.5	2504	25.0		
Hay or Grass Silage	5130	51.3	4275	42.7		
Pastured Cropland	4508	45.0	4508	45.0		
Other Field Crops	33120	662.4	2070	20.7		
Vegetables	952	36.5	952	11.7	952	69.3
Orchards						
Berries	274	20.1	282	34.3	295	59.4
Nursery, Greenhouse						
Other Crops						
Totals	122157	2795.9	30293	417.9	1247	128.7
Total Herbicides, Insecticides, Fungicides: 100 lbs					153697	3342.5

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	60422	6779	6209	12988
1969	61559	5746	5638	11384
1972 (1)	67015	5611	6176	11817

Wet Manure Factor: Tons per litter farrowed 7.636  
Wet Manure Defecated: Tons, 1972 90235  
Nutrients in Wet Manure: Nitrogen, tons 451  
Phosphorus, tons 126  
Potash, tons 342

(1) Farrowing trends applied to obtain this figure for 1972.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	36093	12493	23600
1969	32228	11509	20719
1972	(1) 34366	(1) 12273	(1) 22093

Wet Manure Factor: Tons Per Animal 13.24 6.45  
Wet Manure Defecated: Tons, 1972 161267 142500  
Wet Manure Defecated: Tons, 1972 Combined: 303767  
Nutrients in Wet Manure: Nitrogen, tons 1701  
Phosphorus, tons 304  
Potash, tons 1519

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		6274	
1969		5110	1189
1972		(1) 4707	4530

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 7578 57893  
Nutrients in Wet Manure: Nitrogen, Tons 106 399  
Phosphorus, Tons 16 58  
Potash, Tons 76 347

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		240655		
1969		185217		
1972		(1) 15173	600	6060

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
Wet Manure Defecated: Tons, 1972 629  
Nutrients in Wet Manure: Combined 381  
Nitrogen, tons 10 6  
Phosphorus, tons 3 2  
Potash, tons 2 1

(1) State trends applied to obtain county figures.

To Convert From To Multiply By  
Pounds (lb) Kilograms (kg) 0.453  
Acres (acre) Hectare (ha) .4047  
Tons (ton) Kilograms (kg) 907.2

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	283776	Number I-V farms	1126
Number of farms	1711	Acres in I-V farms	211265
Acres in farms	244625	Cropland I-V farms	175102
Cropland in farms	198761	Harvested cropland I-V farms	129302
Harvested cropland in farms	132980		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	63130	8828	3973	12801
GRAINS	13351	1593	110	1703
Wheat	9559	1225	98	1323
Oats	3317	330	12	342
Barley	36	4	0	4
Rye	439	34	0	34
OTHER FIELD CROPS	36343	2034	221	2255
Soybeans	35757	1942	191	2133
Potatoes	5	3	0	3
Sugar beets				
Field beans	239	0	0	0
HAY OR GRASS SILAGE	15791	525	18	543
PASTURED CROPLAND	18031	280	8	288
Cropland used for pasture	16154	261	6	267
Improved pasture	1877	19	2	21
VEGETABLES, SWEET CORN, MELONS	1161	334	97	431
ORCHARDS	206	45	0	45
BERRIES	132	29	0	29
NURSERY & GREENHOUSE PRODUCTS	61	1	0	1
OTHER CROPS	138	1	0	1
Total Fertilizer Used, Tons		13670	4427	18097
Percent of Fertilizer Used		76	24	100

(1) TABLE 7--FERTILIZER USED IN 1973 (Spring & Fall 1973 Fert. Tonnage Reports--Ind.)

Item	Tons
Fertilizer Used on Crops: Solid	19042
Liquid	17183
Total	36225
Primary Nutrients in Fertilizer	17735
Nitrogen	6886
Phosphorus	4574
Potash	6275

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1861	13602	15463
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4787	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 6943		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
	Herbicides	Insecticides	Fungicides	Total
Table 1	2795.9	417.9	128.7	3342.5

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	90235	451	126	342
Cattle: Table 3	303767	1701	304	1519
Sheep: Table 4	7578	106	16	76
Horses: Table 4	57893	399	58	347
Chickens: Table 5	629	10	3	2
Turkeys: Table 5	381	6	2	1
Total from Livestock, Tons	1460483	2673	509	2287

Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	36225	6886	4574	6275

Lime: Limestone equivalent purchased or applied, tons: Table 8 15463  
Salts: Applied on all highways, tons: Table 9 6943

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 5-56

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southeast 2.3 COUNTY: Noble

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	54505	1198.8	12112	181.6		
Grains	11023	55.1	3674	36.7		
Hay or Grass Silage	5700	57.0	4750	47.5		
Pastured Cropland	5078	50.7	5078	50.7		
Other Field Crops	20960	419.2	1310	13.1		
Vegetables	235	9.0	235	3.6	235	17.1
Orchards						
Berries	206	12.4	224	25.3	229	56.6
Nursery, Greenhouse						
Other Crops						
Totals	97707	2102.2	27383	358.5	464	73.7
Total Herbicides, Insecticides, Fungicides: 100 lbs						
125554 2534.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	51786	5946	5218	11164
1969	44840	4433	4500	8933
1972 (1)	52399	4880	5557	10439
Wet Manure Factor: Tons per litter farrowed		7.636		
Wet Manure Defecated: Tons, 1972		79712		
Nutrients in Wet Manure:				
Nitrogen, tons		399		
Phosphorus, tons		112		
Potash, tons		299		

(1) Farrowing trends applied to obtain inventory for 1972.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	33153	12719	20434
1969	30532	11894	18638
1972 (1)	32558	(1) 12683	(1) 19875
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		166655	128194
Wet Manure Defecated: Tons, 1972 Combined:		294849	
Nutrients in Wet Manure:			
Nitrogen, tons		1651	
Phosphorus, tons		295	
Potash, tons		1474	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		13033	
1969		8523	933
1972		(1) 7415	3555
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		11938	45433
Nutrients in Wet Manure:			
Nitrogen, Tons		167	313
Phosphorus, Tons		25	45
Potash, Tons		119	273

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		313785		
1969		294166		
1972		(1) 245011		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		10156		
Nutrients in Wet Manure:				
Nitrogen, tons		158		
Phosphorus, tons		41		
Potash, tons		36		
Combined				

(1) State trends applied to get county figures for 1972.

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	47132	5569	2441	8010
GRAINS	18265	1624	304	1928
Wheat	11425	1083	211	1294
Oats	6318	518	89	607
Barley	140	6	1	7
Rye	268	8	3	11
OTHER FIELD CROPS	21807	960	228	1188
Soybeans	20552	789	193	982
Potatoes	41	3	0	3
Sugar beets				
Field beans	318	0	0	0
HAY OR GRASS SILAGE	15951	319	122	441
PASTURED CROPLAND	20312	309	33	342
Cropland used for pasture	18597	265	33	298
Improved pasture	1715	44	0	44
VEGETABLES, SWEET CORN, MELONS	286	61	57	118
ORCHARDS	232	10	9	19
BERRIES	46	9	1	10
NURSERY & GREENHOUSE PRODUCTS	27	3	0	3
OTHER CROPS	71	2	0	2
Total Fertilizer Used, Tons		8866	3195	12061
Percent of Fertilizer Used		74	26	100

TABLE 7--FERTILIZER USED IN 1973

Fertilizer Used on Crops:	Tons	
	Solid	Liquid
Total	6450	12042
Total	18492	
Primary Nutrients in Fertilizer	7727	
Nitrogen	2401	
Phosphorus	3398	
Potash	1928	

(1) Full year information available for only 1973.

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	2656	3127	5783
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3929	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5699		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	2102.2	358.5	73.7	2534.4
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	79712	399	112	299
Cattle: Table 3	294849	1651	295	1474
Sheep: Table 4	11938	167	25	119
Horses: Table 4	45433	313	45	273
Chickens: Table 5	10156	158	41	36
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	442088	2688	518	2201
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7	18492	Nitrogen	Phosphorus	Potash
		2401	3398	1928
Lime: Limestone equivalent purchased or applied, tons: Table 8 5783				
Salts: Applied on all highways, tons: Table 9 5699				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From To Multiply By

Pounds (lb) Kilograms (kg) 0.453

Acres (acre) Hectare (ha) .4047

Tons (ton) Kilograms (kg) 907.2

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-57

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana

PLANNING SUBAREA: Southeast 2.3 COUNTY: St. Joseph

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	60076	1652.0	13350	200.2		
Grains	9483	47.4	3161	31.6		
Hay or Grass Silage	3270	32.7	2725	27.2		
Pastured Cropland	2117	21.1	2117	21.1		
Other Field Crops	28560	571.2	1785	17.8		
Vegetables	160	17.6	460	7.1	460	36.0
Orchards						
Berries	77	5.2	81	9.3	84	18.6
Nursery, Greenhouse						
Other Crops						
Totals	104043	2347.2	23679	314.3	544	54.6
Total Herbicides, Insecticides, Fungicides: 100 lbs					128266	2716.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	25659	2548	2549	5097
1969	24397	2477	2261	4738
1972 (1)	32064	3478	2749	6227
Wet Manure Factor: Tons per litter farrowed		7.636		
Wet Manure Defecated: Tons, 1972		47549		
Nutrients in Wet Manure:				
Nitrogen, tons		238		
Phosphorus, tons		67		
Potash, tons		181		

(1) Farrowing trends applied to obtain 1972 Inventory.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	19598	6971	12627
1969	14787	5315	9472
1972 (1)	15768	(1) 5668	(1) 10100
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		74478	65145
Wet Manure Defecated: Tons, 1972 Combined:		139623	
Nutrients in Wet Manure:			
Nitrogen, tons		782	
Phosphorus, tons		140	
Potash, tons		698	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2957	
1969		1840	861
1972 (1)		1601	3280
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2578	41924
Nutrients in Wet Manure:			
Nitrogen, Tons		36	289
Phosphorus, Tons		5	42
Potash, Tons		26	252

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		178255		
1969		197329		
1972 (1)		164355	-	-
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6813		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		106		
Phosphorus, tons		27		
Potash, tons		24		

(1) State trends applied to obtain 1972 figures.

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	50534	7046	2925	9971
GRAINS	13773	1634	178	1812
Wheat	11137	1369	165	1534
Oats	2238	243	13	256
Barley	38	3	0	3
Rye	312	16	0	16
OTHER FIELD CROPS	34398	2244	524	2868
Soybeans	30807	1511	218	1729
Potatoes	1193	378	123	501
Sugar beets				
Field beans	294	0	0	0
HAY OR GRASS SILAGE	8295	341	15	356
PASTURED CROPLAND	8469	138	26	164
Cropland used for pasture	8021	131	17	148
Improved pasture	448	7	9	16
VEGETABLES, SWEET CORN, MELONS	561	198	31	229
ORCHARDS	70	8	0	8
BERRIES	29	10	0	10
NURSERY & GREENHOUSE PRODUCTS	251	103	0	103
OTHER CROPS	284	0	0	0
Total Fertilizer Used, Tons		11822	3699	15521
Percent of Fertilizer Used		76	24	100

TABLE 7--FERTILIZER USED IN 1973 (Spring & Fall 1973 Ind. Fertilizer Reports)

Fertilizer Used on Crops:	Solid	Liquid	Total
	10877	9569	20446
Primary Nutrients in Fertilizer:			
Nitrogen	2880		
Phosphorus	2983		
Potash	3334		

(1) Full year information available for only 1973.

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1326	10393	11719
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	8242	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		11954

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	2347.2	314.3	54.6	2716.1	
Manure: Kind of Livestock					
Table	Manure	Nitrogen	Phosphorus	Potash	
2	4754.9	238	67	181	
3	13962.3	782	140	698	
4	2578	36	5	26	
4	4192.4	289	42	252	
5	6813	106	27	24	
5	-	-	-	-	
Total from Livestock, Tons		2384.87	1451	281	1181
Fertilizers: Tons of Commercial Fertilizers Applied					
Table 7	Total	Nitrogen	Phosphorus	Potash	
	20446	2880	2983	3334	
Lime: Limestone equivalent purchased or applied, tons:					
Table 8	11719				
Salts: Applied on all highways, tons: Table 9 11954					

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-58

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Indiana  
 PLANNING SUBAREA: Southeast 2.3 COUNTY: Stauben

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	3324.1	971.1	7387	110.8		
Grains	6527	32.6	2176	21.7		
Hay or Grass Silage	1710	17.1	3925	39.2		
Pastured Cropland	3802	38.0	3802	38.0		
Other Field Crops	9360	187.2	585	5.8		
Vegetables	82	3.2	82	1.3	82	6.0
Orchards						
Berries	0	0	0	0	0	0
Nursery, Greenhouse						
Other Crops						
Totals	57722	1222.1	17957	216.8	82	6.0
Total Herbicides, Insecticides, Fungicides: 100 lbs				75761		1114.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	22823	2472	2173	4645
1969	19358	2061	1955	4016
1972 (1)	25253	2488	2751	5239

Wet Manure Factor: Tons per litter farrowed 7.636  
 Wet Manure Defecated: Tons, 1972 40005  
 Nutrients in Wet Manure: Nitrogen, tons 200  
 Phosphorus, tons 56  
 Potash, tons 152

(1) Farrowing trends applied to obtain 1972 Inventory.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	23124	9108	14086
1969	21103	8045	13058
1972 (1)	22503	(1) 8579	(1) 13924

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 112728 89810  
 Wet Manure Defecated: Tons, 1972 Combined: 202538  
 Nutrients in Wet Manure: Nitrogen, tons 1134  
 Phosphorus, tons 203  
 Potash, tons 1013

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		9098	
1969		6791	731
1972		(1) 5908	2785

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 9512 35592  
 Nutrients in Wet Manure: Nitrogen, Tons 133 246  
 Phosphorus, Tons 20 36  
 Potash, Tons 95 211

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		154875		
1969		111437		
1972		(1) 95315	3510	35100

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
 Wet Manure Defecated: Tons, 1972 3951  
 Nutrients in Wet Manure: Nitrogen, tons 62 34 2206  
 Phosphorus, tons 16 9  
 Potash, tons 11 8

(1) State trends applied to obtain county figure.

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	25749	3176	830	4006
GRAINS	10707	1091	51	1142
Wheat	6588	732	33	765
Oats	3633	311	18	332
Barley	120	16	0	16
Rye	183	7	0	7
OTHER FIELD CROPS	9918	718	47	765
Soybeans	9111	428	43	471
Potatoes	338	271	0	271
Sugar beets				
Field beans	273	0	0	0
HAY OR GRASS SILAGE	14350	137	11	148
PASTURED CROPLAND	15210	120	18	138
Cropland used for pasture	14272	107	18	125
Improved pasture	938	13	0	13
VEGETABLES, SWEET CORN, MELONS	100	59	2	61
ORCHARDS	8	0	0	0
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	88	1	0	1
Total Fertilizer Used, Tons		5302	959	6261
Percent of Fertilizer Used		85	15	100

TABLE 7--FERTILIZER USED IN 1973 (Spring &amp; Fall 1973 Ind. Fertilizer Tonnage Reports)

Item	Tons
Fertilizer Used on Crops: Solid	11710
Liquid	761
Total	12471
Primary Nutrients in Fertilizer	6707
Nitrogen	1604
Phosphorus	2131
Potash	2972

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	566	2099	2665
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2321	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3366		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1222.1	216.8	6.0	1444.9
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	40005	200	56	152
Cattle: Table 3	202538	1134	203	1013
Sheep: Table 4	9512	133	20	95
Horses: Table 4	35592	246	36	211
Chickens: Table 5	3951	62	16	71
Turkeys: Table 5	2206	34	9	8
Total from Livestock, Tons	293804	1809	340	1496
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7		Nitrogen	Phosphorus	Potash
	12471	1604	2131	2972
Lime: Limestone equivalent purchased or applied, tons: Table 8 2665				
Salts: Applied on all highways, tons: Table 9 3366				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0

STATE: Michigan

PLANNING SUBAREA: Southeast 2.3

COUNTY: Allegan

TABLE 5-59

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	63450	1744.9	14100	211.5		
Grains	10536	52.7	3512	35.1		
Hay or Grass Silage	10777	107.8	8980	89.8		
Pastured Cropland	5816	58.2	5816	58.2		
Other Field Crops	1847	50.2	1506	162.8		
Vegetables	3298	156.7	2509	243.5	2219	143.9
Orchards						
Berries	4645	215.3	6113	529.8	6117	921.1
Nursery, Greenhouse						
Other Crops						
Totals	100369	2385.8	42536	1337.7	8336	1065.0
Total Herbicides, Insecticides, Fungicides:			100 lbs	151241		4788.5

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	26691	2771	2435	5206
1969	45404	3165	2947	6112
1972	46700	4100	3300	7400
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		53502		
Nutrients in Wet Manure:		Nitrogen, tons		268
		Phosphorus, tons		75
		Potash, tons		203

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves		
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves	
1964	42088	17270	24818	
1969	43013	17397	25616	
1972	47000	18900	28100	
Wet Manure Factor: Tons Per Animal		13.14	6.45	
Wet Manure Defecated: Tons, 1972		248346	181245	
Wet Manure Defecated: Tons, 1972 Combined:		429591		
Nutrients in Wet Manure:		Nitrogen, tons		2406
		Phosphorus, tons		430
		Potash, tons		2148

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3335	
1969		4965	1515
1972		4100	6022
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		6601	76961
Nutrients in Wet Manure:		Nitrogen, Tons	92
		Phosphorus, Tons	14
		Potash, Tons	66

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		912515		
1969		680989		
1972		720700	30000	300000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		29873		
Nutrients in Wet Manure:		Combined		18920
		Nitrogen, tons		295
		Phosphorus, tons		76
		Potash, tons		66

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	528512	Number I-V farms	1414
Number of farms	2470	Acres in I-V farms	203193
Acres in farms	275743	Cropland I-V farms	161167
Cropland in farms	210118	Harvested cropland	
Harvested cropland in farms	132903	I-V farms	115412

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	51054	6575	1622	8197
GRAINS	19306	2112	33	2145
Wheat	9202	1129	24	1153
Oats	6903	728	6	734
Barley	438	51	2	53
Rye	583	28	1	29
OTHER FIELD CROPS	1889	283	365	748
Soybeans	334	10	8	18
Potatoes	1474	365	357	722
Sugar beets				
Field beans	892	8	0	8
HAY OR GRASS SILAGE	28669	708	11	719
PASTURED CROPLAND	18011	121	5	126
Cropland used for pasture	16331	112	4	116
Improved pasture	1680	9	1	10
VEGETABLES, SWEET CORN, MELONS	3563	1445	69	1571
ORCHARDS	9216	1390	29	1419
BERRIES	1083	180	0	180
NURSERY & GREENHOUSE PRODUCTS	463	140	19	159
OTHER CROPS	102	5	0	5
Total Fertilizer Used, Tons		13067	2148	15215
Percent of Fertilizer Used		86	16	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	20373
Liquid	3880
Total	24253
Primary Nutrients in Fertilizer	11884
Nitrogen	3922
Phosphorus	3803
Potash	4159

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	8295	8295	16590
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	6113	30.3
1971-72	5734	28.9
1972-73	6843	32.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		9925

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2385.8	1337.7	1065.0	4788.5

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	53502	268	75	203
Cattle: Table 3	429591	2406	430	2148
Sheep: Table 4	6601	92	14	66
Horses: Table 4	76901	531	77	462
Chickens: Table 5	29873	466	119	105
Turkeys: Table 5	18920	295	76	66
Total from Livestock, Tons	615448	4058	791	3050

Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	24253	3922	3803	4159

Lime: Limestone equivalent purchased or applied, tons: Table 8 16590

Salts: Applied on all highways, tons: Table 9 9925

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-60

**GREAT LAKES BASIN MATERIAL USAGE INVENTORY**  
 Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds  
 PLANNING AREA: Lake Michigan 2.0 STATE: Michigan  
 PLANNING SUBAREA: Southeast 2.3 COUNTY: Barry

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	33660	925.6	7480	112.2		
Grains	7722	38.6	2574	25.8		
Hay or Grass Silage	8366	83.6	6972	69.8		
Pastured Cropland	5780	57.8	5780	57.8		
Other Field Crops	2685	64.6	552	49.8	422	63.2
Vegetables	299	21.4	270	24.8	260	11.7
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	58512	1191.6	23628	340.2	682	74.9
Total Herbicides, Insecticides, Fungicides: 100 lbs 82822 1606.7						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	15134	1180	1417	2897
1969	15051	1645	1407	3052
1972	15500	2200	1600	3800

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 27474  
 Nutrients in Wet Manure: Nitrogen, tons 137  
 Phosphorus, tons 38  
 Potash, tons 104

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	31710	12479	19231
1969	28905	11108	17797
1972	31600	12100	19500

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 158994 125775  
 Wet Manure Defecated: Tons, 1972 Combined: 284769  
 Nutrients in Wet Manure: Nitrogen, tons 1595  
 Phosphorus, tons 285  
 Potash, tons 1424

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		10118	
1969		8150	1063
1972		6600	4304

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 10626 55005  
 Nutrients in Wet Manure: Nitrogen, Tons 149 380  
 Phosphorus, Tons 22 55  
 Potash, Tons 106 330

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		130735		
1969		146758		
1972		127600	10000	100000

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
 Wet Manure Defecated: Tons, 1972 5289  
 Nutrients in Wet Manure: Combined 6307  
 Nitrogen, tons 83 98  
 Phosphorus, tons 21 25  
 Potash, tons 19 22

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	25875	2888	748	3636
GRAINS	14824	1430	2	1432
Wheat	7212	771	1	772
Oats	6512	569	0	569
Barley	232	25	0	25
Rye	161	8	0	8
OTHER FIELD CROPS	2932	262	150	412
Soybeans	1021	80	1	81
Potatoes	422	84	110	194
Sugar beets				
Field beans	1127	20	0	20
HAY OR GRASS SILAGE	22301	522	0	522
PASTURED CROPLAND	16871	191	4	195
Cropland used for pasture	15636	174	4	178
Improved pasture	1235	17	0	17
VEGETABLES, SWEET CORN, MELONS	460	91	4	95
ORCHARDS	274	44	0	44
BERRIES	21	6	0	6
NURSERY & GREENHOUSE PRODUCTS	41	2	0	2
OTHER CROPS	48	2	0	2
Total Fertilizer Used, Tons		5158	908	6366
Percent of Fertilizer Used		86	14	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	8556
Liquid	1630
Total	10186
Primary Nutrients in Fertilizer	4991
Nitrogen	1647
Phosphorus	1597
Potash	1747

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	11630	2850	14480
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	4279	29.2
1971-72	4322	29.8
1972-73	4125	30.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5983		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1191.6	340.2	74.9	1606.7
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	27474	129	110	96
Cattle: Table 3	284769	1569	285	1424
Sheep: Table 4	10626	149	22	106
Horses: Table 4	55005	380	55	330
Chickens: Table 5	5289	83	21	19
Turkeys: Table 5	6307	98	25	22
Total from Livestock, Tons	389470	2734	518	1997
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	10186	1647	1597	1747
Lime: Limestone equivalent purchased or applied, tons: Table 8 14480				
Salts: Applied on all highways, tons: Table 9 5983				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-61

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Berrien

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	29970	821.2	6660	99.9		
Grains	7152	35.8	2381	23.8		
Hay or Grass Silage	2891	28.9	2112	21.1		
Pastured Cropland	2207	22.0	2207	22.0		
Other Field Crops	15211	305.2	1050	21.1	105	15.8
Vegetables	7163	281.8	3876	157.3	5087	421.4
Orchards						
Berries	21961	1138.1	30042	5221.7	30856	3160.0
Nursery, Greenhouse						
Other Crops						
Totals	89561	2636.3	48631	5570.2	36048	3897.2

Total Herbicides, Insecticides, Fungicides: 100 lbs 174240 12103.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	22515	2120	1935	4055
1969	19004	1199	1772	2971
1972	19600	2000	2000	4000

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 28920  
 Nutrients in Wet Manure: Nitrogen, tons 115  
 Phosphorus, tons 40  
 Potash, tons 110

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	11762	6099	8663
1969	10784	4214	6570
1972	11800	4600	7200

Wet Manure Factor: Tons Per Animal 13.11 6.15  
 Wet Manure Defecated: Tons, 1972 60114 46410  
 Wet Manure Defecated: Tons, 1972 Combined: 106884  
 Nutrients in Wet Manure: Nitrogen, tons 599  
 Phosphorus, tons 107  
 Potash, tons 534

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		961	
1969		1022	1816
1972		800	4591

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1288 58673  
 Nutrients in Wet Manure: Nitrogen, Tons 18 405  
 Phosphorus, Tons 3 59  
 Potash, Tons 13 352

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		132525		
1969		125115		
1972		131100		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 5117  
 Nutrients in Wet Manure: Nitrogen, tons 85  
 Phosphorus, tons 22  
 Potash, tons 19

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	22168	3211	705	3916
GRAINS	10690	1222	9	1231
Wheat	6679	798	6	804
Oats	2623	301	3	304
Barley	399	55	1	56
Rye	634	31	0	31
OTHER FIELD CROPS	12506	812	60	872
Soybeans	12361	752	59	811
Potatoes	105	141	1	145
Sugar beets				
Field beans	1412	0	0	0
HAY OR GRASS SILAGE	7296	211	1	212
PASTURED CROPLAND	6587	171	13	184
Cropland used for pasture	5652	151	13	164
Improved pasture	935	20	0	20
VEGETABLES, SWEET CORN, MELONS	6898	1943	38	1981
ORCHARDS	35602	6388	111	6499
BERRIES	3880	831	21	852
NURSERY & GREENHOUSE PRODUCTS	1014	134	6	110
OTHER CROPS	48	10	0	10
Total Fertilizer Used, Tons		11963	961	12924
Percent of Fertilizer Used		91	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	21406
Liquid	4077
Total	25483
Primary Nutrients in Fertilizer	12487
Nitrogen	4121
Phosphorus	3996
Potash	4370

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	4312	10062	14374
Tonnages for Other Recent Years -			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	7054	29.0
1971-72	6870	28.6
1972-73	7393	29.2
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 10722		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2636.3	5570.2	3897.2	12103.7
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	28920	451	116	101
Cattle: Table 3	106884	599	107	534
Sheep: Table 4	1288	18	3	13
Horses: Table 4	58673	405	59	352
Chickens: Table 5	5117	85	22	19
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	201212	1558	307	1019
Fertilizers: Tons of Commercial Fertilizers Applied				
Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	25483	4121	3996	4370
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	14374			
Salts: Applied on all highways, tons: Table 9 10722				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-62

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan  
 PLANNING SUBAREA: Southeast 2.3 COUNTY: Branch

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	74250	2041.8	16500	247.4		
Grains	11370	56.8	3790	37.2		
Hay or Grass Silage	5249	52.4	4374	43.8		
Pastured Cropland	4340	43.4	4340	43.4		
Other Field Crops	22407	448.2	1408	14.9	8	1.2
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	117616	2642.6	30412	387.4	8	1.2
Total Herbicides, Insecticides, Fungicides: 100 lbs 148036 3031.2						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	33829	3389	3292	6681
1969	35480	2856	3263	6119
1972	36500	3700	3600	7300

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 52779  
 Nutrients in Wet Manure: Nitrogen, tons 284  
 Phosphorus, tons 74  
 Potash, tons 201

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	29992	12388	17604
1969	23981	8961	15020
1972	26200	9800	16400

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 128772 105780  
 Wet Manure Defecated: Tons, 1972 Combined: 234552  
 Nutrients in Wet Manure: Nitrogen, tons 1313  
 Phosphorus, tons 235  
 Potash, tons 1173

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		11027	
1969		12138	1137
1972		9900	2502

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 15939 31976  
 Nutrients in Wet Manure: Nitrogen, Tons 223 221  
 Phosphorus, Tons 33 32  
 Potash, Tons 159 192

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		104345		
1969		67101		
1972		55900		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 2317  
 Nutrients in Wet Manure: Nitrogen, tons 36  
 Phosphorus, tons 9  
 Potash, tons 8

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	45905	5547	1450	6997
GRAINS	19637	1981	116	1997
Wheat	12476	1405	93	1498
Oats	6055	492	20	512
Barley	211	33	0	33
Rye	492	25	3	28
OTHER FIELD CROPS	21939	1143	81	1224
Soybeans	21659	1074	79	1153
Potatoes	8	3	0	3
Sugar beets				
Field beans	1576	5	0	5
HAY OR GRASS SILAGE	14229	384	29	413
PASTURED CROPLAND	14575	98	2	100
Cropland used for pasture	13117	94	2	96
Improved pasture	1458	4	0	4
VEGETABLES, SWEET CORN, MELONS	135	37	0	37
ORCHARDS	401	15	0	15
BERRIES	11	2	0	2
NURSERY & GREENHOUSE PRODUCTS	283	33	22	55
OTHER CROPS	391	38	13	51
Total Fertilizer Used, Tons		9283	1713	10996
Percent of Fertilizer Used		84	16	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14779
Liquid	2815
Total	17594
Primary Nutrients in Fertilizer	8621
Nitrogen	2845
Phosphorus	2759
Potash	3017

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	8152	2446	10598
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	6574	35.2
1971-72	4869	25.5
1972-73	5398	26.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 7829		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2642.6	387.4	1.2	3031.2
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	52779	823	211	185
Cattle: Table 3	234552	1313	235	1173
Sheep: Table 4	15939	223	33	159
Horses: Table 4	31976	221	32	192
Chickens: Table 5	2317	36	9	8
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	337563	2616	520	1717
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	17594	2845	2759	3017
Lime: Limestone equivalent purchased or applied, tons: Table 8 10598				
Salts: Applied on all highways, tons: Table 9 7829				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-63

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Calhoun

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	69300	1905.7	15400	231.0		
Grains	15330	76.6	5110	51.1		
Hay or Grass Silage	7991	79.9	6659	66.6		
Pastured Cropland	7863	78.6	7863	78.6		
Other Field Crops	6252	130.1	773	50.5	408	61.2
Vegetables	1164	74.2	761	41.9	721	56.3
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	107900	2345.1	36566	519.7	1129	117.5
Total Herbicides, Insecticides, Fungicides: 100 lbs						
145595 2982.3						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	28535	2545	2568	5113
1969	26080	2361	2768	5129
1972	26800	3100	3100	6200
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		14826		
Nutrients in Wet Manure: Nitrogen, tons		224		
Phosphorus, tons		63		
Potash, tons		170		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	42092	14750	27342
1969	37944	12750	25194
1972	41500	13600	27900
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		178704	179955
Wet Manure Defecated: Tons, 1972 Combined:		358659	
Nutrients in Wet Manure: Nitrogen, tons		2008	
Phosphorus, tons		359	
Potash, tons		1723	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8281	
1969		10192	1578
1972		8300	5200
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		13363	66456
Nutrients in Wet Manure: Nitrogen, Tons		187	186
Phosphorus, Tons		28	66
Potash, Tons		134	392

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		151245		
1969		104531		
1972		107200		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		4443		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		69		
Phosphorus, tons		18		
Potash, tons		16		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	64115	5707	1464	7171
GRAINS	26679	2739	247	2986
Wheat	13962	1639	143	1782
Oats	11334	995	95	1090
Barley	374	33	1	34
Rye	500	36	0	36
OTHER FIELD CROPS	6553	658	32	690
Soybeans	5708	363	25	388
Potatoes	408	240	2	242
Sugar beets				
Field beans	936	0	0	0
HAY OR GRASS SILAGE	20943	547	22	569
PASTURED CROPLAND	25912	220	5	225
Cropland used for pasture	23681	198	5	203
Improved pasture	2231	22	0	22
VEGETABLES, SWEET CORN, MELONS	1105	270	11	281
ORCHARDS	606	51	37	88
BERRIES	19	6	0	6
NURSERY & GREENHOUSE PRODUCTS	324	18	4	52
OTHER CROPS	29	0	0	0
Total Fertilizer Used, Tons		10246	1822	12068
Percent of Fertilizer Used		85	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	16220
Liquid	3089
Total	19309
Primary Nutrients in Fertilizer	9461
Nitrogen	3122
Phosphorus	3028
Potash	3311

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	13925	1675	15600
Tonnes for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	6574	36.2
1971-72	4868	25.5
1972-73	5397	26.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		7827

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2345.1	519.7	117.5	2982.3
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	14826	699	179	157
Cattle: Table 3	358659	2008	359	1793
Sheep: Table 4	13363	187	28	134
Horses: Table 4	66456	186	66	399
Chickens: Table 5	4443	69	18	16
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	487747	3449	650	2499
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	19309	3122	3028	3311
Lime: Limestone equivalent purchased or applied, tons: Table 8 15600				
Salts: Applied on all highways, tons: Table 9 7827				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 5-64

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Cass

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	44730	1230.0	9940	119.1		
Grains	8712	43.5	2904	29.0		
Hay or Grass Silage	4533	45.3	3778	37.7		
Pastured Cropland	4505	45.0	4505	45.0		
Other Field Crops	9611	193.1	696	17.5	101	15.1
Vegetables	1986	79.4	1488	63.8	1196	66.0
Orchards						
Berries	1232	57.9	1456	137.8	1458	301.0
Nursery, Greenhouse						
Other Crops						
Totals	75309	1694.2	24767	479.9	2755	382.1
Total Herbicides, Insecticides, Fungicides: 100 lbs					102831	2556.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	62501	4010	7846	11856
1969	71520	5570	10751	17321
1972	73600	8600	11900	20500

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 148215  
 Nutrients in Wet Manure: Nitrogen, tons 741  
 Phosphorus, tons 208  
 Potash, tons 563

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	19175	7540	11635
1969	17134	6314	10820
1972	18700	6800	11900

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 89352 76755  
 Wet Manure Defecated: Tons, 1972 Combined: 166107  
 Nutrients in Wet Manure: Nitrogen, tons 930  
 Phosphorus, tons 166  
 Potash, tons 831

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		6242	
1969		5929	1153
1972		4800	2856

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 7728 36500  
 Nutrients in Wet Manure: Nitrogen, Tons 108 252  
 Phosphorus, Tons 16 37  
 Potash, Tons 77 219

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		158405		
1969		153600		
1972		159200		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 6628  
 Nutrients in Wet Manure:  
 Nitrogen, tons 103  
 Phosphorus, tons 27  
 Potash, tons 23

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	36665	4375	1143	5818
GRAINS	15399	1137	72	1509
Wheat	8123	816	61	877
Oats	5871	514	6	520
Barley	557	57	0	57
Rye	529	20	6	26
OTHER FIELD CROPS	10710	618	101	719
Soybeans	10505	554	93	647
Potatoes	101	46	2	48
Sugar beets				
Field beans	838	0	0	0
HAY OR GRASS SILAGE	12206	206	16	222
PASTURED CROPLAND	15770	226	16	242
Cropland used for pasture	14126	194	16	210
Improved pasture	1644	32	0	32
VEGETABLES, SWEET CORN, MELONS	1693	404	28	432
ORCHARDS	2033	257	9	266
BERRIES	157	31	0	31
NURSERY & GREENHOUSE PRODUCTS	28	1	0	1
OTHER CROPS	45	16	0	16
Total Fertilizer Used, Tons		7571	1685	9256
Percent of Fertilizer Used		82	18	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12440
Liquid	2370
Total	14810
Primary Nutrients in Fertilizer	7257
Nitrogen	2395
Phosphorus	2322
Potash	2540

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	9198	20000	29198
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	5472	29.4
1971-72	4829	26.2
1972-73	4531	23.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 6572		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1694.2	479.9	382.1	2556.2
Manure: Kind of Livestock				
Manure	Nitrogen	Phosphorus	Potash	Total
Swine: Table 2	148215	2312	593	519
Cattle: Table 3	166107	930	166	831
Sheep: Table 4	7728	108	16	17
Horses: Table 4	36500	252	37	219
Chickens: Table 5	6628	103	27	23
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	365178	3705	839	1609
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland:		Nitrogen	Phosphorus	Potash
Table 7	14810	2395	2322	2540
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	29198			
Salts: Applied on all highways, tons: Table 9 6572				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY  
 Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-65

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Clinton

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	56970	1566.6	12660	189.9		
Grains	18420	92.1	6140	61.4		
Hay or Grass Silage	9100	91.0	7834	78.3		
Pastured Cropland	5138	51.3	5138	51.3		
Other Field Crops	31378	690.6	2034	41.6	204	30.6
Vegetables	615	34.0	472	36.0	390	38.9
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	122221	2531.6	34578	461.5	594	69.5
Total Herbicides, Insecticides, Fungicides: 100 lbs				157393		3062.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	33358	3647	2750	6397
1969	27480	2411	2118	4529
1972	28300	3200	2300	5500

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 39765  
 Nutrients in Wet Manure: Nitrogen, tons 199  
 Phosphorus, tons 56  
 Potash, tons 151

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	48588	17910	30678
1969	43556	16156	27400
1972	47600	17600	30000

Wet Manure Factor: Tons Per Animal 13.14  
 Wet Manure Defecated: Tons, 1972 231264  
 Wet Manure Defecated: Tons, 1972 Combined: 424764  
 Nutrients in Wet Manure: Nitrogen, tons 2379  
 Phosphorus, tons 425  
 Potash, tons 2124

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		13860	
1969		9865	1068
1972		8000	3132

Wet Manure Factor: Tons per animal 1.61  
 Wet Manure Defecated: Tons, 1972 12880  
 Nutrients in Wet Manure: Nitrogen, Tons 180  
 Phosphorus, Tons 27  
 Potash, Tons 129

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		118305		
1969		69184		
1972		75200		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 3117  
 Nutrients in Wet Manure: Nitrogen, tons 49  
 Phosphorus, tons 12  
 Potash, tons 11

To Convert From

Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To

Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By

0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	366016	Number I-V farms	1128
Number of farms	1981	Acres in I-V farms	223878
Acres in farms	286958	Cropland I-V farms	187096
Cropland in farms	225794	Harvested cropland	
Harvested cropland in farms	116025	I-V farms	128434

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	45487	6398	1050	7448
GRAINS	25216	2968	15	3013
Wheat	14811	1910	28	1938
Oats	9217	952	13	965
Barley	144	55	0	55
Rye	606	39	4	43
OTHER FIELD CROPS	30544	3172	125	3297
Soybeans	17018	1303	35	1338
Potatoes	204	67	0	67
Sugar beets				
Field beans	871	2	0	2
HAY OR GRASS SILAGE	26641	807	27	834
PASTURED CROPLAND	17195	222	2	224
Cropland used for pasture	15357	181	2	183
Improved pasture	1838	41	0	41
VEGETABLES, SWEET CORN, MELONS	599	171	3	174
ORCHARDS	484	42	0	42
BERRIES	7	0	0	0
NURSERY & GREENHOUSE PRODUCTS	310	88	0	88
OTHER CROPS	150	10	0	10
Total Fertilizer Used, Tons		13880	1252	15132
Percent of Fertilizer Used		92	8	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	20337
Liquid	3874
Total	24211
Primary Nutrients in Fertilizer: Nitrogen	11863
Phosphorus	3915
Potash	3796

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	4331	3550	7881
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1205	15.1
1971-72	2473	31.1
1972-73	2551	26.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3701		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2531.6	461.5	69.5	3062.6
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	39765	620	159	139
Cattle: Table 3	421764	2379	425	2124
Sheep: Table 4	12880	180	27	129
Horses: Table 4	40027	276	40	240
Chickens: Table 5	3117	49	12	11
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons				
	520553	3504	663	2643
Fertilizers: Tons of Commercial Fertilizers Applied				
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	24211	3915	3796	4152
Lime: Limestone equivalent purchased or applied, tons: Table 8 7881				
Salts: Applied on all highways, tons: Table 9 3701				

TABLE 5-66

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: MichiganPLANNING SUBAREA: Southeast 2.3 COUNTY: Eaton

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides		
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	
Corn	58320	1603.8	12960	194.1			
Grains	16056	80.2	5352	53.5			
Hay or Grass Silage	7183	71.8	5986	59.8			
Pastured Cropland	5451	54.5	5451	54.5			
Other Field Crops	20101	181.4	1719	84.7	644	96.6	
Vegetables	1583	105.0	1041	56.0	1117	87.5	
Orchards							
Berries							
Nursery, Greenhouse							
Other Crops							
Totals	108697	2396.7	32509	502.9	1761	184.1	
Total Herbicides, Insecticides, Fungicides:					100 lbs	142967	3083.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	19322	1761	1694	3455
1969	13655	1238	1155	2393
1972	14100	1600	1300	2900
Wet Manure Factor: Tons per litter farrowed			7.23	
Wet Manure Defecated: Tons, 1972			20967	
Nutrients in Wet Manure:				
			Nitrogen, tons 105	
			Phosphorus, tons 29	
			Potash, tons 80	

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves		
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves	
1964	39448	15815	23633	
1969	31023	11439	19574	
1972	33900	12400	21500	
Wet Manure Factor: Tons Per Animal			13.14	6.15
Wet Manure Defecated: Tons, 1972			162936	138675
Wet Manure Defecated: Tons, 1972 Combined:			301611	
Nutrients in Wet Manure:				
			Nitrogen, tons 1689	
			Phosphorus, tons 302	
			Potash, tons 1508	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		12162	
1969		10942	1519
1972		8900	5398
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		14329	68986
Nutrients in Wet Manure:			
		Nitrogen, Tons 201	476
		Phosphorus, Tons 30	69
		Potash, Tons 143	444

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		159215		
1969		67578		
1972		50700		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		2102		
Nutrients in Wet Manure:				
		Nitrogen, tons 33	Combined	
		Phosphorus, tons 8		
		Potash, tons 7		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>		Number I-V farms		
365504		888		
Number of farms	1782	Acres in I-V farms 192193		
Acres in farms	259883	Cropland I-V farms 148085		
Cropland in farms	192974	Harvested cropland		
Harvested cropland in farms	109263	I-V farms 92843		
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	33974	4543	840	5383
GRAINS	20892	2488	30	2518
Wheat	13402	1739	24	1763
Oats	6418	659	2	660
Barley	467	57	0	57
Rye	452	26	4	30
OTHER FIELD CROPS	16006	1827	97	1924
Soybeans	2347	295	3	298
Potatoes	644	307	0	307
Sugar beets				
Field beans	1249	33	0	33
HAY OR GRASS SILAGE	19154	337	1	338
PASTURED CROPLAND	19298	176	26	202
Cropland used for pasture	16715	153	26	179
Improved pasture	2583	23	0	23
VEGETABLES, SWEET CORN, MELONS	1778	377	12	1479
ORCHARDS	65	5	0	5
BERRIES	79	2	0	2
NURSERY & GREENHOUSE PRODUCTS	556	205	0	205
OTHER CROPS	8	1	0	1
Total Fertilizer Used, Tons		9994	1036	11030
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	14824
Liquid	2824
Total	17648
Primary Nutrients in Fertilizer	
Nitrogen	8648
Phosphorus	2767
Potash	3027

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	7392	840	8232
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	4279	29.9
1971-72	4322	29.8
1972-73	4125	30.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5983

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2396.7	502.9	184.1	3083.7
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	20967	327	84	73
Cattle: Table 3	301611	1689	302	1508
Sheep: Table 4	14329	201	30	143
Horses: Table 4	68986	476	69	444
Chickens: Table 5	2102	33	8	7
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	407995	2726	493	2145
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	17648	2854	2767	3027
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	8232			
Salts: Applied on all highways, tons: Table 9 5983				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-67

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Hilldale

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	70020	1925.5	15560	233.4		
Grains	12420	62.1	4110	11.4		
Hay or Grass Silage	7976	79.7	664.7	66.4		
Pastured Cropland	5608	56.0	5608	56.0		
Other Field Crops	27440	428.8	1340	13.4		
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	117464	2552.1	33295	410.6		
Total Herbicides, Insecticides, Fungicides: 100 lbs 150759 2962.7						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	30907	3381	3167	6548
1969	23096	2276	2052	4328
1972	23800	3000	2300	5300

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 38319  
 Nutrients in Wet Manure: Nitrogen, tons 192  
 Phosphorus, tons 54  
 Potash, tons 746

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	37273	16329	20944
1969	31215	13094	18121
1972	34100	14200	19900

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 186588 128355  
 Wet Manure Defecated: Tons, 1972 Combined: 314943  
 Nutrients in Wet Manure: Nitrogen, tons 1764  
 Phosphorus, tons 315  
 Potash, tons 1575

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8977	
1969		7520	1763
1972		6200	5142

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 9982 65715  
 Nutrients in Wet Manure: Nitrogen, Tons 440 453  
 Phosphorus, Tons 21 66  
 Potash, Tons 100 394

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		208315		
1969		217042		
1972		189700		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 7863  
 Nutrients in Wet Manure: Nitrogen, tons 123  
 Phosphorus, tons 31  
 Potash, tons 28

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres	384256	Number I-V farms	1027
Number of farms	2028	Acres in I-V farms	199964
Acres in farms	278865	Cropland I-V farms	154424
Cropland in farms	208783	Harvested cropland I-V farms	106069
Harvested cropland in farms	127244		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	45874	5685	1315	7000
GRAINS	20855	2395	75	2470
Wheat	11279	1418	44	1462
Oats	8583	918	30	948
Barley	89	10	0	10
Rye	343	16	0	16
OTHER FIELD CROPS	16339	747	79	826
Soybeans	16277	746	71	817
Potatoes	1	0	0	0
Sugar beets				
Field beans	1110	1	0	1
HAY OR GRASS SILAGE	21905	445	34	479
PASTURED CROPLAND	16995	116	4	120
Cropland used for pasture	15144	96	4	100
Improved pasture	1851	20	0	20
VEGETABLES, SWEET CORN, MELONS	44	8	0	8
ORCHARDS	568	30	0	30
BERRIES	6	2	0	2
NURSERY & GREENHOUSE PRODUCTS	5	0	1	1
OTHER CROPS	133	7	2	9
Total Fertilizer Used, Tons		9436	1510	10946
Percent of Fertilizer Used		86	14	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14712
Liquid	2802
Total	17514
Primary Nutrients in Fertilizer	8582
Nitrogen	2832
Phosphorus	2746
Potash	3004

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	3857	10000	13857
Tonnes for Other Recent Years -			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3386	30.4
1971-72	2539	23.0
1972-73	3217	27.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 4666		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
	Herbicides	Insecticides	Fungicides	Total
Table 1	2552.1	410.6	---	2962.7
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	38319	598	153	134
Cattle: Table 3	314943	1764	315	1575
Sheep: Table 4	9982	140	21	100
Horses: Table 4	65715	453	66	394
Chickens: Table 5	7863	123	31	28
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	436822	3078	586	2231
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	17514	2832	2746	3004
Lime: Limestone equivalent purchased or applied, tons: Table 8 13857				
Salts: Applied on all highways, tons: Table 9 4666				

To Convert From: Pounds (lb) Kilograms (kg)  
 Acres (acre) Hectare (ha)  
 Tons (ton) Kilograms (kg)  
 Multiply By: 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-68

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan  
 PLANNING SUBAREA: Southeast 2.3 COUNTY: Ingham

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	594.00	1633.5	13200	198.0		
Grains	9720	48.6	3240	32.4		
Hay or Grass Silage	7830	78.3	6525	65.2		
Pastured Cropland	4132	41.3	4132	41.3		
Other Field Crops	7706	165.1	528	12.8	73	10.9
Vegetables	1554	114.6	1353	149.0	1064	94.5
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	9034.2	2082.4	28978	498.7	1137	105.4
Total Herbicides, Insecticides, Fungicides:		100 lbs		1204.57		2686.5

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	23153	2181	2540	4721
1969	19679	1714	1776	3490
1972	20200	2300	2000	4300

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 31089  
 Nutrients in Wet Manure: Nitrogen, tons 155  
 Phosphorus, tons 44  
 Potash, tons 118

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	43412	17792	25620
1969	37142	14199	22943
1972	40600	15400	25200

Wet Manure Factor: Tons Per Animal 13.14  
 Wet Manure Defecated: Tons, 1972 202356  
 Wet Manure Defecated: Tons, 1972 Combined: 364896  
 Nutrients in Wet Manure: Nitrogen, tons 2043  
 Phosphorus, tons 365  
 Potash, tons 1824

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		12246	
1969		11135	1394
1972		9100	5028

Wet Manure Factor: Tons per animal 1.61  
 Wet Manure Defecated: Tons, 1972 14651  
 Nutrients in Wet Manure: Nitrogen, Tons 205  
 Phosphorus, Tons 31  
 Potash, Tons 147

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		84267		
1969		65786		
1972		67500		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 2798  
 Nutrients in Wet Manure: Nitrogen, tons 14  
 Phosphorus, tons 11  
 Potash, tons 10

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	41260	6220	1650	7870
GRAINS	16713	1936	60	1996
Wheat	9291	1128	48	1176
Oats	6126	700	11	711
Barley	200	28	0	28
Rye	1045	73	0	73
OTHER FIELD CROPS	7146	822	38	860
Soybeans	4196	407	8	415
Potatoes	73	43	0	43
Sugar beets				
Field beans	321	0	0	0
HAY OR GRASS SILAGE	21068	708	34	742
PASTURED CROPLAND	12221	215	0	215
Cropland used for pasture	11156	182	0	182
Improved pasture	1065	33	0	33
VEGETABLES, SWEET CORN, MELONS	1526	475	27	502
ORCHARDS	350	69	0	69
BERRIES	8	2	0	2
NURSERY & GREENHOUSE PRODUCTS	60	214	0	274
OTHER CROPS	42	2	0	2
Total Fertilizer Used, Tons		10663	1809	12472
Percent of Fertilizer Used		85	15	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	16762
Liquid	3193
Total	19955
Primary Nutrients in Fertilizer	9778
Nitrogen	3227
Phosphorus	3129
Potash	3422

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	4598	4500	9098
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	4279	29.9
1971-72	4322	29.8
1972-73	5499	30.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 7976		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2082.4	498.7	105.4	2686.5
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	31089	185	124	109
Cattle: Table 3	364896	2043	365	1824
Sheep: Table 4	14651	205	31	147
Horses: Table 4	64258	443	64	380
Chickens: Table 5	2798	44	11	10
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	477692	3220	595	2470
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	19955	3227	3129	3422
Lime: Limestone equivalent purchased or applied, tons: Table 8 9098				
Salts: Applied on all highways, tons: Table 9 7976				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-69

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Ionia

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	56880	1564.2	12640	189.6		
Grains	18582	92.9	6194	61.9		
Hay or Grass Silage	10004	100.0	8336	83.3		
Pastured Cropland	5918	59.1	5918	59.1		
Other Field Crops	14705	349.5	1050	36.7	250	37.5
Vegetables	1029	70.3	712	37.5	958	72.4
Orchards						
Berries	1841	89.3	2125	224.9	2127	564.5
Nursery, Greenhouse						
Other Crops						
Totals	108959	2325.3	36975	693.0	3335	674.4
Total Herbicides, Insecticides, Fungicides: 100 lbs			149269	3692.7		

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	26295	2829	2194	5023
1969	26344	2172	2264	4436
1972	27100	2800	2500	5300
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		38319		
Nutrients in Wet Manure: Nitrogen, tons		192		
Phosphorus, tons		54		
Potash, tons		146		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	53439	19863	33576
1969	46559	18186	28373
1972	50900	19800	31100
Wet Manure Factor: Tons Per Animal		13.14	
Wet Manure Defecated: Tons, 1972		260172	
Wet Manure Defecated: Tons, 1972 Combined:		460767	
Nutrients in Wet Manure: Nitrogen, tons		2580	
Phosphorus, tons		461	
Potash, tons		2304	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lams	Horses & Ponies
1964		10174	
1969		7634	1132
1972		6200	3434
Wet Manure Factor: Tons per animal		1.61	
Wet Manure Defecated: Tons, 1972		9982	
Nutrients in Wet Manure: Nitrogen, Tons		140	
Phosphorus, Tons		21	
Potash, Tons		100	

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		98820		
1969		114593		
1972		99200		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		4112		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		41		
Phosphorus, tons		16		
Potash, tons		11		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>		Number I-V farms	
Number of farms		1629	1060
Acres in farms		280124	230970
Cropland in farms		21519	179887
Harvested cropland in farms		138903	126651

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	49044	5889	1321	7210
GRAINS	28624	3052	56	3108
Wheat	15592	1764	39	1803
Oats	11628	1165	17	1182
Barley	495	56	0	56
Rye	601	36	0	36
OTHER FIELD CROPS	13790	1139	77	1216
Soybeans	3286	231	19	250
Potatoes	249	100	0	100
Sugar beets				
Field beans	1964	4	0	4
HAY OR GRASS SILAGE	29733	886	8	894
PASTURED CROPLAND	21403	186	4	190
Cropland used for pasture	18467	152	4	156
Improved pasture	2936	34	0	34
VEGETABLES, SWEET CORN, MELONS	1973	359	3	362
ORCHARDS	2489	141	23	164
BERRIES	12	0	0	0
NURSERY & GREENHOUSE PRODUCTS	203	43	0	43
OTHER CROPS	200	0	0	0
Total Fertilizer Used, Tons		11699	1492	13191
Percent of Fertilizer Used		89	11	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	17729
Liquid	3377
Total	21106
Primary Nutrients in Fertilizer	3377
Nitrogen	1114
Phosphorus	1068
Potash	1182

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared		Tonnage not Government Cost/Shared		Total Tonnage
	1972	6733	1000	7733	
Tonnages for Other Recent Years					
					-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	4676	27.3
1971-72	5479	32.1
1972-73	5649	31.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
	8193	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Table 1	2325.3	693.0	674.4	3692.7
Manure: Kind of Livestock				
Table	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	38319	598	153	134
Cattle: Table 3	460767	2580	461	2304
Sheep: Table 4	9982	140	21	100
Horses: Table 4	43887	303	14	263
Chickens: Table 5	4112	64	16	11
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	557067	3685	695	2815
Fertilizers: Tons of Commercial Fertilizers Applied				
Table	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Table 7	21106	1114	1068	1182
Lime: Limestone equivalent purchased or applied, tons: Table 8 7733				
Salts: Applied on all highways, tons: Table 9 8193				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

TABLE 5-70

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0

STATE: Michigan

PLANNING SUBAREA: Southeast 2.3

COUNTY: Jackson

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	55080	1511.7	1221.0	183.6		
Grains	8256	41.2	2752	27.5		
Hay or Grass Silage	10378	103.7	861.8	86.1		
Pastured Cropland	6101	61.0	610.1	61.0		
Other Field Crops	1319	27.9	11.0	7.6	60	9.0
Vegetables	772	59.0	731	84.3	627	10.0
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	82239	1810.5	3091.8	1453.1	687	19.0
Total Herbicides, Insecticides, Fungicides: 100 lbs				713811		2312.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	17160	1653	1831	3487
1969	15283	1330	1605	2935
1972	15700	1700	1800	3500

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 25305  
Nutrients in Wet Manure: Nitrogen, tons 127  
Phosphorus, tons 35  
Potash, tons 96

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	11563	11650	19913
1969	10791	15292	25502
1972	11600	16600	28000

Wet Manure Factor: Tons Per Animal 13.11  
Wet Manure Defecated: Tons, 1972 218121  
Wet Manure Defecated: Tons, 1972 Combined: 398721  
Nutrients in Wet Manure: Nitrogen, tons 2233  
Phosphorus, tons 399  
Potash, tons 1991

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		18191	
1969		17327	1616
1972		11100	6112

Wet Manure Factor: Tons per animal 1.61  
Wet Manure Defecated: Tons, 1972 22701  
Nutrients in Wet Manure: Nitrogen, Tons 318  
Phosphorus, Tons 18  
Potash, Tons 227

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		100125		
1969		61018		
1972		66700		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 2765  
Nutrients in Wet Manure: Nitrogen, tons 11  
Phosphorus, tons 10  
Potash, tons 10

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	37028	4313	1661	6007
GRAINS	15946	1627	79	1706
Wheat	7876	860	111	901
Oats	8129	681	28	709
Barley	205	28	2	30
Rye	116	31	0	31
OTHER FIELD CROPS	1623	200	3	203
Soybeans	998	75	1	76
Potatoes	60	30	0	30
Sugar beets				
Field beans	1071	2	0	2
HAY OR GRASS SILAGE	27179	533	12	545
PASTURED CROPLAND	19828	565	0	565
Cropland used for pasture	16172	156	0	156
Improved pasture	3356	109	0	109
VEGETABLES, SWEET CORN, MELONS	808	367	1	368
ORCHARDS	1016	75	26	101
BERRIES	37	8	0	8
NURSERY & GREENHOUSE PRODUCTS	101	107	0	107
OTHER CROPS	160	2	0	2
Total Fertilizer Used, Tons		7829	1785	9611
Percent of Fertilizer Used		81	19	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12921
Liquid	2161
Total	15382
Primary Nutrients in Fertilizer	7537
Nitrogen	2187
Phosphorus	2112
Potash	2638

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1388	2850	7238
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "e" Mile
1970-71	8155	32.0
1971-72	6816	26.9
1972-73	7593	28.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 11013		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1810.5	453.4	49.0	2312.9
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	25305	395	101	89
Cattle: Table 3	398721	2233	399	1991
Sheep: Table 4	22701	318	18	227
Horses: Table 4	82329	568	82	191
Chickens: Table 5	2765	13	11	10
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	531821	3557	611	2811
Fertilizers: Tons of Commercial Fertilizers Applied				
	Primary Nutrients			
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	15382	2187	2112	2638
Lime: Limestone equivalent purchased or applied, tons: Table 8 7238				
Salts: Applied on all highways, tons: Table 9 11013				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Kalamazoo

TABLE 5-71

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	45000	1237.5	10000	150.0		
Grains	12630	63.1	4210	42.1		
Hay or Grass Silage	4651	46.5	3876	38.7		
Pastured Cropland	3029	30.2	3029	30.2		
Other Field Crops	5514	111.0	423	12.9	83	12.4
Vegetables	102	4.0	92	2.8	51	2.6
Orchards						
Berries	858	41.1	1001	103.1	1001	254.0
Nursery, Greenhouse						
Other Crops						
Totals	71784	1533.4	22631	379.8	1135	269.0
Total Herbicides, Insecticides, Fungicides: 100 lbs 95550 2182.2						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	21673	1879	2022	3901
1969	23380	1633	1856	3489
1972	21100	2100	2100	4200
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 30366				
Nutrients in Wet Manure:				
		Nitrogen, tons	152	
		Phosphorus, tons	43	
		Potash, tons	115	

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	21030	6276	14754
1969	20219	6150	14069
1972	22100	6700	15400
Wet Manure Factor: Tons Per Animal			
		13.14	6.45
Wet Manure Defecated: Tons, 1972 88038 99320			
Wet Manure Defecated: Tons, 1972 Combined: 187368			
Nutrients in Wet Manure:			
		Nitrogen, tons	1049
		Phosphorus, tons	187
		Potash, tons	937

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5993	
1969		2701	1227
1972		2200	5047
Wet Manure Factor: Tons per animal			
		1.61	12.78
Wet Manure Defecated: Tons, 1972 3542 64501			
Nutrients in Wet Manure:			
		Nitrogen, Tons	50
		Phosphorus, Tons	7
		Potash, Tons	35
			387

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		103305		
1969		192988		
1972		137300		
Wet Manure Factor: Lbs. per bird				
		82.9		
Wet Manure Defecated: Tons, 1972 5691				
Nutrients in Wet Manure:				
		Nitrogen, tons	88	Combined
		Phosphorus, tons	23	
		Potash, tons	20	

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
COUNTY, land area, acres (1) 359488				
Number of farms 1194				
Acres in farms 185274				
Harvested cropland in farms 139793				
Harvested cropland in farms 82822				
Number I-V farms 621				
Acres in I-V farms 138851				
Cropland I-V farms 108692				
Harvested cropland I-V farms 70752				
CORN	29267	3292	907	4199
GRAINS	20730	1758	413	2171
Wheat	11049	1117	244	1391
Oats	7753	469	124	593
Barley	903	59	36	95
Rye	620	50	0	50
OTHER FIELD CROPS	5404	245	98	343
Soybeans	5239	206	98	304
Potatoes	83	30	0	30
Sugar beets				
Field beans	1000	0	0	0
HAY OR GRASS SILAGE	12102	391	8	399
PASTURED CROPLAND	9128	61	2	63
Cropland used for pasture				
Improved pasture	8115	49	2	51
VEGETABLES, SWEET CORN, MELONS	1013	12	0	12
VEGETABLES, SWEET CORN, MELONS	195	90	1	91
ORCHARDS	1873	325	12	337
BERRIES	44	18	0	18
NURSERY & GREENHOUSE PRODUCTS	357	72	9	81
OTHER CROPS	95	13	0	13
Total Fertilizer Used, Tons		6265	1450	7715
Percent of Fertilizer Used		81	19	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	10369
Liquid	1975
Total	12344
Primary Nutrients in Fertilizer	6049
Nitrogen	1996
Phosphorus	1936
Potash	2117

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	9041	3428	12469
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	6113	30.3
1971-72	5734	28.9
1972-73	6813	32.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 9925		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1533.4	379.8	269.0	2182.2
Manure: Kind of	Tons of Materials in Wet Manure Defecated			
Livestock	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	30366	474	121	106
Cattle: Table 3	187368	1049	187	937
Sheep: Table 4	3542	50	7	35
Horses: Table 4	64501	445	65	387
Chickens: Table 5	5691	88	23	20
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	291168	2106	403	1485
Fertilizers:	Tons of Commercial Fertilizers Applied			
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland:	12344	1996	1936	2117
Lime: Limestone equivalent purchased or applied, tons:				
Table 8 12469				
Salts: Applied on all highways, tons: Table 9 9925				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2



TABLE 5-72

**GREAT LAKES BASIN MATERIAL USAGE INVENTORY**  
 Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan  
 PLANNING SUBAREA: Southeast 2.3 COUNTY: Kent

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	34110	938.0	7580	113.7		
Grains	8040	40.2	2680	26.8		
Hay or Grass Silage	10501	105.0	8751	87.5		
Pastured Cropland	6406	64.0	6406	64.0		
Other Field Crops	1750	45.2	570	58.2	500	75.0
Vegetables	1059	41.7	866	66.7	892	47.1
Orchards						
Berries	10150	489.5	12124	1255.9	12130	3090.6
Nursery, Greenhouse						
Other Crops						
Totals	72016	1723.6	38977	1672.8	13522	3212.7
Total Herbicides, Insecticides, Fungicides: 100 lbs				124515		6609.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	9912	861	845	1706
1969	13260	997	1130	2127
1972	13700	1300	1200	2500
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		18075		
Nutrients in Wet Manure:				
	Nitrogen, tons	90		
	Phosphorus, tons	25		
	Potash, tons	69		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	14049	17642	22807
1969	39067	16634	22433
1972	12700	18100	24600
Wet Manure Factor: Tons Per Animal		13.14	
Wet Manure Defecated: Tons, 1972		237834	
Wet Manure Defecated: Tons, 1972 Combined:		395504	
Nutrients in Wet Manure:			
	Nitrogen, tons	2220	
	Phosphorus, tons	397	
	Potash, tons	1283	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2933	
1969		1974	1465
1972		1600	3456
Wet Manure Factor: Tons per animal		1.61	
Wet Manure Defecated: Tons, 1972		2576	
Nutrients in Wet Manure:			
	Nitrogen, Tons	36	
	Phosphorus, Tons	5	
	Potash, Tons	26	

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		177245		
1969		183857		
1972		114500		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		4746		
Nutrients in Wet Manure:				
	Nitrogen, tons	74		
	Phosphorus, tons	19		
	Potash, tons	17		

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	34281	4221	1112	5333
GRAINS	15043	1487	12	1499
Wheat	5795	626	6	632
Oats	7063	668	6	674
Barley	271	20	0	20
Eye	400	22	0	22
OTHER FIELD CROPS	2540	528	25	553
Soybeans	120	7	0	7
Potatoes	502	316	17	333
Sugar beets				
Field beans	1075	5	0	5
HAY OR GRASS SILAGE	28813	600	4	604
PASTURED CROPLAND	18860	202	0	202
Cropland used for pasture	17651	183	0	183
Improved pasture	1209	19	0	19
VEGETABLES, SWEET CORN, MELONS	2059	857	12	869
ORCHARDS	15356	1379	128	1507
BERRIES	111	7	0	7
NURSERY & GREENHOUSE PRODUCTS	111	58	1	59
OTHER CROPS	144	7	0	7
Total Fertilizer Used, Tons		9351	1294	10645
Percent of Fertilizer Used		88	12	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	14307
Liquid	2725
Total	17032
Primary Nutrients in Fertilizer:	
Nitrogen	8346
Phosphorus	2754
Potash	2670

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	6447	7200	13647
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	23622	51.3
1971-72	25287	55.3
1972-73	19204	39.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		27853

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1723.6	1672.8	3212.7	6609.1
Manure: Kind of				
	Manure	Nitrogen	Phosphorus	Potash
Livestock: Table 1	18075	282	72	63
Swine: Table 2	396504	2220	397	1983
Cattle: Table 3	2576	36	5	26
Sheep: Table 4	14168	305	14	265
Horses: Table 5	1746	77	19	17
Turkeys: Table 6	0	0	0	0
Total from Livestock, Tons	166069	2920	537	2354
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	17032	2754	2670	2922
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	13647			
Salts: Applied on all highways, tons: Table 9		27853		

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-73

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Montcalm

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	37350	1027.1	8300	124.5		
Grains	16812	84.0	5604	56.0		
Hay or Grass Silage	7935	79.3	6612	66.1		
Pastured Cropland	1411	14.1	1411	14.1	9100	1365.0
Other Field Crops	31320	817.5	10330	1058.8		
Vegetables						
Orchards						
Berries	767	36.8	893	93.9	893	241.8
Nursery, Greenhouse						
Other Crops						
Totals	98595	2088.8	36150	1443.4	9993	1606.8
Total Herbicides, Insecticides, Fungicides: 100 lbs				144738		5139.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	8874	760	734	1494
1969	6780	518	572	1090
1972	7000	700	600	1300

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 9399  
 Nutrients in Wet Manure: Nitrogen, tons 47  
 Phosphorus, tons 13  
 Potash, tons 36

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	34040	14895	19145
1969	24508	11081	13427
1972	26800	12000	14800

Wet Manure Factor: Tons Per Animal 13.14  
 6.45  
 Wet Manure Defecated: Tons, 1972 157680  
 95460  
 Wet Manure Defecated: Tons, 1972 Combined: 253140  
 Nutrients in Wet Manure: Nitrogen, tons 1118  
 Phosphorus, tons 253  
 Potash, tons 1266

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3905	
1969		1796	755
1972		1400	2766

Wet Manure Factor: Tons per animal 1.61  
 12.78  
 Wet Manure Defecated: Tons, 1972 2254  
 35349  
 Nutrients in Wet Manure: Nitrogen, Tons 32  
 244  
 Phosphorus, Tons 5  
 35  
 Potash, Tons 23  
 212

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		109245		
1969		26864		
1972		28800		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 1194  
 Nutrients in Wet Manure: Nitrogen, tons 19  
 Phosphorus, tons 5  
 Potash, tons 4  
 Combined

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	455936			Number I-V farms	856
Number of farms	1715			Acres in I-V farms	195967
Acres in farms	269494			Cropland I-V farms	145719
Cropland in farms	191005			Harvested cropland	
Harvested cropland in farms	120699			I-V farms	103166

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	24883	3340	436	3776
GRAINS	21226	1981	11	2022
Wheat	8127	891	30	921
Oats	9332	886	6	892
Barley	118	14	0	14
Rye	3430	180	5	185
OTHER FIELD CROPS	31579	6942	943	7885
Soybeans	840	85	4	89
Potatoes	9088	4459	874	5333
Sugar beets				
Field beans	3455	18	0	18
HAY OR GRASS SILAGE	20832	321	1	322
PASTURED CROPLAND	13594	101	0	101
Cropland used for pasture	12788	101	0	101
Improved pasture	806	0	0	0
VEGETABLES, SWEET CORN, MELONS	896	183	6	189
ORCHARDS	1003	89	1	90
BERRIES	24	4	1	5
NURSERY & GREENHOUSE PRODUCTS	57	10	0	10
OTHER CROPS	109	3	0	3
Total Fertilizer Used, Tons		12992	1429	14421
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	19381
Liquid	3692
Total	23073
Primary Nutrients in Fertilizer	11306
Nitrogen	3731
Phosphorus	3618
Potash	3957

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	8315	20800	29115
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2211	17.0
1971-72	2194	17.0
1972-73	2333	15.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3384		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides 2088.8	Insecticides 1443.4	Fungicides 1606.8	Total 5139.0
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	9399	117	38	33
Cattle: Table 3	253140	1418	253	1266
Sheep: Table 4	2254	32	5	23
Horses: Table 4	35349	244	35	212
Chickens: Table 5	1194	19	5	4
Turkeys: Table 5	0			
Total from Livestock, Tons	301338	1860	336	1538
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	23073	3731	3618	3957
Lime: Limestone equivalent purchased or applied, tons: Table 8	29115			
Salts: Applied on all highways, tons: Table 9 3384				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)  
 To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)  
 Multiply By  
 0.453  
 .4047  
 907.2

TABLE 5-74

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: MichiganPLANNING SUBAREA: Southeast 2.3 COUNTY: Ottawa

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	3384.0	930.6	7520	112.8		
Grains	651.0	32.5	2170	21.7		
Hay or Grass Silage	774.8	77.4	6457	64.5		
Pastured Cropland	1678	16.7	1678	16.7		
Other Field Crops	350	9.7	305	34.5	300	45.0
Vegetables	1906	136.9	1563	102.3	1122	97.9
Orchards						
Berries	3208	154.3	3884	391.5	3902	930.6
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>5824.0</b>	<b>1388.1</b>	<b>26577</b>	<b>774.0</b>	<b>5624</b>	<b>1073.5</b>

Total Herbicides, Insecticides, Fungicides: 100 lbs 9041.1 3235.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	11265	1564	1423	2987
1969	18959	2069	2163	4232
1972	19500	2700	2400	5100

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 36873  
Nutrients in Wet Manure: Nitrogen, tons 184  
Phosphorus, tons 52  
Potash, tons 140

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	33708	15635	18073
1969	31793	14045	17748
1972	34800	15300	19500

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 201042 125775  
Wet Manure Defecated: Tons, 1972 Combined: 326817  
Nutrients in Wet Manure: Nitrogen, tons 1830  
Phosphorus, tons 327  
Potash, tons 1634

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		753	
1969		1150	777
1972		1000	4451

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 1610 56884  
Nutrients in Wet Manure: Nitrogen, Tons 23 392  
Phosphorus, Tons 3 57  
Potash, Tons 16 341

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		573660		
1969		770416		
1972		516800	50000	500000

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
Wet Manure Defecated: Tons, 1972 21421  
Nutrients in Wet Manure: Nitrogen, tons 334 492  
Phosphorus, tons 86 126  
Potash, tons 75 110

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops		Crop Acres	Tons of Fertilizer Used		Total
			Dry	Liquid	
COUNTY, land area, acres <sup>(1)</sup>		360512			Number I-V farms 1167
Number of farms		1816			Acres in I-V farms 136950
Acres in farms		176745			Cropland I-V farms 104105
Cropland in farms		131110			Harvested cropland
Harvested cropland in farms		84954			I-V farms 74377
CORN		30152	3593	768	4361
GRAINS		12289	1424	13	1437
Wheat		5070	630	7	637
Oats		5275	575	3	578
Barley		245	29	0	29
Rye		198	18	0	18
OTHER FIELD CROPS		417	157	13	170
Soybeans		55	1	0	1
Potatoes		303	153	13	166
Sugar beets					
Field beans		363	1	0	1
HAY OR GRASS SILAGE		20643	534	0	534
PASTURED CROPLAND		15204	125	2	127
Cropland used for pasture		14211	120	2	122
Improved pasture		993	5	0	5
VEGETABLES, SWEET CORN, MELONS		2588	1045	34	1079
ORCHARDS		4565	562	31	593
BERRIES		2301	435	0	435
NURSERY & GREENHOUSE PRODUCTS		1550	520	7	527
OTHER CROPS		22	3	0	3
<b>Total Fertilizer Used, Tons</b>			<b>8399</b>	<b>868</b>	<b>9267</b>
<b>Percent of Fertilizer Used</b>			<b>91</b>	<b>9</b>	<b>100</b>

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12455
Liquid	2372
<b>Total</b>	<b>14827</b>
Primary Nutrients in Fertilizer	7265
Nitrogen	2398
Phosphorus	2325
Potash	2542

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	4892	1201	6096
Tonnes for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	675	3.4
1971-72	595	3.1
1972-73	924	3.9
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 1340		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	1388.1	774.0	1073.5	3235.6	
Manure: Kind of Livestock					
		Tons of Materials in Wet Manure Defecated			
		Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2		36873	575	117	129
Cattle: Table 3		326817	1830	327	1634
Sheep: Table 4		1610	23	3	16
Horses: Table 4		56884	392	57	341
Chickens: Table 5		21421	334	86	75
Turkeys: Table 5		31533	492	126	110
Total from Livestock, Tons		475138	3646	746	2305
Fertilizers: Tons of Commercial Fertilizers Applied					
		Primary Nutrients			
		Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7		14827	2398	2325	2542
Lime: Limestone equivalent purchased or applied, tons: Table 8 6096					
Salts: Applied on all highways, tons: Table 9 1340					

(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0

STATE: Michigan

PLANNING SUBAREA: Southeast 2.3

COUNTY: St. Joseph

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	53820	1180.0	11960	179.4		
Grains	11262	56.3	3754	37.5		
Hay or Grass Silage	5476	54.7	4564	45.6		
Pastured Cropland	4208	42.0	4208	42.0		
Other Field Crops	71934	302.4	1340	56.9	115	62.2
Vegetables	863	51.7	432	12.9	432	43.2
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	90563	1987.1	26258	374.3	847	105.4
Total Herbicides, Insecticides, Fungicides: 100 lbs					117668	2466.8

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	34700	3601	3503	7104
1969	36782	3288	3677	6965
1972	37900	4300	4100	8400
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 60732				
Nutrients in Wet Manure: Nitrogen, tons 304				
Phosphorus, tons 85				
Potash, tons 231				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	23882	8465	15417
1969	22349	8184	14165
1972	24500	8900	15600
Wet Manure Factor: Tons Per Animal			
		13.14	6.45
Wet Manure Defecated: Tons, 1972 116946			
Wet Manure Defecated: Tons, 1972 Combined: 217566			
Nutrients in Wet Manure: Nitrogen, tons 1218			
Phosphorus, tons 218			
Potash, tons 1088			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8153	
1969		9822	1055
1972		8000	3608
Wet Manure Factor: Tons per animal			
		1.61	12.78
Wet Manure Defecated: Tons, 1972 12880			
Nutrients in Wet Manure: Nitrogen, tons 180			
Phosphorus, tons 27			
Potash, tons 129			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		135615		
1969		124135		
1972		105700		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 4381				
Nutrients in Wet Manure:				
		Combined		
Nitrogen, tons		68		
Phosphorus, tons		18		
Potash, tons		15		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>	323584	Number I-V farms	771	
Number of farms	1380	Acres in I-V farms	191089	
Acres in farms	237334	Cropland I-V farms	150878	
Cropland in farms	182520	Harvested cropland		
Harvested cropland in farms	113855	I-V farms	100430	
Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	38780	4385	1520	5905
GRAINS	19181	2107	149	2256
Wheat	73387	1638	135	1773
Oats	4007	336	7	343
Barley	216	33	2	35
Rye	982	51	3	51
OTHER FIELD CROPS	23337	1537	90	1627
Soybeans	21250	1126	42	1168
Potatoes	415	192	3	195
Sugar beets				
Field beans	1182	2	0	2
HAY OR GRASS SILAGE	16118	323	25	348
PASTURED CROPLAND	14994	110	7	117
Cropland used for pasture	12910	94	6	100
Improved pasture	2084	16	1	17
VEGETABLES, SWEET CORN, MELONS	828	126	27	153
ORCHARDS	309	67	0	67
BERRIES	24	2	0	2
NURSERY & GREENHOUSE PRODUCTS	328	94	4	98
OTHER CROPS	708	14	0	14
Total Fertilizer Used, Tons		8767	1822	10589
Percent of Fertilizer Used		83	17	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	11231
Liquid	2711
Total	16942
Primary Nutrients in Fertilizer	8302
Nitrogen	2740
Phosphorus	2657
Potash	2905

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	24225	1274	25499
Tonnages for Other Recent Years -			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "e" Mile
1970-71	5472	29.4
1971-72	4829	26.2
1972-73	4531	23.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 6572		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
1987.1		374.3	105.4	2466.8
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	60732	947	243	213
Cattle: Table 3	217566	1218	218	1088
Sheep: Table 4	12880	180	27	122
Horses: Table 4	46110	318	46	277
Chickens: Table 5	4381	68	18	15
Turkeys: Table 5	0			
Total from Livestock, Tons	341669	2731	552	1722
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	16942	2740	2657	2905
Lime: Limestone equivalent purchased or applied, tons: Table 8 25499				
Salts: Applied on all highways, tons: Table 9 6572				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

TABLE 5-76

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0

STATE: Michigan

PLANNING SUBAREA: Southeast 2,3

COUNTY: Shiawassee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	15000	1237.5	10000	150.0		
Grains	19212	96.0	6404	64.0		
Hay or Grass Silage	7003	70.0	5836	58.4		
Pastured Cropland	3230	32.3	3230	32.3		
Other Field Crops	48801	1057.6	3237	70.3	362	54.3
Vegetables	172	10.3	86	2.5	86	8.6
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	123118	2503.7	28793	377.5	1418	62.9
Total Herbicides, Insecticides, Fungicides: 100 lbs						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	11279	1281	1162	2443
1969	10994	932	866	1798
1972	11300	1200	900	2100

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 15183  
Nutrients in Wet Manure: Nitrogen, tons 76  
Phosphorus, tons 21  
Potash, tons 58

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	32351	11880	17471
1969	26657	11522	15135
1972	29200	12500	16700

Wet Manure Factor: Tons Per Animal  
13.14  
6.45  
Wet Manure Defecated: Tons, 1972 164250 107715  
Wet Manure Defecated: Tons, 1972 Combined: 271965  
Nutrients in Wet Manure: Nitrogen, tons 1523  
Phosphorus, tons 272  
Potash, tons 1360

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8314	
1969		6640	976
1972		5400	3194

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 8694 40819  
Nutrients in Wet Manure: Nitrogen, Tons 122 282  
Phosphorus, Tons 18 41  
Potash, Tons 87 245

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		136175		
1969		181382		
1972		199400		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 8265  
Nutrients in Wet Manure: Nitrogen, tons 129  
Phosphorus, tons 33  
Potash, tons 29  
Combined

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	315408	Number I-V farms	917
Number of farms	1710	Acres in I-V farms	201976
Acres in farms	258434	Cropland I-V farms	168297
Cropland in farms	206418	Harvested cropland	
Harvested cropland in farms	141564	I-V farms	121722

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	29744	3719	913	4632
GRAINS	29304	3347	53	3400
Wheat	16924	2107	45	2152
Oats	11327	1163	8	1171
Barley	197	27	0	27
Rye	719	44	1	45
OTHER FIELD CROPS	45518	3935	126	4061
Soybeans	32510	2441	104	2545
Potatoes	362	125	7	132
Sugar beets				
Field beans	644	9	0	9
HAY OR GRASS SILAGE	20062	429	0	429
PASTURED CROPLAND	9804	22	1	23
Cropland used for pasture	9139	81	1	82
Improved pasture	665	11	0	11
VEGETABLES, SWEET CORN, MELONS	108	14	1	15
ORCHARDS	105	6	0	6
BERRIES	4	0	0	0
NURSERY & GREENHOUSE PRODUCTS	83	22	0	22
OTHER CROPS	122	4	0	4
Total Fertilizer Used, Tons		11577	1094	12671
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	17030
Liquid	3244
Total	20274
Primary Nutrients in Fertilizer	9934
Nitrogen	3278
Phosphorus	3179
Potash	3477

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	3175	1367	4542
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2981	24.2
1971-72	3388	27.7
1972-73	3434	25.6
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4980

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
	Herbicides	Insecticides	Fungicides	Total
Table 1	2503.7	377.5	62.9	2944.1
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	15183	237	61	53
Cattle: Table 3	271965	1523	272	1360
Sheep: Table 4	8694	122	18	87
Horses: Table 4	40819	282	41	245
Chickens: Table 5	8265	129	33	29
Turkeys: Table 5	0			
Total from Livestock, Tons	344926	2293	425	1774
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	20274	3278	3179	3477
Lime: Limestone equivalent purchased or applied, tons: Table 8	4542			
Salts: Applied on all highways, tons: Table 9	4980			

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-77

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Southeast 2.3 COUNTY: Van Buren

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	30600	841.5	6800	102.0		
Grains	3780	18.9	1260	12.6		
Hay or Grass Silage	1432	14.3	3694	36.9		
Pastured Cropland	3428	34.2	3428	34.2		
Other Field Crops	2429	53.2	643	61.1	521	78.1
Vegetables	8342	240.2	5774	286.5	5234	246.4
Orchards						
Berries	15135	711.9	17919	4322.1	18696	2320.9
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>68746</b>	<b>2044.2</b>	<b>39518</b>	<b>4855.4</b>	<b>24451</b>	<b>2745.4</b>
<b>Total Herbicides, Insecticides, Fungicides: 100 lbs</b>						<b>132115</b>

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
		Spring	Fall	
1964	24898	2150	2567	4717
1969	27332	2830	3491	6321
1972	28100	3700	3900	7600
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 54948				
Nutrients in Wet Manure: Nitrogen, tons 275				
Phosphorus, tons 77				
Potash, tons 209				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	18995	7862	11133
1969	13980	5671	8309
1972	15300	6200	9100
Wet Manure Factor: Tons Per Animal 13.44			
Wet Manure Defecated: Tons, 1972 81468			
Wet Manure Defecated: Tons, 1972 Combined: 140163			
Nutrients in Wet Manure: Nitrogen, tons 785			
Phosphorus, tons 240			
Potash, tons 701			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2928	
1969		1495	876
1972		1200	3569
Wet Manure Factor: Tons per animal 1.61			
Wet Manure Defecated: Tons, 1972 1932			
Nutrients in Wet Manure: Nitrogen, tons 27			
Phosphorus, tons 4			
Potash, tons 19			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		166335		
1969		155703		
1972		142200		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 5894				
Nutrients in Wet Manure:				
	Nitrogen, tons	92	Combined	
	Phosphorus, tons	21		
	Potash, tons	21		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	24696	3878	533	4411
GRAINS	7746	665	18	683
Wheat	3725	366	10	376
Oats	2520	181	7	188
Barley	554	57	0	57
Rye	630	39	0	39
OTHER FIELD CROPS	1206	367	83	450
Soybeans	868	60	3	63
Potatoes	522	243	5	248
Sugar beets				
Field beans	747	11	0	11
HAY OR GRASS SILAGE	10686	253	1	254
PASTURED CROPLAND	10317	169	1	170
Cropland used for pasture	9478	143	4	147
Improved pasture	839	26	0	26
VEGETABLES, SWEET CORN, MELONS	8253	2174	74	2188
ORCHARDS	25759	3272	31	4003
BERRIES	1045	1025	11	1036
NURSERY & GREENHOUSE PRODUCTS	169	181	20	201
OTHER CROPS	70	1	0	1
Total Fertilizer Used, Tons		12636	775	13411
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	18025
Liquid	3433
Total	21458
Primary Nutrients in Fertilizer	10514
Nitrogen	3470
Phosphorus	3364
Potash	3680

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	5567	14976	20543
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "e" Mile
1970-71	7054	29.0
1971-72	6870	28.6
1972-73	7324	29.2
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 10724		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	2044.2	4855.4	2745.4	9645.0
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	54948	857	220	192
Cattle: Table 3	140163	785	140	701
Sheep: Table 4	1932	27	4	19
Horses: Table 4	45612	315	46	274
Chickens: Table 5	5894	92	24	21
Turkeys: Table 5	0			
Total from Livestock, Tons	248549	2076	434	1207
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
Table 7	21458	Nitrogen	Phosphorus	Potash
Applied on Cropland:		3470	3364	3680
Lime: Limestone equivalent purchased or applied, tons: Table 8 20543				
Salts: Applied on all highways, tons: Table 9 10724				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

#### 5.4.2.2 Animal Wastes

There were 9,679,440 metric tons (10,669,722 tons) of wet manure produced from livestock in PSA 2.3. This represents 37 percent of the total livestock manure in the Lake Michigan basin. There were 311,260 cows and heifers calved and 500,751 head of cattle in 1972. This is one of the few planning subareas where turkeys show even one percent of the livestock manure. Nearly 90 percent of the turkeys raised in Michigan are in this planning subarea. Nitrogen, phosphorus, and potash combined comprise 1.2 percent of the total manure tonnage.

Production levels of livestock are expected to remain relatively stable in the next 10 years. The manure production will continue at about present levels.

#### 5.4.2.3 Commercial Fertilizers

A total of 442,524 metric tons (487,799 tons) of commercial fertilizer were applied to croplands in PSA 2.3, with primary nutrients representing 206,490 metric tons (227,609 tons), or 47 percent of the total. Nitrogen, phosphorus, and potash are almost equal in tonnage. Corn and soybean acreage in this planning subarea are expected to increase significantly while other crop production is expected to decrease slightly. Fertilizer levels therefore may increase slightly.

#### 5.4.2.4 Lime

In 1972, 291,750 metric tons (321,666 tons) of lime were purchased or applied to croplands in PSA 2.3. This represents 46 percent of the total amount of lime applied in the Lake Michigan Basin. Based on present usage rates, liming rates will remain relatively unchanged. Government cost-sharing programs, if operative, will not significantly affect the rates.

#### 5.4.2.5 Salts

There were 172,065 metric tons (189,667 tons) of road de-icing salts applied to all highways in PSA 2.3. This represents 29 percent of all road de-icing salts applied in the Lake Michigan basin. The amounts of road de-icing salts may increase in proportion to increases in road mileage. However, increasing salt costs will limit expanded usage.

### 5.5 Planning Subarea 2.4

Planning Subarea 2.4 contains 21 counties, all in Michigan. Total land area equals 3,288,500 hectares (8,125,696 acres). Lands in farms total 626,750 hectares (1,546,220 acres), or 19 percent of the total land area. The majority of land in this planning subarea is in forests.

#### 5.5.1 Agricultural Characteristics

Agriculture is less important here than in some of the more southerly planning subareas; however, there is production of importance in the subarea. About one-half of the Great Lakes Basin fruit output is in PSA 2.4 and PSA 2.3. The major crops produced are hay or grass silage, corn, oats and fruits.

Table 5-78 indicates the relative proportions of materials usage in the planning subarea as compared to the total Great Lakes Basin.

Table 5-78

MATERIALS USAGE BASIN RELATIONSHIP -- PSA 2.4 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 2.4</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	4.45	2.66
Index of chemicals used	167	100
Tons of livestock manure defecated	4.42	3.37
Index of manure defecated	131	100
Lbs of primary nutrients in livestock manure	108	82
Index of primary nutrients in manure	132	100
Lbs commercial fertilizer applied	307	321
Percent liquid fertilizer applied	16	22
Index commercial fertilizer applied	96	100
Lbs primary nutrients in commercial fertilizer	150	153
Index primary nutrients in commercial fertilizer	98	100
Lbs of lime applied	241	170
Index of lime used	142	100
-----		
<u>Per acres of total land area</u>		
Lbs road salts used	15.95	41.74
Index road salts used	38	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907



### 5.5.2 Materials Usage

The following table summarizes by county the materials usage inventory for PSA 2.4.

Table 5-79  
MATERIALS USAGE  
(in 1972)

PSA 2.4	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Croplands (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>Michigan</u>					
Antrim	820	83296	3466	1081	2915
Benzie	830	29452	1142	2194	2356
Charlevoix	288	87816	1293	1550	2465
Delta	337	128809	2229	91	4627
Emmet	309	90278	2022	355	2965
Grand Traverse	1957	93130	6106	1600	2270
Kalkaska	122	30336	528	1416	2428
Lake	110	43701	373	1061	1759
Leelanau	1845	63042	6114	2025	1039
Mackinac	75	49721	526	58	4635
Manistee	1952	60720	5386	2961	2240
Mason	1752	131817	5160	3109	1122
Mecosta	1979	213050	8384	5795	3032
Missaukee	586	190001	3757	5382	1692
Muskegon	1402	140527	5355	3497	6927
Newaygo	2453	254906	7839	6562	5148
Oceana	4313	148747	10466	12999	1253
Osceola	626	236477	3053	5363	3670
Roscommon	14	10017	34	153	3499
Schoolcraft	35	25225	251	172	3779
Wexford	291	70268	2287	2050	4992
<b>TOTAL</b>	<b>22096</b>	<b>2181336</b>	<b>75771</b>	<b>59474</b>	<b>64813</b>

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 5.5.2.1 Agricultural Chemicals

There were 1,002,250 kilograms (2,209,640 pounds) of agricultural chemicals used in PSA 2.4. Herbicides represented 34 percent of the total, insecticides 31 percent, and fungicides 35 percent. This is the highest percentage of fungicides in the Lake Michigan basin. Herbicide use may increase about 10-25 percent in the next 10 years, and fungicide use about 5-10 percent. Insecticide use may increase 30-40 percent in the next 5 years, but decrease to about present levels within 10 years.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-80

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan  
 PLANNING SUBAREA: Northeast 2.4 COUNTY: 21 County Totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	108360	2979.2	24080	361.2		
Grains	35940	178.9	11980	119.2		
Hay or Grass Silage	68530	684.4	57109	570.2		
Pastured Cropland	53592	535.1	53592	535.1		
Other Field Crops	8294	235.2	6621	746.8	6491	873.2
Vegetables	20445	860.4	74968	819.6	14017	913.0
Orchards						
Berries	16603	2026.0	54795	3714.3	54904	5814.2
Nursery, Greenhouse						
Other Crops						
Totals	311764	7499.2	223145	6866.4	75112	7730.4
Total Herbicides, Insecticides, Fungicides: 100 lbs				640321		22096.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	30767	3120	3172	6292
1969	26309	2596	2472	5068
1972	27990	3208	2646	5854
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		42327		
Nutrients in Wet Manure: Nitrogen, tons		212		
Phosphorus, tons		59		
Potash, tons		161		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	204524	89453	115071
1969	177203	76298	100905
1972	193600	82100	111500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		1078794	719175
Wet Manure Defecated: Tons, 1972 Combined:		1797969	
Nutrients in Wet Manure: Nitrogen, tons		10069	
Phosphorus, tons		1798	
Potash, tons		8290	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		16419	-
1969		14188	5857
1972		14185	2261
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		18491	284496
Nutrients in Wet Manure: Nitrogen, Tons		259	1963
Phosphorus, Tons		39	284
Potash, Tons		185	1707

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		817355	-	-
1969		839040	-	-
1972		765900	10000	100000
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		31746	-	-
Nutrients in Wet Manure: Combined		6307		
Nitrogen, tons		127		
Phosphorus, tons		25		
Potash, tons		111		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	84194	11480	1207	12687
GRAINS	55046	5719	67	5786
Wheat	13795	1496	20	1516
Oats	34993	3732	40	3772
Barley	904	89	-	89
Rye	4006	246	4	250
OTHER FIELD CROPS	11470	4252	731	4983
Soybeans	469	15	-	15
Potatoes	6491	3580	701	4281
Sugar beets	-	-	-	-
Field beans	2745	9	-	9
HAY OR GRASS SILAGE	175442	2572	46	2618
PASTURED CROPLAND	165053	1445	6	1451
Cropland used for pasture	149119	1473	5	1478
Improved pasture	15934	172	1	173
VEGETABLES, SWEET CORN, MELONS	19604	5458	94	5552
ORCHARDS	69314	12823	563	13386
BERRIES	2027	54	14	578
NURSERY & GREENHOUSE PRODUCTS	381	65	2	67
OTHER CROPS	524	58	-	58
Total Fertilizer Used, Tons		44636	2710	47346
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	63648
Liquid	12123
Total	75771
Primary Nutrients in Fertilizer	37128
Nitrogen	12252
Phosphorus	11880
Potash	12996

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	14928	14546	59474
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	40074	17.0
1971-72	44434	17.1
1972-73	44685	17.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		44813

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
	Herbicides	Insecticides	Fungicides	Total
Table 1	7499.2	6866.4	7730.4	22096.0
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	42327	212	59	161
Cattle: Table 3	1797969	10069	1798	8990
Sheep: Table 4	18491	259	39	185
Horses: Table 4	284496	1963	284	1707
Chickens: Table 5	31746	195	127	111
Turkeys: Table 5	6307	28	25	22
Total from Livestock, Tons	2181336	13096	2332	11176
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	75771	12252	11880	12996
Lime: Limestone equivalent purchased or applied, tons: Table 8 59474				
Salts: Applied on all highways, tons: Table 9 44813				

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northeast 2.4 COUNTY: Antrim

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	2700	71.2	600	9.0		
Grains	780	3.9	260	2.6		
Hay or Grass Silage	2380	23.7	1983	19.8		
Pastured Cropland	2121	21.2	2121	21.2		
Other Field Crops	601	18.0	668	76.8	668	100.2
Vegetables						
Orchards						
Berries	2108	87.7	2428	147.6	2430	214.5
Nursery, Greenhouse						
Other Crops						
Totals	10690	228.7	8060	277.0	3098	311.7
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					2184.8	1076.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1978	280	251	531
1969	1730	258	270	528
1972	1800	300	300	600
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 4338				
Nutrients in Wet Manure: Nitrogen, tons 22				
Phosphorus, tons 6				
Potash, tons 16				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	7266	3201	4065
1969	6188	2560	3528
1972	6700	2900	3800
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 38106 24510			
Wet Manure Defecated: Tons, 1972 Combined: 62616			
Nutrients in Wet Manure: Nitrogen, tons 351			
Phosphorus, tons 63			
Potash, tons 313			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		406	
1969		510	185
1972		400	524
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 644 6697			
Nutrients in Wet Manure: Nitrogen, Tons 9 46			
Phosphorus, Tons 1 7			
Potash, Tons 6 40			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		58132		
1969		69890		
1972		65000	10000	100000
Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63				
Wet Manure Defecated: Tons, 1972 2694				
Nutrients in Wet Manure: Combined 6307				
Nitrogen, tons 42 98				
Phosphorus, tons 11 25				
Potash, tons 9 22				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	3155	462	17	479
GRAINS	1584	717	0	717
Wheat	165	19	0	19
Oats	1151	121	0	121
Barley	0			
Rye	265	6	0	6
OTHER FIELD CROPS	692	451	0	451
Soybeans				
Potatoes	668	445	0	445
Sugar beets				
Field beans	372	1	0	1
HAY OR GRASS SILAGE	5866	82	0	82
PASTURED CROPLAND	6833	63	0	63
Cropland used for pasture	5733	42	0	42
Improved pasture	1100	21	0	21
VEGETABLES, SWEET CORN, MELONS	208	52	0	52
ORCHARDS	3787	853	32	885
BERRIES	36	6	0	6
NURSERY & GREENHOUSE PRODUCTS	3	0	0	0
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		2117	49	2166
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	2911
Liquid	555
Total	3466
Primary Nutrients in Fertilizer	1698
Nitrogen	560
Phosphorus	513
Potash	594

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	931	150	1081
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1963	17.2
1971-72	1706	15.1
1972-73	2010	10.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2915		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	228.7	277.0	314.7	1076.2
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	4338	68	17	15
Cattle: Table 3	62616	351	63	313
Sheep: Table 4	644	9	1	6
Horses: Table 4	6697	46	7	40
Chickens: Table 5	2694	42	11	9
Turkeys: Table 5	6307	98	25	22
Total from Livestock, Tons	83296	614	124	770
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	3466	560	513	594
Lime: Limestone equivalent purchased or applied, tons: Table 8 1081				
Salts: Applied on all highways, tons: Table 9 2915				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY  
Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-82

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northeast 2.4 COUNTY: Benzie

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	630	17.3	140	2.1		
Grains	60	.3	20	.2		
Hay or Grass Silage	571	5.7	476	4.7		
Pastured Cropland	1020	10.2	1020	10.2		
Other Field Crops						
Vegetables						
Orchards	2502	109.7	2922	226.0	2922	443.2
Berries						
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>4783</b>	<b>143.2</b>	<b>4578</b>	<b>243.2</b>	<b>2922</b>	<b>443.2</b>
<b>Total Herbicides, Insecticides, Fungicides: 100 lbs</b>						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1272	16	14	30
1969	3442	285	291	576
1972	3500	400	300	700
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		5061		
Nutrients in Wet Manure:				
		Nitrogen, tons		25
		Phosphorus, tons		7
		Potash, tons		19

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves		
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves	
1964	1954	863	1091	
1969	1946	802	1144	
1972	2100	900	1200	
Wet Manure Factor: Tons Per Animal		13.14	6.45	
Wet Manure Defecated: Tons, 1972		11826	7740	
Wet Manure Defecated: Tons, 1972 Combined:		19566		
Nutrients in Wet Manure:				
		Nitrogen, tons		110
		Phosphorus, tons		20
		Potash, tons		98

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies	
1964		0		
1969		47	115	
1972		50	365	
Wet Manure Factor: Tons per animal		1.61	12.78	
Wet Manure Defecated: Tons, 1972		81	4665	
Nutrients in Wet Manure:				
		Nitrogen, Tons		1
		Phosphorus, Tons		0
		Potash, Tons		1

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised	
1964		13845			
1969		1675			
1972		1900			
Wet Manure Factor: Lbs. per bird		82.9			
Wet Manure Defecated: Tons, 1972		79			
Nutrients in Wet Manure:		Combined			
		Nitrogen, tons			1
		Phosphorus, tons			0
		Potash, tons			0

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	805	108	65	173
GRAINS	356	27	0	27
Wheat	59	6	0	6
Oats	150	7	0	7
Barley	0			
Rye	147	14	0	14
OTHER FIELD CROPS	0			
Soybeans	0			
Potatoes	0			
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	1201	39	0	39
PASTURED CROPLAND	2965	50	0	50
Cropland used for pasture	2803	47	0	47
Improved pasture	162	3	0	3
VEGETABLES, SWEET CORN, MELONS	27	7	0	7
ORCHARDS	4841	1059	74	1133
BERRIES	48	26	0	26
NURSERY & GREENHOUSE PRODUCTS	19	1	0	1
OTHER CROPS	0			
<b>Total Fertilizer Used, Tons</b>		<b>1317</b>	<b>139</b>	<b>1456</b>
<b>Percent of Fertilizer Used</b>				

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1957
Liquid	373
<b>Total</b>	<b>2330</b>
Primary Nutrients in Fertilizer	1142
Nitrogen	377
Phosphorus	365
Potash	400

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1260	934	2194
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1384	16.7
1971-72	1229	14.9
1972-73	1624	18.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		2356

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	143.2	243.2	443.2	829.6	
Manure: Kind of Livestock					
Table 2	Manure	Nitrogen	Phosphorus	Potash	
Swine: Table 2	5061	79	20	18	
Cattle: Table 3	19566	110	20	98	
Sheep: Table 4	81	1	0	1	
Horses: Table 4	4665	32	5	28	
Chickens: Table 5	79	1	0	0	
Turkeys: Table 5	0	0	0	0	
<b>Total from Livestock, Tons</b>	<b>29452</b>	<b>223</b>	<b>45</b>	<b>145</b>	
Fertilizers: Tons of Commercial Fertilizers Applied					
Table 7	Total	Primary Nutrients		Potash	
Applied on Cropland:		Nitrogen	Phosphorus		
Table 7	1142	377	365	400	
Lime: Limestone equivalent purchased or applied, tons:					
Table 8	2194				
Salts: Applied on all highways, tons: Table 9					
				2356	

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From                      To                      Multiply By  
Pounds (lb)                              Kilograms (kg)                      0.453  
Acres (acre)                              Hectare (ha)                        .4047  
Tons (ton)                                Kilograms (kg)                      907.2

TABLE 5-83

GREAT LAKES BASIN MATERIAL USAGE INVENTORY  
Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northeast 2.4 COUNTY: Charlevoix

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	2700	74.2	600	9.0		
Grains	816	4.0	272	2.7		
Hay or Grass Silage	2560	25.6	2134	21.3		
Pastured Cropland	2555	25.5	2555	25.5		
Other Field Crops	61	1.8	68	7.8	68	10.2
Vegetables						
Orchards						
Berries	257	11.0	290	22.6	290	46.9
Nursery, Greenhouse						
Other Crops						
Totals	8949	142.1	5919	88.9	358	57.1
Total Herbicides, Insecticides, Fungicides: 100 lbs					15226	288.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1092	129	125	254
1969	560	59	55	114
1972	600	60	55	115

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 831  
Nutrients in Wet Manure: Nitrogen, tons 4  
Phosphorus, tons 1  
Potash, tons 3

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	8106	3817	4289
1969	6565	3157	3408
1972	7200	3400	3800

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 44676 24510  
Wet Manure Defecated: Tons, 1972 Combined: 69186  
Nutrients in Wet Manure: Nitrogen, tons 387  
Phosphorus, tons 69  
Potash, tons 346

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		225	
1969		232	316
1972		200	1291

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 322 16499  
Nutrients in Wet Manure: Nitrogen, Tons 5 114  
Phosphorus, Tons 1 16  
Potash, Tons 3 99

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		20790		
1969		21320		
1972		23600		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 978  
Nutrients in Wet Manure: Nitrogen, tons 15  
Phosphorus, tons 4  
Potash, tons 3

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	2657	431	0	431
GRAINS	1126	149	0	149
Wheat	147	17	0	17
Oats	806	101	0	101
Barley	75	4	0	4
Rye	18	2	0	2
OTHER FIELD CROPS	187	24	1	25
Soybeans				
Potatoes	68	6	0	6
Sugar beets				
Field beans	16	0	0	0
HAY OR GRASS SILAGE	6242	80	0	80
PASTURED CROPLAND	6767	27	0	27
Cropland used for pasture	6291	25	0	25
Improved pasture	476	2	0	2
VEGETABLES, SWEET CORN, MELONS	132	39	0	39
ORCHARDS	565	57	0	57
BERRIES	0			
NURSERY & GREENHOUSE PRODUCTS	0			
OTHER CROPS	0			
Total Fertilizer Used, Tons		807	1	808
Percent of Fertilizer Used		100	0	100

COUNTY, land area, acres (1) 265088 Number I-V farms 121  
Number of farms 278 Acres in I-V farms 34658  
Acres in farms 51109 Cropland I-V farms 19604  
Cropland in farms 27473 Harvested cropland I-V farms 10785  
Harvested cropland in farms 13461

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1086
Liquid	207
Total	1293
Primary Nutrients in Fertilizer	534
Nitrogen	209
Phosphorus	203
Potash	222

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1150	400	1550
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1339	17.1
1971-72	1438	18.5
1972-73	1700	20.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed	2465	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	142.1	88.9	57.1	288.1
Manure: Kind of	Tons of Materials in Wet Manure Defecated			
Livestock	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	831	13	3	3
Cattle: Table 3	69186	387	69	346
Sheep: Table 4	322	5	1	3
Horses: Table 4	16499	114	16	99
Chickens: Table 5	978	15	4	3
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	87816	534	93	454
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7	1293	Nitrogen	Phosphorus	Potash
		209	203	222
Lime: Limestone equivalent purchased or applied, tons: Table 8	1550			
Salts: Applied on all highways, tons: Table 9	2465			

To Convert From To Multiply By  
Pounds (lb) Kilograms (kg) 0.453  
Acres (acre) Hectare (ha) .4047  
Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-84

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northeast 2.4 COUNTY: Delta

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains	3804	19.0	1268	12.6		
Hay or Grass Silage	4429	44.2	3691	36.9		
Pastured Cropland	4534	45.3	4534	45.3		
Other Field Crops	412	12.3	458	52.6	458	68.7
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	13179	120.8	9951	147.4	458	68.7
Total Herbicides, Insecticides, Fungicides: 100 lbs 23588 336.9						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	308	20	26	46
1969	203	24	34	58
1972	200	24	34	58
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 419				
Nutrients in Wet Manure: Nitrogen, tons 2				
Phosphorus, tons 1				
Potash, tons 2				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	13463	7394	6069
1969	11003	5917	5086
1972	12000	6400	5600
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 84096 36120			
Wet Manure Defecated: Tons, 1972 Combined: 120216			
Nutrients in Wet Manure: Nitrogen, tons 673			
Phosphorus, tons 120			
Potash, tons 601			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		97	
1969		175	175
1972		100	532
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		161	6799
Nutrients in Wet Manure: Nitrogen, Tons		2	47
Phosphorus, Tons		0	7
Potash, Tons		2	41

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		25137		
1969		34431		
1972		29300		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1214		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		19		
Phosphorus, tons		5		
Potash, tons		4		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1) 752960 Number I-V farms 250				
Number of farms 373 Acres in I-V farms 78795				
Acres in farms 101542 Cropland I-V farms 39254				
Cropland in farms 49165 Harvested cropland I-V farms 20606				
Harvested cropland in farms 24252				
CORN	1070	201	0	201
GRAINS	5372	517	2	519
Wheat	7	5	0	5
Oats	4947	474	2	476
Barley	290	28	0	28
Rye	73	2	0	2
OTHER FIELD CROPS	959	285	2	287
Soybeans				
Potatoes	458	233	0	233
Sugar beets				
Field beans	52	0	0	0
HAY OR GRASS SILAGE	12549	97	0	97
PASTURED CROPLAND	15213	162	0	162
Cropland used for pasture	13294	143	0	143
Improved pasture	1919	19	0	19
VEGETABLES, SWEET CORN, MELONS	628	118	0	118
ORCHARDS	9	0	0	0
BERRIES	23	8	0	8
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	3	1	0	1
Total Fertilizer Used, Tons		1389	4	1393
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1872
Liquid	357
Total	2229
Primary Nutrients in Fertilizer	1092
Nitrogen	360
Phosphorus	349
Potash	383

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	91	0	91
Tonnes for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2943	21.0
1971-72	2740	19.5
1972-73	3190	21.2
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 4627		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	120.8	147.4	68.7	336.9
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	419	7	2	1
Cattle: Table 3	120216	673	120	601
Sheep: Table 4	161	2	0	2
Horses: Table 4	6799	47	7	41
Chickens: Table 5	1214	19	5	4
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	128809	748	134	549
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	2229	360	349	383
Lime: Limestone equivalent purchased or applied, tons: Table 8 01				
Salts: Applied on all highways, tons: Table 9 4627				

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 5-85

GREAT LAKES BASIN MATERIAL USAGE INVENTORY  
Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds  
PLANNING AREA: Lake Michigan 2.0 STATE: Michigan  
PLANNING SUBAREA: Northeast 2.4 COUNTY: Emmet

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	2250	61.8	500	7.5		
Grains	918	4.5	306	3.0		
Hay or Grass Silage	2926	29.2	2438	24.3		
Pastured Cropland	2270	22.7	2270	22.7		
Other Field Crops	412	12.3	458	52.6	458	68.7
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	8776	130.5	5972	110.1	458	68.7
Total Herbicides, Insecticides, Fungicides: 100 lbs					15206	309.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
		1964	1389	
1969	307	25	18	43
1972	300	25	15	40

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 289  
Nutrients in Wet Manure: Nitrogen, tons 1  
Phosphorus, tons 0  
Potash, tons 1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	8762	4102	4660
1969	7186	3374	3812
1972	7900	3700	4200

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 48618 27216  
Wet Manure Defecated: Tons, 1972 Combined: 75834  
Nutrients in Wet Manure: Nitrogen, tons 425  
Phosphorus, tons 76  
Potash, tons 379

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		664	
1969		848	165
1972		700	806

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 1127 10301  
Nutrients in Wet Manure: Nitrogen, Tons 16 71  
Phosphorus, Tons 2 10  
Potash, Tons 11 52

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		50489		
1969		58935		
1972		65800		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 2727  
Nutrients in Wet Manure: Nitrogen, tons 43  
Phosphorus, tons 11  
Potash, tons 10

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres <sup>(1)</sup> 29,472.0 Number I-V farms 120				
Number of farms 248 Acres in I-V farms 38052				
Acres in farms 56907 Cropland I-V farms 20151				
Cropland in farms 28015 Harvested cropland				
Harvested cropland in farms 15226 I-V farms 12140				
CORN	2511	409	38	1117
GRAINS	1786	213	1	214
Wheat	184	30	1	31
Oats	1534	178	0	178
Barley	19	2	0	2
Rye	41	3	0	3
OTHER FIELD CROPS	512	263	0	263
Soybeans	54	0	0	0
Potatoes	458	263	0	263
Sugar beets				
Field beans	38	2	0	2
HAY OR GRASS SILAGE	7277	133	0	133
PASTURED CROPLAND	6649	144	0	144
Cropland used for pasture	6074	130	0	130
Improved pasture	575	14	0	14
VEGETABLES, SWEET CORN, MELONS	74	34	2	36
ORCHARDS	39	17	0	17
BERRIES	9	8	0	8
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	1	0	0	0
Total Fertilizer Used, Tons		1223	41	1264
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1698
Liquid	324
Total	2022
Primary Nutrients in Fertilizer	991
Nitrogen	327
Phosphorus	317
Potash	347

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	261	94	355
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2323	19.4
1971-72	2351	19.8
1972-73	2044	16.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2965		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	130.5	110.1	68.7	309.3
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	289	5	1	1
Cattle: Table 3	75834	425	76	379
Sheep: Table 4	1127	16	2	11
Horses: Table 4	10301	71	10	52
Chickens: Table 5	2727	43	11	10
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	90278	560	100	453
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	2022	327	317	347
Lime: Limestone equivalent purchased or applied, tons: Table 8 355				
Salts: Applied on all highways, tons: Table 9 2965				

To Convert From          To          Multiply By  
Pounds (lb)                  Kilograms (kg)              0.453  
Acres (acre)                Hectare (ha)                .4047  
Tons (ton)                  Kilograms (kg)              907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 5-86

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan  
 PLANNING SUBAREA: Northeast 2.4 COUNTY: Grand Traverse

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1,770	131.1	1060	15.9		
Grains	1326	6.6	442	4.4		
Hay or Grass Silage	3073	30.7	2550	25.6		
Pastured Cropland	1965	19.6	1965	19.6		
Other Field Crops	10	.2	11	1.2	11	1.6
Vegetables	548	11.5	315	18.0	447	22.3
Orchards						
Berries	8822	358.5	10196	574.2	10198	716.2
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>20574</b>	<b>558.2</b>	<b>16549</b>	<b>658.9</b>	<b>10656</b>	<b>740.1</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs					47719	1957.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1940	234	215	449
1969	1348	93	94	187
1972	7400	100	100	200

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 4466  
 Nutrients in Wet Manure: Nitrogen, tons 7  
 Phosphorus, tons 2  
 Potash, tons 5

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	7101	2449	4652
1969	6786	2349	4437
1972	7400	2600	4800

Wet Manure Factor: Tons Per Animal 13.14  
 Wet Manure Defecated: Tons, 1972 34164  
 Wet Manure Defecated: Tons, 1972 Combined: 65124  
 Nutrients in Wet Manure: Nitrogen, tons 365  
 Phosphorus, tons 65  
 Potash, tons 326

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		304	
1969		214	742
1972		200	1889

Wet Manure Factor: Tons per animal 1.61  
 Wet Manure Defecated: Tons, 1972 322  
 Nutrients in Wet Manure: Nitrogen, Tons 5  
 Phosphorus, Tons 1  
 Potash, Tons 3

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		89267		
1969		81504		
1972		50600		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 2097  
 Nutrients in Wet Manure: Nitrogen, tons 33  
 Phosphorus, tons 8  
 Potash, tons 7

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	295808	Number I-V farms	365
Number of farms	633	Acres in I-V farms	57905
Acres in farms	83712	Cropland I-V farms	38118
Cropland in farms	51292	Harvested cropland I-V farms	25168
Harvested cropland in farms	29771		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	3151	440	54	494
GRAINS	1503	176	0	176
Wheat	434	62	0	62
Oats	873	98	0	98
Barley				
Rye	136	6	0	6
OTHER FIELD CROPS	200	26	0	26
Soybeans	15	0	0	0
Potatoes	11	2	0	2
Sugar beets				
Field beans	78	0	0	0
HAY OR GRASS SILAGE	7296	120	1	121
PASTURED CROPLAND	5431	98	1	99
Cropland used for pasture	5144	87	1	88
Improved pasture	287	11	0	11
VEGETABLES, SWEET CORN, MELONS	537	84	0	84
ORCHARDS	12434	2722	72	2794
BERRIES	56	11	0	11
NURSERY & GREENHOUSE PRODUCTS	2	0	0	0
OTHER CROPS	70	11	0	11
Total Fertilizer Used, Tons		3688	128	3816
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	5129
Liquid	277
<b>Total</b>	<b>6106</b>
Primary Nutrients in Fertilizer	2992
Nitrogen	987
Phosphorus	257
Potash	1048

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1254	346	1600
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	273	9.7
1971-72	1156	11.6
1972-73	1565	14.7
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2270		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	558.2	658.9	740.1	1957.2

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1446	23	6	5
Cattle: Table 3	65124	365	65	326
Sheep: Table 4	322	5	1	3
Horses: Table 4	2444	167	24	145
Chickens: Table 5	2097	33	8	7
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	93130	593	104	355

Fertilizers: Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients	
		Nitrogen	Phosphorus
Applied on Cropland: Table 7	6106	987	957
Lime: Limestone equivalent purchased or applied, tons: Table 8	1600		
Salts: Applied on all highways, tons: Table 9 2270			

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)  
 To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)  
 Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.





GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 5-88

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Michigan 2.0 STATE: Michigan

PLANNING SUBAREA: Northeast 2.4 COUNTY: Lake

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Table with 7 columns: Crop Group or Crops, Herbicides (Acres Treated, Amount Used 100 lbs), Insecticides (Acres Treated, Amount Used 100 lbs), and Fungicides (Acres Treated, Amount Used 100 lbs). Rows include Corn, Grains, Hay or Grass Silage, Pastured Cropland, etc.

TABLE 2--MANURE FROM SWINE

Table with 5 columns: Year, Hog & Pig Inventory Dec. 1, Number Sows Farrowing (Dec. 1-May 31, June 1-Nov. 30), and Total. Includes sub-sections for Wet Manure Factor and Nutrients in Wet Manure.

TABLE 3--MANURE FROM CATTLE

Table with 4 columns: Year, Total, Cows & Heifers Calved, and Heifers, Steers, Bulls, Calves. Includes sub-sections for Wet Manure Factor and Nutrients in Wet Manure.

TABLE 4--MANURE FROM SHEEP AND HORSES

Table with 4 columns: Year, Item, Sheep & Lambs, and Horses & Ponies. Includes sub-sections for Wet Manure Factor and Nutrients in Wet Manure.

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Table with 5 columns: Year, Item, Chickens, Turkey Hens, and Turkeys Raised. Includes sub-sections for Wet Manure Factor and Nutrients in Wet Manure.

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Table with 5 columns: Crops, Crop Acres, and Tons of Fertilizer Used (Dry, Liquid, Total). Includes summary statistics for COUNTY land area and farms.

TABLE 7--FERTILIZER USED IN 1972

Table with 2 columns: Item and Tons. Lists Fertilizer Used on Crops (Solid, Liquid) and Primary Nutrients in Fertilizer.

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Table with 4 columns: Year, Tonnage Government Cost/Shared, Tonnage not Government Cost/Shared, and Total Tonnage.

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Table with 3 columns: Year, Tons Purchased Through State, and Tons Applied Per "g" Mile.

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Summary table with columns for Chemicals, Manure, Fertilizers, and Salts, detailing application rates and totals.

To Convert From: Pounds (lb), Acres (acre), Tons (ton). To: Hectare (ha), Kilograms (kg). Multiply By: 0.453, .4047, 907.2

(1) County, land area, acres includes water areas under 40 acres in size.





























#### 5.5.2.2 Animal Wastes

There were 1,978,900 metric tons (2,181,336 tons) of wet manure produced from livestock in PSA 2.4. This represented 8 percent of the total manure produced in the Lake Michigan basin. There were 82,100 cows and heifers calved and 111,500 head of other cattle in 1972. Cattle defecates 82 percent of the manure and horses 13 percent. Production levels of livestock are expected to remain fairly stable or decline slightly in this subarea within the next 10 years. The manure production will continue at about the present levels or slightly lower.

#### 5.5.2.3

Currently a total of 68,739 metric tons (75,771 tons) of commercial fertilizers are applied to croplands in PSA 2.4 with primary nutrients representing 49 percent of the total. Nitrogen, phosphorus and potash are almost equal in tonnages. Over the next ten years the amount of total cropland is expected to remain about the same. Fertilizers use will remain relatively constant. The percent applied in liquid form may increase slightly.

#### 5.5.2.4 Lime

A total of 53,955 metric tons (59,474 tons) of lime was purchased or applied to croplands in PSA 2.4. Based on present usage rates, liming rates are expected to remain relatively unchanged. Present usage in PSA 2.4 is already well above the Great Lakes Basin average. This is due to the importance of grasses on livestock farms in the planning subarea. Government cost-sharing programs, if operative, will not significantly affect the rates.

#### 5.5.2.5 Salts

At the present time about 58,798 metric tons (64,813 tons) of road de-icing salts are applied to all highways in PSA 2.4. Road de-icing salt usage will increase about in proportion to road mileage increases. There will be changes and improvements in methods; however, application rates are not likely to increase.



Section 6

MATERIALS USAGE IN THE LAKE HURON BASIN

6.1 Basin Characteristics

The Lake Huron basin is comprised of 22 counties in the eastern half of the Lower Peninsula of Michigan. The counties have a total land area of 3,292,166 hectares (8,134,832 acres). Over one-third of this acreage is in cropland and pasture. Most of the cropland is found in the southern portion of this basin while the northern portion is suited for recreation because of its extensive forest cover.

6.1.1 Agricultural Characteristics

This area includes two subareas which are very different in their agricultural complexes. Planning Subarea 3.1 is not generally known for its agriculture but thought of more in terms of recreation, forestry, and less intensive farming. Planning Subarea 3.2, by contrast, is primarily known for its agriculture, representing one of the major navy bean producing regions of the world, with sugar beet production also very important.

Table 6-1 indicates the relative proportions of materials used in the Lake Huron basin as compared to the total U.S. Great Lakes Basin.

Table 6-1

MATERIALS USAGE BASIN RELATIONSHIP -- LAKE HURON 3.0 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Lake Huron basin</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.46	2.66
Index of chemicals used	92	100
Tons of livestock manure defecated	2.63	3.37
Index of manure defecated	78	100
Lbs primary nutrients in livestock manure	64	82
Index primary nutrients in manure	78	100
Lbs commercial fertilizer applied	376	321
Percent liquid fertilizer applied	16	22
Index commercial fertilizer applied	117	100
Lbs of primary nutrients in commercial fertilizer	184	153
Index primary nutrients in commercial fertilizer	120	100
Lbs of lime applied	34	170
Index of lime applied	20	100
<hr/>		
<u>Per acre of total land area</u>		
Lbs road salts used	26.11	41.74
Index road salts used	62.5	100
<hr/>		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

From an agricultural standpoint there are more similarities between Planning Subarea 3.2 and 4.1 than exist between 3.1 and 3.2. In like manner, discounting the fruit counties, there are more similarities in agriculture in Planning Subarea 3.1 and 2.4 than between 3.1 and 3.2.

Hay and pasture, a major crop in Planning Subarea 3.1, is much less important in 3.2. On the other hand, corn acreage in PSA 3.2 is much more important while field beans and sugar beets (of major importance in 3.2) are hardly grown in PSA 3.1. Livestock production is important in PSA 3.1. It is also important in 3.2, especially in those counties not bordering on Saginaw Bay.

#### 6.1.2 Materials Usage

An inventory and analysis on materials usage was made based on personal interviews, correspondence and statistics as available from agricultural statistics, census information, state highway departments, universities, private companies, and state and federal agencies. Background for the analysis is presented in the Methodology Section. Table 6-2 summarizes the findings of this inventory and analysis. Detailed statistics are shown in Table 6-3.

Table 6-2  
MATERIALS USAGE  
(in 1972)

Area	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
Lake Huron basin	40,994.4	4,498,921	313,257	28,571	106,203
PSA 3.1	3,948.2	1,050,967	20,784	6,281	34,294
PSA 3.2	37,046.2	3,447,954	292,473	22,290	71,909

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 6.1.2.1 Agricultural Chemicals

There was a total of 1,859,000 kilograms (4,099,440 lbs) of agricultural chemicals used on farm lands in the Lake Huron basin in 1972. Herbicides accounted for the majority of chemical use (77 percent) with insecticides consisting of 15 percent of the total and fungicides being 8 percent. This amounts to 1.11 kilograms (2.46 lbs) of chemicals applied per acre of harvested cropland.



Chemical usage in the northeast counties (PSA 3.1) is projected to increase modestly. It is believed that usage in the east-central counties (PSA 3.2) will increase more than this - perhaps 15 to 25 percent. It is expected that for the entire area, herbicide use will show a substantial increase (perhaps 15 to 20 percent), fungicides a 5 to 10 percent increase, with insecticides staying at about the present level. In strong agricultural counties with high valued crops, chemical applications, methods, and rates will be likely to change drastically over the next 10 years. Future food production will depend a great deal upon what our agricultural scientists and researchers are able to discover in the field of chemicals for our use and application.

#### 6.1.2.2 Animal Wastes

Livestock, as already stated, will continue to be of prime importance in most of these counties. Cattle and cow numbers have declined about 10 percent in the last 8 years. It is projected that these numbers will hold their own. Horse number increases will not be as fast as in the last few years. Chicken numbers have been decreasing about 1 percent a year. Swine numbers were declining but are now holding their own. Livestock manure production per acre is likely to stay near present levels for the next 10 years. It was calculated that 4,081,350 metric tons (4,498,921 tons) of wet manure were produced annually in the Lake Huron basin. Most of this was produced by cattle (83 percent).

#### 6.1.2.3 Commercial Fertilizers

A total of 284,182 metric tons (313,257 tons) of commercial fertilizers were applied to crops in the Lake Huron basin in 1972. Nitrogen accounted for 33 percent, phosphorus 32 percent, and potash 35 percent of the primary nutrient content.

Fertilizer usage, already relatively high, will continue to increase in use more in the southern counties and less for those in the north. The overall area tonnage will likely increase somewhat less than the 25 percent increase projected for PSA 3.2.

#### 6.1.2.4 Lime

Lime usage, relatively unimportant in both subareas, will probably continue to be applied at about current levels. In 1972 there were 25,290 metric tons (28,571 tons) of limestone used in the Lake Huron basin. Lime is important in terms of its water quality impacts due to its effects on the pH level of water and subsequent effects on water's acid - base relationships. The possibilities of precipitating phosphorous in the water and altering calcium content are also likely.

#### 6.1.2.5 Salts

Because of severe climatic conditions during winter and the resultant heavy snowfalls, road de-icing salts are required to keep major roadways open. It is estimated that 96,347 metric tons (106,203 tons) were applied to highways in the Lake Huron basin in the 1972-73 winter. The primary impact upon ground and surface waters resulting from road de-icing salts comes from chloride discharges, which can over time affect the salinity

of nearby wells and open water areas. Assuming that chlorides are conservative and that ion exchange between chlorides and various soil types are minimal, most of the chlorides will eventually reach ground and surface water areas.

Road de-icing will most likely continue at the present levels. Changes are foreseen in road de-icing procedures, but they will add up to rates similar to the present, with total quantities depending on changes in road mileages.

## 6.2 Planning Subarea 3.1

This subarea is comprised of 11 counties all in northeast Michigan, 6 of the counties bordering on Lake Huron and the other 5 draining indirectly into the lake. These are not strong agricultural counties, but they do have important agricultural localities in them. Total land area for this area is 1,486,239 hectares (3,672,448 acres). More than 17 percent of the area is in farmland.

### 6.2.1 Agricultural Characteristics

Hay and pasture utilize about 70,800 hectares (175,000 acres), corn and grains about 10,120 to 12,140 hectares (25,000 to 30,000 acres) each, cash crops about 6,475 hectares (16,000 acres) with 809 hectares (2,000 acres) of cucumbers. The cash field crops are dry beans, soybeans and sugar beets and are grown more towards the south and potatoes more in the north.

Table 6-4 indicates the relative proportions of materials usage in Planning Subarea 3.1 in comparison with the total U.S. Great Lakes Basin.

Table 6-4

## MATERIALS USAGE BASIN RELATIONSHIP -- PLANNING SUBAREA 3.1 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 3.1</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.02	2.66
Index of chemicals used	76	100
Tons of livestock manure defecated	4.72	3.37
Index of manure defecated	140	100
Lbs primary nutrients in livestock manure	114	82
Index of primary nutrients in manure	139	100
Lbs commercial fertilizer applied	213	321
Percent liquid fertilizer applied	16	22
Index commercial fertilizer applied	66	100
Lbs primary nutrients in commercial fertilizer	103	153
Index primary nutrients in commercial fertilizer	67	100
Lbs of lime applied	64	170
Index of lime used	38	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	18.68	41.74
Index road salts used	45	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 6.2.2 Materials Usage

Table 6-5 lists by county the material usage inventory for Planning Subarea 3.1. Detailed statistics are shown in Tables 6-6 to 6-17.

## 6.2.2.1 Agricultural Chemicals

This subarea in comparison with the total Basin applied less chemicals per acre of harvested cropland. Chemical use will most likely increase modestly in the next ten years - perhaps 10-15 percent. In 1972 there were 179,000 kilograms (394,820 lbs) of agricultural chemicals used. Most of this was in the form of herbicides (55 percent). Insecticides accounted for 29 percent and fungicides 16 percent.

## 6.2.2.2 Animal Wastes

Livestock production, and in turn manure production, may stay about the same in PSA 3.1. Cattle will be the class of livestock to especially observe as it

Table 6-5  
MATERIALS USAGE  
(in 1972)

	Chemicals Applied to Crops (tons)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>PSA 3.1</u>					
<u>Michigan</u>					
Alcona	182.8	108,292	776	1,012	2,885
Alpena	379.5	150,763	1,974	267	3,189
Arenac	1,169.1	128,261	7,736	528	3,680
Cheboygan	386.1	76,350	963	596	4,796
Crawford					
Iosco	293.9	143,006	1,875	588	3,064
Montmorency	116.1	53,536	568	258	2,349
Ogemaw	409.9	157,801	2,413	1,492	3,690
Oscoda	81.0	43,141	518	523	2,349
Otsego	193.3	52,453	854	314	4,412
Presque Isle	736.5	137,364	3,107	703	3,880
TOTAL	3,948.2	1,050,967	20,784	6,281	34,294
<u>To Convert From</u>		<u>To</u>		<u>Multiply By</u>	
Pounds (lb)		Kilograms (kg)		0.454	
Tons (ton)		Kilograms (kg)		907.2	
		Metric Tons		0.907	

produces 85 percent of the manure. Horse numbers, which have been increasing very rapidly, will probably continue to increase but at a slower rate. Livestock intensity, as measured by the manure index, is 40 percent higher than the total Basin. Had total cropland acres been used to compute this index, livestock intensity would have been about 10 per cent higher.

#### 6.2.2.3 Commercial Fertilizers

This subarea in comparison with the total Basin applied one-third less commercial fertilizer per acre of harvested cropland. Fertilizer use in 1972 showed that 18,855 metric tons (20,784 tons) were used. Primary nutrients comprised 49 percent of the total fertilizer amount. Nitrogen accounted for 33 percent, phosphorus 32 percent, and potash 35 percent of the primary nutrients.

#### 6.2.2.4 Lime

There were 5,698 metric tons (6,281 tons) of lime purchased or applied in Planning Subarea 3.1 in 1972. There is little to suggest that lime usage will change much from present levels.





TABLE 6-7

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: MichiganPLANNING SUBAREA: North 3.1 COUNTY: Alcona

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1170	32.2	260	2.6		
Grains	1236	6.2	412	4.1		
Hay or Grass Silage	3559	35.6	2966	29.7		
Pastured Cropland	3624	36.2	3624	36.2		
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	9589	110.2	7262	72.6		
Total Herbicides, Insecticides, Fungicides: 100 lbs 16851 182.8						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	403	83	73	156
1969	246	14	28	42
1972	300	15	35	50
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 362				
Nutrients in Wet Manure: Nitrogen, tons 2				
Phosphorus, tons 1				
Potash, tons 1				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	10970	5212	5758
1969	8921	4194	4727
1972	9700	4600	5100
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 60444 32895			
Wet Manure Defecated: Tons, 1972 Combined: 93339			
Nutrients in Wet Manure: Nitrogen, tons 523			
Phosphorus, tons 93			
Potash, tons 467			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2664	
1969		1336	140
1972		1100	899
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 1771 11489			
Nutrients in Wet Manure: Nitrogen, Tons 25 79			
Phosphorus, Tons 4 11			
Potash, Tons 18 69			

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		13480		
1969		28820		
1972		32100		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 1331				
Nutrients in Wet Manure:				
		Combined		
Nitrogen, tons		21		
Phosphorus, tons		5		
Potash, tons		5		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1167	188	0	188
GRAINS	1664	126	0	126
Wheat	284	26	0	26
Oats	1273	101	0	101
Barley	45	0	0	0
Rye	8	0	0	0
OTHER FIELD CROPS	33	1	0	1
Soybeans	0	0	0	0
Potatoes	4	1	0	1
Sugar beets				
Field beans	101	0	0	0
HAY OR GRASS SILAGE	8070	56	0	56
PASTURED CROPLAND	10048	80	0	80
Cropland used for pasture	9514	70	0	70
Improved pasture	346	10	0	10
VEGETABLES, SWEET CORN, MELONS	35	31	0	31
ORCHARDS	67	3	0	3
BERRIES	20	0	0	0
NURSERY & GREENHOUSE PRODUCTS	4	0	0	0
OTHER CROPS	2	0	0	0
Total Fertilizer Used, Tons		485	0	485
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	652
Liquid	124
Total	776
Primary Nutrients in Fertilizer	380
Nitrogen	125
Phosphorus	122
Potash	133

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1012	0	1012
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2463	28.6
1971-72	2309	27.0
1972-73	1987	21.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2885		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	110.2	72.6	0	182.8
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	362	2	1	1
Cattle: Table 3	9339	523	93	467
Sheep: Table 4	1771	25	4	18
Horses: Table 4	11489	79	11	69
Chickens: Table 5	1331	21	5	5
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	24292	650	114	560
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
	776	125	122	133
Lime: Limestone equivalent purchased or applied, tons: Table 8 1012				
Salts: Applied on all highways, tons: Table 9 2885				

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 6-8

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.1 COUNTY: Alpena

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	4230	116.3	940	14.1		
Grains	5472	27.4	1824	18.2		
Hay or Grass Silage	4692	46.9	3910	39.1		
Pastured Cropland	3753	37.5	3753	37.5		
Other Field Crops	21	.6	23	2.6	23	3.4
Vegetables	288	17.2	144	4.3	144	14.4
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	18456	245.9	10594	115.8	167	17.8
Total Herbicides, Insecticides, Fungicides: 100 lbs					29217	379.5

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1171	139	129	268
1969	933	117	126	243
1972	1000	200	100	300
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				2169
Nutrients in Wet Manure: Nitrogen, tons				11
Phosphorus, tons				3
Potash, tons				8

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	15493	6555	8938
1969	12683	5411	7272
1972	13800	5900	7900
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		77526	50955
Wet Manure Defecated: Tons, 1972 Combined:		128481	
Nutrients in Wet Manure: Nitrogen, tons		719	
Phosphorus, tons		128	
Potash, tons		642	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1447	
1969		640	360
1972		500	1385
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		805	17700
Nutrients in Wet Manure: Nitrogen, Tons		11	122
Phosphorus, Tons		2	18
Potash, Tons		8	106

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		63760		
1969		35114		
1972		38800		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1608		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		25		
Phosphorus, tons		6		
Potash, tons		6		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1752	266	6	272
GRAINS	5587	602	2	604
Wheat	909	98	1	99
Oats	4425	475	2	477
Barley	163	16	0	16
Rye	90	13	0	13
OTHER FIELD CROPS	287	49	0	49
Soybeans				
Potatoes	23	9	0	9
Sugar beets				
Field beans	243	1	0	1
HAY OR GRASS SILAGE	10683	67	4	71
PASTURED CROPLAND	10097	109	0	109
Cropland used for pasture	9493	100	0	100
Improved pasture	604	9	0	9
VEGETABLES, SWEET CORN, MELONS	267	40	2	42
ORCHARDS	26	0	0	0
BERRIES	272	82	3	85
NURSERY & GREENHOUSE PRODUCTS	0			
OTHER CROPS	2	1	0	1
Total Fertilizer Used, Tons		1217	17	1234
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1658
Liquid	316
Total	1974
Primary Nutrients in Fertilizer	867
Nitrogen	286
Phosphorus	277
Potash	304

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	267	0	267
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3102	38.7
1971-72	2113	26.6
1972-73	2199	25.9
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3189

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	245.9	115.8	17.8	379.5
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2169	11	3	8
Cattle: Table 3	128481	719	128	642
Sheep: Table 4	805	11	2	8
Horses: Table 4	17700	122	18	106
Chickens: Table 5	1608	25	6	6
Turkeys: Table 5	-	-	-	-
Total from Livestock, Tons	150763	888	157	770
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	1974	286	277	304
Lime: Limestone equivalent purchased or applied, tons: Table 8 267				
Salts: Applied on all highways, tons: Table 9 3189				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

TABLE 6-9

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.1 COUNTY: Arenac

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	11250	309.4	2500	37.5		
Grains	3756	18.8	1252	12.5		
Hay or Grass Silage	3594	35.9	2995	30.0		
Pastured Cropland	2251	22.5	2251	22.5		
Other Field Crops	12615	316.6	1077	54.2	414	62.1
Vegetables	1915	109.5	1025	38.5	991	99.1
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	35381	812.7	11100	195.2	1405	161.2
Total Herbicides, Insecticides, Fungicides: 100 lbs				47886		1169.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1596	176	153	329
1969	3217	230	296	526
1972	3300	300	300	600

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 4338  
Nutrients in Wet Manure: Nitrogen, tons 22  
Phosphorus, tons 6  
Potash, tons 16

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	15877	6567	9310
1969	10867	4901	5966
1972	11900	5300	6600

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 69642 42570  
Wet Manure Defecated: Tons, 1972 Combined: 112212  
Nutrients in Wet Manure: Nitrogen, tons 628  
Phosphorus, tons 112  
Potash, tons 561

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		482	
1969		301	225
1972		200	775

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 322 9905  
Nutrients in Wet Manure: Nitrogen, Tons 5 68  
Phosphorus, Tons 1 10  
Potash, Tons 3 60

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		93322		
1969		33346		
1972		35800		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 1484  
Nutrients in Wet Manure: Nitrogen, tons 23  
Phosphorus, tons 6  
Potash, tons 5

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	8420	1384	179	1563
GRAINS	5706	676	3	679
Wheat	1324	189	2	191
Oats	4316	479	1	480
Barley	10	1	0	1
Eye	20	4	0	4
OTHER FIELD CROPS	11040	1903	60	1963
Soybeans	1377	126	0	126
Potatoes	414	206	5	211
Sugar beets				
Field beans	307	3	5	8
HAY OR GRASS SILAGE	9411	153	0	153
PASTURED CROPLAND	6555	69	0	69
Cropland used for pasture	6309	29	0	29
Improved pasture	246	40	0	40
VEGETABLES, SWEET CORN, MELONS	1704	296	60	356
ORCHARDS	18	14	0	14
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	30	5	0	5
OTHER CROPS	276	25	0	25
Total Fertilizer Used, Tons		4528	307	4835
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	6498
Liquid	1238
Total	7736
Primary Nutrients in Fertilizer	3791
Nitrogen	1251
Phosphorus	1213
Potash	1327

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	375	153	528
Tonnages for Other Recent Years -			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2290	18.2
1971-72	2816	22.6
1972-73	2537	19.1
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3680		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	812.7	195.2	161.2	1169.1
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	4338	22	6	16
Cattle: Table 3	112212	628	112	561
Sheep: Table 4	322	5	1	3
Horses: Table 4	9950	68	10	60
Chickens: Table 5	1484	23	6	5
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	128261	676	135	645
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	7736	1251	1213	1327
Lime: Limestone equivalent purchased or applied, tons: Table 8 528				
Salts: Applied on all highways, tons: Table 9 3680				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-10

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.0 COUNTY: Cheboygan

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	900	24.8	200	3.0		
Grains	876	4.4	292	2.9		
Hay or Grass Silage	2821	28.2	2351	23.5		
Pastured Cropland	2583	25.8	2583	25.8		
Other Field Crops	9	0	10	1.2	10	1.5
Vegetables						
Orchards						
Berries	515	24.8	582	61.5	582	158.7
Nursery, Greenhouse						
Other Crops						
Totals	7704	108.0	6018	117.9	592	160.2
Total Herbicides, Insecticides, Fungicides: 100 lbs					14314	386.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	482	46	43	89
1969	346	62	43	105
1972	400	65	45	110
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				795
Nutrients in Wet Manure: Nitrogen, tons				4
Phosphorus, tons				1
Potash, tons				3

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	9129	4499	4630
1969	6392	3212	3180
1972	7000	3500	3500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		45990	22575
Wet Manure Defecated: Tons, 1972 Combined:		68565	
Nutrients in Wet Manure: Nitrogen, tons		384	
Phosphorus, tons		69	
Potash, tons		343	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		830	
1969		415	124
1972		300	503
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		483	6428
Nutrients in Wet Manure: Nitrogen, Tons		7	44
Phosphorus, Tons		1	6
Potash, Tons		5	39

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		6393		
1969		2124		
1972		1900		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		79		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		1		
Phosphorus, tons		0		
Potash, tons		0		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	978	116	0	116
GRAINS	1510	121	0	121
Wheat	57	4	0	4
Oats	1284	100	0	100
Barley	124	13	0	13
Rye	45	5	0	5
OTHER FIELD CROPS	10	3	0	3
Soybeans				
Potatoes	10	3	0	3
Sugar beets				
Field beans	201	7	0	7
HAY OR GRASS SILAGE	7506	121	0	121
PASTURED CROPLAND	9657	155	0	155
Cropland used for pasture	6855	55	0	55
Improved pasture	2802	100	0	100
VEGETABLES, SWEET CORN, MELONS	26	5	0	5
ORCHARDS	747	73	0	73
BERRIES	5	1	0	1
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	0			
Total Fertilizer Used, Tons		692	0	692
Percent of Fertilizer Used		100	0	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	809
Liquid	154
Total	963
Primary Nutrients in Fertilizer	472
Nitrogen	156
Phosphorus	151
Potash	165

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	395	200	596
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	4605	26.6
1971-72	5277	30.6
1972-73	3306	18.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
	4796	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	108.0	117.9	160.2	386.1
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	795	4	1	3
Cattle: Table 3	68565	384	69	343
Sheep: Table 4	483	7	1	5
Horses: Table 4	6428	44	6	39
Chickens: Table 5	79	1	0	0
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	76350	440	77	390
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
	963	156	151	165
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	596			
Salts: Applied on all highways, tons: Table 9				
				4796

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

TABLE 6-11

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.1 COUNTY: Crawford (Census information not available)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn						
Grains						
Hay or Grass Silage						
Pastured Cropland						
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals						
Total Herbicides, Insecticides, Fungicides: 100 lbs						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964				
1969				
1972				
Wet Manure Factor: Tons per litter farrowed				
Wet Manure Defecated: Tons, 1972				
Nutrients in Wet Manure: Nitrogen, tons				
Phosphorus, tons				
Potash, tons				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964			
1969			
1972			
Wet Manure Factor: Tons Per Animal			
Wet Manure Defecated: Tons, 1972			
Wet Manure Defecated: Tons, 1972 Combined:			
Nutrients in Wet Manure: Nitrogen, tons			
Phosphorus, tons			
Potash, tons			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964			
1969			
1972			
Wet Manure Factor: Tons per animal			
Wet Manure Defecated: Tons, 1972			
Nutrients in Wet Manure: Nitrogen, Tons			
Phosphorus, Tons			
Potash, Tons			

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964				
1969				
1972				
Wet Manure Factor: Lbs. per bird				
Wet Manure Defecated: Tons, 1972				
Nutrients in Wet Manure:				
Nitrogen, tons				
Phosphorus, tons				
Potash, tons				

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1)				
Number of farms				
Acres in I-V farms				
Acres in farms				
Cropland in farms				
Harvested cropland I-V farms				
CORN				
GRAINS				
Wheat				
Oats				
Barley				
Rye				
OTHER FIELD CROPS				
Soybeans				
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE				
PASTURED CROPLAND				
Cropland used for pasture				
Improved pasture				
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons				
Percent of Fertilizer Used				

TABLE 7--FERTILIZER USED IN 1972 TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Item	Tons	Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
Liquid					
Total					
1972					
Tonnages for Other Recent Years					
Primary Nutrients in Fertilizer					
Nitrogen					
Phosphorus					
Potash					

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73		
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure Nitrogen Phosphorus Potash				
Swine: Table 2				
Cattle: Table 3				
Sheep: Table 4				
Horses: Table 4				
Chickens: Table 5				
Turkeys: Table 5				
Total from Livestock, Tons				
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item Total Nitrogen Phosphorus Potash				
Applied on Cropland: Table 7				
Lime: Limestone equivalent purchased or applied, tons: Table 8				
Salts: Applied on all highways, tons: Table 9				

To Convert From To Multiply By

Pounds (lb) Kilograms (kg) 0.453

Acres (acre) Hectare (ha) .4047

Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-12

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan  
 PLANNING SUBAREA: North 3.1 COUNTY: Iosco

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	5040	138.6	1120	16.8		
Grains	1620	8.1	540	5.4		
Hay or Grass Silage	3160	31.6	2634	26.3		
Pastured Cropland	3122	31.2	3122	31.2		
Other Field Crops	14	0	16	1.8	16	2.4
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	12956	2095	7432	81.5	16	2.4
Total Herbicides, Insecticides, Fungicides: 100 lbs 20404 293.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1932	306	335	641
1969	1281	234	242	476
1972	1300	300	200	500
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 3615				
Nutrients in Wet Manure: Nitrogen, tons 18				
Phosphorus, tons 5				
Potash, tons 14				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	13089	6367	6722
1969	12766	4730	8036
1972	14000	5100	8900
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 67014 57405			
Wet Manure Defecated: Tons, 1972 Combined: 124419			
Nutrients in Wet Manure: Nitrogen, tons 697			
Phosphorus, tons 124			
Potash, tons 622			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1817	
1969		1022	276
1972		800	1039
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 1288 13278			
Nutrients in Wet Manure: Nitrogen, tons 18 92			
Phosphorus, tons 3 13			
Potash, tons 13 80			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		11226		
1969		9153		
1972		9800		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 406				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 6				
Phosphorus, tons 2				
Potash, tons 1				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	3423	389	11	400
GRAINS	2204	233	8	241
Wheat	340	29	2	31
Oats	1723	196	6	202
Barley	8	0	0	0
Rye	5	0	0	0
OTHER FIELD CROPS	506	55	0	55
Soybeans	23	2	0	2
Potatoes	16	6	0	6
Sugar beets				
Field beans	389	0	0	0
HAY OR GRASS SILAGE	8314	72	0	72
PASTURED CROPLAND	9662	32	0	32
Cropland used for pasture	9212	17	0	17
Improved pasture	450	15	0	15
VEGETABLES, SWEET CORN, MELONS	28	2	0	2
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS	585	370	0	370
OTHER CROPS				
Total Fertilizer Used, Tons		1153	19	1172
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1575
Liquid	300
Total	1875
Primary Nutrients in Fertilizer	919
Nitrogen	303
Phosphorus	294
Potash	322

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	438	150	588
Tonnages for Other Recent Years -			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "e" Mile
1970-71	2024	23.7
1971-72	2799	33.0
1972-73	2113	23.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3064		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	138.6	81.5	2.4	222.5
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3615	18	5	14
Cattle: Table 3	124419	697	124	622
Sheep: Table 4	1288	18	3	13
Horses: Table 4	13278	92	13	80
Chickens: Table 5	406	6	2	1
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	143006	831	147	730
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	1875	303	294	322
Lime: Limestone equivalent purchased or applied, tons: Table 8 588				
Salts: Applied on all highways, tons: Table 9 3064				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

TABLE 6-13

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0

STATE: Michigan

PLANNING SUBAREA: North 3.1

COUNTY: Montmorency

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1260	34.7	280	4.2		
Grains	1536	7.7	512	5.1		
Hay or Grass Silage	1462	14.6	1218	12.2		
Pastured Cropland	1776	17.8	1776	17.8		
Other Field Crops	6	0	6	1.0	6	1.0
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	6040	74.8	3792	40.3	6	1.0
Total Herbicides, Insecticides, Fungicides:			100 lbs		9838	116.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	138	16	13	29
1969	161	14	15	29
1972	200	18	17	35
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				253
Nutrients in Wet Manure: Nitrogen, tons				1
Phosphorus, tons				0
Potash, tons				1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	5535	2689	2846
1969	4322	2095	2227
1972	4700	2300	2400
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		30222	15480
Wet Manure Defecated: Tons, 1972 Combined:		45702	
Nutrients in Wet Manure: Nitrogen, tons		256	
Phosphorus, tons		46	
Potash, tons		229	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1384	
1969		619	87
1972		500	514
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		805	6569
Nutrients in Wet Manure: Nitrogen, Tons		11	39
Phosphorus, Tons		2	7
Potash, Tons		8	39

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		8824		
1969		8101		
1972		5000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		207		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		3		
Phosphorus, tons		1		
Potash, tons		1		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1025	133	10	143
GRAINS	1327	129	0	129
Wheat	163	14	0	14
Oats	1100	109	0	109
Barley	44	4	0	4
Rye	20	2	0	2
OTHER FIELD CROPS	179	34	0	34
Soybeans				
Potatoes	7	4	0	4
Sugar beets				
Field beans	14	0	0	0
HAY OR GRASS SILAGE	3682	21	0	21
PASTURED CROPLAND	5116	25	0	25
Cropland used for pasture	5026	25	0	25
Improved pasture	90	0	0	0
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES	12	2	0	2
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS	1	0	1	1
Total Fertilizer Used, Tons		344	11	355
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	477
Liquid	91
Total	568
Primary Nutrients in Fertilizer	278
Nitrogen	92
Phosphorus	89
Potash	97

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage not Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	258	0	258
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1874	27.9
1971-72	1257	18.8
1972-73	1620	22.7
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		2349

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	74.8	40.3	1.0	116.1
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	253	1	0	1
Cattle: Table 3	45702	256	46	229
Sheep: Table 4	805	11	2	8
Horses: Table 4	6569	39	7	39
Chickens: Table 5	207	3	1	1
Turkeys: Table 5	0			
Total from Livestock, Tons	53536	310	56	278
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	568	92	89	97
Lime: Limestone equivalent purchased or applied, tons: Table 8 258				
Salts: Applied on all highways, tons: Table 9 2349				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-14

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.1 COUNTY: Ogemaw

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	7380	203.0	1640	24.6		
Grains	2712	13.6	904	9.0		
Hay or Grass Silage	5318	53.2	4432	44.3		
Pastured Cropland	3114	31.1	3114	31.1		
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	18524	300.9	10090	109.0	-	-
Total Herbicides, Insecticides, Fungicides: 100 lbs 28614 409.9						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1561	152	173	325
1969	836	107	93	200
1972	900	100	100	200
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				1446
Nutrients in Wet Manure: Nitrogen, tons				7
Phosphorus, tons				2
Potash, tons				5

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	17882	7815	10067
1969	13232	6183	7049
1972	14500	6700	7800
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		88038	50310
Wet Manure Defecated: Tons, 1972 Combined:		138348	
Nutrients in Wet Manure: Nitrogen, tons		775	
Phosphorus, tons		138	
Potash, tons		692	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3341	
1969		2111	254
1972		1700	1188
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2737	15183
Nutrients in Wet Manure: Nitrogen, Tons		38	105
Phosphorus, Tons		6	15
Potash, Tons		27	91

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		7597		
1969		1998		
1972		2100		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		87		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		1		
Phosphorus, tons		0		
Potash, tons		0		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	5837	842	24	866
GRAINS	4275	404	0	404
Wheat	1018	84	0	84
Oats	3187	315	0	315
Barley	10	2	0	2
Rye				
OTHER FIELD CROPS	2	0	0	0
Soybeans				
Potatoes	2	0	0	0
Sugar beets				
Field beans	405	8	0	8
HAY OR GRASS SILAGE	14937	177	0	177
PASTURED CROPLAND	11177	50	0	50
Cropland used for pasture	9521	49	0	49
Improved pasture	1656	1	0	1
VEGETABLES, SWEET CORN, MELONS	2	0	0	0
ORCHARDS	41	3	0	3
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS				
Total Fertilizer Used, Tons		1484	24	1508
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	2027
Liquid	386
Total	2413
Primary Nutrients in Fertilizer	1182
Nitrogen	390
Phosphorus	378
Potash	414

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1292	200	1492
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2770	28.1
1971-72	2006	17.6
1972-73	2544	22.7
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3690

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	300.9	109.0	0	409.9
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1446	7	2	5
Cattle: Table 3	138348	775	138	692
Sheep: Table 4	2737	38	6	27
Horses: Table 4	15183	105	15	91
Chickens: Table 5	87	1	0	0
Turkeys: Table 5	0			
Total from Livestock, Tons	157801	831	161	815
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	2413	390	378	414
Lime: Limestone equivalent purchased or applied, tons: Table 8 1492				
Salts: Applied on all highways, tons: Table 9 3690				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 6-15

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.1 COUNTY: Oscoda

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	810	22.3	180	2.7		
Grains	240	1.2	80	.8		
Hay or Grass Silage	1686	16.9	1405	14.0		
Pastured Cropland	1186	11.9	1186	11.9		
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	3922	52.3	2851	28.7	-	-
Total Herbicides, Insecticides, Fungicides: 100 lbs 6773 81.0						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	759	195	112	308
1969	337	34	30	64
1972	300	30	30	60

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 434  
 Nutrients in Wet Manure: Nitrogen, tons 2  
 Phosphorus, tons 1  
 Potash, tons 2

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	4876	2397	2479
1969	3415	1474	1941
1972	3700	1600	2100

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 21024 13545  
 Wet Manure Defecated: Tons, 1972 Combined: 34569  
 Nutrients in Wet Manure: Nitrogen, tons 194  
 Phosphorus, tons 35  
 Potash, tons 173

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1471	
1969		884	152
1972		700	546

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1127 6978  
 Nutrients in Wet Manure: Nitrogen, Tons 16 48  
 Phosphorus, Tons 2 7  
 Potash, Tons 11 42

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		31250		
1969		5744		
1972		800		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 33  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 1  
 Phosphorus, tons 0  
 Potash, tons 0

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	918	143	25	168
GRAINS	791	82	0	82
Wheat	128	12	0	12
Oats	663	70	0	70
Barley				
Rye				
OTHER FIELD CROPS				
Soybeans				
Potatoes				
Sugar beets				
Field beans	5	0	0	0
HAY OR GRASS SILAGE	5312	60	0	60
PASTURED CROPLAND	4187	14	0	14
Cropland used for pasture	4071	14	0	14
Improved pasture	116	0	0	0
VEGETABLES, SWEET CORN, MELONS				
ORCHARDS				
BERRIES				
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS				
Total Fertilizer Used, Tons		299	25	324
Percent of Fertilizer Used		92	8	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	435
Liquid	83
Total	518
Primary Nutrients in Fertilizer	254
Nitrogen	84
Phosphorus	81
Potash	89

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	498	25	523
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1875	27.9
1971-72	1257	18.8
1972-73	1620	22.7
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2349		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	52.3	28.7	0	81.0
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	434	2	1	2
Cattle: Table 3	34569	194	35	173
Sheep: Table 4	1127	16	2	11
Horses: Table 4	6978	48	7	42
Chickens: Table 5	33	1	0	0
Turkeys: Table 5	0			
Total from Livestock, Tons	43117	261	45	228
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	518	84	81	89
Lime: Limestone equivalent purchased or applied, tons: Table 8 523				
Salts: Applied on all highways, tons: Table 9 2349				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-16

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.1 COUNTY: Otsego

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	810	22.3	180	2.7		
Grains	684	3.4	228	2.3		
Hay or Grass Silage	2225	22.2	1855	18.6		
Pastured Cropland	1706	17.1	1706	17.1		
Other Field Crops	270	8.1	300	34.5	300	45.0
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	5695	73.1	4269	75.2	300	45.0
Total Herbicides, Insecticides, Fungicides: 100 lbs 10264 193.3						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	317	60	30	90
1969	382	46	42	88
1972	400	45	45	90
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 651				
Nutrients in Wet Manure: Nitrogen, tons 3				
Phosphorus, tons 1				
Potash, tons 2				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	5814	2431	3383
1969	4304	1964	2340
1972	4700	2100	2600
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 27594 16770			
Wet Manure Defecated: Tons, 1972 Combined: 44364			
Nutrients in Wet Manure: Nitrogen, tons 248			
Phosphorus, tons 44			
Potash, tons 222			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		309	
1969		496	101
1972		400	528
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 640 6748			
Nutrients in Wet Manure: Nitrogen, Tons 9 47			
Phosphorus, Tons 1 7			
Potash, Tons 6 40			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		5673		
1969		1241		
1972		1200		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 50				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 1				
Phosphorus, tons 0				
Potash, tons 0				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	890	123	6	129
GRAINS	1458	127	0	127
Wheat	160	24	0	24
Oats	1041	74	0	74
Barley	148	18	0	18
Rye	67	8	0	8
OTHER FIELD CROPS	443	170	0	170
Soybeans	112	12	0	12
Potatoes	302	155	0	155
Sugar beets				
Field beans	9	1	0	1
HAY OR GRASS SILAGE	6347	55	0	55
PASTURED CROPLAND	6573	48	0	48
Cropland used for pasture	4856	39	0	39
Improved pasture	1717	9	0	9
VEGETABLES, SWEET CORN, MELONS	6	1	0	1
ORCHARDS	4	0	0	0
BERRIES				
NURSERY & GREENHOUSE PRODUCTS				
OTHER CROPS	14	3	0	3
Total Fertilizer Used, Tons		528	6	534
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	717
Liquid	137
Total	854
Primary Nutrients in Fertilizer	418
Nitrogen	138
Phosphorus	134
Potash	146

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	314	0	314
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2855	28.6
1971-72	3293	33.2
1972-73	3042	28.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 4412		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	73.1	75.2	45.0	193.3
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	651	3	1	2
Cattle: Table 3	44364	248	44	222
Sheep: Table 4	640	9	1	6
Horses: Table 4	6748	47	7	40
Chickens: Table 5	50	1	0	0
Turkeys: Table 5	0			
Total from Livestock, Tons	52453	308	53	270
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	854	138	134	146
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	314			
Salts: Applied on all highways, tons: Table 9 4412				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6-17

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: North 3.1 COUNTY: Presque Isle

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1350	37.1	300	4.5		
Grains	3288	16.4	1096	11.0		
Hay or Grass Silage	4125	41.2	3437	34.4		
Pastured Cropland	4657	46.6	4657	46.6		
Other Field Crops	1536	46.1	1707	196.3	1707	256.0
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	14956	187.4	11197	292.8	1707	256.0
Total Herbicides, Insecticides, Fungicides: 100 lbs					27860	736.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1577	235	181	416
1969	720	96	121	217
1972	700	100	100	200
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		1446		
Nutrients in Wet Manure: Nitrogen, tons		7		
Phosphorus, tons		2		
Potash, tons		5		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	15116	7013	8103
1969	12432	5465	6957
1972	13600	5900	7700
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		77526	49665
Wet Manure Defecated: Tons, 1972 Combined:		127191	
Nutrients in Wet Manure: Nitrogen, tons		712	
Phosphorus, tons		127	
Potash, tons		636	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		708	
1969		327	57
1972		300	564
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		483	7208
Nutrients in Wet Manure: Nitrogen, Tons		7	50
Phosphorus, Tons		1	7
Potash, Tons		5	43

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		22613		
1969		22592		
1972		25000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1036		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		16		
Phosphorus, tons		4		
Potash, tons		4		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1897	207	21	228
GRAINS	5231	652	0	652
Wheat	705	120	0	120
Oats	3994	450	0	450
Barley	427	69	0	69
Rye	55	6	0	6
OTHER FIELD CROPS	2515	741	21	762
Soybeans	150	21	0	21
Potatoes	1707	663	21	684
Sugar beets				
Field beans	52	0	0	0
HAY OR GRASS SILAGE	10544	100	0	100
PASTURED CROPLAND	15266	197	0	197
Cropland used for pasture	13890	175	0	175
Improved pasture	1376	22	0	22
VEGETABLES, SWEET CORN, MELONS	2	2	0	2
ORCHARDS	7	0	0	0
BERRIES	7	1	0	1
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS				
Total Fertilizer Used, Tons		1900	42	1942
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	2610
Liquid	497
Total	3107
Primary Nutrients in Fertilizer	1522
Nitrogen	502
Phosphorus	487
Potash	533

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	303	400	703
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3856	32.8
1971-72	2290	19.6
1972-73	2675	21.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3880

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	187.4	292.8	256.0	736.2
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1446	7	2	5
Cattle: Table 3	127191	712	127	636
Sheep: Table 4	483	7	1	5
Horses: Table 4	7208	50	7	43
Chickens: Table 5	1036	16	4	4
Turkeys: Table 5	0			
Total from Livestock, Tons	137364	792	141	693
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	3107	502	487	533
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	703			
Salts: Applied on all highways, tons: Table 9 3880				

To Convert From To Multiply By  
Pounds (lb) Kilograms (kg) 0.453  
Acres (acre) Hectare (ha) .4047  
Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

### 6.2.2.5 Salts

Major highways passing through this subarea link southeast and eastern Michigan with the Upper Peninsula. Road de-icing use is rather high and will likely continue so. In 1972 there were 31,111 metric tons (34,294 tons) of salts applied in highways in this planning subarea.

### 6.3 Planning Subarea 3.2

Eleven Michigan counties comprise this planning subarea in the southeastern portion of the state. Total land area equals 1,805,926 hectares (4,462,384 acres), with lands in farms equaling 1,022,747 hectares (2,527,175 acres) or 56 percent of the total land area.

#### 6.3.1. Agricultural Characteristics

This subarea is one of the most fertile and most productive agricultural regions in Michigan. It is commonly known as the "Saginaw Valley". Looking at ones right hand with palm up, it is the region in Michigan extending from the tip of the thumb down and around and then up to about the base of the fourth finger. Four of the eleven counties border on Saginaw Bay (Lake Huron) and all drain into the Bay.

Table 6-18 indicates the relative proportions of materials usage in the planning subarea as compared to the total U.S. Great Lakes Basin.

Table 6-18

#### MATERIALS USAGE BASIN RELATIONSHIP -- PSA 3.2 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 3.2</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.52	2.66
Index of chemicals applied	95	100
Tons of livestock manure defecated	2.35	3.37
Index of manure defecated	70	100
Lbs of primary nutrients in livestock manure	57	82
Index of primary nutrients in manure	70	100
Lbs commercial fertilizer applied	398	321
Percent liquid fertilizer applied	16	22
Index commercial fertilizer applied	124	100
Lbs primary nutrients in commercial fertilizer	195	153
Index primary nutrients in commercial fertilizer	127	100
Lbs of lime applied	30	170
Index of lime used	18	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	32.23	41.74
Index road salts used	77	100
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

### 6.3.2 Materials Usage

Table 6-19 lists by county the material usage inventory for PSA 3.2. Detailed statistics are shown in Tables 6-12 to 6-31.

Table 6-19  
MATERIAL USAGE  
(in 1972)

	Chemicals Applied To Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>PSA 3.2</u>					
<u>Michigan</u>					
Bay	5,562.8	100,835	38,333	1,500	9,140
Clare	389.0	147,885	1,814	3,351	6,408
Genessee	1,476.0	287,319	11,931	4,730	17,892
Gladwin	472.8	162,902	2,330	557	3,495
Gratiot	4,912.9	306,737	39,491	715	3,754
Huron	6,551.0	727,888	55,195	0	3,613
Isabella	2,357.6	421,227	14,915	4,463	4,021
Lapeer	2,682.0	515,092	17,610	4,825	5,394
Midland	1,367.0	123,204	9,062	68	4,445
Saginaw	5,450.1	300,343	48,944	800	9,157
Tuscola	5,825.0	354,522	52,848	1,281	4,592
TOTAL	37,046.2	3,447,954	292,473	22,290	71,909

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 6.3.2.1 Agricultural Chemicals

There were 1,680,000 kilograms (3,704,620 lbs) of chemicals used in Planning Subarea 3.2. Seventy-nine percent of all chemicals used were herbicides, insecticides 14 percent, and fungicides 7 percent. All of the major field crops and cash crops, except potatoes, are primarily users of herbicides. Chemical usage per harvested acre is almost equal to the Basin average in spite of the very modest use of insecticides and fungicides. It is projected that chemical usage in this subarea may increase 15-20 percent in the next 10 years. Herbicide usage may increase more than this, with insecticide and fungicide usage less.

#### 6.3.2.2 Animal Wastes

Livestock production in the subarea will continue but will be largely in those counties not bordering on the Bay. Dairy and cattle, now producing 82 percent of the livestock manure, will be the major types. Manure production rates will continue at about present levels. In 1972 there were 3,127,932 metric tons (3,447,954 tons) of wet manure defecated in this planning subarea. Nitrogen, phosphorus, and potash combined comprise 1.2 percent of the total manure tonnage.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 6-20

PLANNING AREA: Lake Huron 3,0

STATE: Michigan

PLANNING SUBAREA: Central 3,2

COUNTY: 11 Subarea County Totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	131250	11911.8	96500	1117.5		
Grains	165681	828.1	55228	552.1		
Hay or Grass Silage	68046	680.6	57205	572.0		
Pastured Cropland	40709	407.1	40709	407.1		
Other Field Crops	594487	11904.2	43126	1652.6	11631	1744.7
Vegetables	13054	645.4	8132	573.5	8129	689.2
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	1316230	29107.5	300900	5204.8	20060	2133.9
Total Herbicides, Insecticides, Fungicides: 100 lbs						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	102069	8831	8670	17501
1969	85884	6934	6836	13770
1972	85610	9100	7700	16800

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 121681  
Nutrients in Wet Manure: Nitrogen, tons 609  
Phosphorus, tons 199  
Potash, tons 461

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	361220	137295	223925
1969	290298	105283	185015
1972	317100	111100	203000

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 1503216 1309350  
Wet Manure Defecated: Tons, 1972 Combined: 2812566  
Nutrients in Wet Manure: Nitrogen, tons 15751  
Phosphorus, tons 2811  
Potash, tons 14062

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		31160	-
1969		26832	8609
1972		22100	32324

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 35581 413101  
Nutrients in Wet Manure: Nitrogen, tons 499 2812  
Phosphorus, tons 76 414  
Potash, tons 355 2178

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		1610366		
1969		1635820		
1972		1568800		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 65026  
Nutrients in Wet Manure: Nitrogen, tons 1014  
Phosphorus, tons 260  
Potash, tons 228 No significant number

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>	4462384	Number I-V farms	10231
Number of farms	16578	Acres in I-V farms	2064078
Acres in farms	2527175	Cropland I-V farms	1697221
Cropland in farms	1992194	Harvested cropland	
Harvested cropland in farms	1460446	I-V farms	1334263

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	297167	43521	10589	54110
GRAINS	226510	29768	577	30345
Wheat	125463	18201	454	18655
Oats	86545	9810	80	9890
Barley	8231	1150	36	1186
Rye	4776	427	6	433
OTHER FIELD CROPS	602681	85080	3582	88662
Soybeans	74463	6099	133	6232
Potatoes	11762	6151	103	6254
Sugar beets				
Field beans	5852	25	3	28
HAY OR GRASS SILAGE	187599	3951	45	3996
PASTURED CROPLAND	128317	998	16	1014
Cropland used for pasture	118702	939	16	955
Improved pasture	9615	59	0	59
VEGETABLES, SWEET CORN, MELONS	14838	3253	135	3388
ORCHARDS	2251	200	1	201
BERRIES	449	77	0	77
NURSERY & GREENHOUSE PRODUCTS	1409	678	1	679
OTHER CROPS	1882	231	65	296
Total Fertilizer Used, Tons		167782	15014	182796
Percent of Fertilizer Used		92	8	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	245677
Liquid	46796
Total	292473
Primary Nutrients in Fertilizer	143313
Nitrogen	47293
Phosphorus	45861
Potash	50159

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	14905	7385	22290
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	38562	21.1
1971-72	49494	26.6
1972-73	49577	24.7
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 71909		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	29407.5	5204.8	2433.9	37046.2
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine	121681	609	169	461
Cattle	2812566	15751	2814	14062
Sheep	35581	499	76	355
Horses	413101	2849	414	2477
Chickens	65025	1014	261	228
Turkeys	-	-	-	-
Total from Livestock, Tons	3447954	20722	3734	17583
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	292473	47293	45861	50159
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	22290			
Salts: Applied on all highways, tons: Table 9 71909				

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6-21

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3,0 STATE: Michigan  
 PLANNING SUBAREA: Central 3,2 COUNTY: Bay

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	16830	162.8	3710	56.1		
Grains	9336	16.7	3112	31.1		
Hay or Grass Silage	1881	18.8	1570	15.7		
Pastured Cropland	1258	12.6	1258	12.6		
Other Field Crops	85567	2245.3	11893	931.0	7734	1160.1
Vegetables	3687	179.3	2295	197.7	2380	193.0
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	118562	2965.5	23668	1244.2	10114	1353.1
Total Herbicides, Insecticides, Fungicides: 100 lbs				15254.4		5562.8

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	1573	132	115	817
1969	3026	211	223	1314
1972	3100	300	200	500

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 3615  
 Nutrients in Wet Manure: Nitrogen, tons 18  
 Phosphorus, tons 5  
 Potash, tons 14

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	13230	5586	7644
1969	7308	3001	4307
1972	8000	3300	4700

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 43362 30315  
 Wet Manure Defecated: Tons, 1972 Combined: 73677  
 Nutrients in Wet Manure: Nitrogen, tons 113  
 Phosphorus, tons 74  
 Potash, tons 368

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		162	
1969		269	258
1972		200	1649

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 322 21074  
 Nutrients in Wet Manure: Nitrogen, Tons 5 145  
 Phosphorus, Tons 1 21  
 Potash, Tons 3 126

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		85351		
1969		19208		
1972		51800		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 2117  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 33  
 Phosphorus, tons 9  
 Potash, tons 8

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	8914	1339	613	1952
GRAINS	11635	1612	19	1631
Wheat	8612	1226	19	1245
Oats	2382	314	0	314
Barley	127	21	0	21
Rye	478	45	0	45
OTHER FIELD CROPS	88880	18333	754	19087
Soybeans	2331	268	2	270
Potatoes	7734	4094	66	4160
Sugar beets				
Field beans	26	0	0	0
HAY OR GRASS SILAGE	1648	117	0	117
PASTURED CROPLAND	3060	18	1	19
Cropland used for pasture	2765	36	1	37
Improved pasture	295	12	0	12
VEGETABLES, SWEET CORN, MELONS	4002	1052	45	1097
ORCHARDS	0	0	0	0
BERRIES	18	1	0	1
NURSERY & GREENHOUSE PRODUCTS	5	2	0	2
OTHER CROPS	141	22	0	22
Total Fertilizer Used, Tons		22526	1432	23958
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	32200
Liquid	6133
Total	38333
Primary Nutrients in Fertilizer	18783
Nitrogen	6198
Phosphorus	6011
Potash	6574

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	0	1500	1500
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	4312	20.6
1971-72	6974	31.5
1972-73	6301	29.2
Total Estimated Tons Applied on All Highways in 1972-73, As Computed	9140	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2965.5	1244.2	1353.1	5562.8
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3615	18	5	11
Cattle: Table 3	73677	413	74	368
Sheep: Table 4	322	5	1	3
Horses: Table 4	21074	145	21	126
Chickens: Table 5	2117	33	9	8
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	100835	614	110	519
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	38333	6198	6011	6574
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	1500			
Salts: Applied on all highways, tons: Table 9				
	9140			

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-22

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: Central 3.2 COUNTY: Clare

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	7110	195.5	1580	23.7		
Grains	2460	12.3	820	8.2		
Hay or Grass Silage	1176	41.8	3480	34.8		
Pastured Cropland	3646	36.5	3646	36.5		
Other Field Crops						
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	17392	286.1	9526	103.2		
Total Herbicides, Insecticides, Fungicides: 100 lbs 26918 389.3						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2670	260	262	522
1969	2802	216	237	453
1972	2900	300	300	600

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 4338  
 Nutrients in Wet Manure: Nitrogen, tons 22  
 Phosphorus, tons 6  
 Potash, tons 16

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	15218	5629	9589
1969	12451	4404	8047
1972	13600	4800	8800

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 63072 56760  
 Wet Manure Defecated: Tons, 1972 Combined: 119832  
 Nutrients in Wet Manure: Nitrogen, tons 671  
 Phosphorus, tons 120  
 Potash, tons 599

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4047	
1969		4665	301
1972		4000	1342

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 6440 17151  
 Nutrients in Wet Manure: Nitrogen, Tons 90 118  
 Phosphorus, Tons 14 17  
 Potash, Tons 64 103

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		26079		
1969		3338		
1972		3000		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 124  
 Nutrients in Wet Manure: Nitrogen, tons 2  
 Phosphorus, tons 1  
 Potash, tons 0

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	4329	540	109	649
GRAINS	3392	333	1	334
Wheat	740	88	1	89
Oats	2430	226	0	226
Barley	26	4	0	4
Rye	147	8	0	8
OTHER FIELD CROPS	171	22	0	22
Soybeans				
Potatoes	4	1	0	1
Sugar beets				
Field beans	177	0	0	0
HAY OR GRASS SILAGE	10995	73	0	73
PASTURED CROPLAND	12814	53	2	55
Cropland used for pasture	10980	53	2	55
Improved pasture	1834	0	0	0
VEGETABLES, SWEET CORN, MELONS	0	0	0	0
ORCHARDS	3	0	0	0
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	15	1	0	1
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		1022	112	1134
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1524
Liquid	290
Total	1814
Primary Nutrients in Fertilizer	889
Nitrogen	293
Phosphorus	284
Potash	312

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	2890	461	3351
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3310	21.3
1971-72	4494	29.1
1972-73	4416	26.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 6406		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	286.1	103.2	-	389.3
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	4338	22	6	16
Cattle: Table 3	119832	671	120	599
Sheep: Table 4	6440	90	14	64
Horses: Table 4	17151	118	17	103
Chickens: Table 5	124	2	1	0
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	147085	903	158	782
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	1814	293	284	312
Lime: Limestone equivalent purchased or applied, tons: Table 8 3351				
Salts: Applied on all highways, tons: Table 9 6408				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 6-23

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0

STATE: Michigan

PLANNING SUBAREA: Central 3.2

COUNTY: Genesee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	293h0	806.8	6520	97.8		
Grains	9906	19.4	3302	33.0		
Hay or Grass Silage	5366	53.7	4472	44.7		
Pastured Cropland	2472	24.7	2472	24.7		
Other Field Crops	1375h	266.9	837	8.4		
Vegetables	360	8.0	24h	31.4	353	6.8
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	61202	1229.6	17857	240.0	353	6.8
Total Herbicides, Insecticides, Fungicides: 100 lbs					79406	1476.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	8233	739	689	1428
1969	7153	487	430	917
1972	7400	600	500	1100
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				7953
Nutrients in Wet Manure: Nitrogen, tons				40
Phosphorus, tons				11
Potash, tons				30

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	27583	10078	17505
1969	20495	6106	14389
1972	22400	6600	15800
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		86724	101910
Wet Manure Defecated: Tons, 1972 Combined:		188634	
Nutrients in Wet Manure: Nitrogen, tons		1056	
Phosphorus, tons		189	
Potash, tons		943	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		7602	
1969		4832	1172
1972		4000	6329
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		6440	80885
Nutrients in Wet Manure: Nitrogen, Tons		90	558
Phosphorus, Tons		14	81
Potash, Tons		64	485

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		82948		
1969		74400		
1972		82200		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3407		
Nutrients in Wet Manure: Combined				
Nitrogen, tons		53		
Phosphorus, tons		14		
Potash, tons		12		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	23197	3192	769	3961
GRAINS	15517	1797	37	1834
Wheat	8290	1123	29	1152
Oats	5906	613	8	621
Barley	90	11	0	11
Rye	254	16	0	16
OTHER FIELD CROPS	14245	1078	26	1104
Soybeans	11264	737	9	746
Potatoes	117	61	0	61
Sugar beets				
Field beans	504	13	0	13
HAY OR GRASS SILAGE	11446	182	0	182
PASTURED CROPLAND	7457	80	0	80
Cropland used for pasture	7177	80	0	80
Improved pasture	280	0	0	0
VEGETABLES, SWEET CORN, MELONS	494	88	1	89
ORCHARDS	725	59	0	59
BERRIES	136	32	0	32
NURSERY & GREENHOUSE PRODUCTS	306	103	0	103
OTHER CROPS	20	0	0	0
Total Fertilizer Used, Tons		6624	833	7457
Percent of Fertilizer Used		89	11	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	10022
Liquid	1909
Total	11931
Primary Nutrients in Fertilizer	5846
Nitrogen	1929
Phosphorus	1871
Potash	2046

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	3230	1500	4730
Tonnages for Other Recent Years			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	9574	27.8
1971-72	12058	35.1
1972-73	12336	33.6
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		17892

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1229.6	240.0	6.8	1476.4
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated		Nitrogen	Phosphorus	Potash
Swine: Table 2	7953	40	11	30
Cattle: Table 3	188634	1056	189	943
Sheep: Table 4	6440	90	14	64
Horses: Table 4	80885	558	81	485
Chickens: Table 5	3407	53	14	12
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	287319	1797	309	1534
Fertilizers: Tons of Commercial Fertilizers Applied				
Tons of Commercial Fertilizers Applied		Primary Nutrients		
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	11931	1929	1871	2046
Lime: Limestone equivalent purchased or applied, tons: Table 8 4730				
Salts: Applied on all highways, tons: Table 9 17892				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-24

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0

STATE: Michigan

PLANNING SUBAREA: Central 3.2

COUNTY: Gladwin

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	7200	198.0	1600	24.0		
Grains	2676	13.4	892	8.9		
Hay or Grass Silage	4784	47.8	3986	39.9		
Pastured Cropland	4194	41.9	4194	41.9		
Other Field Crops	2231	55.8	119	1.2		
Vegetables						
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	21085	356.9	10791	115.9		
Total Herbicides, Insecticides, Fungicides:		100 lbs			31876	472.8

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	3216	340	340	680
1969	2278	211	179	390
1972	2300	300	200	500
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 3615				
Nutrients in Wet Manure: Nitrogen, tons 18				
Phosphorus, tons 5				
Potash, tons 14				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	17966	6019	11947
1969	13760	5260	8500
1972	15100	5700	9400
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		74898	60630
Wet Manure Defecated: Tons, 1972 Combined: 135528			
Nutrients in Wet Manure: Nitrogen, tons 759			
Phosphorus, tons 136			
Potash, tons 678			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2996	
1969		2968	359
1972		2400	1547
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3864	19771
Nutrients in Wet Manure: Nitrogen, Tons		54	136
Phosphorus, Tons		8	20
Potash, Tons		39	119

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		13490		
1969		2978		
1972		3000		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		124		
Nutrients in Wet Manure:				
Nitrogen, tons		2	Combined	
Phosphorus, tons		0		
Potash, tons		0		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres	322176 (1)	Number I-V farms	253	
Number of farms	507	Acres in I-V farms	61328	
Acres in farms	91491	Cropland I-V farms	40148	
Cropland in farms	56269	Harvested cropland		
Harvested cropland in farms	28865	I-V farms	22330	
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	5107	652	40	692
GRAINS	4122	382	0	382
Wheat	1140	116	0	116
Oats	2813	253	0	253
Barley	25	3	0	3
Rye	62	2	0	2
OTHER FIELD CROPS	1768	268	0	268
Soybeans	65	10	0	10
Potatoes	3	1	0	1
Sugar beets				
Field beans	230	2	0	2
HAY OR GRASS SILAGE	11339	78	0	78
PASTURED CROPLAND	12186	34	0	34
Cropland used for pasture	11166	28	0	28
Improved pasture	1020	5	0	5
VEGETABLES, SWEET CORN, MELONS	27	0	0	0
ORCHARDS	2	0	0	0
BERRIES				
NURSERY & GREENHOUSE PRODUCTS	10	0	0	0
OTHER CROPS				
Total Fertilizer Used, Tons		1416	40	1456
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1957
Liquid	373
Total	2330
Primary Nutrients in Fertilizer	1142
Nitrogen	377
Phosphorus	365
Potash	400

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	557	0	557
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1882	20.5
1971-72	3080	33.8
1972-73	2410	24.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3495

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	356.9	115.9	-	472.8
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3615	18	5	14
Cattle: Table 3	135528	759	136	678
Sheep: Table 4	3864	54	8	39
Horses: Table 4	19771	136	20	119
Chickens: Table 5	124	2	0	0
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	162902	969	169	850
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	2330	377	365	400
Lime: Limestone equivalent purchased or applied, tons: Table 8 557				
Salts: Applied on all highways, tons: Table 9 3495				

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6-25

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: Central 3.2 COUNTY: Gratiot

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	65070	1789.4	11460	216.9		
Grains	18756	93.8	6252	62.5		
Hay or Grass Silage	3748	37.5	3123	31.2		
Pastured Cropland	2738	27.4	2738	27.4		
Other Field Crops	88331	2135.9	5340	109.2	532	79.8
Vegetables	2415	144.9	1208	36.2	1208	120.8
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	181058	4228.9	33121	483.4	1740	200.6
Total Herbicides, Insecticides, Fungicides: 100 lbs 215919 4912.9						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	19194	1712	1527	3239
1969	16909	1291	1233	2529
1972	17400	1700	1400	3100

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 22630  
 Nutrients in Wet Manure: Nitrogen, tons 113  
 Phosphorus, tons 32  
 Potash, tons 86

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	32822	10076	22746
1969	27231	7755	19476
1972	29000	8400	21400

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 110376 138030  
 Wet Manure Defecated: Tons, 1972 Combined: 248406  
 Nutrients in Wet Manure: Nitrogen, tons 1391  
 Phosphorus, tons 248  
 Potash, tons 1242

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5152	
1969		3275	702
1972		2600	1998

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 4186 25534  
 Nutrients in Wet Manure: Nitrogen, Tons 59 176  
 Phosphorus, Tons 9 26  
 Potash, Tons 42 153

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		193295		
1969		142473		
1972		144300		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 5981  
 Nutrients in Wet Manure: Nitrogen, tons 93  
 Phosphorus, tons 24  
 Potash, tons 21

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres 391920 (1) Number I-V farms 1292  
 Number of farms 1935 Acres in I-V farms 261373  
 Acres in farms 301373 Cropland I-V farms 221385  
 Cropland in farms 248055 Harvested cropland  
 Harvested cropland in farms 191626 I-V farms 177990

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	44466	6808	2054	8862
GRAINS	22217	2783	44	2827
Wheat	13069	1889	37	1926
Oats	8385	837	5	842
Barley	80	8	0	8
Rye	585	40	0	40
OTHER FIELD CROPS	98306	11544	515	12059
Soybeans	17444	1511	22	1533
Potatoes	532	249	20	269
Sugar beets				
Field beans	329	0	3	3
HAY OR GRASS SILAGE	10801	363	3	366
PASTURED CROPLAND	10150	75	0	75
Cropland used for pasture	9121	70	0	70
Improved pasture	1029	5	0	5
VEGETABLES, SWEET CORN, MELONS	2206	368	26	394
ORCHARDS	9	0	0	0
BERRIES	11	1	0	1
NURSERY & GREENHOUSE PRODUCTS	32	3	0	3
OTHER CROPS	515	67	25	92
Total Fertilizer Used, Tons		22012	2670	24682
Percent of Fertilizer Used		89	11	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	33172
Liquid	6319
Total	39491
Primary Nutrients in Fertilizer	19351
Nitrogen	6386
Phosphorus	6192
Potash	6773

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	265	450	715
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	1952	15.8
1971-72	2468	19.3
1972-73	2588	19.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3754		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	4228.9	483.4	200.6	4912.9
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	22630	113	32	86
Cattle: Table 3	248406	1391	248	1242
Sheep: Table 4	4186	59	9	42
Horses: Table 4	25534	176	26	153
Chickens: Table 5	5981	93	24	21
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	306737	1832	339	1544
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:				
Table 7	39491	6386	6192	6773
Lime: Limestone equivalent purchased or applied, tons: Table 8 715				
Salts: Applied on all highways, tons: Table 9 3754				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-26

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: Central 3.2 COUNTY: Huron

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	95940	2638.4	21320	319.8		
Grains	39072	195.4	13024	130.2		
Hay or Grass Silage	13100	131.0	10917	109.2		
Pastured Cropland	6855	68.6	6855	68.6		
Other Field Crops	107235	2754.5	5825	77.1	179	26.8
Vegetables	230	13.8	115	3.4	171	14.8
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>262432</b>	<b>5801.7</b>	<b>58056</b>	<b>708.3</b>	<b>350</b>	<b>41.6</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs 320838 6551.6						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	13462	972	1122	2094
1969	12916	1045	1076	2121
1972	13300	1400	1200	2600
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 18798				
Nutrients in Wet Manure: Nitrogen, tons 94				
Phosphorus, tons 26				
Potash, tons 71				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	78645	26944	51701
1969	68594	23632	44962
1972	75000	25700	49300
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 337698 317985			
Wet Manure Defecated: Tons, 1972 Combined: 655683			
Nutrients in Wet Manure: Nitrogen, tons 3672			
Phosphorus, tons 656			
Potash, tons 3278			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1031	
1969		673	721
1972		500	1951
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 805 24934			
Nutrients in Wet Manure: Nitrogen, Tons 11 172			
Phosphorus, Tons 2 25			
Potash, Tons 8 150			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		575005		
1969		783556		
1972		667500		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 27668				
Nutrients in Wet Manure:				
		Combined		
Nitrogen, tons		432		
Phosphorus, tons		111		
Potash, tons		97		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres 524032 (1)		Number I-V farms 1834		
Number of farms 2507		Acres in I-V farms 376787		
Acres in farms 426244		Cropland I-V farms 325669		
Cropland in farms 361196		Harvested cropland I-V farms 257884		
Harvested cropland in farms 273805				
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	62323	10061	2447	12508
GRAINS	49091	6915	104	7019
Wheat	28373	4454	85	4539
Oats	19153	2282	19	2301
Barley	1117	140	0	140
Rye	335	24	0	24
OTHER FIELD CROPS	106248	13058	485	13543
Soybeans	2709	175	45	220
Potatoes	179	97	0	97
Sugar beets				
Field beans	1560	3	0	3
HAY OR GRASS SILAGE	38524	1076	2	1078
PASTURED CROPLAND	23771	259	0	259
Cropland used for pasture	23035	237	0	237
Improved pasture	736	22	0	22
VEGETABLES, SWEET CORN, MELONS	438	61	0	61
ORCHARDS	25	2	0	2
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	8	2	0	2
OTHER CROPS	76	2	0	2
Total Fertilizer Used, Tons		31459	3038	34497
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	46364
Liquid	8831
<b>Total</b>	<b>55195</b>
Primary Nutrients in Fertilizer	27046
Nitrogen	8925
Phosphorus	8655
Potash	9466

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	0	0	0
Tonnes for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "g" Mile
1970-71	1827	10.8
1971-72	2082	12.3
1972-73	2491	13.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3613		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	5801.7	708.3	41.6	6551.6	
Manure: Kind of Livestock					
		Tons of Materials in Wet Manure Defecated			
		Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	18798	94	26	71	
Cattle: Table 3	655683	3672	656	3278	
Sheep: Table 4	805	11	2	8	
Horses: Table 4	24934	172	25	150	
Chickens: Table 5	27668	432	111	97	
Turkeys: Table 5	0	0	0	0	
Total from Livestock, Tons	727888	4381	820	3604	
Fertilizers: Tons of Commercial Fertilizers Applied					
		Primary Nutrients			
Item	Total	Nitrogen	Phosphorus	Potash	
Applied on Cropland: Table 7	55195	8925	8655	9466	
Lime: Limestone equivalent purchased or applied, tons: Table 8 0					
Salts: Applied on all highways, tons: Table 9 3613					

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6-27

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: Central 3.2 COUNTY: Isabella

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	50130	1378.6	11140	167.1		
Grains	13356	66.8	4452	44.5		
Hay or Grass Silage	8115	81.2	7262	72.6		
Pastured Cropland	5394	53.9	5394	53.9		
Other Field Crops	14154	349.3	756	7.6		
Vegetables	755	28.9	400	18.9	514	34.3
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	91904	1958.7	29404	364.6	514	34.3
Total Herbicides, Insecticides, Fungicides:		100 lbs		121822		2357.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	14376	1370	1328	2698
1969	7442	857	744	1601
1972	7700	1100	800	1900
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				13737
Nutrients in Wet Manure: Nitrogen, tons				69
Phosphorus, tons				19
Potash, tons				52

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	47959	16439	31520
1969	39358	12708	26650
1972	43000	13800	29200
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		181332	188340
Wet Manure Defecated: Tons, 1972 Combined:		369672	
Nutrients in Wet Manure: Nitrogen, tons		370	
Phosphorus, tons		1848	
Potash, tons			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3222	
1969		1960	736
1972		1600	2612
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2576	33381
Nutrients in Wet Manure: Nitrogen, tons		36	230
Phosphorus, tons		5	33
Potash, tons		26	200

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		91889		
1969		40804		
1972		44900		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1861		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		29		
Phosphorus, tons		7		
Potash, tons		7		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crop Group	Acres	Tons of Fertilizer Used	Dry	Liquid	Total
CORN	35227	4623	844		5467
GRAINS	14821	1538	10		1548
Wheat	5825	659	5		664
Oats	8458	832	5		837
Barley	61	11	0		11
Rye	402	24	0		24
OTHER FIELD CROPS	15105	1463	15		1478
Soybeans	1232	74	0		74
Potatoes	7	3	0		3
Sugar beets					
Field beans	1722	5	0		5
HAY OR GRASS SILAGE	23232	451	7		458
PASTURED CROPLAND	18577	134	0		134
Cropland used for pasture	16721	130	0		130
Improved pasture	1856	4	0		4
VEGETABLES, SWEET CORN, MELONS	728	163	12		175
ORCHARDS	88	18	0		18
BERRIES	14	5	0		5
NURSERY & GREENHOUSE PRODUCTS	5	1	0		1
OTHER CROPS	102	31	2		33
Total Fertilizer Used, Tons		8432	890		9322
Percent of Fertilizer Used		90	10		100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12529
Liquid	2386
Total	14915
Primary Nutrients in Fertilizer	7308
Nitrogen	2412
Phosphorus	2339
Potash	2557

TABLE 8--GROUND LIMESTONE EQUIVALENT  
APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	4049	414	4463
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2181	21.2
1971-72	2235	21.9
1972-73	2772	25.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4021

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
Table 1	1958.7	364.6	34.3	2357.6
Manure: Kind of	Tons of Materials in Wet Manure Defecated			
Swine: Table 2	Manure	Nitrogen	Phosphorus	Potash
Cattle: Table 3	13737	69	19	52
Sheep: Table 4	369672	2070	370	1848
Horses: Table 4	2576	36	5	26
Chickens: Table 5	33381	230	33	200
Turkeys: Table 5	1861	29	7	7
Total from Livestock, Tons	0	0	0	0
	421227	2434	434	2133
Fertilizers:	Tons of Commercial Fertilizers Applied			
Table 7	Total	Nitrogen	Phosphorus	Potash
Table 7	14915	2412	2339	2557
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	4463			
Salts: Applied on all highways, tons:	Table 9 4021			

To Convert From To Multiply By

Pounds (lb) Kilograms (kg) 0.453

Acres (acre) Hectare (ha) .4047

Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-28

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: Central 3.2 COUNTY: Lapeer

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides		
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	
Corn	46710	1284.5	10380	155.7			
Grains	12666	63.3	4222	42.2			
Hay or Grass Silage	12249	122.5	10205	102.1			
Pastured Cropland	5762	57.6	5762	57.6			
Other Field Crops	7955	200.7	1312	110.6	929	139.4	
Vegetables	1727	60.3	1708	168.3	1320	117.2	
Orchards							
Berries							
Nursery, Greenhouse							
Other Crops							
Totals	87070	1788.9	33592	636.5	2249	256.6	
Total Herbicides, Insecticides, Fungicides: 100 lbs						122911	2682.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	7642	687	689	1376
1969	8450	762	751	1513
1972	8700	1000	800	1800
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				13014
Nutrients in Wet Manure: Nitrogen, tons				65
Phosphorus, tons				18
Potash, tons				49

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	49421	22969	26452
1969	40959	17866	23093
1972	44800	19400	25400
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		254916	163830
Wet Manure Defecated: Tons, 1972 Combined:		418746	
Nutrients in Wet Manure: Nitrogen, tons		2385	
Phosphorus, tons		419	
Potash, tons		2094	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4824	
1969		4245	1866
1972		3500	5848
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		5635	74737
Nutrients in Wet Manure: Nitrogen, Tons		79	516
Phosphorus, Tons		12	75
Potash, Tons		46	448

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		92313		
1969		64734		
1972		71400		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		2960		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		46		
Phosphorus, tons		12		
Potash, tons		10		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	33684	4688	884	5572
GRAINS	16744	2092	40	2132
Wheat	7113	956	24	980
Oats	8437	974	12	986
Barley	218	30	0	30
Rye	404	65	4	69
OTHER FIELD CROPS	7468	1328	9	1337
Soybeans	351	43	0	43
Potatoes	929	419	6	425
Sugar beets				
Field beans	561	1	0	1
HAY OR GRASS SILAGE	33203	526	10	536
PASTURED CROPLAND	17907	73	9	82
Cropland used for pasture	16852	66	9	75
Improved pasture	1455	7	0	7
VEGETABLES, SWEET CORN, MELONS	2152	689	0	689
ORCHARDS	932	85	0	85
BERRIES	118	16	0	16
NURSERY & GREENHOUSE PRODUCTS	926	543	0	543
OTHER CROPS	62	13	0	13
Total Fertilizer Used, Tons		10054	952	11006
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14792
Liquid	2818
Total	17610
Primary Nutrients in Fertilizer	8629
Nitrogen	2848
Phosphorus	2761
Potash	3020

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	3155	1670	4825
Tonnages for Other Recent Years			
			--

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2881	26.4
1971-72	3474	29.7
1972-73	3719	29.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5394		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	1788.9	636.5	256.6	2682.0	
Manure: Kind of Livestock					
		Tons of Materials in Wet Manure Defecated			
		Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2		13014	65	18	49
Cattle: Table 3		418746	2345	419	2094
Sheep: Table 4		5635	79	12	56
Horses: Table 4		74737	516	75	448
Chickens: Table 5		2960	46	12	10
Turkeys: Table 5		0	0	0	0
Total from Livestock, Tons		515092	3051	536	2657
Fertilizers: Tons of Commercial Fertilizers Applied					
		Total	Primary Nutrients		
			Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7		17610	2848	2761	3020
Lime: Limestone equivalent purchased or applied, tons:					
Table 8		4825			
Salts: Applied on all highways, tons: Table 9 5394					

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 6-29

GREAT LAKES BASIN MATERIAL USAGE INVENTORY  
 Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds  
 PLANNING AREA: LAKE HURON 3.0 STATE: MICHIGAN  
 PLANNING SUBAREA: CENTRAL 3.2 COUNTY: MIDLAND

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	15480	425.7	3440	51.6		
Grains	4050	20.2	1350	13.5		
Hay or Grass Silage	1898	19.0	1582	15.8		
Pastured Cropland	1378	13.8	1378	13.8		
Other Field Crops	27166	668.1	1665	37.9	203	30.4
Vegetables	460	27.6	230	6.9	230	23.0
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	50432	1174.4	9645	139.5	433	53.4
Total Herbicides, Insecticides, Fungicides: 100 lbs					60510	1367.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	5758	595	538	1133
1969	3617	317	310	627
1972	3700	400	400	800

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 5784  
 Nutrients in Wet Manure: Nitrogen, tons 29  
 Phosphorus, tons 8  
 Potash, tons 22

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	11206	3571	7635
1969	8709	2743	5966
1972	9500	3000	6500

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 39420 41925  
 Wet Manure Defecated: Tons, 1972 Combined: 81345  
 Nutrients in Wet Manure: Nitrogen, tons 456  
 Phosphorus, tons 81  
 Potash, tons 407

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1127	
1969		353	582
1972		300	2588

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 483 34353  
 Nutrients in Wet Manure: Nitrogen, Tons 7 237  
 Phosphorus, Tons 1 34  
 Potash, Tons 5 206

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		59823		
1969		27423		
1972		29900		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 1239  
 Nutrients in Wet Manure: Nitrogen, tons 19  
 Phosphorus, tons 5  
 Potash, tons 4

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	9341	1240	377	1617
GRAINS	4002	463	6	469
Wheat	1889	240	3	243
Oats	1895	210	3	213
Barley	51	3	0	3
Rye	153	10	0	10
OTHER FIELD CROPS	25385	3128	193	3321
Soybeans	2789	229	22	251
Potatoes	203	117	10	127
Sugar beets				
Field beans	43	0	0	0
HAY OR GRASS SILAGE	4401	75	0	75
PASTURED CROPLAND	3433	34	0	34
Cropland used for pasture	3338	34	0	34
Improved pasture	95	0	0	0
VEGETABLES, SWEET CORN, MELONS	377	107	5	112
ORCHARDS				
BERRIES	5	0	0	0
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	233	30	6	36
Total Fertilizer Used, Tons		5077	587	5664
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	7612
Liquid	1450
Total	9062
Primary Nutrients in Fertilizer	4440
Nitrogen	1465
Phosphorus	1421
Potash	1554

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	68	0	68
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3256	32.2
1971-72	3315	33.0
1972-73	3065	28.6
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 4445		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
Table 1	1174.4	139.5	53.4	1367.3
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure	Nitrogen	Phosphorus	Potash	Total
Swine: Table 2	5784	29	8	22
Cattle: Table 3	81345	456	81	407
Sheep: Table 4	483	7	1	5
Horses: Table 4	34353	237	34	206
Chickens: Table 5	1239	19	5	4
Turkeys: Table 5	0			
Total from Livestock, Tons	123204	748	129	644
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	9062	1465	1421	1554
Lime: Limestone equivalent purchased or applied, tons: Table 8 68				
Salts: Applied on all highways, tons: Table 9 4445				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 6-30

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0 STATE: Michigan

PLANNING SUBAREA: Central 3.2 COUNTY: Saginaw

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	38520	1059.3	8560	128.4		
Grains	20436	102.2	6812	68.1		
Hay or Grass Silage	4977	49.8	4147	41.4		
Pastured Cropland	2310	23.1	2310	23.1		
Other Field Crops	138797	3386.2	8244	149.4	637	95.6
Vegetables	2270	113.6	1353	93.5	1597	116.9
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	207310	4734.2	31426	503.9	2234	212.5
Total Herbicides, Insecticides, Fungicides: 100 lbs					240970	5450.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	13001	1089	1072	2161
1969	12084	874	1054	1928
1972	12400	1100	1200	2300
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				16629
Nutrients in Wet Manure: Nitrogen, tons				83
Phosphorus, tons				23
Potash, tons				63

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	30000	13403	16597
1969	23097	9977	13120
1972	25200	10800	14400
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		141912	92880
Wet Manure Defecated: Tons, 1972 Combined:		234792	
Nutrients in Wet Manure: Nitrogen, tons		1315	
Phosphorus, tons		235	
Potash, tons		1174	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2112	
1969		1172	1002
1972		1000	3332
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1610	42583
Nutrients in Wet Manure: Nitrogen, Tons		23	294
Phosphorus, Tons		3	43
Potash, Tons		16	255

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		165575		
1969		104411		
1972		114100		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		4729		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		74		
Phosphorus, tons		19		
Potash, tons		17		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>	520704	Number I-V farms	1578
Number of farms	2454	Acres in I-V farms	295871
Acres in farms	347836	Cropland I-V farms	253378
Cropland in farms	286584	Harvested cropland I-V farms	216948
Harvested cropland in farms	237662		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	30923	4500	945	5445
GRAINS	33728	4522	64	4586
Wheat	21644	3103	58	3161
Oats	10758	1271	6	1277
Barley	581	73	0	73
Rye	569	57	1	58
OTHER FIELD CROPS	134677	18520	772	19292
Soybeans	33211	2773	33	2806
Potatoes	637	285	1	286
Sugar beets				
Field beans	370	0	0	0
HAY OR GRASS SILAGE	14780	541	14	555
PASTURED CROPLAND	7115	71	0	71
Cropland used for pasture	6523	69	0	69
Improved pasture	592	2	0	2
VEGETABLES, SWEET CORN, MELONS	2810	473	28	501
ORCHARDS	207	22	0	22
BERRIES	139	20	0	20
NURSERY & GREENHOUSE PRODUCTS	100	22	1	23
OTHER CROPS	452	45	30	75
Total Fertilizer Used, Tons		28736	1854	30590
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	41113
Liquid	7831
Total	48944
Primary Nutrients in Fertilizer	23983
Nitrogen	7914
Phosphorus	7675
Potash	8394

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	0	800	800
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	4681	16.4
1971-72	5813	19.4
1972-73	6313	19.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 9157		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	4734.2	503.9	212.5	5450.6
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	16629	83	23	63
Cattle: Table 3	234792	1315	235	1174
Sheep: Table 4	1610	23	3	16
Horses: Table 4	42583	294	43	255
Chickens: Table 5	4729	74	19	17
Turkeys: Table 5	0			
Total from Livestock, Tons	300343	1789	323	1525
Fertilizers: Tons of Commercial Fertilizers Applied				
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	48944	7914	7675	8394
Lime: Limestone equivalent purchased or applied, tons: Table 8 800				
Salts: Applied on all highways, tons: Table 9 9157				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 6-31

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Huron 3.0

STATE: Michigan

PLANNING SUBAREA: Central 3.2

COUNTY: Tuscola

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	61020	1702.8	13760	206.4	-	-
Grains	32970	164.8	10990	109.9	-	-
Hay or Grass Silage	7749	77.5	6458	64.6	-	-
Pastured Cropland	4702	47.0	4702	47.0	-	-
Other Field Crops	109392	2821.5	7135	220.2	1417	212.6
Vegetables	1150	69.0	575	17.2	695	64.7
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	217883	4882.6	43620	665.3	2112	277.3
Total Herbicides, Insecticides, Fungicides:				100 lbs	263615	5825.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	9944	635	688	1323
1969	9207	663	594	1257
1972	9500	900	700	1600
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				11568
Nutrients in Wet Manure: Nitrogen, tons				58
Phosphorus, tons				16
Potash, tons				44

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	37170	16581	20589
1969	28335	11831	16505
1972	31000	12900	18100
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		169506	116745
Wet Manure Defecated: Tons, 1972 Combined:		286251	
Nutrients in Wet Manure: Nitrogen, tons		1603	
Phosphorus, tons		286	
Potash, tons		1431	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1885	
1969		2420	910
1972		2000	3028
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3220	38698
Nutrients in Wet Manure: Nitrogen, Tons		45	267
Phosphorus, Tons		7	39
Potash, Tons		32	232

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		224595		
1969		342495		
1972		356700		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		14785		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		231		
Phosphorus, tons		59		
Potash, tons		52		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>	521536	Number I-V farms	1474
Number of farms	2208	Acres in I-V farms	304875
Acres in farms	359139	Cropland I-V farms	262617
Cropland in farms	298844	Harvested cropland	
Harvested cropland in farms	238663	I-V farms	223427

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	39656	5878	1507	7385
GRAINS	51211	7331	252	7583
Wheat	28068	4345	193	4538
Oats	15928	1998	22	2020
Barley	5855	846	36	882
Rye	1297	136	1	137
OTHER FIELD CROPS	109428	16338	813	17151
Soybeans	3067	279	0	279
Potatoes	1417	824	0	824
Sugar beets				
Field beans	330	1	0	1
HAY OR GRASS SILAGE	21230	469	9	478
PASTURED CROPLAND	11847	137	4	141
Cropland used for pasture	11424	136	4	140
Improved pasture	423	1	0	1
VEGETABLES, SWEET CORN, MELONS	1604	232	18	250
ORCHARDS	260	14	1	15
BERRIES	8	2	0	2
NURSERY & GREENHOUSE PRODUCTS	1	1	0	1
OTHER CROPS	281	21	2	23
Total Fertilizer Used, Tons		30424	2606	33030
Percent of Fertilizer Used		92	8	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	44392
Liquid	8456
Total	52848
Primary Nutrients in Fertilizer	25896
Nitrogen	8546
Phosphorus	8287
Potash	9063

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	691	590	1281
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2706	18.8
1971-72	3501	24.5
1972-73	3166	20.8
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4592

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	4882.6	665.3	277.3	5825.2
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
Table 3	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	11568	58	16	44
Cattle: Table 3	286251	1603	286	1431
Sheep: Table 4	3220	45	7	32
Horses: Table 4	38698	267	39	232
Chickens: Table 5	14785	231	59	52
Turkeys: Table 5	0			
Total from Livestock, Tons	354522	2204	407	1791
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Primary Nutrients			
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	52848	8546	8287	9063
Lime: Limestone equivalent purchased or applied, tons: Table 8 1281				
Salts: Applied on all highways, tons: Table 9 4592				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

#### 6.3.2.3 Commercial Fertilizers

The 1972 figures show 265,332 metric tons (292,473 tons) of commercial fertilizers were applied to croplands in Planning Subarea 3.2. Fertilizer usage is about 25 percent above Basin average and usage will continue to increase as it is essential to the production of these high valued crops. Nitrogen, phosphorus and potash represent 33, 32, and 35 percent respectively of the primary nutrients in the fertilizer. Overall fertilization rates are expected to increase perhaps as much as 25 percent in the next 10 years.

#### 6.3.2.4 Lime

Lime application is one of the lowest in this area and is projected to remain at this low level. For 1972, a total of 20,221 metric tons (22,290 tons) of limestone was either purchased or applied to croplands.

#### 6.3.2.5 Salts

Road salt de-icing usage is relatively modest in this area. This represents a normal application rate for these counties. Thus, salt de-icing is not expected to increase greatly. The amount applied in 1972 was 65,236 metric tons (71,909 tons) for all highways in Planning Subarea 3.2.

## Section 7

### MATERIALS USAGE IN THE LAKE ERIE BASIN

#### 7.1 Basin Characteristics

This planning area encompasses agricultural land bordering Lake Huron on its west, Lake Erie along its entire length on the south, and then bordering western Lake Ontario with Niagara County on the south. Included are Michigan, Ohio, Pennsylvania, and New York counties.

##### 7.1.1 Agricultural Characteristics

There are wide variations in the types of agriculture conducted in this lake basin. Those found here include dairy and swine areas, and large acreages of corn and soybeans. Areas near the lake produce fruit and grapes.

As one studies the figures and tries to observe the trends, there does not appear to be any compelling reasons for expecting major shifts or changes in types of agriculture. The dairy areas will likely continue to emphasize dairying but cow numbers will decrease. The corn belt can maximize returns by raising corn and soybeans which support swine production and cattle feeding. Corn will continue as "king". Soybean acreages may increase. Swine and cattle production may increase. The fruit, grape and vegetable regions will undergo shifts but these enterprises will continue to be emphasized here. Farm numbers will decline and individual units will get larger. For a long while it was thought that this led to more extensive types of farming operations. However, now there is much evidence that with larger units more specialization develops, with the result that production may be intensified. This is the most likely trend for the future.

Table 7-1 indicates the relative proportion of material usage in the Lake Erie basin as compared to the total U.S. Great Lakes Basin.

Table 7-1

## MATERIALS USAGE BASIN RELATIONSHIP -- LAKE ERIE 4.0 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Lake Erie basin</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.52	2.66
Index of chemicals applied	95	100
Tons of livestock manure defecated	2.51	3.37
Index of manure defecated	74	100
Lbs primary nutrients in livestock manure	63	82
Index primary nutrients in manure	77	100
Lbs commercial fertilizer applied	340	321
Percent liquid fertilizer applied	23	22
Index commercial fertilizer applied	106	100
Lbs primary nutrients in commercial fertilizer	169	153
Index primary nutrients in commercial fertilizer	110	100
Lbs of lime applied	180	170
Index of lime applied	106	100
<hr/>		
<u>Per acre of total land area</u>		
Lbs road salts used	69.18	41.74
Index road salts used	166	100
<hr/>		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 7.1.2 Materials Usage

An inventory and analysis of materials usage was based on personal interviews, correspondence, and statistics as available from agricultural statistics, census information, state highway departments, universities, private companies, and state and federal agencies. Background for the analysis is presented in Section 2 - Methodology. Table 7-2 summarizes the findings of this inventory and analysis. Detailed statistics are shown on Table 7-3.

Table 7-2

MATERIALS USAGE  
(in 1972)

Area	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
Lake Erie basin	142,445	14,186,552	962,952	510,419	543,417
PSA 4.1	23,598	3,595,528	197,618	48,932	175,619
PSA 4.2	79,543	6,312,949	651,276	306,809	115,170
PSA 4.3	7,026	1,688,055	42,726	75,890	136,046
PSA 4.4	32,278	2,590,020	71,332	78,788	116,582

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 7.1.2.1 Agricultural Chemicals

There was a total of 6,461,200 kilograms (14,244,500 lbs) of agricultural chemicals spread on agricultural lands in the Lake Erie basin in 1972. Chemical rates are projected to increase in this area 15-25 percent in the next 10 years. Herbicide usage is most likely to increase nearer the top level of this range. Insecticide usage may increase even less than fungicide use and might possibly show no increase.

Herbicides range from as high as 83 percent of all chemicals used in one subarea to a low of only 20 percent in another. Insecticides range from 50 to 13 percent and fungicides from 30 to 4 percent. This makes it difficult to generalize about the area.

One of the problems concerning the use of chemicals, even if effective in performing their functional roles, is that some residues will still remain in the soils. In the case of herbicides, this is known as "carryover" and in the case of insecticides as "persistence." It is believed that the persistence associated with insecticides will be almost entirely eliminated in the future and that carryover in herbicides will be greatly reduced, if not entirely eliminated.

## 7.1.2.2 Animal Wastes

It was estimated that 12,869,800 metric tons (14,186,552 tons) of wet manure are produced annually. Nitrogen, phosphorus and potash comprise 1.3 percent of the total manure defecated. Percentages for the livestock vary greatly from one planning subarea to the next, however, cattle produce the majority of the manure. Cattle manure percentages range from as high as 85 to a low of 63 percent. Swine manure represents 19 percent of the livestock manure in one subarea and only one percent in another subarea. Horse manure is 20 percent of the total in one subarea and as low as 8 percent in another.

### 7.1.2.3 Commercial Fertilizers

A total of 873,575 metric tons (962,952 tons) of commercial fertilizers were applied to crops in the Lake Erie basin in 1972. Nitrogen accounted for 31 percent, phosphorus 32 percent, and potash 37 percent of the primary nutrient content by weight. Fertilizer rates are likely to increase -- however, not all nutrients at the same rates. Overall it is expected that the nitrogen increase will be the greatest and the phosphorus use will increase the least.

### 7.1.2.4 Lime

Liming rates seem to run considerably higher in some of the eastern basin counties. Lime usage is expected to continue at near present levels. It is projected that the greatest usage will continue to be in those counties and subareas where more than average amounts are already being used. In 1972 a total of 463,050 metric tons (510,419 tons) of lime were used in this lake basin.

### 7.1.2.5 Salts

The Lake Erie basin is second only to the Lake Michigan basin in the amount of road de-icing salts used on highways. In 1972-73 it was estimated that 492,988 metric tons (543,417 tons) of salts were used. This represented more than 30 percent of the salts used in the entire Great Lakes Basin.

The primary impact upon ground and surface waters resulting from road de-icing salts comes from chloride discharges which can, over time, affect the salinity of nearby wells and open water areas. Road de-icers will continue to be used in this area. Usage is expected to largely be determined by miles of highway as rates per mile are not expected to increase.

## 7.2 Planning Subarea 4.1

This subarea includes almost 60 percent of the population of Michigan. At the same time, these nine southeast Michigan counties, five bordering on the lake and four one county removed, are very important agricultural counties. The southern parts of Lenawee and Monroe Counties, bordering on the State of Ohio, are typical corn belt production areas.

### 7.2.1 Agricultural Characteristics

Agriculture is varied in this planning subarea. Sanilac County on the north is predominately dairy with cropping programs -- corn, grain crops, and hay -- supporting this industry. Sanilac also produced 17,000 hectares (42,000 acres) of navy beans as a cash crop. Lenawee County on the south is heavier in the production of corn, grain, and soybeans with much less hay. Cattle, dairy, and swine production are major livestock enterprises in the southeast Michigan counties. Monroe, Macomb, and St. Clair Counties produced 1,800, 1,600 and 1,200 hectares (4,400, 3,900 and 3,000 acres) of vegetables respectively.

Table 7-4 indicates the relative proportions of materials usage in Planning Subarea 4.1 in comparison with the total Great Lakes Basin.

TABLE 7-3

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds  
Michigan, Indiana, Ohio,

PLANNING AREA: Lake Erie 4.0

STATE: Pennsylvania, and New York

PLANNING SUBAREA: Northwest 4.1 Central 4.3  
Southwest 4.2 East 4.4

(9-Michigan, 3-Indiana, 28-Ohio,  
1-Pennsylvania, 4-New York)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	17794.99	48934.5	39544.6	5930.6		
Grains	619050	3093.9	206350	2062.0		
Hay or Grass Silage	259897	2598.7	216580	2164.7		
Pastured Cropland	147878	1477.1	147878	1477.1		
Other Field Crops	1626278	32915.6	108347	1889.5	7682	1152.9
Vegetables	88306	2846.9	81184	4281.7	85186	4411.9
Orchards						
Berries	42832	1948.0	49336	14851.1	52143	10409.3
Nursery, Greenhouse						
Other Crops						
Totals	4563740	93814.7	1205421	32656.7	145011	15974.1

Total Herbicides, Insecticides, Fungicides: 100 lbs 5914172 142445.5

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	15709504	Number I-V farms	41824
Number of farms	65390	Acres in I-V farms	8205330
Acres in farms	9630551	Cropland I-V farms	6717988
Cropland in farms	7650641	Harvested cropland	
Harvested cropland in farms	5657806	I-V farms	5186277

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1596413	25340	65173	218513
GRAINS	1005485	127347	5700	133047
Wheat	581215	81025	4343	85368
Oats	393669	43560	1310	44870
Barley	5494	619	10	629
Rye	11880	1021	20	1041
OTHER FIELD CROPS	1670195	78036	7139	85175
Soybeans	1546716	46815	3822	50637
Potatoes	14937	8849	445	9294
Sugar beets				
Field beans	38925	156	5	161
HAY OR GRASS SILAGE	745700	15657	511	16168
PASTURED CROPLAND	538192	5749	146	5895
Cropland used for pasture	463133	4747	98	4845
Improved pasture	75059	1002	48	1050
VEGETABLES, SWEET CORN, MELONS	103446	30185	3348	33333
ORCHARDS	61594	8604	868	9472
BERRIES	1658	374	20	394
NURSERY & GREENHOUSE PRODUCTS	14258	4591	203	4794
OTHER CROPS	5539	297	22	319
Total Fertilizer Used, Tons		524336	82935	607271
Percent of Fertilizer Used		84	16	100

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	953847	94837	88392	183229
1969	961874	82118	79495	161617
1972	1063596	89641	91849	181490

Wet Manure Factor: Tons per litter farrowed  
Wet Manure Defecated: Tons, 1972 1353368  
Nutrients in Wet Manure: Nitrogen, tons 6874  
Phosphorus, tons 1912  
Potash, tons 5138

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	1184519	485920	698599
1969	982987	400795	582192
1972	1042378	491857	550521

Wet Manure Factor: Tons Per Animal 13.44 6.45  
Wet Manure Defecated: Tons, 1972 6463001 3550860  
Wet Manure Defecated: Tons, 1972 Combined: 10013861  
Nutrients in Wet Manure: Nitrogen, tons 56078  
Phosphorus, tons 10014  
Potash, tons 50069

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		368600	
1969		308986	47495
1972		254135	148638

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 409157 1899593  
Nutrients in Wet Manure: Nitrogen, Tons 5728 13107  
Phosphorus, Tons 858 1900  
Potash, Tons 4092 11398

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		8466439		
1969		8327303		
1972		8807844	234960	2298100

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
Wet Manure Defecated: Tons, 1972 365085  
Nutrients in Wet Manure: Combined 144420  
Nitrogen, tons 5695 2253  
Phosphorus, tons 1460 578  
Potash, tons 1278 505

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	
Liquid	
Total	962952
Primary Nutrients in Fertilizer	477064
Nitrogen	150090
Phosphorus	154025
Potash	172951

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			510419
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	374667	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 543417		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:		Hundredweight Applied on Cropland			
Table 1	93814.7	32656.7	15974.1	142445.5	
Manure: Kind of Livestock		Tons of Materials in Wet Manure Defecated			
Swine: Table 2	1353368	6874	1919	5138	
Cattle: Table 3	10013861	56871	10155	50777	
Sheep: Table 4	409157	5728	858	4092	
Horses: Table 4	1899593	13107	1893	11356	
Chickens: Table 5	365085	5695	1460	1278	
Turkeys: Table 5	144420	2266	582	508	
Total from Livestock, Tons	14486552	90541	16827	73149	
Fertilizers:		Tons of Commercial Fertilizers Applied			
		Primary Nutrients			
Item	Total	Nitrogen	Phosphorus	Potash	
Applied on Cropland: Table 7	962952	150090	154025	172951	
Lime: Limestone equivalent purchased or applied, tons: Table 8		510419			
Salts: Applied on all highways, tons: Table 9 543417					

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres  
includes water areas under  
40 acres in size.

Table 7-4

## MATERIALS USAGE BASIN RELATIONSHIP -- PSA 4.1 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 4.1</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.21	2.66
Index of chemicals applied	83	100
Tons of livestock manure defecated	3.37	3.37
Index of manure defecated	100	100
Lbs primary nutrients in livestock manure	85	82
Index primary nutrients in manure	104	100
Lbs commercial fertilizer applied	370	321
Percent liquid fertilizer applied	16	32
Index commercial fertilizer applied	115	100
Lbs primary nutrients in commercial fertilizer	181	153
Index primary nutrients in commercial fertilizer	118	100
Lbs of lime applied	92	170
Index of lime applied	54	100
-----		
<u>Per acre of total land area</u>		
Lbs of road salts used	87.96	41.74
Index road salts used	211	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 7.2.2 Materials Usage

Table 7-5 lists by county the material usage inventory for PSA 4.1. Detailed statistics are shown on Tables 7-6 to 7-15.

Table 7-5  
MATERIALS USAGE  
(in 1972)

<u>PSA 4.1</u> <u>Michigan</u>	<u>Chemicals</u> <u>Applied</u> <u>to Crops</u> <u>(100 lbs)</u>	<u>Livestock</u> <u>Manure</u> <u>(tons)</u>	<u>Commercial</u> <u>Fertilizer</u> <u>on Cropland</u> <u>(tons)</u>	<u>Limestone</u> <u>Purchased</u> <u>or Applied</u> <u>(tons)</u>	<u>Salts</u> <u>Applied to</u> <u>all Highways</u> <u>(tons)</u>
Lenawee	5,206	564,214	50,637	23,059	4,453
Livingston	1,241	385,983	10,506	2,872	17,253
Macomb	1,621	204,158	10,885	336	17,296
Monroe	4,306	207,015	35,563	1,000	17,109
Oakland	604	275,359	4,267	2,200	26,296
St. Clair	2,161	420,734	15,901	719	11,909
Sanilac	5,206	881,456	47,078	12,246	6,794
Wastenaw	2,680	542,482	18,643	6,000	14,320
Wayne	573	114,127	4,138	500	60,189
TOTAL	23,598	3,595,528	197,618	48,932	175,619
-----					
<u>To Convert From</u>		<u>To</u>		<u>Multiply By</u>	
Pounds (lb)		Kilograms (kg)		0.454	
Tons (ton)		Kilograms (kg)		907.2	
		Metric Tons		0.907	



TABLE 7-6

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0

STATE: Michigan

PLANNING SUBAREA: Northwest 4.1

COUNTY: 9 county totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	371700	10221.8	82600	1239.0		
Grains	130878	574.4	43026	436.3		
Hay or Grass Silage	69502	696.0	58001	580.0		
Pastured Cropland	39326	393.3	39326	393.3		
Other Field Crops	232937	5016.1	17726	590.0	3930	590.0
Vegetables	20446	644.1	13624	1274.9	17326	860.7
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	864939	17625.7	254903	4513.5	21256	1458.7
Total Herbicides, Insecticides, Fungicides: 100 lbs					1141098	23597.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	108955	9459	9052	18511
1969	101532	8236	8337	16573
1972	104500	10700	9400	20100

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 145323  
 Nutrients in Wet Manure: Nitrogen, tons 726  
 Phosphorus, tons 203  
 Potash, tons 552

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	331536	130296	201340
1969	260553	102351	158302
1972	285000	111400	173600

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 1463793 1,119,720  
 Wet Manure Defecated: Tons, 1972 Combined: 2503513  
 Nutrients in Wet Manure: Nitrogen, tons 14463  
 Phosphorus, tons 2504  
 Potash, tons 12918

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		106188	
1969		86602	12440
1972		70400	55975

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 113344 715,360  
 Nutrients in Wet Manure: Nitrogen, Tons 1285 4936  
 Phosphorus, Tons 237 716  
 Potash, Tons 1133 4292

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		1163139		
1969		890115		
1972		916500		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 37988  
 Nutrients in Wet Manure:  
 Nitrogen, tons 593  
 Phosphorus, tons 153  
 Potash, tons 133  
 Combined Not significant number

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	312204	47839	12208	60047
GRAINS	187612	24682	360	25042
Wheat	101122	14991	290	15281
Oats	79213	8933	62	8995
Barley	1342	141	2	143
Rye	2731	231	2	233
OTHER FIELD CROPS	222090	20833	1540	22373
Soybeans	160975	9486	581	10067
Potatoes	3244	2254	352	2606
Sugar beets				
Field beans	5585	24	0	24
HAY OR GRASS SILAGE	195854	4417	110	4527
PASTURED CROPLAND	124341	1108	8	1116
Cropland used for pasture	115229	945	8	953
Improved pasture	9112	163	0	163
VEGETABLES, SWEET CORN, MELONS	24065	6392	620	7002
ORCHARDS	6180	723	12	735
BERRIES	261	46	3	51
NURSERY & GREENHOUSE PRODUCTS	4812	2461	36	2497
OTHER CROPS	1690	91	6	97
Total Fertilizer Used, Tons		108608	14903	123511
Percent of Fertilizer Used		88	12	100

COUNTY, land area, acres 3992896 (1) Number I-V farms 8183  
 Number of farms 14262 Acres in I-V farms 1608771  
 Acres in farms 2019455 Cropland I-V farms 1338440  
 Cropland in farms 1621120 Harvested cropland  
 Harvested cropland in farms 1068323 I-V farms 951783

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	165990
Liquid	31619
Total	197618
Primary Nutrients in Fertilizer	96833
Nitrogen	31956
Phosphorus	30987
Potash	33892

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	20428	28504	48932
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	136205	33.7
1971-72	111219	29.6
1972-73	121082	31.2
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 175619		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	17625.7	4513.5	1458.7	23597.9
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	145323	726	203	552
Cattle: Table 3	2583513	14468	2584	12918
Sheep: Table 4	113344	1585	237	1133
Horses: Table 4	715360	4936	716	4292
Chickens: Table 5	37988	593	153	133
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	3595528	22308	3893	19028
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	197618	31956	30986	33891
Lime: Limestone equivalent purchased or applied, tons: Table 8 48932				
Salts: Applied on all highways, tons: Table 9 175619				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-7

PLANNING AREA: Lake Erie 4.0

STATE: Michigan

PLANNING SUBAREA: Northwest 4.1

COUNTY: Lenawee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	98910	2720.0	21980	329.7		
Grains	26940	134.7	8980	89.8		
Hay or Grass Silage	6530	65.3	5442	54.4		
Pastured Cropland	3073	30.7	3073	30.7		
Other Field Crops	74739	1510.2	4917	78.0	274	41.1
Vegetables	951	27.4	477	34.0	872	60.8
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	211143	4488.3	44869	616.6	1146	101.9
Total Herbicides, Insecticides, Fungicides:		100 lbs		257158		5206.8

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	38578	3319	3141	6460
1969	38036	3141	3103	6244
1972	39100	4100	3500	7600

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 54940  
 Nutrients in Wet Manure: Nitrogen, tons 275  
 Phosphorus, tons 77  
 Potash, tons 209

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	54921	13314	41607
1969	46691	10322	35869
1972	51100	11800	39300

Wet Manure Factor: Tons Per Animal 13.14  
 Wet Manure Defecated: Tons, 1972 155052 253485  
 Wet Manure Defecated: Tons, 1972 Combined: 408537  
 Nutrients in Wet Manure: Nitrogen, tons 2288  
 Phosphorus, tons 409  
 Potash, tons 2043

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		15648	
1969		12765	1523
1972		10400	5634

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 16744 72003  
 Nutrients in Wet Manure: Nitrogen, Tons 234 497  
 Phosphorus, Tons 35 72  
 Potash, Tons 167 432

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		218435		
1969		284342		
1972		289100		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 11983  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 187  
 Phosphorus, tons 48  
 Potash, tons 42

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres 401856 (1)	Number I-V farms 1637
Number of farms 2558	Acres in I-V farms 349366
Acres in farms 403602	Cropland I-V farms 297183
Cropland in farms 335283	Harvested cropland
Harvested cropland in farms 241044	I-V farms 222247

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	86049	14368	4642	19030
GRAINS	41849	6233	166	6401
Wheat	27809	4001	190	4751
Oats	13244	1571	17	1568
Barley	123	19	0	19
Rye	416	23	0	23
OTHER FIELD CROPS	73513	4443	523	4966
Soybeans	70973	3579	415	3994
Potatoes	274	101	0	101
Sugar beets				
Field beans	696	1	0	1
HAY OR GRASS SILAGE	19123	610	3	613
PASTURED CROPLAND	10900	105	0	105
Cropland used for pasture	9500	75	0	75
Improved pasture	1320	30	0	30
VEGETABLES, SWEET CORN, MELONS	1313	304	42	426
ORCHARDS	982	66	2	68
BERRIES	3	0	0	0
NURSERY & GREENHOUSE PRODUCTS	22	9	0	9
OTHER CROPS	773	26	1	29
Total Fertilizer Used, Tons		26267	5361	31648
Percent of Fertilizer Used		63	17	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	42535
Liquid	8102
Total	50637
Primary Nutrients in Fertilizer	24812
Nitrogen	6188
Phosphorus	7940
Potash	8684

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	8111	14948	23059
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	2271	11.3
1971-72	1865	9.3
1972-73	3070	14.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 4453		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	4488.3	616.6	101.9	5206.8
Manure: Kind of Livestock				
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	54948	275	77	209
Cattle: Table 3	408537	2288	409	2043
Sheep: Table 4	16744	234	35	167
Horses: Table 4	72003	497	72	432
Chickens: Table 5	11983	187	48	42
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	564215	3481	641	2893
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	50637	6188	7940	8684
Lime: Limestone equivalent purchased or applied, tons: Table 8 23059				
Salts: Applied on all highways, tons: Table 9 4453				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-8

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0

STATE: Michigan

PLANNING SUBAREA: Northwest 4.1

COUNTY: Livingston

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	29250	804.4	6500	97.5		
Grains	5430	27.2	1810	18.1		
Hay or Grass Silage	8754	87.5	7295	73.0		
Pastured Cropland	4124	41.2	4124	41.2		
Other Field Crops	876	14.2	61	2.8	23	3.4
Vegetables	240	4.8	192	25.9	240	.2
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	48474	979.3	19982	258.5	263	3.6
Total Herbicides, Insecticides, Fungicides: 100 lbs						
68719 1241.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	5535	645	573	1218
1969	5812	445	530	975
1972	6000	600	600	1200

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 8676  
Nutrients in Wet Manure: Nitrogen, tons 43  
Phosphorus, tons 12  
Potash, tons 33

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	33996	14582	19414
1969	27660	12456	15204
1972	30200	13600	16600

Wet Manure Factor: Tons  
Per Animal 13.14 6.45  
Wet Manure Defecated:  
Tons, 1972 178704 107070  
Wet Manure Defecated: Tons, 1972 Combined: 285774  
Nutrients in Wet Manure: Nitrogen, tons 1600  
Phosphorus, tons 286  
Potash, tons 1429

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		12240	
1969		7497	1426
1972		6100	6362

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 9821 81306  
Nutrients in Wet Manure: Nitrogen, Tons 137 561  
Phosphorus, Tons 21 81  
Potash, Tons 98 488

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		70816		
1969		10550		
1972		9800		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 406  
Nutrients in Wet Manure:  
Nitrogen, tons 6  
Phosphorus, tons 2  
Potash, tons 1

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres 366080 (1)				
Number I-V farms 536				
Number of farms 1099				
Acres in I-V farms 128523				
Acres in farms 174047				
Cropland I-V farms 92874				
Cropland in farms 119832				
Harvested cropland				
I-V farms 62762				
Harvested cropland in farms 71810				
CORN	25761	3352	516	3868
GRAINS	10169	1065	31	1096
Wheat	5208	503	28	611
Oats	4333	431	1	432
Barley	48	5	0	5
Rye	412	23	0	23
OTHER FIELD CROPS	828	85	18	103
Soybeans	676	47	18	65
Potatoes	23	22	0	22
Sugar beets				
Field beans	836	3	0	3
HAY OR GRASS SILAGE	24097	543	9	552
PASTURED CROPLAND	12362	143	0	143
Cropland used for pasture	11069	124	0	124
Improved pasture	1293	19	0	19
VEGETABLES, SWEET CORN, MELONS	443	112	2	114
ORCHARDS	671	3	4	34
BERRIES	14	0	0	0
NURSERY & GREENHOUSE PRODUCTS	1151	652	0	652
OTHER CROPS	9	1	0	1
Total Fertilizer Used, Tons		5906	580	6566
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	8825
Liquid	1681
Total	10506
Primary Nutrients in Fertilizer	5148
Nitrogen	1699
Phosphorus	1647
Potash	1802

TABLE 8--GROUND LIMESTONE EQUIVALENT  
APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	2351	521	2872
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	12335	28.9
1971-72	12417	28.7
1972-73	11895	25.5
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 17253		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	979.3	258.5	3.6	1241.4
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	8676	43	12	33
Cattle: Table 3	285774	1600	286	1429
Sheep: Table 4	9821	137	21	98
Horses: Table 4	81306	561	81	488
Chickens: Table 5	406	6	2	1
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	385983	2347	402	2049
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	10506	1699	1647	1802
Lime: Limestone equivalent purchased or applied, tons: Table 8 2872				
Salts: Applied on all highways, tons: Table 9 17253				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0

STATE: Michigan

PLANNING SUBAREA: Northwest 4.1

COUNTY: Macomb

TABLE 7-9

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	18900	519.8	4200	53.0		
Grains	6120	30.6	2040	20.4		
Hay or Grass Silage	3694	36.9	3078	30.8		
Pastured Cropland	1725	17.2	1725	17.2		
Other Field Crops	8952	150.4	864	57.7	469	70.4
Vegetables	3815	112.6	2949	343.9	3197	150.5
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	41206	867.5	14856	533.0	3666	220.9
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					59728	1621.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	4072	326	358	684
1969	2649	227	163	390
1972	2700	300	200	500

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 3615  
 Nutrients in Wet Manure: Nitrogen, tons 18  
 Phosphorus, tons 5  
 Potash, tons 14

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	19872	10378	9494
1969	12574	6400	6174
1972	13500	7000	6500

Wet Manure Factor: Tons Per Animal 1.3, 1.4  
 Wet Manure Defecated: Tons, 1972 91890  
 Wet Manure Defecated: Tons, 1972 Combined: 135840  
 Nutrients in Wet Manure: Nitrogen, tons 761  
 Phosphorus, tons 136  
 Potash, tons 679

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2733	
1969		1683	737
1972		1400	4684

Wet Manure Factor: Tons per animal 1.61  
 Wet Manure Defecated: Tons, 1972 2254  
 Nutrients in Wet Manure: Nitrogen, tons 32  
 Phosphorus, tons 5  
 Potash, tons 23

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		102215		
1969		62489		
1972		68600		

Wet Manure Factor: Lbs. per bird 22.9  
 Wet Manure Defecated: Tons, 1972 2043  
 Nutrients in Wet Manure: Nitrogen, tons 44  
 Phosphorus, tons 11  
 Potash, tons 10

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres 307328 (1)		Number I-V farms 277		
Number of farms 997		Acres in I-V farms 72476		
Acres in farms 90934		Cropland I-V farms 60208		
Cropland in farms 77368		Harvested cropland I-V farms 41074		
Harvested cropland in farms 47335				

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	13022	1967	370	2337
GRAINS	7230	955	11	966
Wheat	3225	507	6	513
Oats	3076	388	3	393
Barley				
Rye	252	23	0	23
OTHER FIELD CROPS	4006	593	9	602
Soybeans	2944	266	3	269
Potatoes	469	193	0	193
Sugar beets				
Field beans	139	0	0	0
HAY OR GRASS SILAGE	10024	226	0	226
PASTURED CROPLAND	4750	74	1	75
Cropland used for pasture	4299	41	1	42
Improved pasture	487	33	0	33
VEGETABLES, SWEET CORN, MELONS	5270	1796	48	1844
ORCHARDS	1401	271	0	271
BERRIES	25	7	0	7
NURSERY & GREENHOUSE PRODUCTS	72	441	2	443
OTHER CROPS	13	2	0	2
Total Fertilizer Used, Tons		6362	441	6803
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	9143
Liquid	1742
Total	10885
Primary Nutrients in Fertilizer	5334
Nitrogen	1750
Phosphorus	1707
Potash	1867

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	301	35	336
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	13054	39.8
1971-72	10736	32.9
1972-73	11025	36.9
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 17296		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
	Herbicides	Insecticides	Fungicides	Total
Table 1	867.5	533.0	220.9	1621.4
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3015	16	5	14
Cattle: Table 3	135040	761	136	679
Sheep: Table 4	2294	32	5	23
Horses: Table 4	59000	411	60	398
Chickens: Table 5	2843	44	11	10
Turkeys: Table 5	0			
Total from Livestock, Tons	204198	1266	94	1084
Fertilizers: Tons of Commercial Fertilizers Applied				
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	10885	1750	1707	1867
Lime: Limestone equivalent purchased or applied, tons: Table 8 336				
Salts: Applied on all highways, tons: Table 9 17296				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-10

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: MichiganPLANNING SUBAREA: Northwest 4.1 COUNTY: Monroe

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	41400	1138.5	9200	138.0		
Grains	17550	87.8	5850	50.5		
Hay or Grass Silage	1892	10.9	1577	15.8		
Pastured Cropland	1000	10.0	1000	10.0		
Other Field Crops	72207	1475.1	7021	390.1	2665	399.8
Vegetables	4226	124.0	2456	238.0	3765	242.2
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	138275	2854.3	27104	810.4	6430	642.0
Total Herbicides, Insecticides, Fungicides: 100 lbs				171809		4306.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	16887	1378	1410	2788
1969	15408	1111	1117	2228
1972	15200	1400	1300	2700
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 19521				
Nutrients in Wet Manure: Nitrogen, tons 98				
Phosphorus, tons 27				
Potash, tons 74				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	16852	4195	12657
1969	13984	2928	11056
1972	15300	3200	12100
Wet Manure Factor: Tons Per Animal 13.14			
Wet Manure Defecated: Tons, 1972 42048			
Wet Manure Defecated: Tons, 1972 Combined: 120093			
Nutrients in Wet Manure: Nitrogen, tons 673			
Phosphorus, tons 120			
Potash, tons 600			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4368	
1969		4441	942
1972		3600	4440
Wet Manure Factor: Tons per animal 1.61			
Wet Manure Defecated: Tons, 1972 5796			
Nutrients in Wet Manure: Nitrogen, Tons 81			
Phosphorus, Tons 12			
Potash, Tons 58			

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		200095		
1969		106870		
1972		117300		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 4862				
Nutrients in Wet Manure:				
Nitrogen, tons 76				
Phosphorus, tons 19				
Potash, tons 17				

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	39791	6719	1896	8615
GRAINS	27659	4164	22	4186
Wheat	19424	3209	22	3231
Oats	7673	902	0	902
Barley	57	9	0	9
Rye	468	44	0	44
OTHER FIELD CROPS	66584	6560	528	7088
Soybeans	60471	3649	68	3717
Potatoes	2665	1773	280	2053
Sugar beets				
Field beans	89	0	0	0
HAY OR GRASS SILAGE	5358	152	2	154
PASTURED CROPLAND	3185	32	0	32
Cropland used for pasture	2790	28	0	28
Improved pasture	395	4	0	4
VEGETABLES, SWEET CORN, MELONS	4840	1664	241	1905
ORCHARDS	392	65	0	65
BERRIES	62	14	3	17
NURSERY & GREENHOUSE PRODUCTS	672	123	29	152
OTHER CROPS	437	13	0	13
Total Fertilizer Used, Tons		19506	2721	22227
Percent of Fertilizer Used		88	12	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	28973
Liquid	5690
Total	35563
Primary Nutrients in Fertilizer	17426
Nitrogen	5751
Phosphorus	5576
Potash	6099

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	0	1000	1000
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	8231	31.5
1971-72	7767	29.9
1972-73	11796	40.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 17109		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2854.3	810.4	642.0	4306.7
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	19521	98	27	74
Cattle: Table 3	120093	673	120	600
Sheep: Table 4	5796	81	12	58
Horses: Table 4	56743	392	57	340
Chickens: Table 5	4862	76	19	17
Turkeys: Table 5	0			
Total from Livestock, Tons	207015	1320	235	1036
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	35563	5751	5576	6099
Lime: Limestone equivalent purchased or applied, tons: Table 8 1000				
Salts: Applied on all highways, tons: Table 9 17109				

To Convert From

Pounds (lb)

Acres (acre)

Tons (ton)

To

Kilograms (kg)

Hectare (ha)

Kilograms (kg)

Multiply By

0.453

.4047

907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 7-11

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0

STATE: Michigan

PLANNING SUBAREA: Northwest 4.1

COUNTY: Oakland

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	11250	309.4	2500	37.5		
Grains	2976	14.9	992	9.9		
Hay or Grass Silage	4351	43.6	3534	36.3		
Pastured Cropland	3546	35.5	3546	35.5		
Other Field Crops	322	7.3	106	10.7	91	13.6
Vegetables	384	7.7	307	41.5	384	.4
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	22839	418.4	11085	171.4	475	14.0
Total Herbicides, Insecticides, Fungicides:		100 lbs		34399		603.8

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2970	298	300	598
1969	3009	214	170	384
1972	3100	300	200	500

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 3615  
 Nutrients in Wet Manure: Nitrogen, tons 18  
 Phosphorus, tons 5  
 Potash, tons 14

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	18218	6839	11319
1969	12008	4326	7682
1972	13100	4700	8400

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 61758 54180  
 Wet Manure Defecated: Tons, 1972 Combined: 115938  
 Nutrients in Wet Manure: Nitrogen, tons 649  
 Phosphorus, tons 116  
 Potash, tons 580

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4438	
1969		2584	2442
1972		2100	11717

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 3381 149743  
 Nutrients in Wet Manure: Nitrogen, Tons 47 1033  
 Phosphorus, Tons 7 150  
 Potash, Tons 34 890

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		87271		
1969		58162		
1972		64700		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 2662  
 Nutrients in Wet Manure: Nitrogen, tons 42  
 Phosphorus, tons 11  
 Potash, tons 9

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	5936	1207	145	1352
GRAINS	5553	563	8	571
Wheat	3063	315	3	318
Oats	2191	219	3	222
Barley	10	2	0	2
Rye	116	0	2	10
OTHER FIELD CROPS	465	76	1	77
Soybeans	323	29	1	30
Potatoes	91	44	0	44
Sugar beets				
Field beans	171	0	0	0
HAY OR GRASS SILAGE	11039	129	0	129
PASTURED CROPLAND	11189	82	3	85
Cropland used for pasture	9533	72	3	75
Improved pasture	1336	10	0	10
VEGETABLES, SWEET CORN, MELONS	522	75	53	128
ORCHARDS	1023	78	0	78
BERRIES	19	6	0	6
NURSERY & GREENHOUSE PRODUCTS	360	240	3	243
OTHER CROPS				
Total Fertilizer Used, Tons		2454	213	2667
Percent of Fertilizer Used		92	8	100

COUNTY, land area, acres 554560 (1) Number I-V farms 378  
 Number of farms 863 Acres in I-V farms 72947  
 Acres in farms 101620 Cropland I-V farms 51135  
 Cropland in farms 68065 Harvested cropland  
 Harvested cropland in farms 33362 I-V farms 21977

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	3584
Liquid	683
Total	4267
Primary Nutrients in Fertilizer	2091
Nitrogen	690
Phosphorus	669
Potash	732

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1487	713	2200
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	21531	39.4
1971-72	21198	38.7
1972-73	18130	31.0
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 26296		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	410.4	171.4	14.0	603.8
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3615	18	5	14
Cattle: Table 3	115938	649	116	580
Sheep: Table 4	3381	47	7	34
Horses: Table 4	149743	1033	150	898
Chickens: Table 5	2662	42	11	9
Turkeys: Table 5	0			
Total from Livestock, Tons	275359	1789	289	1013
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	4267	690	669	732
Lime: Limestone equivalent purchased or applied, tons: Table 8 2200				
Salts: Applied on all highways, tons: Table 9 26296				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-12

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0

STATE: Michigan

PLANNING SUBAREA: Northwest 4.1

COUNTY: St. Clair

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	34200	240.5	7600	114.0		
Grains	12786	83.9	4262	42.6		
Hay or Grass Silage	10162	101.6	2462	24.7		
Pastured Cropland	6696	67.0	6696	67.0		
Other Field Crops	12691	289.0	802	15.3	70	10.5
Vegetables	2932	36.9	2235	149.8	2331	126.1
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	79474	1548.9	30113	473.4	2401	138.5
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					111988	2160.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	3005	462	421	883
1969	3547	280	373	653
1972	3600	400	400	800

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 5784  
Nutrients in Wet Manure: Nitrogen, tons 29  
Phosphorus, tons 8  
Potash, tons 22

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	45114	18718	26396
1969	34506	13100	21406
1972	37700	14200	23500

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 186588 151575  
Wet Manure Defecated: Tons, 1972 Combined: 338163  
Nutrients in Wet Manure: Nitrogen, tons 1894  
Phosphorus, tons 338  
Potash, tons 1691

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3564	
1969		2350	1325
1972		1900	5231

Wet Manure Factor: Tons per animal 1.61 12.76  
Wet Manure Defecated: Tons, 1972 3059 66852  
Nutrients in Wet Manure: Nitrogen, Tons 43 461  
Phosphorus, Tons 6 67  
Potash, Tons 31 401

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		207395		
1969		167282		
1972		165900		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 6877  
Nutrients in Wet Manure: Nitrogen, tons 107  
Phosphorus, tons 28  
Potash, tons 24

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	25500	4052	828	4880
GRAINS	15171	1933	23	1956
Wheat	7578	1069	15	1084
Oats	5662	557	8	665
Barley	261	16	0	16
Rye	241	20	0	20
OTHER FIELD CROPS	10704	1530	42	1572
Soybeans	3651	430	4	434
Potatoes	70	27	0	27
Sugar beets				
Field beans	289	12	0	12
HAY OR GRASS SILAGE	25147	392	8	400
PASTURED CROPLAND	18507	99	0	99
Cropland used for pasture	17870	91	0	91
Improved pasture	637	8	0	8
VEGETABLES, SWEET CORN, MELONS	3012	796	122	918
ORCHARDS	394	29	1	30
BERRIES	3	0	0	0
NURSERY & GREENHOUSE PRODUCTS	188	69	0	69
OTHER CROPS	13	2	0	2
Total Fertilizer Used, Tons		8914	1024	9938
Percent of Fertilizer Used		90	10	100

COUNTY, land area, acres 469568 (1)  
Number of farms 1662  
Acres in I-V farms 150176  
Acres in farms 218207  
Cropland in farms 174358  
Harvested cropland in farms 97441  
Number I-V farms 813  
Acres in I-V farms 150176  
Cropland I-V farms 124351  
Harvested cropland I-V farms 79966

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	13357
Liquid	2544
Total	15901
Primary Nutrients in Fertilizer	7791
Nitrogen	2571
Phosphorus	2493
Potash	2727

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	304	415	719
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "e" Mile
1970-71	8752	36.4
1971-72	8772	36.8
1972-73	8211	32.3
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 11909		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1548.9	473.4	138.5	2160.8
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	5784	29	8	22
Cattle: Table 3	338163	1894	338	1691
Sheep: Table 4	3059	43	6	31
Horses: Table 4	66852	461	67	401
Chickens: Table 5	6877	107	28	24
Turkeys: Table 5	0			
Total from Livestock, Tons	420735	2534	447	2169
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7	15901	Nitrogen 2571	Phosphorus 2493	Potash 2727
Lime: Limestone equivalent purchased or applied, tons: Table 8	719			
Salts: Applied on all highways, tons: Table 9 11909				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-13

PLANNING AREA: Lake Erie 4.0

STATE: Michigan

PLANNING SUBAREA: Northwest 4.1

COUNTY: Sanilac

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	79740	2192.8	17720	265.8		
Grains	40290	201.4	13430	134.3		
Hay or Grass Silage	22574	225.7	18812	188.1		
Pastured Cropland	12548	125.5	12548	125.5		
Other Field Crops	48416	1227.4	2574	25.7		
Vegetables	4104	190.1	2130	87.3	2912	217.1
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	207672	4162.9	67214	826.7	2912	217.1
Total Herbicides, Insecticides, Fungicides: 100 lbs						
277798 5206.7						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	7161	660	641	1301
1969	7697	773	794	1567
1972	7900	900	900	1800
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 13014				
Nutrients in Wet Manure: Nitrogen, tons 65				
Phosphorus, tons 18				
Potash, tons 49				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	94859	42523	52336
1969	77314	37153	40161
1972	84500	40400	44100
Wet Manure Factor: Tons Per Animal			
		13.14	6.45
Wet Manure Defecated: Tons, 1972			
		530856	284445
Wet Manure Defecated: Tons, 1972 Combined: 815301			
Nutrients in Wet Manure: Nitrogen, tons 4566			
Phosphorus, tons 615			
Potash, tons 4077			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2983	
1969		1421	1415
1972		1200	3875
Wet Manure Factor: Tons per animal			
		1.61	12.78
Wet Manure Defecated: Tons, 1972			
		1932	49523
Nutrients in Wet Manure: Nitrogen, Tons			
		27	342
Phosphorus, Tons			
		4	50
Potash, Tons			
		17	297

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		91901		
1969		41358		
1972		40700		
Wet Manure Factor: Lbs. per bird				
		82.9		
Wet Manure Defecated: Tons, 1972				
		1687		
Nutrients in Wet Manure:				
Nitrogen, tons		26	Combined	
Phosphorus, tons		7		
Potash, tons		6		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres 615040 (1)				
Number I-V farms 1850				
Number of farms 2787				
Acres in I-V farms 361942				
Acres in farms 461108				
Cropland in I-V farms 329838				
Cropland in farms 389101				
Harvested cropland				
Harvested cropland in farms 263195				
I-V farms 239245				
CORN	66875	10243	2475	12718
GRAINS	50995	428	57	4341
Wheat	19756	2702	32	2814
Oats	29720	3471	25	3496
Barley	600	68	0	668
Rye	615	72	0	72
OTHER FIELD CROPS	47299	6401	277	6678
Soybeans	3196	354	0	354
Potatoes	9	2	2	4
Sugar beets				
Field beans	1702	4	0	4
HAY OR GRASS SILAGE	67845	1735	81	1816
PASTURED CROPLAND	41704	374	2	376
Cropland used for pasture	40389	348	2	350
Improved pasture	1395	26	0	26
VEGETABLES, SWEET CORN, MELONS	4691	640	13	653
ORCHARDS	711	71	0	71
BERRIES	45	3	0	3
NURSERY & GREENHOUSE PRODUCTS	965	274	0	274
OTHER CROPS	279	35	5	40
Total Fertilizer Used, Tons		26504	2920	29424
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	39545
Liquid	7533
Total	47078
Primary Nutrients in Fertilizer:	
Nitrogen	23068
Phosphorus	7613
Potash	6073

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	4246	8000	12246
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	3588	21.2
1971-72	3930	23.4
1972-73	4684	26.1
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 6794		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	4162.9	826.7	217.1	5206.7
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	13014	65	16	49
Cattle: Table 3	815301	4566	615	4077
Sheep: Table 4	1932	27	4	19
Horses: Table 4	49523	342	50	297
Chickens: Table 5	1687	26	7	6
Turkeys: Table 5	0			
Total from Livestock, Tons	881457	5026	694	4448
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:				
Table 7	47078	7613	7382	8073
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	12246			
Salts: Applied on all highways, tons: Table 9 6794				

To Convert From: Pounds (lb), Acres (acre), Tons (ton) To: Kilograms (kg), Hectare (ha), Kilograms (kg) Multiply By: 0.453, .4047, 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 7-14

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Michigan

PLANNING SUBAREA: Northwest 4.1 COUNTY: Washtenaw

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	54540	1499.8	12120	181.8		
Grains	17316	86.6	2772	27.7		
Hay or Grass Silage	10041	100.4	5034	50.3		
Pastured Cropland	6018	60.2	6018	60.2		
Other Field Crops	9984	202.7	943	45.0	338	50.7
Vegetables	1000	41.5	1412	171.8	1783	23.7
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	100505	1999.2	35299	606.8	2121	74.4
Total Herbicides, Insecticides, Fungicides: 100 lbs						
137925 2680.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	24101	2092	1501	3593
1969	23590	1894	1932	3826
1972	24600	2500	2100	4600

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 33258  
Nutrients in Wet Manure: Nitrogen, tons 166  
Phosphorus, tons 47  
Potash, tons 126

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	44102	18155	25947
1969	33858	14379	19479
1972	36700	15600	21100

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 204984 136095  
Wet Manure Defecated: Tons, 1972 Combined: 341079  
Nutrients in Wet Manure: Nitrogen, tons 1910  
Phosphorus, tons 341  
Potash, tons 1705

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		58375	
1969		53361	1961
1972		43300	7297

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 69713 93256  
Nutrients in Wet Manure: Nitrogen, Tons 975 643  
Phosphorus, Tons 146 93  
Potash, Tons 697 500

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		130533		
1969		126700		
1972		124900		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 5177  
Nutrients in Wet Manure: Combined  
Nitrogen, tons 61  
Phosphorus, tons 21  
Potash, tons 18

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	42159	5325	1191	6516
GRAINS	26260	2933	39	2972
Wheat	13173	1671	33	1704
Oats	12335	1175	3	1181
Barley	235	22	2	24
Rye	199	16	0	16
OTHER FIELD CROPS	10519	599	90	779
Soybeans	10151	681	20	701
Potatoes	338	9	70	79
Sugar beets				
Field beans	1653	4	0	4
HAY OR GRASS SILAGE	31315	605	7	612
PASTURED CROPLAND	19936	191	2	193
Cropland used for pasture	17773	158	2	160
Improved pasture	2163	33	0	33
VEGETABLES, SWEET CORN, MELONS	1876	415	56	471
ORCHARDS	641	67	5	72
BERRIES	64	10	0	10
NURSERY & GREENHOUSE PRODUCTS	61	14	0	14
OTHER CROPS	83	9	0	9
Total Fertilizer Used, Tons		10262	1390	11652
Percent of Fertilizer Used		88	12	100

COUNTY, land area, acres 494720 (1) Number I-V farms 971  
Number of farms 1699 Acres in I-V farms 207514  
Acres in farms 200283 Cropland I-V farms 163697  
Cropland in farms 190810 Harvested cropland  
Harvested cropland in farms 126019 I-V farms 113387

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	15660
Liquid	2983
Total	18643
Primary Nutrients in Fertilizer	
Nitrogen	3015
Phosphorus	2923
Potash	3197

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	3620	2372	6000
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	8127	26.8
1971-72	6665	22.1
1972-73	9873	30.6
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 14320		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1999.2	606.8	74.4	2680.4
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	33258	166	47	126
Cattle: Table 3	341079	1910	341	1705
Sheep: Table 4	69713	975	146	697
Horses: Table 4	93256	643	93	500
Chickens: Table 5	5177	61	21	18
Turkeys: Table 5				
Total from Livestock, Tons	542483	3775	648	3106
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	18643	3015	2923	3197
Lime: Limestone equivalent purchased or applied, tons: Table 8	6000			
Salts: Applied on all highways, tons: Table 9 14320				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-15

PLANNING AREA: Lake Erie 4.0

STATE: Indiana

PLANNING SUBAREA: Northwest 4.1

COUNTY: Wayne

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	3510	96.5	780	11.7		
Grains	1470	7.4	490	4.9		
Hay or Grass Silage	793	7.9	661	6.6		
Pastured Cropland	594	5.9	594	5.9		
Other Field Crops	7000	140.0	438	4.4		
Vegetables	1961	50.6	1471	183.7	1846	47.8
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>15327</b>	<b>308.3</b>	<b>4434</b>	<b>217.2</b>	<b>1846</b>	<b>47.8</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs					<b>21607</b>	<b>373.3</b>

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	4546	319	307	626
1969	1584	151	155	306
1972	1600	200	200	400

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 2892  
Nutrients in Wet Manure: Nitrogen, tons 14  
Phosphorus, tons 4  
Potash, tons 11

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	3704	1594	2110
1969	2328	787	1541
1972	2500	900	1700

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 11826 10965  
Wet Manure Defecated: Tons, 1972 Combined: 22791  
Nutrients in Wet Manure: Nitrogen, tons 128  
Phosphorus, tons 23  
Potash, tons 114

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		339	
1969		500	569
1972		400	575

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 644 56329  
Nutrients in Wet Manure: Nitrogen, Tons 9 596  
Phosphorus, Tons 1 66  
Potash, Tons 6 518

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		49428		
1969		32362		
1972		35300		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 1471  
Nutrients in Wet Manure: Combined  
Nitrogen, tons 23  
Phosphorus, tons 5  
Potash, tons 5

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres 387200 (1)  
Number of farms 597  
Acres in farms 49527  
Cropland in farms 38887  
Harvested cropland in farms 25362

Number I-V farms 281  
Acres in I-V farms 35788  
Cropland I-V farms 30123  
Harvested cropland I-V farms 20728

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
<b>CORN</b>	4111	586	135	721
<b>GRAINS</b>	2778	382	1	383
Wheat	1711	254	1	255
Oats	979	115	0	115
Barley				
Rye	5	2	0	2
<b>OTHER FIELD CROPS</b>	5972	456	52	508
Soybeans	5960	451	32	503
Potatoes	3	3	0	3
Sugar beets				
Field beans				
<b>HAY OR GRASS SILAGE</b>	1505	29	0	29
<b>PASTURED CROPLAND</b>	1592	5	0	5
Cropland used for pasture	1606	8	0	8
Improved pasture	85	0	0	0
<b>VEGETABLES, SWEET CORN, MELONS</b>	2058	200	43	243
<b>ORCHARDS</b>	345	46	0	46
<b>BERRIES</b>	39	5	0	5
<b>NURSERY &amp; GREENHOUSE PRODUCTS</b>	511	339	2	341
<b>OTHER CROPS</b>	83	1	0	1
<b>Total Fertilizer Used, Tons</b>		<b>2353</b>	<b>233</b>	<b>2586</b>
<b>Percent of Fertilizer Used</b>		<b>91</b>	<b>9</b>	<b>100</b>

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	3476
Liquid	662
<b>Total</b>	<b>4138</b>
Primary Nutrients in Fertilizer	2028
Nitrogen	569
Phosphorus	549
Potash	710

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	0	500	500
Tonnages for Other Recent Years			
			-

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71	58706	55.3
1971-72	37869	44.3
1972-73	41496	44.2
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 60189		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland

Table 1	Herbicides	Insecticides	Fungicides	Total
	308.3	217.2	47.8	573.3

Manure: Kind of Livestock

Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2028	14	4	11
Cattle: Table 3	22791	128	23	114
Sheep: Table 4	644	9	1	6
Horses: Table 4	26329	306	56	318
Chickens: Table 5	1471	23	5	5
Turkeys: Table 5	-	-	-	-
<b>Total from Livestock, Tons</b>	<b>114127</b>	<b>770</b>	<b>120</b>	<b>694</b>

Fertilizers: Tons of Commercial Fertilizers Applied

Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	4138	569	549	710

Lime: Limestone equivalent purchased or applied, tons: Table 8 900

Salts: Applied on all highways, tons: Table 9 60189

To Convert From To Multiply By

Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

#### 7.2.2.1 Agricultural Chemicals

Chemical usage is relatively low because the major crops in this planning subarea use primarily herbicides (75 percent of the total) with much less use of insecticides (19 percent) and fungicides (6 percent). The fungicides are used primarily on the vegetable crops. This general pattern will likely continue to prevail. It is projected that chemical usage in this planning subarea may increase 15-25 percent in the next 10 years--herbicide use nearer the top range and fungicides use nearer the bottom range. For 1972 the amount of chemicals used totalled 1,071,340 kilograms (2,359,790 lbs).

#### 7.2.2.2 Animal Wastes

Livestock intensity as measured by manure production, is about the same as the Basin average. One factor, very significant in the urban and surrounding areas, is the growth in horse population. Horses produced 20 percent of the livestock manure in Planning Subarea 4.1--the highest percent for any Basin subarea. Livestock manure levels are projected to increase slightly, but will remain about the same as the present Basin average. The 1972 amount was 3,261,810 metric tons (3,595,528 tons) of livestock manure.

#### 7.2.2.3 Commercial Fertilizers

Commercial fertilizer use is about 15 percent above Basin average. Nitrogen, phosphorus and potash represent 33, 32, and 35 percent respectively, the same as in Planning Subarea 3.2. Overall fertilization rates are expected to increase 15-25 percent in the next 10 years. Nitrogen will likely show the greatest increase. Total commercial fertilizer use in 1972 for this planning subarea was 179,279 metric tons (197,618 tons).

#### 7.2.2.4 Lime

Lime usage in this subarea is relatively low and is projected to remain at about this level. In 1972 44,391 metric tons (48,932 tons) of lime was purchased or applied in PSA 4.1. This was the smallest amount used in any subarea in this lake basin.

#### 7.2.2.5 Salts

Road de-icing salts are in heavy use in this planning subarea and will continue at these rates because of the large metropolitan areas and subsequent high traffic volume. For the 1972-73 season this area applied 159,320 metric tons (175,619 tons) of salts, nearly one-third of the total for the entire lake basin.

### 7.3 Planning Subarea 4.2

This subarea encompasses three northeast Indiana counties and twenty northwest Ohio counties. This is corn belt country. While only four counties in the subarea directly border on Lake Erie, a number of others are on the Maumee River.

#### 7.3.1 Agricultural Characteristics

This land has fertile loamy soils with large acreages devoted to the production of corn. In addition, 88 percent of the soybean acreage in the Lake Erie basin is in this planning subarea. Vegetable production is also very significant. Tomatoes and sweet corn comprise about 70 percent of the vegetable acreage.

Table 7-16 indicates the relative proportions of materials usage in Planning Subarea 4.2 in comparison with the total Great Lakes Basin.

Table 7-16

#### MATERIALS USAGE BASIN RELATIONSHIP -- PSA 4.2 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 4.2</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.09	2.66
Index of chemicals applied	79	100
Tons of livestock manure defecated	1.66	3.37
Index of manure defecated	49	100
Lbs primary nutrients in livestock manure	43	82
Index primary nutrients in manure	52	100
Lbs commercial fertilizer applied	343	321
Percent liquid fertilizer applied	28	22
Index commercial fertilizer applied	107	100
Lbs primary nutrients in commercial fertilizer	175	153
Index primary nutrients in commercial fertilizer	114	100
Lbs of lime applied	161	170
Index of lime applied	95	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	36.39	41.74
Index road salts used	87	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 7.3.2 Materials Usage

Table 7-17 lists by county the material usage inventory for PSA 4.2. Detailed statistics are shown on Tables 7-18 to 7-41.

Table 7-17

MATERIALS USAGE  
(in 1972)

PSA 4.2	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>Indiana</u>					
Adams	3,060	378,189	32,229	8,390	3,242
Allen	4,434	388,081	41,234	10,245	8,450
DeKalb	2,160	231,312	22,400	4,842	4,489
<u>Ohio</u>					
Allen	2,732	231,867	20,610	9,071	3,350
Auglaize	3,223	485,589	27,183	10,532	3,771
Crawford	2,686	330,599	25,543	28,266	4,129
Defiance	2,706	168,043	15,757	7,492	2,524
Erie	2,096	130,792	13,586	14,889	3,967
Fulton	3,841	439,657	57,046	13,725	5,562
Hancock	4,520	279,900	31,286	13,019	3,118
Henry	4,243	197,682	37,693	903	5,076
Huron	3,658	241,664	24,950	12,739	4,414
Lucas	2,128	83,122	13,477	9,970	10,262
Mercer	4,072	744,322	34,961	25,547	3,626
Ottawa	2,026	85,937	11,648	3,009	7,325
Paulding	3,364	74,096	15,809	7,673	1,813
Putnam	4,555	352,690	34,110	16,737	2,886
Sandusky	4,117	246,745	34,189	4,897	6,817
Seneca	4,133	323,914	15,723	28,094	5,439
VanWert	4,167	116,936	33,784	6,556	2,480
Williams	2,795	322,171	26,908	10,061	5,149
Wood	5,568	236,694	54,458	11,721	13,757
Wyandot	3,259	222,947	26,692	48,431	3,524
TOTAL	79,543	6,312,949	651,276	306,809	115,170

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-18

PLANNING AREA: Lake Erie 4.0 STATE: Indiana and Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: 23 County Totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	123978.4	34092.9	275509	4131.8		
Grains	42434.8	2120.8	11444.9	1413.3		
Hay or Grass Silage	784.80	784.8	65400	653.4		
Pastured Cropland	51907	517.9	51907	517.9		
Other Field Crops	1353760	27075.2	84610	845.4		
Vegetables	37963	1223.1	37963	1763.0	37963	2179.3
Orchards						
Berries	1124	208.6	4692	844.1	4830	1171.3
Nursery, Greenhouse						
Other Crops						
Totals	3120366	66023.3	661530	10168.9	42793	3350.6
Total Herbicides, Insecticides, Fungicides: 100 lbs 3894689 79542.8						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	794457	81128	75082	156210
1969	817643	70705	68151	138856
1972	915783	75784	79316	155100
Wet Manure Factor: Tons per litter farrowed				
Wet Manure Defecated: Tons, 1972 1161675				
Nutrients in Wet Manure: Nitrogen, tons 5916				
Phosphorus, tons 1651				
Potash, tons 4410				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	497091	151178	342913
1969	410536	127078	283458
1972	434031	172989	261042
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 2273075 1683721			
Wet Manure Defecated: Tons, 1972 Combined: 3956796			
Nutrients in Wet Manure: Nitrogen, tons 22159			
Phosphorus, tons 3257			
Potash, tons 12783			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		231831	
1969		196220	14355
1972		165112	41123
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 265830 526447			
Nutrients in Wet Manure: Nitrogen, tons 3722 3632			
Phosphorus, tons 588 526			
Potash, tons 2658 3159			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		5370303		
1969		6024711		
1972		6469919	216710	2115600
Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63				
Wet Manure Defecated: Tons, 1972 268181				
Nutrients in Wet Manure: Combined 134360				
Nitrogen, tons 4183 2096				
Phosphorus, tons 1073 537				
Potash, tons 939 470				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	1139759	177563	50511	228077
GRAINS	711999	88635	5252	93887
Wheat	447216	61333	4005	65338
Oats	253057	26278	1224	27502
Barley	1716	152	6	158
Rye	7302	661	16	677
OTHER FIELD CROPS	1411078	57447	5547	56994
Soybeans	1357618	35982	3228	39210
Potatoes	4278	2480	29	2509
Sugar beets				
Field beans	29339	111	5	116
HAY OR GRASS SILAGE	280552	5754	240	5994
PASTURED CROPLAND	203558	2342	82	2424
Cropland used for pasture	182517	2090	55	2145
Improved pasture	21011	252	27	279
VEGETABLES, SWEET CORN, MELONS	44572	14810	2250	17060
ORCHARDS	5473	956	51	1007
BERRIES	329	93	14	107
NURSERY & GREENHOUSE PRODUCTS	758	284	62	346
OTHER CROPS	3573	172	16	188
Total Fertilizer Used, Tons		342167	64033	406200
Percent of Fertilizer Used		84	16	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	470820
Liquid	180456
Total	651276
Primary Nutrients in Fertilizer	331826
Nitrogen	103808
Phosphorus	105889
Potash	122129

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			305809
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	79406	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 115170		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	66023.3	10168.9	3350.6	79542.8
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine	1161675	5916	1651	4410
Cattle	3956796	22952	4098	20491
Sheep	265830	3722	588	2658
Horses	526447	3632	519	3117
Chickens	268181	4183	1073	939
Turkeys	134020	2109	541	473
Total from Livestock, Tons	6312949	42514	8470	32088
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	651276	103808	105889	122129
Lime: Limestone equivalent purchased or applied, tons: Table 8 306809				
Salts: Applied on all highways, tons: Table 9 115170				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-19

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Indiana

PLANNING SUBAREA: Southwest 4.2 COUNTY: Adams

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1995.1	1373.7	1110.1	166.5		
Grains	1287.0	64.3	429.0	42.9		
Hay or Grass Silage	339.0	33.9	282.5	28.2		
Pastured Cropland	252.4	25.2	252.4	25.2		
Other Field Crops	562.0	112.4	351.5	35.1		
Vegetables	102.1	39.1	102.1	15.7	102.1	74.3
Orchards						
Berries	26	1.6	27	3.1	28	6.8
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>12602.5</b>	<b>2662.6</b>	<b>2530.3</b>	<b>316.7</b>	<b>104.9</b>	<b>81.1</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs 152377 3060.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	111577	11136	3927	8363
1969	55182	4589	4369	8959
1972 (1)	83877	6890	6701	13591

Wet Manure Factor: Tons per litter farrowed 7.636  
 Wet Manure Defecated: Tons, 1972 103781  
 Nutrients in Wet Manure: Nitrogen, tons 519  
 Phosphorus, tons 115  
 Potash, tons 394

(1) Hog & Pig Inventory not shown for Indiana. Number estimated in same proportion as litters farrowed.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	23786	8942	14844
1969	18251	7042	11209
1972	(1) 19462	(1) 7509	(1) 11953

Wet Manure Factor: Tons Per Animal 13.11 6.45  
 Wet Manure Defecated: Tons, 1972 98668 77097  
 Wet Manure Defecated: Tons, 1972 Combined: 175765  
 Nutrients in Wet Manure: Nitrogen, tons 984  
 Phosphorus, tons 176  
 Potash, tons 879

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5619	
1969		3926	1223
1972		(1) 3416	4660

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 5500 59555  
 Nutrients in Wet Manure: Nitrogen, Tons 77 411  
 Phosphorus, Tons 12 60  
 Potash, Tons 55 357

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		436705		
1969		668519		
1972		(1) 556834	16720	167200

Wet Manure Factor: Lbs. per bird 82.2 365.0  
 Wet Manure Defecated: Tons, 1972 23081 89.63  
 Nutrients in Wet Manure: Nitrogen, tons 360 Combined 10507  
 Phosphorus, tons 92 164  
 Potash, tons 81 42  
 37

(1) 1972 County figures: State trends applied to each county as county figures not available for 1972.

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	220800	Number I-V farms	1117
Number of farms	1514	Acres in I-V farms	187377
Acres in farms	204537	Cropland I-V farms	161282
Cropland in farms	173631	Harvested cropland	
Harvested cropland in farms	139482	I-V farms	131715

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	45691	6519	2081	8600
GRAINS	27136	2540	152	2692
Wheat	12215	1611	126	1737
Oats	2159	224	26	250
Barley	21	2	0	2
Rye	36	3	0	3
OTHER FIELD CROPS	51069	1322	119	1441
Soybeans	53961	1294	111	1405
Potatoes	47	23	0	23
Sugar beets				
Field beans	850	4	0	4
HAY OR GRASS SILAGE	9820	333	21	354
PASTURED CROPLAND	10094	210	7	217
Cropland used for pasture	9503	207	5	212
Improved pasture	591	3	2	5
VEGETABLES, SWEET CORN, MELONS	1245	433	31	464
ORCHARDS	27	0	0	0
BERRIES	7	0	0	0
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	396	1	0	1
Total Fertilizer Used, Tons		11362	2411	13773
Percent of Fertilizer Used		82	18	100

(1) TABLE 7--FERTILIZER USED IN 1973 TABLE 8--GROUND LIMESTONE EQUIVALENT

Fertilizer Used on Crops	Tons	Tons of Fertilizer Applied		
		Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
Liquid	11717			
Total	32229			
Primary Nutrients in Fertilizer	15844			
Nitrogen	4676			
Phosphorus	5206			
Potash	5962			

(1) Full year information available for only 1973.  
 TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2235	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3242

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2662.6	316.7	81.1	3060.4

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	103781	519	115	394
Cattle: Table 3	175765	984	176	879
Sheep: Table 4	5500	77	12	55
Horses: Table 4	59555	411	60	357
Chickens: Table 5	23081	360	92	81
Turkeys: Table 5	10507	164	42	37
Total from Livestock, Tons	378189	2515	527	1803

Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	32229	4676	5206	5962

Lime: Limestone equivalent purchased or applied, tons: Table 8 8390  
 Salts: Applied on all highways, tons: Table 9 3242

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-20

PLANNING AREA: Lake Erie 4.0 STATE: Indiana  
 PLANNING SUBAREA: Southwest 4.2 COUNTY: Allen

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	7781.0	2139.7	17291	259.3		
Grains	24323	121.6	8108	81.0		
Hay or Grass Silage	354.0	35.4	2950	29.5		
Pastured Cropland	3564	35.6	3564	35.6		
Other Field Crops	79120	1582.4	4945	49.4		
Vegetables	247	9.5	247	3.8	247	18.0
Orchards						
Berries	83	6.2	85	9.9	89	17.3
Nursery, Greenhouse						
Other Crops						
Totals	188687	3930.4	37190	468.5	336	35.3
Total Herbicides, Insecticides, Fungicides: 100 lbs 226213 4434.2						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	55180	6283	5617	11900
1969	63553	5466	5139	10605
1972 (1)	80306	6416	6985	13401
Wet Manure Factor: Tons per litter farrowed		7.636		
Wet Manure Defecated: Tons, 1972		102330		
Nutrients in Wet Manure: Nitrogen, tons		512		
Phosphorus, tons		113		
Potash, tons		389		

(1) County Hog & Pig Inventory not shown--calculated at same ratio as litters farrowed.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	28011	9034	18977
1969	22856	7235	15621
1972	17442	6567	10875
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		86290	70144
Wet Manure Defecated: Tons, 1972 Combined:		156434	
Nutrients in Wet Manure: Nitrogen, tons		876	
Phosphorus, tons		156	
Potash, tons		782	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		70432	
1969		6814	2030
1972		(1) 5954	7734
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		9586	98841
Nutrients in Wet Manure: Nitrogen, Tons		134	682
Phosphorus, Tons		20	99
Potash, Tons		96	593

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		463095		
1969		439635		
1972		(1) 366172	9090	90900
Wet Manure Factor: Lbs. per bird		82.90	365.0	89.63
Wet Manure Defecated: Tons, 1972		15178		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		237		89
Phosphorus, tons		61		23
Potash, tons		53		20

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	65453	9139	3555	12694
GRAINS	29153	4151	452	4603
Wheat	22239	2676	340	3016
Oats	16487	1442	111	1553
Barley	40	5	0	5
Rye	255	20	2	22
OTHER FIELD CROPS	71559	2208	324	2532
Soybeans	70724	1969	312	2281
Potatoes	351	151	0	151
Sugar beets				
Field beans	783	1	1	2
HAY OR GRASS SILAGE	11882	239	8	247
PASTURED CROPLAND	14256	141	3	144
Cropland used for pasture	13283	132	3	135
Improved pasture	973	9	0	9
VEGETABLES, SWEET CORN, MELONS	301	133	18	151
ORCHARDS	58	7	0	7
BERRIES	43	3	0	3
NURSERY & GREENHOUSE PRODUCTS	187	143	3	146
OTHER CROPS	306	0	0	0
Total Fertilizer Used, Tons		16165	4364	20529
Percent of Fertilizer Used		79	21	100

(1) TABLE 7--FERTILIZER USED IN 1973

Item	Tons
Fertilizer Used on Crops: Solid	28680
Liquid	12554
Total	41234
Primary Nutrients in Fertilizer	19500
Nitrogen	5508
Phosphorus	6473
Potash	7519

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	1103	9142	10245
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	5826	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		8450

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	3930.4	468.5	35.3	4434.2
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	102330	512	143	389
Cattle: Table 3	156434	876	156	782
Sheep: Table 4	9586	134	20	96
Horses: Table 4	98841	682	99	593
Chickens: Table 5	15178	237	61	53
Turkeys: Table 5	5712	89	23	20
Total from Livestock, Tons	388081	2530	502	1933
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	41234	5508	6473	7519
Lime: Limestone equivalent purchased or applied, tons: Table 8	10245			
Salts: Applied on all highways, tons: Table 9	8450			

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 7-21

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Indiana  
 PLANNING SUBAREA: Southwest 4.2 COUNTY: DeKalb

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	40391	1110.7	8976	134.6		
Grains	11761	58.8	3920	39.2		
Hay or Grass Silage	3480	31.8	2900	29.0		
Pastured Cropland	2633	26.3	2633	26.3		
Other Field Crops	33360	667.2	2085	20.8		
Vegetables	97	3.7	97	1.5	97	7.1
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	91722	1901.5	20611	251.4	97	7.1
Total Herbicides, Insecticides, Fungicides: 100 lbs					112430	2160.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	27878	2950	2765	5715
1969	27580	2505	2509	5014
1972 (1)	37300	3018	3763	6781
Wet Manure Factor: Tons per litter farrowed				7.636
Wet Manure Defecated: Tons, 1972				51780
Nutrients in Wet Manure: Nitrogen, tons				259
Phosphorus, tons				72
Potash, tons				197

(1) 1972 Hog & Pig Inventory by County not shown. Calculated at same ratio as litters farrowed.

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	21732	8983	12749
1969	18014	6427	11587
1972	14527	7335	7192
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		96382	46388
Wet Manure Defecated: Tons, 1972 Combined:		142770	
Nutrients in Wet Manure: Nitrogen, tons		800	
Phosphorus, tons		143	
Potash, tons		714	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8987	
1969		5910	564
1972		(1) 5242	2149
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		8279	27464
Nutrients in Wet Manure: Nitrogen, Tons		116	190
Phosphorus, Tons		17	27
Potash, Tons		83	165

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		83062		
1969		22504		
1972		(1) 24574		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1019		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		16		
Phosphorus, tons		4		
Potash, tons		4		

(1) State trends applied to county as county figures for 1972 not available.

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	27063	3619	1003	4622
GRAINS	17948	2027	142	2169
Wheat	11300	1387	119	1506
Oats	5903	590	22	612
Barley	20	3	0	3
Rye	526	30	1	31
OTHER FIELD CROPS	29264	947	167	1114
Soybeans	29103	881	167	1048
Potatoes	151	65	0	65
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	9847	294	3	297
PASTURED CROPLAND	10532	118	2	120
Cropland used for pasture	9356	99	2	101
Improved pasture	1176	19	0	19
VEGETABLES, SWEET CORN, MELONS	118	31	5	36
ORCHARDS	5	0	0	0
BERRIES	1	0	0	0
NURSERY & GREENHOUSE PRODUCTS	3	0	0	0
OTHER CROPS	969	8	1	9
Total Fertilizer Used, Tons		7044	1323	8367
Percent of Fertilizer Used		84	16	100

TABLE 7--FERTILIZER USED IN 1973 (From Spring 1973 Fertilizer Report for Indiana)

Item	Tons
Fertilizer Used on Crops: Solid	14325
Liquid	8075
Total	22400
Primary Nutrients in Fertilizer	11440
Nitrogen	3950
Phosphorus	3158
Potash	4332

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972	3110	1732	4842
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3095	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4489

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides 1901.5	Insecticides 251.4	Fungicides 7.1	Total 2160.0
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
Swine: Table 2	Manure 51780	Nitrogen 259	Phosphorus 72	Potash 197
Cattle: Table 3	142770	800	143	714
Sheep: Table 4	8279	116	17	83
Horses: Table 4	27464	190	27	165
Chickens: Table 5	1019	16	4	4
Turkeys: Table 5				
Total from Livestock, Tons	231312	1381	263	1163
Fertilizers:	Tons of Commercial Fertilizers Applied			
Table 7	Total 22400	Nitrogen 3950	Phosphorus 3158	Potash 4332
Lime: Limestone equivalent purchased or applied, tons:	Table 8 4842			
Salts: Applied on all highways, tons: Table 9 4489				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)  
 To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)  
 Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 7-22

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Allen

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	4388.4	1206.8	9752	146.2		
Grains	16162	80.8	5387	53.8		
Hay or Grass Silage	2010	20.1	1675	16.7		
Pastured Cropland	2488	24.8	2488	24.8		
Other Field Crops	5304.0	1060.8	3315	33.1		
Vegetables	381	12.2	381	18.1	381	21.7
Orchards						
Berries	22	1.1	24	4.4	25	6.3
Nursery, Greenhouse						
Other Crops						
Totals	117987	2406.6	23022	297.1	406	28.0
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					141115	2731.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	37221	3889	3703	7592
1969	34938	3138	2980	6118
1972	36100	3097	3224	6321
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				47091
Nutrients in Wet Manure: Nitrogen, tons				235
Phosphorus, tons				66
Potash, tons				179

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	21957	5901	16056
1969	16367	4060	12307
1972	17600	4536	13064
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		59603	84263
Wet Manure Defecated: Tons, 1972 Combined:		113866	
Nutrients in Wet Manure: Nitrogen, tons		806	
Phosphorus, tons		114	
Potash, tons		719	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		10443	
1969		7824	679
1972		6700	1300
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		10787	16614
Nutrients in Wet Manure: Nitrogen, Tons		151	115
Phosphorus, Tons		23	17
Potash, Tons		108	100

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		214815		
1969		288422		
1972		325917		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		13509		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		210		
Phosphorus, tons		54		
Potash, tons		47		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres <sup>(1)</sup>	262144			
Number of farms	1611			
Acres in farms	235862			
Cropland in farms	183745			
Harvested cropland in farms	150169			
Number I-V farms	1040			
Acres in I-V farms	190259			
Cropland I-V farms	164369			
Harvested cropland I-V farms	137549			
CORN	46504	7445	1511	8956
GRAINS	28031	3681	87	3768
Wheat	17706	2536	67	2603
Oats	10038	1119	20	1139
Barley	44	4	0	4
Rye	238	22	0	22
OTHER FIELD CROPS	56076	1573	89	1662
Soybeans	55065	1330	48	1378
Potatoes	6	5	0	5
Sugar beets				
Field beans	909	6	0	6
HAY OR GRASS SILAGE	6978	96	0	96
PASTURED CROPLAND	8912	51	0	51
Cropland used for pasture	8061	41	0	41
Improved pasture	851	10	0	10
VEGETABLES, SWEET CORN, MELONS	433	107	2	109
ORCHARDS	23	1	0	1
BERRIES	6	1	0	1
NURSERY & GREENHOUSE PRODUCTS	34	4	0	4
OTHER CROPS	158	12	2	14
Total Fertilizer Used, Tons		12977	1691	14668
Percent of Fertilizer Used		88	12	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14488
Liquid	6122
Total	20610
Primary Nutrients in Fertilizer	10191
Nitrogen	3261
Phosphorus	3325
Potash	3605

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			9071
Tonnes for Other Recent Years			
1971			11661
1973			18297

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2310	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3350

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	2406.6	297.1	28.0	2731.7
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	47091	235	66	179
Cattle: Table 3	143866	806	114	719
Sheep: Table 4	10787	151	23	108
Horses: Table 4	16614	115	17	100
Chickens: Table 5	13509	210	54	47
Turkeys: Table 5				
Total from Livestock, Tons	231867	1517	304	1153
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	20610	3261	3325	3605
Lime: Limestone equivalent purchased or applied, tons: Table 8 9071				
Salts: Applied on all highways, tons: Table 9 3350				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

TABLE 7-23

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio  
 PLANNING SUBAREA: Southwest 4.2 COUNTY: Auglaize

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	57812	1589.8	12847	192.7		
Grains	17992	89.9	5997	59.9		
Hay or Grass Silage	6330	63.3	5275	52.7		
Pastured Cropland	3343	33.4	3343	33.4		
Other Field Crops	50480	1009.6	3155	31.5		
Vegetables	413	13.2	413	19.7	413	23.5
Orchards	19	.9	21	3.8	22	5.3
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	136389	2800.1	31051	393.7	435	28.8
Total Herbicides, Insecticides, Fungicides: 100 lbs					167875	3222.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	46306	5187	4519	9706
1969	57251	5348	5467	10815
1972	62800	5813	6050	11863
Wet Manure Factor: Tons per litter farrowed		7.45		
Wet Manure Defecated: Tons, 1972		88379		
Nutrients in Wet Manure:		Nitrogen, tons		442
		Phosphorus, tons		124
		Potash, tons		336

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves		
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves	
1964	30462	12160	18302	
1969	30214	11591	18623	
1972	34700	19845	14855	
Wet Manure Factor: Tons Per Animal		13.14	6.45	
Wet Manure Defecated: Tons, 1972		260763	95815	
Wet Manure Defecated: Tons, 1972 Combined:		356578		
Nutrients in Wet Manure:		Nitrogen, tons		1997
		Phosphorus, tons		357
		Potash, tons		1783

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies	
1964		11135		
1969		10419	573	
1972		9100	4450	
Wet Manure Factor: Tons per animal		1.61	12.78	
Wet Manure Defecated: Tons, 1972		14651	18531	
Nutrients in Wet Manure:		Nitrogen, Tons		205
		Phosphorus, Tons		31
		Potash, Tons		117

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised	
1964		203735			
1969		153566			
1972		173643	400	4000	
Wet Manure Factor: Lbs. per bird		82.9	365	89.63	
Wet Manure Defecated: Tons, 1972		7198			
Nutrients in Wet Manure:		Combined			
		Nitrogen, tons			112
		Phosphorus, tons			29
		Potash, tons			25

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	52273	8074	1634	9708
GRAINS	33292	3854	274	4128
Wheat	16790	2230	145	2375
Oats	16108	1605	127	1732
Barley	109	10	0	10
Rye	152	8	2	10
OTHER FIELD CROPS	48663	1377	95	1472
Soybeans	48591	1368	95	1463
Potatoes	2	1	0	1
Sugar beets				
Field beans	1873	14	0	14
HAY OR GRASS SILAGE	19760	575	46	621
PASTURED CROPLAND	12716	182	9	191
Cropland used for pasture	11531	167	7	174
Improved pasture	1185	15	2	17
VEGETABLES, SWEET CORN, MELONS	469	82	89	171
ORCHARDS	25	0	0	0
BERRIES	1	0	0	0
NURSERY & GREENHOUSE PRODUCTS	40	10	0	10
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		14168	2147	16315
Percent of Fertilizer Used		87	13	100

TABLE 7--FERTILIZER USED IN 1972 (July 1, 1972-June 30, 1973)

Item	Tons
Fertilizer Used on Crops: Solid	21468
Liquid	5715
Total	27183
Primary Nutrients in Fertilizer	13497
Nitrogen	3644
Phosphorus	4800
Potash	5053

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			10532
Tonnages for Other Recent Years			
1971			16612
1973			17177

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "e" Mile
1970-71		
1971-72		
1972-73	2600	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3771

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2800.1	393.7	28.8	3222.6
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	88379	442	124	336
Cattle: Table 3	356578	1997	357	1783
Sheep: Table 4	14651	205	31	147
Horses: Table 4	18531	128	19	111
Chickens: Table 5	7198	112	29	25
Turkeys: Table 5	252	4	1	1
Total from Livestock, Tons	485589	2888	561	2403
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7		Nitrogen	Phosphorus	Potash
	27183	3644	4800	5053
Lime: Limestone equivalent purchased or applied, tons: Table 8 10532				
Salts: Applied on all highways, tons: Table 9 3771				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Crawford

TABLE 7-24

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	44552	1225.1	9900	148.5		
Grains	17016	85.0	5672	56.7		
Hay or Grass Silage	3690	36.9	3075	30.7		
Pastured Cropland	4193	41.9	4193	41.9		
Other Field Crops	49360	987.2	3085	30.8		
Vegetables	8	.3	8	.4	8	.5
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	118819	2376.4	25933	309.0	8	.5
Total Herbicides, Insecticides, Fungicides: 100 lbs				144760	2685.9	

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	57417	4660	4892	9552
1969	51297	4339	3913	8252
1972	55100	4344	4520	8864
Wet Manure Factor: Tons per litter farrowed		7.45		
Wet Manure Defecated: Tons, 1972		66037		
Nutrients in Wet Manure: Nitrogen, tons		330		
Phosphorus, tons		92		
Potash, tons		251		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	27447	7745	19696
1969	21431	6098	15333
1972	23400	6237	17163
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		81954	110701
Wet Manure Defecated: Tons, 1972 Combined:		192655	
Nutrients in Wet Manure: Nitrogen, tons		1079	
Phosphorus, tons		193	
Potash, tons		962	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		27489	
1969		24986	715
1972		21300	2495
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		34293	31886
Nutrients in Wet Manure: Nitrogen, Tons		480	220
Phosphorus, Tons		72	32
Potash, Tons		343	191

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		130805		
1969		122225		
1972		138193		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		5728		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		89		
Phosphorus, tons		23		
Potash, tons		20		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	50139	7800	1855	9655
GRAINS	29609	3927	153	4080
Wheat	19208	2717	105	2822
Oats	9923	1154	42	1196
Barley	33	5	0	5
Rye	107	45	5	50
OTHER FIELD CROPS	49348	1258	176	1434
Soybeans	48920	1171	153	1324
Potatoes	1	0	0	0
Sugar beets				
Field beans	1230	2	0	2
HAY OR GRASS SILAGE	11615	116	2	118
PASTURED CROPLAND	16328	129	0	129
Cropland used for pasture	1445	112	0	112
Improved pasture	1483	17	0	17
VEGETABLES, SWEET CORN, MELONS	9	0	0	0
ORCHARDS	4	0	0	0
BERRIES	5	0	0	0
NURSERY & GREENHOUSE PRODUCTS	5	9	0	9
OTHER CROPS	60	26	0	26
Total Fertilizer Used, Tons		13267	2186	15453
Percent of Fertilizer Used		86	14	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	18943
Liquid	6600
Total	25543
Primary Nutrients in Fertilizer	12113
Nitrogen	3403
Phosphorus	4021
Potash	4689

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			28266
Tonnages for Other Recent Years			
1971			15000
1973			39508

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2847	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4129

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	2376.4	309.0	.5	2685.9
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	66037	330	92	251
Cattle: Table 3	192655	1079	193	263
Sheep: Table 4	34293	480	72	343
Horses: Table 4	31886	220	32	191
Chickens: Table 5	5728	89	23	20
Turkeys: Table 5				
Total from Livestock, Tons	330599	2198	432	1768
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	25543	3403	4021	4689
Lime: Limestone equivalent purchased or applied, tons: Table 8 28266				
Salts: Applied on all highways, tons: Table 9 4129				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-25

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Defiance

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	32185	920.8	7411	111.6		
Grains	20615	103.0	6872	68.7		
Hay or Grass Silage	1860	18.6	1550	15.5		
Pastured Cropland	2005	20.0	2005	20.0		
Other Field Crops	64240	1284.8	4015	40.1		
Vegetables	361	11.5	361	17.2	361	20.5
Orchards						
Berries	119	8.2	124	20.2	131	25.5
Nursery, Greenhouse						
Other Crops						
Totals	122685	2366.9	22368	293.3	492	46.0
Total Herbicides, Insecticides, Fungicides: 100 lbs					14545	2706.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	18262	1922	1925	3847
1969	22757	1976	1791	3767
1972	24600	1995	2077	4072

Wet Manure Factor: Tons per litter farrowed 7.45  
 Wet Manure Defecated: Tons, 1972 30336  
 Nutrients in Wet Manure: Nitrogen, tons 152  
 Phosphorus, tons 42  
 Potash, tons 115

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	15315	5259	10056
1969	10797	3747	7050
1972	11400	5103	6297

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 67053 40616  
 Wet Manure Defecated: Tons, 1972 Combined: 107669  
 Nutrients in Wet Manure: Nitrogen, tons 603  
 Phosphorus, tons 108  
 Potash, tons 538

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3744	
1969		2864	653
1972		1900	1239

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 3059 15834  
 Nutrients in Wet Manure: Nitrogen, Tons 43 109  
 Phosphorus, Tons 6 16  
 Potash, Tons 31 95

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		171645		
1969		237936		
1972		268868		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 11145  
 Nutrients in Wet Manure: Nitrogen, tons 174  
 Phosphorus, tons 45  
 Potash, tons 39

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	261680	Number I-V farms	870
Number of farms	1375	Acres in I-V farms	199429
Acres in farms	230410	Cropland I-V farms	166910
Cropland in farms	188220	Harvested cropland I-V farms	127835
Harvested cropland in farms	140297		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	28503	4743	943	5086
GRAINS	30137	3379	122	3501
Wheat	17238	2177	86	2263
Oats	12219	1128	36	1164
Barley	2	0	0	0
Rye	501	58	0	58
OTHER FIELD CROPS	58374	1155	88	1543
Soybeans	57875	1195	56	1251
Potatoes	314	178	12	190
Sugar beets				
Field beans	3494	7	0	7
HAY OR GRASS SILAGE	8439	230	0	230
PASTURED CROPLAND	7582	96	0	96
Cropland used for pasture	6897	86	0	86
Improved pasture	685	10	0	10
VEGETABLES, SWEET CORN, MELONS	410	148	7	155
ORCHARDS	98	7	0	7
BERRIES	50	50	0	50
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	40	1	0	7
Total Fertilizer Used, Tons		9466	1160	10676
Percent of Fertilizer Used		89	11	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12249
Liquid	3508
Total	15757
Primary Nutrients in Fertilizer	7935
Nitrogen	2574
Phosphorus	2521
Potash	2840

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			7492
Tonnages for Other Recent Years			
1971			7309
1973			8837

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1740	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2524		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	2366.9	293.3	46.0	2706.2
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	30336	152	42	115
Cattle: Table 3	107669	603	108	538
Sheep: Table 4	3059	43	6	31
Horses: Table 4	15834	109	16	95
Chickens: Table 5	11145	174	45	39
Turkeys: Table 5				
Total from Livestock, Tons	168043	1081	217	818
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	15757	2574	2521	2840
Lime: Limestone equivalent purchased or applied, tons: Table 8	7492			
Salts: Applied on all highways, tons: Table 9 2524				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-26

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Erie

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	19939	518.3	11331	66.1		
Grains	7685	38.1	2562	25.6		
Hay or Grass Silage	1560	15.6	1300	13.0		
Pastured Cropland	858	8.5	858	8.5		
Other Field Crops	20320	406.4	1270	12.7		
Vegetables	3129	109.7	3129	163.2	3129	194.9
Orchards						
Berries	878	42.2	1011	185.2	1037	257.4
Nursery, Greenhouse						
Other Crops						
Totals	51669	1169.1	11861	474.6	11466	452.3
Total Herbicides, Insecticides, Fungicides: 100 lbs 73996 2096.0						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	7943	796	731	1527
1969	7108	793	663	1456
1972	7400	743	773	1516
Wet Manure Factor: Tons per litter farrowed				7.15
Wet Manure Defecated: Tons, 1972				11294
Nutrients in Wet Manure: Nitrogen, tons				56
Phosphorus, tons				16
Potash, tons				43

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	8085	3842	4243
1969	8212	3604	4608
1972	9000	5181	3819
Wet Manure Factor: Tons Per Animal		13.11	6.45
Wet Manure Defecated: Tons, 1972		72020	22698
Wet Manure Defecated: Tons, 1972 Combined:		24718	
Nutrients in Wet Manure: Nitrogen, tons		530	
Phosphorus, tons		95	
Potash, tons		474	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3346	
1969		2489	437
1972		2000	1125
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3220	18212
Nutrients in Wet Manure: Nitrogen, Tons		45	126
Phosphorus, Tons		7	18
Potash, Tons		32	109

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		77745		
1969		73177		
1972		80769		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3348		
Nutrients in Wet Manure: Nitrogen, tons		52	Combined	
Phosphorus, tons		13		
Potash, tons		12		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	18879	3753	632	4385
GRAINS	11290	1821	73	1894
Wheat	9942	1297	66	1363
Oats	3944	488	7	495
Barley	107	17	0	17
Rye	265	15	0	15
OTHER FIELD CROPS	17215	1340	137	1477
Soybeans	15198	723	14	767
Potatoes	36	14	7	21
Sugar beets				
Field beans	82	0	0	0
HAY OR GRASS SILAGE	1862	273	1	274
PASTURED CROPLAND	3719	53	0	53
Cropland used for pasture	2894	37	0	37
Improved pasture	825	16	0	16
VEGETABLES, SWEET CORN, MELONS	3897	1112	85	1197
ORCHARDS	1222	161	0	161
BERRIES	23	5	0	5
NURSERY & GREENHOUSE PRODUCTS	24	9	1	10
OTHER CROPS	221	55	0	55
Total Fertilizer Used, Tons		8582	929	9511
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12168
Liquid	1118
Total	13586
Primary Nutrients in Fertilizer	6829
Nitrogen	1884
Phosphorus	2063
Potash	2882

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			11889
Tonnages for Other Recent Years			
1971			22667
1973			11658

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2735	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3967

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1169.1	474.6	452.3	2096.0
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	11294	56	16	13
Cattle: Table 3	94718	530	95	474
Sheep: Table 4	3220	45	7	32
Horses: Table 4	18212	126	18	109
Chickens: Table 5	3348	52	13	12
Turkeys: Table 5				
Total from Livestock, Tons	130792	809	119	670
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	13586	1884	2063	2882
Lime: Limestone equivalent purchased or applied, tons: Table 8 11889				
Salts: Applied on all highways, tons: Table 9 3967				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-27

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio  
 PLANNING SUBAREA: Southwest 4.2 COUNTY: Fulton

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	76988	2117.1	17108	256.6		
Grains	12320	61.5	4107	41.0		
Hay or Grass Silage	2160	21.6	1800	18.0		
Pastured Cropland	1119	11.1	1119	11.1		
Other Field Crops	44640	892.8	2790	27.9		
Vegetables	2474	79.1	2474	117.8	2474	140.6
Orchards						
Berries	86	4.8	96	17.0	99	22.9
Nursery, Greenhouse						
Other Crops						
Totals	139787	3188.0	29494	489.4	2573	163.5
Total Herbicides, Insecticides, Fungicides: 100 lbs					171854	3840.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	56784	1482	4554	9036
1969	71393	3652	3488	7140
1972	78400	3842	3999	7841
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				58415
Nutrients in Wet Manure: Nitrogen, tons				292
Phosphorus, tons				82
Potash, tons				222

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	45224	5932	39292
1969	39548	6340	33208
1972	42400	7371	35029
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		96855	225937
Wet Manure Defecated: Tons, 1972 Combined:		322792	
Nutrients in Wet Manure: Nitrogen, tons		1808	
Phosphorus, tons		323	
Potash, tons		1614	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4532	
1969		2922	670
1972		2200	1538
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3542	19656
Nutrients in Wet Manure: Nitrogen, tons		50	136
Phosphorus, tons		7	20
Potash, tons		35	118

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		485795		
1969		560494		
1972		640138	18300	120000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		26534		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		474		8718
Phosphorus, tons		106		136
Potash, tons		93		31

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	77513	14162	4777	18939
GRAINS	22427	3270	154	3424
Wheat	16249	2541	139	2680
Oats	5468	663	13	676
Barley	66	6	1	7
Rye	628	59	0	59
OTHER FIELD CROPS	48057	3059	127	3186
Soybeans	46708	2440	92	2532
Potatoes	838	528	2	530
Sugar beets				
Field beans	80	0	1	1
HAY OR GRASS SILAGE	8524	258	0	258
PASTURED CROPLAND	4254	65	7	72
Cropland used for pasture	3990	60	7	67
Improved pasture	264	5	0	5
VEGETABLES, SWEET CORN, MELONS	2811	1003	266	1269
ORCHARDS	103	11	0	11
BERRIES	24	3	0	3
NURSERY & GREENHOUSE PRODUCTS	27	1	0	1
OTHER CROPS	50	1	0	1
Total Fertilizer Used, Tons		21833	5332	27165
Percent of Fertilizer Used		80	20	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	33706
Liquid	23340
Total	57046
Primary Nutrients in Fertilizer	27219
Nitrogen	10015
Phosphorus	6943
Potash	10261

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			13725
Tonnages for Other Recent Years			
1971			21772
1973			15252

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3835	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5562

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3188.0	489.4	163.5	3840.9
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	58415	292	82	222
Cattle: Table 3	322792	1808	323	1614
Sheep: Table 4	3542	50	7	35
Horses: Table 4	19656	136	20	118
Chickens: Table 5	26534	474	106	93
Turkeys: Table 5	8718	136	35	31
Total from Livestock, Tons	439657	2836	573	2113
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	57046	10015	6943	10261
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	13725			
Salts: Applied on all highways, tons: Table 9 5562				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-28

PLANNING AREA: Lake Erie 4.0 STATE: Ohio  
 PLANNING SUBAREA: Southwest 4.2 COUNTY: Hancock

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	71359	1962.3	15858	237.8		
Grains	24640	123.2	8213	82.1		
Hay or Grass Silage	3480	34.8	2900	29.0		
Pastured Cropland	2456	24.5	2456	24.5		
Other Field Crops	88240	1764.8	5515	55.1		
Vegetables	1137	36.1	1137	34.1	1137	61.6
Orchards						
Berries	50	2.4	57	10.4	58	11.4
Nursery, Greenhouse						
Other Crops						
Totals	197362	3948.4	36136	493.0	1195	79.0
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					228623	4520.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	51899	5735	5312	11047
1969	42418	4275	4747	8422
1972	44000	4291	4445	8736
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				65083
Nutrients in Wet Manure: Nitrogen, tons				325
Phosphorus, tons				91
Potash, tons				247

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	23102	6098	17004
1969	18124	4623	13501
1972	19200	5103	14097
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		67053	90926
Wet Manure Defecated: Tons, 1972 Combined:		157979	
Nutrients in Wet Manure: Nitrogen, tons		885	
Phosphorus, tons		158	
Potash, tons		790	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		22974	
1969		20028	534
1972		16300	1544
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		26243	19732
Nutrients in Wet Manure: Nitrogen, tons		367	136
Phosphorus, tons		55	20
Potash, tons		262	118

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		198515		
1969		211731		
1972		239256	1500	15000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		9917		
Nutrients in Wet Manure: Combined		94.6		
Nitrogen, tons		155		15
Phosphorus, tons		40		4
Potash, tons		35		3

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	70173	11323	2755	14078
GRAINS	40722	5349	259	5618
Wheat	30208	4237	222	4459
Oats	10061	1074	47	1121
Barley	120	6	0	6
Rye	285	28	0	28
OTHER FIELD CROPS	93250	3457	204	3661
Soybeans	89887	2327	84	2411
Potatoes	182	147	0	147
Sugar beets				
Field beans	7448	7	0	7
HAY OR GRASS SILAGE	10108	143	15	158
PASTURED CROPLAND	9439	69	0	69
Cropland used for pasture	8396	52	0	52
Improved pasture	1043	17	0	17
VEGETABLES, SWEET CORN, MELONS	1292	511	95	606
ORCHARDS	68	5	1	6
BERRIES	2	0	0	0
NURSERY & GREENHOUSE PRODUCTS	61	0	55	55
OTHER CROPS	32	0	0	0
Total Fertilizer Used, Tons		20864	3394	24258
Percent of Fertilizer Used		86	14	100

TABLE 7--FERTILIZER USED IN 1972 (July 1, 1972-June 30, 1973)

Item	Tons
Fertilizer Used on Crops: Solid	22754
Liquid	8532
Total	31286
Primary Nutrients in Fertilizer	15932
Nitrogen	5061
Phosphorus	4851
Potash	6020

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			13019
Tonnes for Other Recent Years			
1971			47103
1973			19288

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2150	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		3118

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3948.4	493.0	79.0	4520.4
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	65083	325	91	247
Cattle: Table 3	157979	885	158	790
Sheep: Table 4	26243	367	55	262
Horses: Table 4	19732	136	20	118
Chickens: Table 5	9917	155	40	35
Turkeys: Table 5	946	15	4	3
Total from Livestock, Tons	279900	1883	368	1455
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	31286	5061	4851	6020
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	13019			
Salts: Applied on all highways, tons: Table 9 3118				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 7-29

GREAT LAKES BASIN MATERIAL USAGE INVENTORY  
Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio  
PLANNING SUBAREA: Southwest 4.2 COUNTY: Henry

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	714.55	1965.0	15879	238.1		
Grains	19699	98.4	6567	65.6		
Hay or Grass Silage	2640	26.4	2200	22.0		
Pastured Cropland	1265	12.6	1265	12.6		
Other Field Crops	644.80	1289.6	4030	40.3		
Vegetables	34.02	108.8	34.02	161.9	34.02	193.3
Orchards						
Berries	18	1.1	20	3.3	20	4.3
Nursery, Greenhouse						
Other Crops						
Totals	162959	3501.9	33363	543.8	3422	197.6
Total Herbicides, Insecticides, Fungicides:			100 lbs	199744	4243.3	

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	20592	1958	1803	3761
1969	23026	1621	1660	3281
1972	24900	1739	1809	3548
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				26433
Nutrients in Wet Manure: Nitrogen, tons				132
Phosphorus, tons				37
Potash, tons				100

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	19474	4261	15213
1969	13744	3686	10058
1972	11100	5481	8919
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		72020	57528
Wet Manure Defecated: Tons, 1972 Combined:		129548	
Nutrients in Wet Manure: Nitrogen, tons		725	
Phosphorus, tons		130	
Potash, tons		648	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3615	
1969		4103	112
1972		2400	1001
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3864	12793
Nutrients in Wet Manure: Nitrogen, Tons		54	88
Phosphorus, Tons		8	13
Potash, Tons		39	77

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		469295		
1969		513142		
1972		579850	1600	16000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		24035		
Nutrients in Wet Manure:			Combined	1009
Nitrogen, tons		375		16
Phosphorus, tons		96		4
Potash, tons		84		4

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	65555	10058	3283	13341
GRAINS	34815	4459	271	4730
Wheat	25312	3537	251	3788
Oats	9314	910	20	930
Barley	11	1	0	1
Rye	148	11	0	11
OTHER FIELD CROPS	80795	2841	352	3193
Soybeans	74748	1549	76	1625
Potatoes	57	36	0	36
Sugar beets				
Field beans	741	1	0	1
HAY OR GRASS SILAGE	8466	185	5	190
PASTURED CROPLAND	5069	38	0	38
Cropland used for pasture	4734	37	0	37
Improved pasture	335	1	0	1
VEGETABLES, SWEET CORN, MELONS	3866	1198	116	1314
ORCHARDS	18	2	0	2
BERRIES	5	1	0	1
NURSERY & GREENHOUSE PRODUCTS	6	3	0	3
OTHER CROPS	105	6	0	6
Total Fertilizer Used, Tons		18792	4027	22819
Percent of Fertilizer Used		82	18	100

TABLE 7--FERTILIZER USED IN 1972 (July 1, 1972-June 30, 1973)

Item	Tons
Fertilizer Used on Crops: Solid	26742
Liquid	10951
Total	37693
Primary Nutrients in Fertilizer	18754
Nitrogen	6546
Phosphorus	5592
Potash	6616

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			903
Tonnages for Other Recent Years			
1971			6839
1973			1740

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3500	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5076

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3501.9	543.8	197.6	4243.3
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	26433	132	37	100
Cattle: Table 3	129548	725	130	648
Sheep: Table 4	3864	54	8	39
Horses: Table 4	12793	88	13	77
Chickens: Table 5	24035	375	96	84
Turkeys: Table 5	1009	16	4	4
Total from Livestock, Tons	197682	1390	288	952
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7	37693	Nitrogen	Phosphorus	Potash
		6546	5592	6616
Lime: Limestone equivalent purchased or applied, tons: Table 8 903				
Salts: Applied on all highways, tons: Table 9 5076				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Huron

TABLE 7-30

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	50085	1377.3	11130	166.9		
Grains	19761	98.8	6587	65.8		
Hay or Grass Silage	4050	40.5	3375	33.7		
Pastured Cropland	2688	26.8	2688	26.8		
Other Field Crops	61920	1238.4	3870	38.7		
Vegetables	3044	97.4	3044	144.9	3044	173.0
Orchards						
Berries	239	12.1	271	49.0	280	67.5
Nursery, Greenhouse						
Other Crops						
Totals	141787	2891.3	30965	525.8	3324	240.5
Total Herbicides, Insecticides, Fungicides:		100 lbs		176076		3657.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	21569	2711	1878	4589
1969	25242	2029	2124	4153
1972	27600	2225	2316	4541
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				33830
Nutrients in Wet Manure: Nitrogen, tons				169
Phosphorus, tons				47
Potash, tons				122

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	19825	7744	12081
1969	15216	5989	9227
1972	16600	8127	8473
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		106789	54651
Wet Manure Defecated: Tons, 1972 Combined:		161440	
Nutrients in Wet Manure: Nitrogen, tons		904	
Phosphorus, tons		161	
Potash, tons		807	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		17077	
1969		16114	727
1972		12300	1616
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		19803	20652
Nutrients in Wet Manure: Nitrogen, Tons		277	143
Phosphorus, Tons		42	21
Potash, Tons		198	124

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		106185		
1969		59474		
1972		67206	5000	50000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		2786		
Nutrients in Wet Manure: Nitrogen, tons		43	Combined	3153
Phosphorus, tons		11		49
Potash, tons		10		13

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V GENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	42026	8606	1059	9665
GRAINS	31275	1432	82	1514
Wheat	19903	3004	50	3054
Oats	10124	1290	31	1321
Barley	156	21	0	21
Rye	545	54	1	55
OTHER FIELD CROPS	58782	1920	88	2008
Soybeans	57742	1533	70	1603
Potatoes	406	241	0	241
Sugar beets				
Field beans	1212	1	0	1
HAY OR GRASS SILAGE	10829	192	5	197
PASTURED CROPLAND	10506	111	0	111
Cropland used for pasture	8504	96	0	96
Improved pasture	2002	18	0	18
VEGETABLES, SWEET CORN, MELONS	3459	1038	288	1326
ORCHARDS	314	46	0	46
BERRIES	19	1	14	15
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	175	4	0	4
Total Fertilizer Used, Tons		16354	1536	17890
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	20430
Liquid	4520
Total	24950
Primary Nutrients in Fertilizer	12492
Nitrogen	4170
Phosphorus	3728
Potash	4594

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			12739
Tonnages for Other Recent Years			
1971			35940
1973			45944

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3043	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
	4444	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2891.3	525.8	240.5	3657.6
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure	Nitrogen	Phosphorus	Potash	
Swine: Table 2	33830	169	47	129
Cattle: Table 3	161440	904	161	807
Sheep: Table 4	19803	277	42	198
Horses: Table 4	20652	143	21	124
Chickens: Table 5	2786	43	11	10
Turkeys: Table 5	3153	49	13	11
Total from Livestock, Tons	241664	1585	295	1279
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	24950	4170	3728	4594
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	12739			
Salts: Applied on all highways, tons: Table 9				
	4444			

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-31

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Lucas

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	29097	800.1	6466	96.9		
Grains	5428	27.1	1809	18.0		
Hay or Grass Silage	990	9.9	825	8.2		
Pastured Cropland	432	4.3	432	4.3		
Other Field Crops	26640	532.8	1665	16.6		
Vegetables	3120	99.8	3120	148.5	3120	177.3
Orchards						
Berries	339	17.0	388	70.4	399	97.1
Nursery, Greenhouse						
Other Crops						
Totals	66046	1491.0	14705	362.9	3519	274.4
Total Herbicides, Insecticides, Fungicides: 100 lbs					84270	2128.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	10551	947	951	1898
1969	10470	959	962	1921
1972	10800	971	1011	1982
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				14667
Nutrients in Wet Manure: Nitrogen, tons				73
Phosphorus, tons				21
Potash, tons				56

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	3247	619	3298
1969	3968	499	3469
1972	4300	1890	2410
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		24835	15545
Wet Manure Defecated: Tons, 1972 Combined:		40380	
Nutrients in Wet Manure: Nitrogen, tons		226	
Phosphorus, tons		40	
Potash, tons		202	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		792	
1969		421	250
1972		400	1620
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		644	20704
Nutrients in Wet Manure: Nitrogen, Tons		9	143
Phosphorus, Tons		1	21
Potash, Tons		6	124

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		79036		
1969		113068		
1972		127767	6000	7500
Wet Manure Factor: Lbs. per bird		82.9	365	82.63
Wet Manure Defecated: Tons, 1972		5196		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		83	1431	
Phosphorus, tons		21	6	
Potash, tons		19	5	

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	21657	4354	1218	5572
GRAINS	9615	1330	15	1345
Wheat	7149	1054	12	1066
Oats	2320	265	3	268
Barley	0	0	0	0
Rye	124	11	0	11
OTHER FIELD CROPS	31580	2168	238	2406
Soybeans	28319	1156	67	1223
Potatoes	647	348	0	348
Sugar beets				
Field beans	5	0	0	0
HAY OR GRASS SILAGE	2819	46	0	46
PASTURED CROPLAND	1460	24	0	24
Cropland used for pasture	1353	22	0	22
Improved pasture	107	2	0	2
VEGETABLES, SWEET CORN, MELONS	3545	1321	119	1440
ORCHARDS	455	108	0	108
BERRIES	21	2	0	2
NURSERY & GREENHOUSE PRODUCTS	213	95	1	96
OTHER CROPS	66	0	0	0
Total Fertilizer Used, Tons		9448	1591	11039
Percent of Fertilizer Used		86	14	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	11386
Liquid	2091
Total	13477
Primary Nutrients in Fertilizer	6672
Nitrogen	2433
Phosphorus	2019
Potash	2220

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			9970
Tonnages for Other Recent Years			
1971			9635
1973			11801

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	7075	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 10262		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1491.0	362.9	274.4	2128.3
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Manure: Kind of Livestock	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	14667	73	21	56
Cattle: Table 3	40380	226	40	202
Sheep: Table 4	644	9	1	6
Horses: Table 4	20704	143	21	124
Chickens: Table 5	5296	83	21	19
Turkeys: Table 5	1431	22	6	5
Total from Livestock, Tons	83122	556	110	412
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	13477	2433	2019	2220
Lime: Limestone equivalent purchased or applied, tons: Table 8 9970				
Salts: Applied on all highways, tons: Table 9 10262				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-32

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Mercer

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	68974	1896.7	15328	229.9		
Grains	25738	128.6	8579	85.7		
Hay or Grass Silage	7650	76.5	6375	63.7		
Pastured Cropland	4584	45.8	4584	45.8		
Other Field Crops	64160	1283.2	4010	40.1		
Vegetables	1134	36.3	1134	54.0	1134	64.4
Orchards						
Berries	40	2.2	45	8.0	47	10.8
Nursery, Greenhouse						
Other Crops						
Totals	172280	3462.3	40055	527.2	1181	75.2
Total Herbicides, Insecticides, Fungicides: 100 lbs					213516	4071.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	82093	9182	8180	17362
1969	86341	8684	8333	17017
1972	91800	8866	9227	18093
Wet Manure Factor: Tons per litter farrowed		7.45		
Wet Manure Defecated: Tons, 1972		134793		
Nutrients in Wet Manure: Nitrogen, tons		674		
Phosphorus, tons		189		
Potash, tons		512		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	35227	17037	18190
1969	35413	17229	18184
1972	40300	30996	9304
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		407287	60011
Wet Manure Defecated: Tons, 1972 Combined:		467298	
Nutrients in Wet Manure: Nitrogen, tons		2617	
Phosphorus, tons		467	
Potash, tons		2336	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		6568	
1969		7132	603
1972		6200	573
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		9982	7323
Nutrients in Wet Manure: Nitrogen, Tons		440	51
Phosphorus, Tons		21	7
Potash, Tons		100	44

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		662725		
1969		1016878		
1972		1149072	123000	1230000
Wet Manure Factor: Lbs. per bird		82.9	365	89.61
Wet Manure Defecated: Tons, 1972		47629		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		743	77297	
Phosphorus, tons		191	309	
Potash, tons		167	271	

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	66059	9917	1902	11819
GRAINS	41631	5071	235	5306
Wheat	20861	2803	194	2997
Oats	20291	2222	17	2263
Barley	111	7	0	7
Rye	293	31	0	31
OTHER FIELD CROPS	56711	1124	282	1706
Soybeans	51247	1191	273	1464
Potatoes	323	200	0	200
Sugar beets				
Field beans	1759	14	0	14
HAY OR GRASS SILAGE	23786	856	45	901
PASTURED CROPLAND	18323	369	8	377
Cropland used for pasture		16823	332	8
Improved pasture		1500	37	0
VEGETABLES, SWEET CORN, MELONS	1289	398	14	372
ORCHARDS	49	6	0	6
BERRIES	6	2	0	2
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	163	5	11	16
Total Fertilizer Used, Tons		18022	2497	20519
Percent of Fertilizer Used		88	12	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons (July 1, 1972-June 30, 1973)
Fertilizer Used on Crops: Solid	26364
Liquid	8597
Total	34961
Primary Nutrients in Fertilizer	17712
Nitrogen	4991
Phosphorus	6517
Potash	6204

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			25547
Tonnages for Other Recent Years			
1971			29383
1973			22281

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2500	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
	3626	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3469.3	527.2	75.2	4071.7
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	134793	674	189	512
Cattle: Table 3	467298	2617	467	2336
Sheep: Table 4	9982	440	21	100
Horses: Table 4	7323	51	7	44
Chickens: Table 5	47629	743	191	167
Turkeys: Table 5	77297	1210	310	271
Total from Livestock, Tons	744322	5435	1185	3430
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	34961	4991	6517	6204
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	25547			
Salts: Applied on all highways, tons: Table 9				
	3626			

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-33

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Ottawa

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1711.8	311.8	251.1	38.1		
Grains	10368	51.8	3456	34.5		
Hay or Grass Silage	3690	36.9	3075	30.7		
Pastured Cropland	478	4.7	478	4.7		
Other Field Crops	3584.0	716.8	224.0	22.4		
Vegetables	1322	42.3	1322	62.9	1322	75.1
Orchards						
Berries	1060	49.9	1225	225.4	1256	314.5
Nursery, Greenhouse						
Other Crops						
Totals	64206	1217.2	7434.0	478.7	2578	389.6
Total Herbicides, Insecticides, Fungicides: 100 lbs 81124 2025.5						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	5913	527	461	988
1969	5643	540	510	1050
1972	5900	538	560	1098
Wet Manure Factor: Tons per litter farrowed 7.45				
Wet Manure Defecated: Tons, 1972 8180				
Nutrients in Wet Manure: Nitrogen, tons 41				
Phosphorus, tons 11				
Potash, tons 31				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	7769	2269	5500
1969	5645	1876	3769
1972	6200	2835	3365
Wet Manure Factor: Tons Per Animal 13.74 6.45			
Wet Manure Defecated: Tons, 1972 37252 21704			
Wet Manure Defecated: Tons, 1972 Combined: 58956			
Nutrients in Wet Manure: Nitrogen, tons 330			
Phosphorus, tons 59			
Potash, tons 295			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1659	
1969		1040	200
1972		800	856
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 1288 10940			
Nutrients in Wet Manure: Nitrogen, Tons 18 75			
Phosphorus, Tons 3 11			
Potash, Tons 13 66			

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		122995		
1969		140324		
1972		158566		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 6573				
Nutrients in Wet Manure:				
Nitrogen, tons 103				
Phosphorus, tons 26				
Potash, tons 23				

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used Dry	Liquid	Total
CORN	10923	1557	476	2033
GRAINS	16075	1772	235	2007
Wheat	10862	1300	120	1420
Oats	4686	436	44	480
Barley	107	9	1	10
Rye	227	20	0	20
OTHER FIELD CROPS	36098	2052	681	2733
Soybeans	32294	1071	288	1359
Potatoes	1	1	0	1
Sugar beets				
Field beans	78	3	0	3
HAY OR GRASS SILAGE	10382	188	10	198
PASTURED CROPLAND	1625	16	0	16
Cropland used for pasture	7471	11	0	11
Improved pasture	154	5	0	5
VEGETABLES, SWEET CORN, MELONS	2823	223	317	540
ORCHARDS	1502	316	50	366
BERRIES	9	1	0	1
NURSERY & GREENHOUSE PRODUCTS	2	1	0	1
OTHER CROPS	133	3	0	3
Total Fertilizer Used, Tons		6832	1769	8601
Percent of Fertilizer Used		79	21	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	8138
Liquid	3510
Total	11648
Primary Nutrients in Fertilizer	5759
Nitrogen	1383
Phosphorus	2280
Potash	2096

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3009
Tonnages for Other Recent Years			
1971			3587
1973			1837

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	5050	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 7325		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1217.2	478.7	389.6	2025.5
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	8180	41	11	31
Cattle: Table 3	58956	330	59	295
Sheep: Table 4	1288	18	3	13
Horses: Table 4	10940	75	11	66
Chickens: Table 5	6593	103	26	23
Turkeys: Table 5				
Total from Livestock, Tons	85957	567	110	428
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	11648	1383	2280	2096
Lime: Limestone equivalent purchased or applied, tons: Table 8 3009				
Salts: Applied on all highways, tons: Table 9 1837				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 7-34

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0

STATE: Ohio

PLANNING SUBAREA: Southwest 4.2

COUNTY: Paulding

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	52170	1142.9	11660	174.9		
Grains	25250	126.2	8417	84.1		
Hay or Grass Silage	1690	16.5	1375	13.7		
Pastured Cropland	1284	12.8	1284	12.8		
Other Field Crops	7104	1420.8	11110	111.1		
Vegetables	110	3.5	110	5.2	110	6.3
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	151804	3022.7	27286	335.1	110	6.3
Total Herbicides, Insecticides, Fungicides: 100 lbs					179200	3364.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	8049	917	786	1703
1969	6576	724	613	1337
1972	6800	677	705	1382
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				10296
Nutrients in Wet Manure: Nitrogen, tons				161
Phosphorus, tons				11
Potash, tons				36

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	6867	2295	4572
1969	4774	1795	2979
1972	5100	2079	3021
Wet Manure Factor: Tons Per Animal		13.74	6.45
Wet Manure Defecated: Tons, 1972		27318	19485
Wet Manure Defecated: Tons, 1972 Combined:		46803	
Nutrients in Wet Manure: Nitrogen, tons		252	
Phosphorus, tons		47	
Potash, tons		234	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3512	
1969		1813	275
1972		1300	747
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2093	9547
Nutrients in Wet Manure: Nitrogen, Tons		29	66
Phosphorus, Tons		4	10
Potash, Tons		21	57

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		39685		
1969		82510		
1972		93236	4000	17000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		3865		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		60		7
Phosphorus, tons		15		2
Potash, tons		14		6

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
COUNTY, land area, acres (1) 266880				
Number I-V farms 775				
Number of farms 1157				
Acres in I-V farms 242342				
Acres in farms 263155				
Cropland I-V farms 219614				
Harvested cropland				
Cropland in farms 235393				
Harvested cropland in farms 190848				
I-V farms 181503				
CORN	43795	4770	2733	7503
GRAINS	43800	4070	228	4298
Wheat	18320	1996	533	2529
Oats	25176	2055	395	2450
Barley	4	0	0	0
Rye	211	17	0	17
OTHER FIELD CROPS	85166	884	244	1128
Soybeans	84956	823	240	1063
Potatoes	103	50	0	50
Sugar beets				
Field beans	5486	6	2	8
HAY OR GRASS SILAGE	6304	69	0	69
PASTURED CROPLAND	4750	21	10	31
Cropland used for pasture	4391	14	0	14
Improved pasture	359	7	10	17
VEGETABLES, SWEET CORN, MELONS	125	20	3	23
ORCHARDS	0	0	0	0
BERRIES	4	1	0	1
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	10	1	0	1
Total Fertilizer Used, Tons		9842	3920	13762
Percent of Fertilizer Used		72	28	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	11283
Liquid	4526
Total	15809
Primary Nutrients in Fertilizer	7925
Nitrogen	2438
Phosphorus	2718
Potash	2769

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			7673
Tonnes for Other Recent Years			
1971			12357
1973			8291

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1250	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		1813

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3022.7	335.1	6.3	3364.1
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	10296	161	41	36
Cattle: Table 3	46803	262	47	234
Sheep: Table 4	2093	29	4	21
Horses: Table 4	9547	66	10	57
Chickens: Table 5	3865	60	15	14
Turkeys: Table 5	1192	23	6	5
Total from Livestock, Tons	74096	601	123	367
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
	15809	2438	2718	2769
Lime: Limestone equivalent purchased or applied, tons: Table 8 7673				
Salts: Applied on all highways, tons: Table 9 1813				

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-35

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Putnam

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	60007	1650.1	13335	200.2		
Grains	23176	115.8	7725	77.2		
Hay or Grass Silage	3900	39.0	3250	32.5		
Pastured Cropland	2352	23.5	2352	23.5		
Other Field Crops	85600	1712.0	5350	53.5		
Vegetables	4598	45.98	4598	45.98	4598	261.3
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	179640	3687.5	36617	605.8	4598	261.3
Total Herbicides, Insecticides, Fungicides: 100 lbs 220855 4594.6						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	62280	6884	6334	13218
1969	57715	5514	5621	11135
1972	52700	5659	5890	11549
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				86040
Nutrients in Wet Manure: Nitrogen, tons				430
Phosphorus, tons				120
Potash, tons				327

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	25535	7648	17887
1969	20586	6348	14238
1972	22200	8883	13317
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		116723	85895
Wet Manure Defecated: Tons, 1972 Combined:		202618	
Nutrients in Wet Manure: Nitrogen, tons		1135	
Phosphorus, tons		203	
Potash, tons		1013	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8829	
1969		6713	285
1972		5600	823
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		9016	10518
Nutrients in Wet Manure: Nitrogen, Tons		126	73
Phosphorus, Tons		19	11
Potash, Tons		90	63

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		563305		
1969		571304		
1972		645574	19600	316000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		26759		
Nutrients in Wet Manure:		Combined 17739		
Nitrogen, tons		417		277
Phosphorus, tons		107		71
Potash, tons		94		62

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	66365	9577	3249	12826
GRAINS	36736	4469	241	4710
Wheat	25899	3436	197	3633
Oats	10316	998	44	1042
Barley	111	5	0	5
Rye	188	16	0	16
OTHER FIELD CROPS	100516	4559	436	4995
Soybeans	92242	2261	163	2424
Potatoes	261	172	1	173
Sugar beets				
Field beans	2656	14	0	14
HAY OR GRASS SILAGE	13504	311	8	319
PASTURED CROPLAND	9531	78	1	79
Cropland used for pasture	8691	76	1	77
Improved pasture	840	2	0	2
VEGETABLES, SWEET CORN, MELONS	5225	1547	182	1729
ORCHARDS	4	0	0	0
BERRIES	6	2	0	2
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	230	35	1	36
Total Fertilizer Used, Tons		20592	4118	24710
Percent of Fertilizer Used		83	17	100

TABLE 7--FERTILIZER USED IN 1972 (July 1, 1972-June 30, 1973)

Item	Tons
Fertilizer Used on Crops: Solid	26642
Liquid	7268
Total	34110
Primary Nutrients in Fertilizer	17168
Nitrogen	5279
Phosphorus	5823
Potash	6066

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			16737
Tonnages for Other Recent Years			
1971			27124
1973			30200

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1990	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 2886		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	3687.5	605.8	261.3	4554.6
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
Swine: Table 2	86040	430	120	327
Cattle: Table 3	202618	1135	203	1013
Sheep: Table 4	9016	126	19	90
Horses: Table 4	10518	73	11	63
Chickens: Table 5	26759	117	107	24
Turkeys: Table 5	17739	277	71	62
Total from Livestock, Tons	352690	2458	531	1649
Fertilizers:	Tons of Commercial Fertilizers Applied			
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland:	34110	5279	5823	6066
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	16737			
Salts: Applied on all highways, tons: Table 9 2886				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 7-36

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Sandusky

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	47700	1311.7	10600	159.0		
Grains	14082	70.4	4696	46.9		
Hay or Grass Silage	3390	33.9	2825	28.2		
Pastured Cropland	1735	17.3	1735	17.3		
Other Field Crops	50160	1003.2	3135	31.3		
Vegetables	6370	203.8	6370	303.2	6370	362.0
Orchards						
Berries	966	47.4	1107	201.9	1138	279.7
Nursery, Greenhouse						
Other Crops						
Totals	124170	2687.7	30468	787.8	7508	641.7
Total Herbicides, Insecticides, Fungicides:		100 lbs	162386	4117.2		

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	20572	2046	1903	3949
1969	21959	1486	1542	3028
1972	24100	1628	1695	3323

Wet Manure Factor: Tons per litter farrowed 7.45  
 Wet Manure Defecated: Tons, 1972 24756  
 Nutrients in Wet Manure: Nitrogen, tons 124  
 Phosphorus, tons 35  
 Potash, tons 94

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	23395	7186	15902
1969	18801	5862	12939
1972	20000	8127	11873

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 106789 76581  
 Wet Manure Defecated: Tons, 1972 Combined: 183370  
 Nutrients in Wet Manure: Nitrogen, tons 1027  
 Phosphorus, tons 183  
 Potash, tons 917

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		6690	
1969		6465	655
1972		6600	1686

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 10626 21547  
 Nutrients in Wet Manure: Nitrogen, Tons 11.8 11.9  
 Phosphorus, Tons 22 22  
 Potash, Tons 106 129

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		142075		
1969		137632		
1972		155524		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 6446  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 101  
 Phosphorus, tons 26  
 Potash, tons 23

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	45824	8592	1562	10154
GRAINS	26814	3771	62	3833
Wheat	19047	2841	53	2894
Oats	7102	888	7	895
Barley	125	19	0	19
Rye	285	17	1	18
OTHER FIELD CROPS	58222	5504	264	5768
Soybeans	50689	2451	78	2529
Potatoes	357	219	0	219
Sugar beets				
Field beans	118	0	0	0
HAY OR GRASS SILAGE	11705	326	4	330
PASTURED CROPLAND	7690	100	0	100
Cropland used for pasture	6179	84	0	84
Improved pasture	1511	16	0	16
VEGETABLES, SWEET CORN, MELONS	7239	2915	150	3065
ORCHARDS	1319	255	0	255
BERRIES	43	8	0	8
NURSERY & GREENHOUSE PRODUCTS	96	1	0	1
OTHER CROPS	22	3	0	3
Total Fertilizer Used, Tons		21475	2042	23517
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	30427
Liquid	3762
Total	34189
Primary Nutrients in Fertilizer	17602
Nitrogen	5375
Phosphorus	5232
Potash	6995

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			4897
Tonnages for Other Recent Years			
1971			5311
1973			7019

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4700	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 6817		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2687.7	787.8	641.7	4117.2
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	24756	124	35	94
Cattle: Table 3	183370	1027	183	917
Sheep: Table 4	10626	11.8	22	106
Horses: Table 4	21547	11.9	22	129
Chickens: Table 5	6446	101	26	23
Turkeys: Table 5				
Total from Livestock, Tons	246745	1549	288	1269
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	34189	5375	5232	6995
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	4897			
Salts: Applied on all highways, tons: Table 9 6817				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 7-37

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Seneca

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	65635	1804.9	14586	238.7		
Grains	25006	125.0	8335	83.3		
Hay or Grass Silage	5160	51.6	4300	43.0		
Pastured Cropland	3292	32.9	3292	32.9		
Other Field Crops	74000	1480.0	4625	46.2		
Vegetables	1490	47.7	1490	70.9	1490	84.7
Orchards						
Berries	27	2.1	27	4.2	29	4.9
Nursery, Greenhouse						
Other Crops						
Totals	174610	3544.2	36655	499.2	1519	89.6
Total Herbicides, Insecticides, Fungicides: 100 lbs					212784	4133.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	42685	1420	3913	8333
1969	38744	3747	3647	7394
1972	40800	3815	3971	7786
Wet Manure Factor: Tons per litter Farrowed				7.45
Wet Manure Defecated: Tons, 1972				58006
Nutrients in Wet Manure: Nitrogen, tons				290
Phosphorus, tons				81
Potash, tons				220

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	26609	9623	16986
1969	19352	7587	11765
1972	20800	10773	10027
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		141557	64674
Wet Manure Defecated: Tons, 1972 Combined:		206231	
Nutrients in Wet Manure: Nitrogen, tons		1155	
Phosphorus, tons		206	
Potash, tons		1031	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		26461	
1969		22711	680
1972		19600	1563
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		31556	19975
Nutrients in Wet Manure: Nitrogen, Tons		441	138
Phosphorus, Tons		66	20
Potash, Tons		316	120

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		138505		
1969		106832		
1972		120720	5000	50000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		5004		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		78		3142
Phosphorus, tons		20		49
Potash, tons		18		13
				11

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	58113	9784	2131	11915
GRAINS	41140	5789	106	5895
Wheat	28431	4262	79	4341
Oats	11439	1387	27	1414
Barley	151	11	0	11
Rye	1044	126	1	127
OTHER FIELD CROPS	78688	3159	364	3523
Soybeans	76048	2285	187	2472
Potatoes	179	94	7	101
Sugar beets				
Field beans	1465	6	0	6
HAY OR GRASS SILAGE	15231	391	26	417
PASTURED CROPLAND	13198	202	6	208
Cropland used for pasture	11739	192	6	198
Improved pasture	1459	10	0	10
VEGETABLES, SWEET CORN, MELONS	1693	500	127	627
ORCHARDS	16	0	0	0
BERRIES	16	5	0	5
NURSERY & GREENHOUSE PRODUCTS	3	0	1	1
OTHER CROPS	97	0	0	0
Total Fertilizer Used, Tons		19836	2761	22597
Percent of Fertilizer Used		88	12	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	6910
Liquid	8813
Total	15723
Primary Nutrients in Fertilizer	15723
Nitrogen	4810
Phosphorus	5132
Potash	5781

TABLE 8--GROUND LIMESTONE EQUIVALENT

Year	APPLIED		Total Tonnage
	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	
1972			28094
Tonnes for Other Recent Years			
1971			56442
1973			47295

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3750	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5439		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3544.2	499.2	89.6	4133.0
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	58006	290	81	220
Cattle: Table 3	206231	1155	206	1031
Sheep: Table 4	31556	441	66	316
Horses: Table 4	19975	138	20	120
Chickens: Table 5	5004	78	20	18
Turkeys: Table 5	3142	49	13	11
Total from Livestock, Tons	323924	2151	406	1716
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	15723	4810	5132	5781
Lime: Limestone equivalent purchased or applied, tons: Table 8 28094				
Salts: Applied on all highways, tons: Table 9 5439				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-38

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: VanWert

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	68593	1886.2	15243	228.6		
Grains	20981	104.9	6994	69.9		
Hay or Grass Silage	1740	17.4	1450	14.5		
Pastured Cropland	1227	12.2	1227	12.2		
Other Field Crops	85600	1712.0	5350	53.5		
Vegetables	319	10.2	319	15.2	319	18.1
Orchards						
Berries	22	1.0	25	4.6	26	6.5
Nursery, Greenhouse						
Other Crops						
Totals	178482	3743.9	30608	398.5	345	24.6
Total Herbicides, Insecticides, Fungicides: 100 lbs				209435		4167.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	19125	1979	1877	3856
1969	16416	1637	1600	3237
1972	16900	1632	1700	3332
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				24823
Nutrients in Wet Manure: Nitrogen, tons				124
Phosphorus, tons				35
Potash, tons				94

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	10099	3232	6867
1969	7203	2274	4929
1972	7300	3024	4276
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		39735	27580
Wet Manure Defecated: Tons, 1972 Combined:		67315	
Nutrients in Wet Manure: Nitrogen, tons		377	
Phosphorus, tons		67	
Potash, tons		337	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4700	
1969		3076	488
1972		2400	1035
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3864	13227
Nutrients in Wet Manure: Nitrogen, Tons		54	91
Phosphorus, Tons		8	13
Potash, Tons		39	79

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		148315		
1969		137627		
1972		155519	2000	20000
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		6446		
Nutrients in Wet Manure: Nitrogen, tons		101	20	
Phosphorus, tons		26	5	
Potash, tons		23	4	

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	63307	7967	3511	11478
GRAINS	38445	4846	439	5285
Wheat	22569	3183	385	3568
Oats	15750	1628	52	1680
Barley	5	1	0	1
Rye	321	35	2	37
OTHER FIELD CROPS	88031	1317	220	1537
Soybeans	86528	1080	159	1239
Potatoes	2	0	0	0
Sugar beets				
Field beans	2185	24	1	25
HAY OR GRASS SILAGE	6246	53	5	58
PASTURED CROPLAND	4946	40	2	42
Cropland used for pasture	1652	36	2	38
Improved pasture	294	4	0	4
VEGETABLES, SWEET CORN, MELONS	362	141	12	153
ORCHARDS	31	2	0	2
BERRIES	0	0	0	0
NURSERY & GREENHOUSE PRODUCTS	27	0	0	0
OTHER CROPS	17	2	0	2
Total Fertilizer Used, Tons		14392	4190	18582
Percent of Fertilizer Used		77	23	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	17636
Liquid	16148
Total	33784
Primary Nutrients in Fertilizer	15945
Nitrogen	5746
Phosphorus	5068
Potash	5131

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			6556
Tonnages for Other Recent Years			
1971			17447
1973			38050

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1710	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		2480

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3743.9	398.5	24.6	4167.0
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	24823	124	35	94
Cattle: Table 3	67315	377	67	337
Sheep: Table 4	3864	54	8	39
Horses: Table 4	13227	91	13	79
Chickens: Table 5	6446	101	26	23
Turkeys: Table 5	1261	20	5	4
Total from Livestock, Tons	116936	767	154	576
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	33784	5746	5068	5131
Lime: Limestone equivalent purchased or applied, tons: Table 8 6556				
Salts: Applied on all highways, tons: Table 9 2480				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-39

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Williams

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	46078	1267.1	10240	153.5		
Grains	16285	81.4	5428	54.2		
Hay or Grass Silage	3570	35.7	2975	29.7		
Pastured Cropland	2415	24.1	2415	24.1		
Other Field Crops	52880	1057.6	3305	33.0		
Vegetables	257	8.2	257	12.2	257	14.6
Orchards						
Berries						
Nursery, Greenhouse						
Other Crops						
Totals	127185	2474.1	24620	306.7	257	14.6
Total Herbicides, Insecticides, Fungicides: 100 lbs 2795.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	35712	3633	3413	7046
1969	35093	3041	2799	5840
1972	37100	3025	3149	6174

Wet Manure Factor: Tons per litter farrowed 7.45  
Wet Manure Defecated: Tons, 1972 45996  
Nutrients in Wet Manure: Nitrogen, tons 230  
Phosphorus, tons 64  
Potash, tons 175

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	28964	8476	20488
1969	25322	6744	18578
1972	28000	8505	19495

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 111756 125743  
Wet Manure Defecated: Tons, 1972 Combined: 237499  
Nutrients in Wet Manure: Nitrogen, tons 1330  
Phosphorus, tons 237  
Potash, tons 1187

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		8200	
1969		2045	506
1972		6900	1590

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 11109 20320  
Nutrients in Wet Manure: Nitrogen, Tons 155 240  
Phosphorus, Tons 23 20  
Potash, Tons 111 122

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		182405		
1969		132880		
1972		150154	4500	4500

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
Wet Manure Defecated: Tons, 1972 6224  
Nutrients in Wet Manure: Combined 1023  
Nitrogen, tons 97 16  
Phosphorus, tons 25 4  
Potash, tons 22 4

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>		Number I-V farms	
269312	1016	1599	202930
238628	165026	189767	127329
189767			
141706			

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	41408	6649	1553	8202
GRAINS	26443	3314	156	3470
Wheat	15649	2125	105	2230
Oats	10109	1144	51	1195
Barley	196	5	0	5
Rye	155	8	0	8
OTHER FIELD CROPS	47176	2187	206	2393
Soybeans	46806	2120	189	2309
Potatoes	2	0	0	0
Sugar beets				
Field beans	1747	0	0	0
HAY OR GRASS SILAGE	12826	266	27	293
PASTURED CROPLAND	8517	84	9	93
Cropland used for pasture	7918	77	9	86
Improved pasture	599	7	0	7
VEGETABLES, SWEET CORN, MELONS	292	79	84	163
ORCHARDS	9	2	0	2
BERRIES	4	1	0	1
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	123	8	0	8
Total Fertilizer Used, Tons		12590	2035	14625
Percent of Fertilizer Used		86	14	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	19519
Liquid	7389
Total	26908
Primary Nutrients in Fertilizer	13963
Nitrogen	4827
Phosphorus	4129
Potash	5007

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			10061
Tonnages for Other Recent Years			
1971			13552
1973			22136

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3550	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 5149		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	2474.1	306.7	14.6	2795.4
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	45996	230	64	175
Cattle: Table 3	237499	1330	237	1187
Sheep: Table 4	11109	155	23	111
Horses: Table 4	20320	140	203	122
Chickens: Table 5	6224	97	25	22
Turkeys: Table 5	1023	16	4	4
Total from Livestock, Tons	322171	1968	556	1621
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	26908	4827	4129	5007
Lime: Limestone equivalent purchased or applied, tons: Table 8 10061				
Salts: Applied on all highways, tons: Table 9 5149				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 7-40

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Southwest 4.2 COUNTY: Wood

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	96831	2662.8	21518	322.7		
Grains	34703	173.5	11568	115.6		
Hay or Grass Silage	5730	57.3	4775	47.7		
Pastured Cropland	1853	18.5	1853	18.5		
Other Field Crops	83920	1678.4	524.5	52.4		
Vegetables	2900	92.8	2900	138.0	2900	164.8
Orchards						
Berries	60	4.7	60	9.1	64	10.7
Nursery, Greenhouse						
Other Crops						
Totals	225997	4688.0	47919	704.0	2964	175.5
Total Herbicides, Insecticides, Fungicides: 100 lbs 276880 5567.5						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	27674	1616	1640	3256
1969	23093	1218	1179	2397
1972	23900	1216	1265	2481
Wet Manure Factor: Tons per litter farrowed 7.45				
Wet Manure Defecated: Tons, 1972 18483				
Nutrients in Wet Manure: Nitrogen, tons 92				
Phosphorus, tons 26				
Potash, tons 70				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	26473	4009	22464
1969	23376	3160	20216
1972	25500	2835	22665
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 37252 11,6189			
Wet Manure Defecated: Tons, 1972 Combined: 183447			
Nutrients in Wet Manure: Nitrogen, tons 1027			
Phosphorus, tons 183			
Potash, tons 917			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		7634	
1969		7160	812
1972		5900	1548
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 9499 19783			
Nutrients in Wet Manure: Nitrogen, Tons 133 137			
Phosphorus, Tons 20 20			
Potash, Tons 95 119			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		141225		
1969		102926		
1972		124295		7500
Wet Manure Factor: Lbs. per bird 82.9 89.63				
Wet Manure Defecated: Tons, 1972 5152				
Nutrients in Wet Manure: Combined 336				
Nitrogen, tons 80 5				
Phosphorus, tons 21 1				
Potash, tons 18 1				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	85273	12766	1304	17069
GRAINS	57816	7477	342	7819
Wheat	38477	5524	305	5829
Oats	18791	1924	32	1956
Barley	129	8	1	12
Rye	223	6	0	6
OTHER FIELD CROPS	103117	4160	493	4653
Soybeans	97172	2728	155	2883
Potatoes	12	7	0	7
Sugar beets				
Field beans	384	1	0	1
HAY OR GRASS SILAGE	17375	207	9	216
PASTURED CROPLAND	7568	78	18	96
Cropland used for pasture	6271	73	5	78
Improved pasture	1297	5	13	18
VEGETABLES, SWEET CORN, MELONS	3295	1094	204	1298
ORCHARDS	34	4	0	4
BERRIES	36	6	0	6
NURSERY & GREENHOUSE PRODUCTS	26	8	1	9
OTHER CROPS	130	1	1	2
Total Fertilizer Used, Tons		25802	5371	31173
Percent of Fertilizer Used		83	17	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	46225
Liquid	8233
Total	54458
Primary Nutrients in Fertilizer	28333
Nitrogen	7879
Phosphorus	9913
Potash	10541

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			11721
Tonnages for Other Recent Years			
1971			15115
1973			28253

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	9485	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 13757		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	4688.0	704.0	175.5	5567.5
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	18483	92	26	70
Cattle: Table 3	183441	1027	183	917
Sheep: Table 4	9499	133	20	95
Horses: Table 4	19783	137	20	119
Chickens: Table 5	5152	80	21	18
Turkeys: Table 5	336	5	1	1
Total from Livestock, Tons	236694	1474	271	1220
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	54458	7879	9913	10541
Lime: Limestone equivalent purchased or applied, tons: Table 8 11721				
Salts: Applied on all highways, tons: Table 9 13757				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-41

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio  
 PLANNING SUBAREA: Southwest 4.2 COUNTY: Wyandot

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	55237	1519.0	12275	181.1		
Grains	18480	92.1	6160	61.6		
Hay or Grass Silage	2820	28.2	2350	23.5		
Pastured Cropland	3112	31.1	3112	31.1		
Other Field Crops	58480	1169.6	3655	36.5		
Vegetables	329	10.5	329	15.7	329	18.7
Orchards						
Berries	70	3.7	79	14.2	82	19.1
Nursery, Greenhouse						
Other Crops						
Totals	138528	2854.5	27960	366.7	411	38.1
Total Herbicides, Insecticides, Fungicides: 100 lbs 166899 3259.3						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	39881	4538	3998	8536
1969	33848	3394	3095	6489
1972	35600	3344	3481	6825

Wet Manure Factor: Tons per litter farrowed 7.45  
 Wet Manure Defecated: Tons, 1972 50846  
 Nutrients in Wet Manure: Nitrogen, tons 254  
 Phosphorus, tons 71  
 Potash, tons 193

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	17792	5553	12239
1969	13115	3862	9283
1972	14200	4347	9853

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 57120 63552  
 Wet Manure Defecated: Tons, 1972 Combined: 120672  
 Nutrients in Wet Manure: Nitrogen, tons 676  
 Phosphorus, tons 121  
 Potash, tons 603

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		27893	
1969		22015	384
1972		20700	1001

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 33327 12793  
 Nutrients in Wet Manure: Nitrogen, Tons 467 88  
 Phosphorus, Tons 70 13  
 Potash, Tons 333 77

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		100935		
1969		113338		
1972		128072		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 5309  
 Nutrients in Wet Manure: Nitrogen, tons 83  
 Phosphorus, tons 21  
 Potash, tons 19

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	17261	6989	2788	9777
GRAINS	30249	3836	262	4098
Wheat	21572	2859	236	3095
Oats	8329	944	26	970
Barley	48	7	0	7
Rye	275	21	0	21
OTHER FIELD CROPS	59621	1276	153	1429
Soybeans	57995	1036	121	1157
Potatoes	0	0	0	0
Sugar beets				
Field beans	754	0	0	0
HAY OR GRASS SILAGE	9184	107	0	107
PASTURED CROPLAND	12743	64	0	64
Cropland used for pasture	11235	47	0	47
Improved pasture	1508	17	0	17
VEGETABLES, SWEET CORN, MELONS	374	116	36	152
ORCHARDS	89	23	0	23
BERRIES	8	1	0	1
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	70	0	0	0
Total Fertilizer Used, Tons		12412	3239	15651
Percent of Fertilizer Used		79	21	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	19625
Liquid	7067
Total	26692
Primary Nutrients in Fertilizer	13278
Nitrogen	3955
Phosphorus	4377
Potash	4946

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			48431
Tonnages for Other Recent Years			
1971			46902
1973			43340

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2430	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3524		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	2854.5	366.7	38.1	3259.3
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	50846	254	71	193
Cattle: Table 3	120672	676	121	603
Sheep: Table 4	33327	467	70	333
Horses: Table 4	12793	88	13	77
Chickens: Table 5	5309	83	21	19
Turkeys: Table 5				
Total from Livestock, Tons	222947	1568	293	1225
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	26692	3955	4377	4946
Lime: Limestone equivalent purchased or applied, tons: Table 8	48431			
Salts: Applied on all highways, tons: Table 9 3524				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

#### 7.3.2.1 Agricultural Chemicals

Total chemical use is low compared to the entire Basin. However, the corn and soybeans grown here are crops requiring primarily herbicides. Herbicides represented 83 percent of all chemicals used, with insecticides 13 percent and fungicides only 4. This was the highest herbicide percentage figure of any Basin subarea. It is projected that chemical usage in this subarea may increase 10-25 percent in the next 10 years with herbicide increase near the top of this range. In 1972 there were 3,607,980 kilograms (7,954,280 lbs) of agricultural chemicals used in PSA 4.2.

#### 7.3.2.2 Animal Wastes

Cattle and swine numbers in the planning subarea represented the equivalent of about 20 percent of Ohio's cattle total and about 23 percent of Ohio's swine total. Cattle and swine produce 82 percent of the manure tonnage. Swine produced 19 percent of all manure -- the highest percent for any Basin subarea. Livestock income relative to income from crops and other sources will likely continue in about the same relationship as now in the next 10 years. Thus, the index of manure production should remain about the same. The figure for 1972 was 5,727,000 metric tons (6,312,949 tons) of livestock manure defecated. Nitrogen, phosphorus, and potash combined comprises 1.3 percent of the total manure tonnage.

#### 7.3.2.3 Commercial Fertilizers

Commercial fertilizer use is about 7 percent above Basin average. Nitrogen represented 31 percent, phosphorus 32, and potash 37 percent of the nutrients used. Fertilization rates, as estimated by some soil scientists, will increase by perhaps 20-25 percent in this corn belt subarea in the next 10 years. In 1972 the amount used in Planning Subarea 4.2 was 590,838 metric tons (651,276 tons) of commercial fertilizers.

#### 7.3.2.4 Lime

Planning Subarea 4.2 had 278,337 metric tons (306,809 tons) of limestone either purchased or applied to croplands in 1972. Lime usage should remain about the same as the present level. If any change does occur it is more likely to be down rather than up.

#### 7.3.2.5 Salts

This area uses the least amount of road de-icing salts in the lake basin. For 1972-73 the total was 104,482 metric tons (115,170 tons) of salt. Future use of road salts in this subarea will likely continue to be near these modest levels.

#### 7.4 Planning Subarea 4.3

This planning subarea extends from one county west of Cleveland east to the Pennsylvania border. Four of the eight counties border on Lake Erie and the others are one county removed. There are a number of metropolitan counties in the subarea, in addition to Cleveland.

##### 7.4.1 Agricultural Characteristics

This subarea is on the eastern border of the cornbelt. Corn and soybeans are two of the major crops grown. There are over 20,250 hectares (50,000 acres) of grains, mostly wheat. The value of crops produced per acre is below that of most counties to the west.

Table 7-42 indicates the relative proportions of materials usage in Planning Subarea 4.3 in comparison with the total Great Lakes Basin.

Table 7-42

MATERIALS USAGE BASIN RELATIONSHIP - PSA 4.3 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 4.3</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	2.25	2.66
Index of chemicals used	85	100
Tons of livestock manure defecated	5.39	3.37
Index of manure defecated	160	100
Lbs primary nutrients in livestock manure	134	82
Index primary nutrients in manure	163	100
Lbs commercial fertilizer applied	273	321
Percent liquid fertilizer applied	2	22
Index commercial fertilizer applied	85	100
Lbs primary nutrients in commercial fertilizer	134	153
Index primary nutrients in commercial fertilizer	88	100
Lbs of lime applied	485	170
Index of lime applied	285	100
-----		
<u>Per acre of total land area</u>		
Lbs of road salts used	117.55	41.74
Index road salts used	282	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

##### 7.4.2 Materials Usage

Table 7-43 lists by county the material usage inventory for PSA 4.3. Detailed statistics are shown in Tables 7-44 to 7-52.

Table 7-43  
MATERIALS USAGE  
(in 1972)

PSA 4.3	Chemicals Applied to Crops (100 Lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>Ohio</u>					
Ashtabula	1767	424848	10821	20728	28718
Cuyahoga	241	40512	1984	20728	29505
Geauga	337	224320	1649	3038	21054
Lake	456	29586	976	445	8833
Lorain	1946	295955	9630	9790	6035
Medina	996	351703	8283	9568	15213
Portage	954	249850	8005	8822	13054
Summit	289	71281	1378	2771	13634
TOTAL	7026	1688055	42726	75890	136046
<hr/>					
<u>To Convert From</u>			<u>To</u>		<u>Multiply By</u>
Pounds (lb)			Kilograms (kg)		0.454
Tons (ton)			Kilograms (kg)		907.2
			Metric Tons		0.907

#### 7.4.2.1 Agricultural Chemicals

Chemical usage is not heavy in the subarea. Most of the herbicides are used on corn and soybeans. All of the fungicides and over half of the insecticides are used on fruit and vegetable crops. About 80 percent of the fruit in the subarea is grown in three counties along the lake and 80 percent of the vegetable production is concentrated in 4 counties. Chemical usage may increase 3 to 15 percent in this planning subarea. In 1972 there were 319,000 kilograms (702,680 lbs) of agricultural chemicals used in this subarea.

#### 7.4.2.2 Animal Wastes

Cattle accounted for 76 percent of the livestock manure, horses 19, swine and chickens each 2 and sheep 1 percent. The horse population is primarily because of the metropolitan centers in the planning subarea. Cattle, especially cows, and horses produce considerable manure per animal. Manure production per harvested crop acre was well above the Great Lakes Basin average. Had manure production been equated with total crop acres the figure would still have been very high. Livestock manure production is projected to continue at about present levels or perhaps slightly downward in the next 10 years. The 1972 level was 1,531,400 metric tons (1,688,055 tons) of wet manure. Nitrogen, phosphorus, and potash combined, comprise 1.2 percent of the total manure tonnage.



TABLE 7-44

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Central 4.3 COUNTY: 8 County Totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	73785	2028.7	16397	245.7		
Grains	32456	162.1	10818	108.0		
Hay or Grass Silage	33900	339.0	28250	282.3		
Pastured Cropland	19197	191.6	19197	191.6		
Other Field Crops	35520	710.4	2220	22.2		
Vegetables	4551	145.5	4551	216.7	4551	258.8
Orchards						
Berries	3908	194.7	4461	810.3	4590	1119.2
Nursery, Greenhouse						
Other Crops						
Totals	203317	3772.0	85894	1876.8	9111	1378.0
Total Herbicides, Insecticides, Fungicides: 100 lbs					298352	7026.8

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	29845	2703	2724	5427
1969	27803	1932	1958	3890
1972	28950	1990	2072	4062
Wet Manure Factor: Tons per litter farrowed		7.45		
Wet Manure Defecated: Tons, 1972		30262		
Nutrients in Wet Manure:				
Nitrogen, tons		151		
Phosphorus, tons		42		
Potash, tons		115		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	119110	62589	56551
1969	99521	51704	47817
1972	108400	86589	21811
Wet Manure Factor: Tons Per Animal		13.14	
Wet Manure Defecated: Tons, 1972		1137779	
Wet Manure Defecated: Tons, 1972 Combined:		1278460	
Nutrients in Wet Manure:			
Nitrogen, tons		7159	
Phosphorus, tons		1278	
Potash, tons		6392	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		19184	
1969		16052	7726
1972		9100	25548
Wet Manure Factor: Tons per animal		1.61	
Wet Manure Defecated: Tons, 1972		14651	
Nutrients in Wet Manure:			
Nitrogen, Tons		205	
Phosphorus, Tons		31	
Potash, Tons		147	

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		253662		
1969		651113		
1972		739148		
Wet Manure Factor: Lbs. per bird		82.2		89.63
Wet Manure Defecated: Tons, 1972		30638		
Nutrients in Wet Manure:				
Nitrogen, tons		178		7541
Phosphorus, tons		122		118
Potash, tons		107		26

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	73292	13907	1172	15079
GRAINS	53382	7347	33	7380
Wheat	20552	2958	19	2977
Oats	27692	3766	11	3777
Barley	1356	190	-	190
Rye	597	45	1	46
OTHER FIELD CROPS	30490	2968	17	2985
Soybeans	27737	1333	13	1346
Potatoes	2547	1573	-	1573
Sugar beets				
Field beans	3014	18	-	18
HAY OR GRASS SILAGE	87304	1939	26	1965
PASTURED CROPLAND	60246	940	23	963
Cropland used for pasture	48443	723	4	727
Improved pasture	11803	217	19	236
VEGETABLES, SWEET CORN, MELONS	5172	1449	71	1520
ORCHARDS	5248	831	1	832
BERRIES	234	67	1	68
NURSERY & GREENHOUSE PRODUCTS	5323	1515	69	1584
OTHER CROPS	70	10	-	10
Total Fertilizer Used, Tons		30991	1413	32404
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	
Liquid	
Total	42726
Primary Nutrients in Fertilizer	20952
Nitrogen	5925
Phosphorus	7047
Potash	7980

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			75890
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	93799	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		136046

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	3772.0	1876.8	1378.0	7026.8
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
Swine: Table 2	Manure	Nitrogen	Phosphorus	Potash
	30262	151	42	115
Cattle: Table 3		7159	1278	6392
Sheep: Table 4		14651	205	147
Horses: Table 4		326503	2253	1959
Chickens: Table 5		30638	478	107
Turkeys: Table 5		7541	118	26
Total from Livestock, Tons	1688055	10364	1830	8746
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		Potash
Applied on Cropland:		Nitrogen	Phosphorus	
Table 7	42726	5925	7047	7980
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	75890			
Salts: Applied on all highways, tons: Table 9	136046			

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-45

PLANNING AREA: Lake Erie 4.0

STATE: Ohio

PLANNING SUBAREA: Central 4.3

COUNTY: Ashtabula

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	16027	440.7	3562	53.4		
Grains	5277	29.8	1992	19.9		
Hay or Grass Silage	8940	89.4	7450	74.5		
Pastured Cropland	5873	58.7	5873	58.7		
Other Field Crops	1600	32.0	100	1.0		
Vegetables	241	7.7	241	11.5	241	13.7
Orchards						
Berries	1578	74.6	1820	334.6	1867	466.6
Nursery, Greenhouse						
Other Crops						
Totals	40236	732.9	21038	553.6	2108	480.3
Total Herbicides, Insecticides, Fungicides:		100 lbs		63362		1766.8

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	3839	309	368	677
1969	5345	290	369	659
1972	5500	333	345	678
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				5051
Nutrients in Wet Manure: Nitrogen, tons				25
Phosphorus, tons				7
Potash, tons				19

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	31313	17219	14094
1969	28583	15517	13066
1972	31900	27594	4306
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		362585	27774
Wet Manure Defecated: Tons, 1972 Combined:		390359	
Nutrients in Wet Manure: Nitrogen, tons		2186	
Phosphorus, tons		390	
Potash, tons		1952	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2708	
1969		2284	1034
1972		1200	1906
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1932	24359
Nutrients in Wet Manure: Nitrogen, Tons		27	168
Phosphorus, Tons		4	24
Potash, Tons		19	146

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		98091		
1969		67178		
1972		75911		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3147		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		49		
Phosphorus, tons		13		
Potash, tons		11		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	14,8128	Number I-V farms	690
Number of farms	1500	Acres in I-V farms	126344
Acres in farms	191993	Cropland I-V farms	80509
Cropland in farms	114396	Harvested cropland I-V farms	52735
Harvested cropland in farms	66068		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	14571	2707	264	2971
GRAINS	10251	1527	7	1534
Wheat	2215	375	2	377
Oats	7093	1036	5	1041
Barley	178	23	0	23
Rye	24	3	0	3
OTHER FIELD CROPS	1077	174	9	183
Soybeans	882	66	9	75
Potatoes	194	107	0	107
Sugar beets				
Field beans	795	7	0	7
HAY OR GRASS SILAGE	23879	493	16	509
PASTURED CROPLAND	19658	338	10	348
Cropland used for pasture	15814	288	1	289
Improved pasture	3844	50	9	59
VEGETABLES, SWEET CORN, MELONS	274	53	30	83
ORCHARDS	2225	423	0	423
BERRIES	20	10	0	10
NURSERY & GREENHOUSE PRODUCTS	151	35	5	40
OTHER CROPS	24	7	0	7
Total Fertilizer Used, Tons		5774	341	6115
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	10155
Liquid	666
Total	10821
Primary Nutrients in Fertilizer	5686
Nitrogen	1749
Phosphorus	1803
Potash	2134

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			20728
Tonnages for Other Recent Years			
1971			26079
1973			25829

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	19800	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		28718

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	732.9	553.6	480.3	1766.8
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	5051	25	7	19
Cattle: Table 3	390359	2186	390	1952
Sheep: Table 4	1932	27	4	19
Horses: Table 4	24359	168	24	146
Chickens: Table 5	3147	49	13	11
Turkeys: Table 5	0			
Total from Livestock, Tons	424848	2455	438	2147
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	10821	1749	1803	2134
Lime: Limestone equivalent purchased or applied, tons: Table 8 20728				
Salts: Applied on all highways, tons: Table 9 28718				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-46

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Central 4.3 COUNTY: Cuyahoga

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	900	24.7	200	3.0		
Grains	900	4.5	300	3.0		
Hay or Grass Silage	450	4.5	375	3.7		
Pastured Cropland	197	1.9	197	1.9		
Other Field Crops	800	16.0	50	.5		
Vegetables	756	24.2	756	36.0	756	43.0
Orchards						
Berries	138	7.0	157	28.4	162	39.2
Nursery, Greenhouse						
Other Crops						
Totals	4741	82.8	2035	76.5	918	82.2
Total Herbicides, Insecticides, Fungicides: 100 lbs					7094	241.5

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	336	8	4	12
1969	150	15	7	22
1972	350	25	26	51
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				380
Nutrients in Wet Manure: Nitrogen, tons				2
Phosphorus, tons				1
Potash, tons				1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	792	290	502
1969	771	359	412
1972	1000	500	500
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		6570	3225
Wet Manure Defecated: Tons, 1972 Combined:		9795	
Nutrients in Wet Manure: Nitrogen, tons		55	
Phosphorus, tons		10	
Potash, tons		49	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		607	
1969		351	696
1972		300	2287
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		483	29228
Nutrients in Wet Manure: Nitrogen, Tons		7	202
Phosphorus, Tons		1	29
Potash, Tons		5	175

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		23363		
1969		13362		
1972		15099		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		626		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		10		
Phosphorus, tons		3		
Potash, tons		2		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>	291840	Number I-V farms	162
Number of farms	272	Acres in I-V farms	6761
Acres in farms	10782	Cropland I-V farms	4332
Cropland in farms	5730	Harvested cropland	
Harvested cropland in farms	4074	I-V farms	3401

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	533	54	2	56
GRAINS	489	39	0	39
Wheat	210	15	0	15
Oats	268	24	0	24
Barley	6	0	0	0
Rye	0	0	0	0
OTHER FIELD CROPS	416	15	0	15
Soybeans	416	15	0	15
Potatoes				
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	567	26	0	26
PASTURED CROPLAND	521	10	0	10
Cropland used for pasture	369	6	0	6
Improved pasture	152	4	0	4
VEGETABLES, SWEET CORN, MELONS	859	203	0	203
ORCHARDS	183	24	0	24
BERRIES	10	1	0	1
NURSERY & GREENHOUSE PRODUCTS	426	163	21	184
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		535	23	558
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons	
	Solid	Liquid
Fertilizer Used on Crops:	1982	2
Total	1984	
Primary Nutrients in Fertilizer	763	
Nitrogen	287	
Phosphorus	259	
Potash	217	

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
Tonnes for Other Recent Years			
1971			26079
1973			25829

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	20343	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		29505

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	82.8	76.5	82.2	241.5
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	380	2	1	1
Cattle: Table 3	9770	55	10	49
Sheep: Table 4	483	7	1	5
Horses: Table 4	29228	202	29	175
Chickens: Table 5	626	10	3	2
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	40487	276	44	232
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	1984	287	259	217
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	20728			
Salts: Applied on all highways, tons: Table 9 29505				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 7-47

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Central 4.3 COUNTY: Geauga

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	3339	91.8	742	11.1		
Grains	2744	13.7	915	9.1		
Hay or Grass Silage	4470	44.7	3725	37.2		
Pastured Cropland	2186	21.8	2186	21.8		
Other Field Crops	800	16.0	50	.5		
Vegetables	107	3.4	107	5.1	107	6.1
Orchards						
Berries	173	8.4	198	36.2	204	50.2
Nursery, Greenhouse						
Other Crops						
Totals	13819	199.8	7923	121.0	311	56.3
Total Herbicides, Insecticides, Fungicides: 100 lbs					22053	377.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	394.8	462	454	916
1969	174.8	208	227	435
1972	1700	207	216	423

Wet Manure Factor: Tons per litter farrowed 7.45  
 Wet Manure Defecated: Tons, 1972 3151  
 Nutrients in Wet Manure: Nitrogen, tons 16  
 Phosphorus, tons 4  
 Potash, tons 12

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	12166	7109	5057
1969	9322	5430	3892
1972	9900	9800	100

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 128772 645  
 Wet Manure Defecated: Tons, 1972 Combined: 129417  
 Nutrients in Wet Manure: Nitrogen, tons 725  
 Phosphorus, tons 129  
 Potash, tons 647

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1010	
1969		1069	1473
1972		800	6072

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1288 77600  
 Nutrients in Wet Manure: Nitrogen, Tons 18 535  
 Phosphorus, Tons 3 78  
 Potash, Tons 13 466

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		223685		
1969		173655		
1972		128430	12000	120000

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
 Wet Manure Defecated: Tons, 1972 5323  
 Nutrients in Wet Manure: Nitrogen, tons 83 Combined 754.1  
 Phosphorus, tons 21 118  
 Potash, tons 19 30 26

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres <sup>(1)</sup>	260480	Number I-V farms	301
Number of farms	578	Acres in I-V farms	48088
Acres in farms	69527	Cropland I-V farms	26982
Cropland in farms	38610	Harvested cropland	
Harvested cropland in farms	22721	I-V farms	18165

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	4673	856	50	906
GRAINS	4361	597	0	597
Wheat	803	114	0	114
Oats	3184	436	0	436
Barley	281	40	0	40
Rye	23	3	0	3
OTHER FIELD CROPS	33	13	0	13
Soybeans	14	2	0	2
Potatoes	19	11	0	11
Sugar beets				
Field beans	27	0	0	0
HAY OR GRASS SILAGE	8683	55	6	61
PASTURED CROPLAND	6213	81	13	94
Cropland used for pasture	5373	43	3	46
Improved pasture	1540	38	10	48
VEGETABLES, SWEET CORN, MELONS	122	30	0	30
ORCHARDS	237	36	1	37
BERRIES	7	1	0	1
NURSERY & GREENHOUSE PRODUCTS	66	4	1	5
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		1673	71	1744
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1640
Liquid	9
Total	1649
Primary Nutrients in Fertilizer	751
Nitrogen	186
Phosphorus	284
Potash	281

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3038
Tonnages for Other Recent Years			
1971			3209
1973			3280

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	11516	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 21054		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides 199.8	Insecticides 121.0	Fungicides 56.3	Total 377.1
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3151	16	4	12
Cattle: Table 3	129417	725	129	647
Sheep: Table 4	1288	18	3	13
Horses: Table 4	77600	535	78	466
Chickens: Table 5	5323	83	21	19
Turkeys: Table 5	7568	118	30	26
Total from Livestock, Tons	224347	1495	265	1183
Fertilizers: Tons of Commercial Fertilizers Applied				
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	1649	186	284	281
Lime: Limestone equivalent purchased or applied, tons: Table 8 3038				
Salts: Applied on all highways, tons: Table 9 21054				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-48

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Central 4.3 COUNTY: Lake

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1145	31.4	254	3.8		
Grains	900	4.5	300	3.0		
Hay or Grass Silage	660	6.6	550	5.5		
Pastured Cropland	262	2.6	262	2.6		
Other Field Crops	800	16.0	50	.5		
Vegetables	489	15.6	489	23.3	489	27.8
Orchards						
Berries	580	29.6	659	119.1	679	163.8
Nursery, Greenhouse						
Other Crops						
Totals	4836	106.3	2564	157.8	1168	119.6
Total Herbicides, Insecticides, Fungicides: 100 lbs					8568	455.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	512	29	45	74
1969	193	28	23	51
1972	250	32	34	66

Wet Manure Factor: Tons per litter farrowed 7.45  
Wet Manure Defecated: Tons, 1972 492  
Nutrients in Wet Manure: Nitrogen, tons 2  
Phosphorus, tons 1  
Potash, tons 2

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	1652	653	999
1969	1111	349	792
1972	1100	500	600

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 6570 3870  
Wet Manure Defecated: Tons, 1972 Combined: 10440  
Nutrients in Wet Manure: Nitrogen, tons 58  
Phosphorus, tons 10  
Potash, tons 52

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		531	
1969		336	193
1972		300	1199

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 483 15323  
Nutrients in Wet Manure: Nitrogen, Tons 7 106  
Phosphorus, Tons 1 15  
Potash, Tons 5 92

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		44281		
1969		60802		
1972		68706		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 2848  
Nutrients in Wet Manure: Nitrogen, tons 44  
Phosphorus, tons 11  
Potash, tons 10

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	836	21	2	23
GRAINS	846	100	0	100
Wheat	316	29	0	29
Oats	1145	62	0	62
Barley	35	6	0	6
Rye	30	2	0	2
OTHER FIELD CROPS	138	56	0	56
Soybeans	78	8	0	8
Potatoes	60	48	0	48
Sugar beets				
Field beans	30	8	0	8
HAY OR GRASS SILAGE	1166	10	0	10
PASTURED CROPLAND	601	3	0	3
Cropland used for pasture	490	3	0	3
Improved pasture	111	0	0	0
VEGETABLES, SWEET CORN, MELONS	556	205	0	205
ORCHARDS	762	149	0	149
BERRIES	47	7	0	7
NURSERY & GREENHOUSE PRODUCTS	3248	732	16	748
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		1361	18	1379
Percent of Fertilizer Used		99	1	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	976
Liquid	0
Total	976
Primary Nutrients in Fertilizer	389
Nitrogen	102
Phosphorus	144
Potash	143

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			445
Tonnes for Other Recent Years			
1971			835
1973			581

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	6090	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 8833		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	106.3	157.8	191.6	455.7
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	422	2	1	2
Cattle: Table 3	10440	58	10	52
Sheep: Table 4	483	7	1	5
Horses: Table 4	15323	106	15	92
Chickens: Table 5	2848	44	11	10
Turkeys: Table 5	0			
Total from Livestock, Tons	29586	217	38	161
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	976	102	144	143
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	445			
Salts: Applied on all highways, tons: Table 9 8833				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 7-49

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Central 1.3 COUNTY: Lorain

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	20416	561.4	4537	68.0		
Grains	7411	37.2	2480	24.8		
Hay or Grass Silage	4620	46.2	3850	38.5		
Pastured Cropland	3520	35.2	3520	35.2		
Other Field Crops	23040	460.8	1440	14.4		
Vegetables	1298	41.5	1298	61.8	1298	73.8
Orchards						
Berries	816	39.8	936	170.7	961	236.7
Nursery, Greenhouse						
Other Crops						
Totals	61151	1222.1	18061	413.4	2259	310.5
Total Herbicides, Insecticides, Fungicides:			100 lbs	81471		1946.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	6112	653	638	1291
1969	7758	599	675	1274
1972	8500	684	712	1396
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				10400
Nutrients in Wet Manure: Nitrogen, tons				52
Phosphorus, tons				15
Potash, tons				40

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	21731	11611	10090
1969	18865	8644	8221
1972	17800	13986	3814
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		183776	24600
Wet Manure Defecated: Tons, 1972 Combined:		208376	
Nutrients in Wet Manure: Nitrogen, tons		1167	
Phosphorus, tons		208	
Potash, tons		1042	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5966	
1969		5063	941
1972		2700	5403
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		4347	69050
Nutrients in Wet Manure: Nitrogen, tons		61	476
Phosphorus, tons		9	69
Potash, tons		44	414

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		106365		
1969		80753		
1972		91251		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3782		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		59		
Phosphorus, tons		15		
Potash, tons		13		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		Total
		Dry	Liquid	
CORN	19238	3551	251	3802
GRAINS	11263	2006	18	2024
Wheat	7940	1182	17	1199
Oats	5074	674	1	675
Barley	91	17	0	17
Rye	195	18	0	18
OTHER FIELD CROPS	21242	1134	2	1136
Soybeans	20753	857	2	859
Potatoes	471	247	0	247
Sugar beets				
Field beans	1040	2	0	2
HAY OR GRASS SILAGE	15219	336	1	337
PASTURED CROPLAND	9444	139	0	139
Cropland used for pasture	8550	95	0	95
Improved pasture	894	44	0	44
VEGETABLES, SWEET CORN, MELONS	1475	475	3	478
ORCHARDS	1118	130	0	130
BERRIES	33	4	1	5
NURSERY & GREENHOUSE PRODUCTS	318	153	23	176
OTHER CROPS	15	3	0	3
Total Fertilizer Used, Tons		7933	299	8232
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	9026
Liquid	604
Total	9630
Primary Nutrients in Fertilizer	4933
Nitrogen	1318
Phosphorus	1647
Potash	1968

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			9790
Tonnages for Other Recent Years			
1971			18279
1973			20200

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4161	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		6035

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1222.1	413.4	310.5	1946.0
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	10400	52	15	40
Cattle: Table 3	208376	1167	208	1042
Sheep: Table 4	4347	61	9	44
Horses: Table 4	69050	476	69	414
Chickens: Table 5	3782	59	15	13
Turkeys: Table 5	0			
Total from Livestock, Tons	295955	1815	316	1553
Fertilizers: Tons of Commercial Fertilizers Applied				
	Total	Primary Nutrients		
Applied on Cropland: Table 7	9030	Nitrogen	Phosphorus	Potash
		1318	1647	1968
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	9790			
Salts: Applied on all highways, tons: Table 9 6035				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-50

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Central 4.3 COUNTY: Medina

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	15741	132.8	3498	52.4		
Grains	7014	35.0	2338	23.3		
Hay or Grass Silage	7590	75.9	6325	63.2		
Pastured Cropland	3535	35.3	3535	35.3		
Other Field Crops	6880	137.6	430	4.3		
Vegetables	68	2.2	68	3.2	68	3.9
Orchards						
Berries	188	11.7	204	34.6	213	45.2
Nursery, Greenhouse						
Other Crops						
Totals	41016	730.5	16328	216.3	281	49.1
Total Herbicides, Insecticides, Fungicides: 100 lbs 57695 295.9						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	8383	740	724	1464
1969	7881	146	290	736
1972	8000	366	381	747
Wet Manure Factor: Tons per litter farrowed				7.45
Wet Manure Defecated: Tons, 1972				5565
Nutrients in Wet Manure: Nitrogen, tons				28
Phosphorus, tons				8
Potash, tons				21

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	26522	13612	12903
1969	21768	11359	10409
1972	23700	19089	4611
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		250829	29741
Wet Manure Defecated: Tons, 1972 Combined:		280570	
Nutrients in Wet Manure: Nitrogen, tons		1571	
Phosphorus, tons		281	
Potash, tons		1403	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4564	
1969		3521	1617
1972		1800	4412
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2898	56385
Nutrients in Wet Manure: Nitrogen, Tons		41	389
Phosphorus, Tons		6	56
Potash, Tons		29	338

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		243565		
1969		134177		
1972		151620		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6285		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		98		
Phosphorus, tons		25		
Potash, tons		22		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	17655	3275	213	3488
GRAINS	11264	1490	1	1491
Wheat	4806	652	0	652
Oats	5201	675	0	675
Barley	279	36	0	36
Rye	79	9	0	9
OTHER FIELD CROPS	4693	358	0	358
Soybeans	4510	315	0	315
Potatoes	41	20	0	20
Sugar beets				
Field beans	493	0	0	0
HAY OR GRASS SILAGE	20029	468	2	470
PASTURED CROPLAND	11133	195	0	195
Cropland used for pasture	8685	164	0	164
Improved pasture	2448	31	0	31
VEGETABLES, SWEET CORN, MELONS	77	17	0	17
ORCHARDS	190	22	0	22
BERRIES	55	16	0	16
NURSERY & GREENHOUSE PRODUCTS	213	168	1	169
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		6009	217	6226
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	4284
Liquid	3292
Total	8283
Primary Nutrients in Fertilizer	4132
Nitrogen	1009
Phosphorus	1359
Potash	1764

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			9568
Tonnages for Other Recent Years			
1971			19271
1973			16930

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "r" Mile
1970-71		
1971-72		
1972-73	10489	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		15213

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	730.5	216.3	49.1	995.9
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	5565	28	8	21
Cattle: Table 3	280570	1571	281	1403
Sheep: Table 4	2898	41	6	29
Horses: Table 4	59385	389	52	356
Chickens: Table 5	6285	98	25	22
Turkeys: Table 5	0			
Total from Livestock, Tons	354703	2127	379	1831
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	8283	1009	1359	1764
Lime: Limestone equivalent purchased or applied, tons: Table 8 9568				
Salts: Applied on all highways, tons: Table 9 15213				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-51

PLANNING AREA: Lake Erie 4.0 STATE: Ohio  
 PLANNING SUBAREA: Central 4.3 COUNTY: Portage

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	11,500	398.7	3222	48.3		
Grains	6160	30.8	2053	20.5		
Hay or Grass Silage	5790	57.9	4825	48.2		
Pastured Cropland	2956	29.5	2956	29.5		
Other Field Crops	890	16.0	50	.5		
Vegetables	1048	33.5	1048	49.9	1048	59.6
Orchards						
Berries	259	15.0	286	49.9	297	66.6
Nursery, Greenhouse						
Other Crops						
Totals	31513	581.4	11390	246.8	1345	126.2
Total Herbicides, Insecticides, Fungicides: 100 lbs 4724.8 951.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	5152	402	371	773
1969	4762	309	334	643
1972	4700	310	323	633

Wet Manure Factor: Tons per litter farrowed 7.45  
 Wet Manure Defecated: Tons, 1972 4716  
 Nutrients in Wet Manure: Nitrogen, tons 24  
 Phosphorus, tons 7  
 Potash, tons 18

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	20116	9687	10429
1969	17577	8338	9239
1972	19400	13041	6359

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 171359 41016  
 Wet Manure Defecated: Tons, 1972 Combined: 212375  
 Nutrients in Wet Manure: Nitrogen, tons 1189  
 Phosphorus, tons 212  
 Potash, tons 1062

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2969	
1969		2409	1282
1972		1100	1949

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1771 24908  
 Nutrients in Wet Manure: Nitrogen, Tons 25 172  
 Phosphorus, Tons 4 25  
 Potash, Tons 18 149

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		172525		
1969		129805		
1972		116680		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 6080  
 Nutrients in Wet Manure: Nitrogen, tons 95  
 Phosphorus, tons 24  
 Potash, tons 21

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	13505	3020	373	3393
GRAINS	9698	1290	7	1297
Wheat	3228	453	0	453
Oats	5276	721	5	726
Barley	388	53	0	53
Rye	147	6	1	7
OTHER FIELD CROPS	2243	1101	2	1103
Soybeans	610	36	2	38
Potatoes	1633	1066	0	1066
Sugar beets				
Field beans	528	1	0	1
HAY OR GRASS SILAGE	14275	506	1	507
PASTURED CROPLAND	9562	148	0	148
Cropland used for pasture	7494	103	0	103
Improved pasture	2068	45	0	45
VEGETABLES, SWEET CORN, MELONS	1191	327	37	364
ORCHARDS	293	21	0	21
BERRIES	54	26	0	26
NURSERY & GREENHOUSE PRODUCTS	316	151	0	151
OTHER CROPS	5	0	0	0
Total Fertilizer Used, Tons		6591	420	7011
Percent of Fertilizer Used		94	6	100

COUNTY, land area, acres (1) 31654  
 Number I-V farms 480  
 Acres in I-V farms 88214  
 Acres in farms 124315  
 Cropland I-V farms 55876  
 Cropland in farms 76490  
 Harvested cropland 50333  
 I-V farms 41513

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	5999
Liquid	1005
Total	8005
Primary Nutrients in Fertilizer	3719
Nitrogen	1089
Phosphorus	1318
Potash	1312

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			8822
Tonnages for Other Recent Years			
1971			11340
1973			11965

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	9000	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 13054		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	581.4	246.8	126.2	954.4
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	4716	24	7	18
Cattle: Table 3	212375	1189	212	1062
Sheep: Table 4	1771	25	4	18
Horses: Table 4	24908	172	25	149
Chickens: Table 5	6080	95	24	21
Turkeys: Table 5	0			
Total from Livestock, Tons	249850	1505	272	1268
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	8005	1089	1318	1312
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	8822			
Salts: Applied on all highways, tons: Table 9 13054				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 7-52

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: Ohio

PLANNING SUBAREA: Central 4.3 COUNTY: Summit

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	1717	17.2	382	5.7		
Grains	1320	6.6	1140	4.4		
Hay or Grass Silage	1380	13.8	1150	11.5		
Pastured Cropland	668	6.6	668	6.6		
Other Field Crops	800	16.0	50	.5		
Vegetables	544	17.4	544	25.9	544	30.9
Orchards						
Berries	176	8.6	201	36.8	207	50.9
Nursery, Greenhouse						
Other Crops						
Totals	6605	116.2	3435	91.4	751	81.8
Total Herbicides, Insecticides, Fungicides: 100 lbs 10791 289.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1233	100	120	220
1969	566	37	33	70
1972	550	33	35	68
Wet Manure Factor: Tons per litter farrowed 7.45				
Wet Manure Defecated: Tons, 1972 507				
Nutrients in Wet Manure: Nitrogen, tons 3				
Phosphorus, tons 1				
Potash, tons 2				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	1818	2371	2447
1969	1494	1708	1786
1972	1600	2079	1521
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 27318 9810			
Wet Manure Defecated: Tons, 1972 Combined: 37128			
Nutrients in Wet Manure: Nitrogen, tons 208			
Phosphorus, tons 37			
Potash, tons 186			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		829	
1969		949	490
1972		900	2320
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 1449 29650			
Nutrients in Wet Manure: Nitrogen, Tons 20 205			
Phosphorus, Tons 3 30			
Potash, Tons 11 178			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		41787		
1969		54381		
1972		61451		
Wet Manure Factor: Lbs. per bird 82.9				
Wet Manure Defecated: Tons, 1972 2547				
Nutrients in Wet Manure: Combined				
Nitrogen, tons 40				
Phosphorus, tons 10				
Potash, tons 9				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	2281	353	17	370
GRAINS	2410	298	0	298
Wheat	1034	138	0	138
Oats	1151	138	0	138
Barley	98	15	0	15
Rye	99	2	0	2
OTHER FIELD CROPS	648	117	4	121
Soybeans	474	34	0	34
Potatoes	129	74	0	74
Sugar beets				
Field beans	101	0	0	0
HAY OR GRASS SILAGE	3486	45	0	45
PASTURED CROPLAND	2474	26	0	26
Cropland used for pasture	1668	21	0	21
Improved pasture	746	5	0	5
VEGETABLES, SWEET CORN, MELONS	618	139	1	140
ORCHARDS	210	26	0	26
BERRIES	8	2	0	2
NURSERY & GREENHOUSE PRODUCTS	585	109	2	111
OTHER CROPS	26	0	0	0
Total Fertilizer Used, Tons		1115	24	1139
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	1115
Liquid	261
Total	1378
Primary Nutrients in Fertilizer	579
Nitrogen	185
Phosphorus	233
Potash	161

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			2771
Tonnes for Other Recent Years			
1971			3732
1973			3169

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	9400	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 13634		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	116.2	91.4	81.8	289.4
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	507	3	1	2
Cattle: Table 3	37128	208	37	186
Sheep: Table 4	1449	20	3	11
Horses: Table 4	30391	210	30	182
Chickens: Table 5	2547	40	10	9
Turkeys: Table 5	0			
Total from Livestock, Tons	72022	481	81	393
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	1378	185	233	161
Lime: Limestone equivalent purchased or applied, tons: Table 8 2771				
Salts: Applied on all highways, tons: Table 9 13634				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

#### 7.4.2.3 Commercial Fertilizers

The 1972 total of commercial fertilizer use was 38,761 metric tons (42,726 tons) for PSA 4.3. This amount is about 15 percent below the Great Lakes Basin average. Nitrogen represents 28 percent, phosphorus 34, and potash 38 percent of the primary nutrients applied.

#### 7.4.2.4 Lime

The amount of lime purchased or applied to croplands in PSA 4.3 was 68,847 metric tons (75,890 tons). Cuyahoga and Ashtabula Counties were heavy users of lime; Loraine, Medina and Portage medium users; and Lake, Geauga and Summit light users. It is projected that lime usage may continue similar to present use.

#### 7.4.2.5 Salts

All of the counties in this planning subarea are modest to heavy users of road de-icing salts. The 1972-73 season totalled 123,421 metric tons (136,046 tons) of salts used, the second highest total for the Lake Erie basin and the highest rate per acre. It is projected that these heavy rates will continue.

### 7.5 Planning Subarea 4.4

The five counties in this planning subarea extend from northwest Pennsylvania along Lake Erie and then up to Niagara County which borders Canada and Lake Ontario. While it includes only five counties, these total a larger land area and greater acreage of harvested crops than Planning Subarea 4.3 to the west with eight counties.

#### 7.5.1 Agricultural Characteristics

Sweet corn and tomatoes are two of the most important vegetable crops. Potatoes are raised some in the western part of the subarea. The general farm crops -- corn, grains, and hay are raised to support the livestock. The major livestock present are dairy and beef cows.

Table 7-53 indicates relative proportions of materials usage in Planning Subarea 4.4 in comparison with the total Great Lakes Basin.

Table 7-53

## MATERIALS USAGE BASIN RELATIONSHIP -- PSA 4.4 TO GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 4.4</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	6.82	2.66
Index of chemicals applied	256	100
Tons of livestock manure defecated	5.47	3.37
Index of Manure defecated	162	100
Lbs primary nutrients in livestock manure	133	82
Index primary nutrients in manure	162	100
Lbs commercial fertilizer applied	301	321
Percent liquid fertilizer applied	8	22
Index commercial fertilizer applied	94	100
Lbs primary nutrients in commercial fertilizer	116	153
Index primary nutrients in commercial fertilizer	76	100
Lbs lime applied	333	170
Index lime applied	196	100
-----		
<u>Per acre of total land area</u>		
Lbs of road salts used	75.86	41.74
Index of road salts used	184	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 7.5.2 Materials Usage

Table 7-54 lists by county the material usage inventory for PSA 4.4. Detailed statistics are shown in Tables 7-55 to 7-60.

Table 7-54  
MATERIALS USAGE  
(in 1972)

<u>PSA 4.4</u>	<u>Chemicals Applied to Crops (100 lbs)</u>	<u>Livestock Manure (tons)</u>	<u>Commercial Fertilizer on Cropland (tons)</u>	<u>Limestone Purchased or Applied (tons)</u>	<u>Salts Applied to all Highways (tons)</u>
<u>Pennsylvania</u>					
Erie	6489	421552	16054	15500	59321
<u>New York</u>					
Cattaraugus	1610	671634	7910	17791	22481
Chautaugua	14560	691731	15398	21491	8992
Erie	4382	536237	18317	16157	18855
Niagara	5237	268866	13653	7849	6933
TOTAL	32278	2590020	71332	78788	116582
-----					
<u>To Convert From</u>	<u>To</u>		<u>Multiply By</u>		
Pounds (lb)	Kilograms (kg)		0.454		
Tons (ton)	Kilograms (kg)		907.2		
	Metric Tons		0.907		

#### 7.5.2.1 Agricultural Chemicals

Chemical usage is very heavy as measured in this study. Grape production especially coupled with tree fruit and vegetables account for heavy usage of insecticides and fungicides. Insecticides accounted for 50 percent of all chemicals used -- the highest percentage of any subarea in the basin. By contrast, herbicides accounted for only 20 percent of the chemicals used -- the lowest of any subarea. Fungicides amounted to 30 percent. Chemical usage is expected to increase in the next 10 years as much as 15 percent. The amount of chemicals applied in 1972 was 1,465,421 kilograms (3,227,800 lbs).

#### 7.5.2.2 Animal Wastes

Dairy cows and beef cows along with the replacement of young cattle are the major kinds of livestock and contribute 85 percent of the livestock manure produced. Horses have grown in importance and contribute 13 percent of the manure. The result is an index of manure defecation 62 percent above the total Basin average. This rate may diminish modestly in the decade ahead. In 1972 the level was 2,349,666 metric tons (2,590,020 tons) of wet manure. Nitrogen, phosphorus, and potash combined, comprise 1.2 percent of the total manure tonnage.

#### 7.5.2.3 Commercial Fertilizers

During 1972 a total of 64,712 metric tons (71,332 tons) of commercial fertilizer were applied to croplands in PSA 4.4.

Fertilization levels are expected to increase perhaps 10-15 percent, over the next 10 years. They are slightly below Basin average. Nitrogen accounts for 31 percent of the nutrients, phosphorus 37 percent and potash 32 percent. A more intensive use of phosphates appears to be common in the New York counties.

#### 7.5.2.4 Lime

Lime usage is substantially higher than Basin average and is expected to continue at these levels. The 1972 level totalled 71,467 metric tons (78,788 tons) of lime either purchased or applied to croplands in this planning subarea.

#### 7.5.2.5 Salts

Road de-icers appear to be used liberally also. Road de-icing increases are expected to be associated largely with increases in road mileages as we look ahead. Figures for 1972 show 105,763 metric tons (116,582 tons) of road de-icing salts were applied to all highways in PSA 4.4. This was 21 percent of the salts applied in the Lake Erie basin.

TABLE 7-55

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie h.o STATE: Pennsylvania and New York

PLANNING SUBAREA: East h.h COUNTY: 5 County Totals

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	94230	2591.1	20940	314.1		
Grains	31368	156.6	10457	104.4		
Hay or Grass Silage	77915	778.9	64929	649.0		
Pastured Cropland	37448	374.3	37448	374.3		
Other Field Crops	4011	113.9	3791	431.9	3752	562.9
Vegetables	25346	834.2	25346	1027.1	25346	1105.1
Orchards						
Berries	34800	1544.7	40183	13196.7	42723	8118.8
Nursery, Greenhouse						
Other Crops						
Totals	305118	6393.7	203094	16097.5	71821	9786.8
Total Herbicides, Insecticides, Fungicides: 100 lbs					580033	32278.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	20590	1547	1534	3081
1969	14796	1245	1053	2298
1972	14363	1167	1061	2228
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				16108
Nutrients in Wet Manure: Nitrogen, tons				81
Phosphorus, tons				23
Potash, tons				61

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	236650	138855	97795
1969	212277	119662	92615
1972	214947	120879	94068
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		1588350	606739
Wet Manure Defecated: Tons, 1972 Combined:		2195089	
Nutrients in Wet Manure: Nitrogen, tons		12293	
Phosphorus, tons		2196	
Potash, tons		10975	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		11397	
1969		10112	6974
1972		9523	25922
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		15332	331283
Nutrients in Wet Manure: Nitrogen, Tons		215	2286
Phosphorus, Tons		32	331
Potash, Tons		153	1988

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		97935		
1969		758361		
1972		682277	6250	62500
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		28280		
Nutrients in Wet Manure:		Combined 3928		
Nitrogen, tons		441		61
Phosphorus, tons		113		16
Potash, tons		99		74

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	71158	14031	1279	15310
GRAINS	52492	6683	55	6738
Wheat	12325	1743	29	1772
Oats	33707	4583	13	4596
Barley	1080	136	2	138
Rye	1250	84	1	85
OTHER FIELD CROPS	5737	2788	35	2823
Soybeans	386	14	0	14
Potatoes	4168	2542	34	2576
Sugar beets				
Field beans	987	3	0	3
HAY OR GRASS SILAGE	211990	3547	135	3682
PASTURED CROPLAND	150047	1359	33	1392
Cropland used for pasture	116944	989	31	1020
Improved pasture	33103	370	2	372
VEGETABLES, SWEET CORN, MELONS	29337	7544	207	7751
ORCHARDS	44693	6094	804	6898
BERRIES	834	166	2	168
NURSERY & GREENHOUSE PRODUCTS	3365	331	36	367
OTHER CROPS	206	24	0	24
Total Fertilizer Used, Tons		42570	2586	45156
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	65696
Liquid	5636
Total	71332
Primary Nutrients in Fertilizer	27453
Nitrogen	8401
Phosphorus	10102
Potash	8950

TABLE 8--GROUND LIMESTONE EQUIVALENT  
APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			78788
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	80380	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 116582		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	6393.7	16097.5	9786.8	32278.0
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	16108	81	23	61
Cattle: Table 3	2195089	12293	2196	10975
Sheep: Table 4	15332	215	32	153
Horses: Table 4	331283	2286	331	1288
Chickens: Table 5	28280	441	113	99
Turkeys: Table 5	3928	61	16	74
Total from Livestock, Tons	2590020	15377	2711	13290
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7				
Item	Total	Nitrogen	Phosphorus	Potash
Table 7	71332	8401	10102	8950
Lime: Limestone equivalent purchased or applied, tons: Table 8 78788				
Salts: Applied on all highways, tons: Table 9 116582				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2(1) County, land area, acres  
includes water areas under  
40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-56

PLANNING AREA: Lake Erie 4,0 STATE: Pennsylvania  
 PLANNING SUBAREA: East 4,4 COUNTY: Erie

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	18450	507.3	4100	61.5		
Grains	6900	24.5	2300	23.0		
Hay or Grass Silage	14670	146.7	12225	122.2		
Pastured Cropland	6535	65.3	6535	65.3		
Other Field Crops	2748	81.6	2969	340.9	2964	444.6
Vegetables	2501	64.4	2501	150.3	2501	87.7
Orchards						
Berries	8685	403.4	10168	1650.1	10302	2240.3
Nursery, Greenhouse						
Other Crops						
Totals	60489	1303.2	40798	2413.3	15767	2772.6
Total Herbicides, Insecticides, Fungicides: 100 lbs					117054	6489.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2998	202	207	409
1969	2439	147	178	325
1972	2500	163	170	333

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 2408  
 Nutrients in Wet Manure: Nitrogen, tons 12  
 Phosphorus, tons 3  
 Potash, tons 9

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	41669	23379	18290
1969	34995	19220	15775
1972	36900	17424	19476

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 228951 125620  
 Wet Manure Defecated: Tons, 1972 Combined: 354571  
 Nutrients in Wet Manure: Nitrogen, tons 1986  
 Phosphorus, tons 355  
 Potash, tons 1773

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1528	
1969		929	1169
1972		800	4454

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1288 56922  
 Nutrients in Wet Manure: Nitrogen, Tons 18 393  
 Phosphorus, Tons 3 57  
 Potash, Tons 13 342

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		168365		
1969		93983		
1972		77700	5000	50000

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
 Wet Manure Defecated: Tons, 1972 3221  
 Nutrients in Wet Manure: Nitrogen, tons 50 49  
 Phosphorus, tons 13 13  
 Potash, tons 11 11

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	13512	2953	108	3061
GRAINS	11711	1741	7	1748
Wheat	2018	283	2	285
Oats	9156	1382	3	1385
Barley	299	43	2	45
Rye	182	21	0	21
OTHER FIELD CROPS	3266	1668	35	1703
Soybeans	80	7	0	7
Potatoes	3138	1656	34	1690
Sugar beets				
Field beans	45	0	0	0
HAY OR GRASS SILAGE	30023	632	6	638
PASTURED CROPLAND	25878	399	9	408
Cropland used for pasture	19971	295	8	303
Improved pasture	5907	104	1	105
VEGETABLES, SWEET CORN, MELONS	3308	992	14	1006
ORCHARDS	12442	1939	198	2137
BERRIES	100	26	0	26
NURSEERY & GREENHOUSE PRODUCTS	818	40	0	40
OTHER CROPS	17	2	0	2
Total Fertilizer Used, Tons		10392	377	10769
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	11288
Liquid	1766
Total	16054
Primary Nutrients in Fertilizer	5894
Nitrogen	1717
Phosphorus	2125
Potash	2052

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			15500
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72	34779	
1972-73	40900	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 59321		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1303.2	2413.3	2772.6	6489.1
Manure: Kind of Livestock				
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2408	12	3	9
Cattle: Table 3	354571	1986	355	1773
Sheep: Table 4	1288	18	3	13
Horses: Table 4	56922	393	57	351
Chickens: Table 5	3221	50	13	11
Turkeys: Table 5	3142	49	13	11
Total from Livestock, Tons	421552	2508	444	2168
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	16054	1717	2125	2052
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	15500			
Salts: Applied on all highways, tons: Table 9 59321				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-57

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie L.O STATE: New York

PLANNING SUBAREA: East L.L COUNTY: Cattaraugus

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	16200	445.5	3600	54.0		
Grains	3274	19.5	1305	13.0		
Hay or Grass Silage	19858	198.5	16548	165.4		
Pastured Cropland	10781	107.8	10781	107.8		
Other Field Crops	112	2.2	13	.7	6	.9
Vegetables	1178	39.7	1178	45.2	1178	52.5
Orchards						
Berries	1496	25.7	538	232.9	595	98.4
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>52539</b>	<b>838.9</b>	<b>33963</b>	<b>619.0</b>	<b>1779</b>	<b>151.8</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs 88281 1609.7						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1683	190	176	366
1969	1413	182	169	351
1972	1356	179	158	337
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				2437
Nutrients in Wet Manure: Nitrogen, tons				12
Phosphorus, tons				3
Potash, tons				9

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	60460	37812	22648
1969	55673	32575	23098
1972	57743	33552	24191
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		440873	156032
Wet Manure Defecated: Tons, 1972 Combined: 596905			
Nutrients in Wet Manure: Nitrogen, tons 3343			
Phosphorus, tons 597			
Potash, tons 2985			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1077	
1969		1326	1378
1972		1326	5250
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2135	67095
Nutrients in Wet Manure: Nitrogen, tons		30	463
Phosphorus, tons		4	67
Potash, tons		21	403

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		139955		
1969		81189		
1972		73882		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3062		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		48		
Phosphorus, tons		12		
Potash, tons		11		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	81,3520	Number I-V farms	999
Number of farms	1475	Acres in I-V farms	24,2220
Acres in farms	295,583	Cropland I-V farms	124,286
Cropland in farms	115,920	Harvested cropland I-V farms	79,998
Harvested cropland in farms	88,298		

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	12510	2463	74	2537
GRAINS	6524	856	2	858
Wheat	374	56	0	56
Oats	5882	780	0	780
Barley	80	11	0	11
Rye	70	0	0	0
OTHER FIELD CROPS	93	6	0	6
Soybeans	84	4	0	4
Potatoes	9	2	0	2
Sugar beets				
Field beans	260	0	0	0
HAY OR GRASS SILAGE	58938	737	27	764
PASTURED CROPLAND	48011	300	1	301
Cropland used for pasture	34710	198	1	199
Improved pasture	13301	102	0	102
VEGETABLES, SWEET CORN, MELONS	1343	343	0	343
ORCHARDS	412	48	5	53
BERRIES	76	17	0	17
NURSERY & GREENHOUSE PRODUCTS	106	5	20	25
OTHER CROPS	25	2	0	2
Total Fertilizer Used, Tons		4777	129	4906
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	7356
Liquid	554
Total	7910
Primary Nutrients in Fertilizer	3085
Nitrogen	956
Phosphorus	1142
Potash	987

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			17791
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	15500	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 22481		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	838.9	619.0	151.8	1609.7
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2437	12	3	9
Cattle: Table 3	596905	3343	597	2985
Sheep: Table 4	2135	30	4	21
Horses: Table 4	67095	463	67	403
Chickens: Table 5	3062	48	12	11
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	671634	3896	683	3429
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	7910	956	1142	987
Lime: Limestone equivalent purchased or applied, tons: Table 8 17791				
Salts: Applied on all highways, tons: Table 9 22481				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 7-58

PLANNING AREA: Lake Erie 4.0

STATE: New York

PLANNING SUBAREA: East 4.4

COUNTY: Chautaugua

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	19800	544.5	1400	66.0		
Grains	3485	17.4	1162	11.6		
Hay or Grass Silage	19570	195.7	16308	163.0		
Pastured Cropland	10775	107.7	10775	107.7		
Other Field Crops	351	8.6	182	19.7	170	25.5
Vegetables	5158	173.8	5158	198.0	5158	229.7
Orchards						
Berries	15649	642.7	17500	8661.5	19476	3387.0
Nursery, Greenhouse						
Other Crops						
Totals	74788	1690.4	55565	9227.5	24804	3642.2
Total Herbicides, Insecticides, Fungicides: 100 lbs						
155157 14560.1						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1779	121	118	239
1969	1761	133	70	203
1972	1691	103	92	195
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				1410
Nutrients in Wet Manure: Nitrogen, tons				7
Phosphorus, tons				2
Potash, tons				5

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	67883	39189	28694
1969	59151	33168	25983
1972	58725	31163	24632
Wet Manure Factor: Tons Per Animal		13.74	6.45
Wet Manure Defecated: Tons, 1972		448902	158876
Wet Manure Defecated: Tons, 1972 Combined:		607778	
Nutrients in Wet Manure: Nitrogen, tons		3404	
Phosphorus, tons		608	
Potash, tons		3039	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1750	
1969		1224	1760
1972		1163	6000
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1872	76680
Nutrients in Wet Manure: Nitrogen, Tons		26	529
Phosphorus, Tons		4	77
Potash, Tons		19	460

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		215115		
1969		105769		
1972		96250		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3990		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		62		
Phosphorus, tons		16		
Potash, tons		71		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	15103	2675	368	3043
GRAINS	5809	765	4	769
Wheat	578	68	0	68
Oats	4721	640	4	644
Barley	54	9	0	9
Rye	276	35	0	35
OTHER FIELD CROPS	363	152	0	152
Soybeans	155	0	0	0
Potatoes	208	152	0	152
Sugar beets				
Field beans	83	3	0	3
HAY OR GRASS SILAGE	58220	969	56	1025
PASTURED CROPLAND	46131	394	23	417
Cropland used for pasture	26313	282	22	304
Improved pasture	9818	112	1	113
VEGETABLES, SWEET CORN, MELONS	5993	1480	11	1491
ORCHARDS	16435	2086	541	2627
BERRIES	222	33	2	35
NURSERY & GREENHOUSE PRODUCTS	84	18	7	25
OTHER CROPS	39	6	0	6
Total Fertilizer Used, Tons		8581	1012	9593
Percent of Fertilizer Used		89	11	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14320
Liquid	1078
Total	15398
Primary Nutrients in Fertilizer	6005
Nitrogen	1862
Phosphorus	2222
Potash	1921

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			21491
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	6200	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		8992

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1690.4	9227.5	3642.2	14560.1
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1110	7	2	5
Cattle: Table 3	607778	3404	608	3039
Sheep: Table 4	1872	26	4	19
Horses: Table 4	76680	529	77	460
Chickens: Table 5	3990	62	16	74
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	691730	4028	707	3537
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7	Total	Nitrogen	Phosphorus	Potash
	15398	1862	2222	1921
Lime: Limestone equivalent purchased or applied, tons: Table 8				
	21491			
Salts: Applied on all highways, tons: Table 9				
	8992			

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 7-59

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: New York

PLANNING SUBAREA: East 4.4 COUNTY: Erie

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	17730	487.5	3940	59.1		
Grains	8016	40.0	2672	26.7		
Hay or Grass Silage	14869	148.6	12391	123.9		
Pastured Cropland	5711	57.1	5711	57.1		
Other Field Crops	577	15.7	469	52.9	459	68.9
Vegetables	13985	471.2	13985	536.7	13985	622.8
Orchards						
Berries	2212	114.7	2389	1066.9	2655	431.8
Nursery, Greenhouse						
Other Crops						
Totals	63100	1334.8	47557	1923.3	17099	1123.5
Total Herbicides, Insecticides, Fungicides: 100 lbs						
				121756		4381.6

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	9668	545	584	1129
1969	4007	276	253	529
1972	3847	269	239	508

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 3672  
Nutrients in Wet Manure: Nitrogen, tons 18  
Phosphorus, tons 5  
Potash, tons 14

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	43197	26674	16523
1969	39373	23842	15531
1972	42263	24557	17706

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 322679 114204  
Wet Manure Defecated: Tons, 1972 Combined: 436883  
Nutrients in Wet Manure: Nitrogen, tons 2447  
Phosphorus, tons 437  
Potash, tons 2184

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2882	
1969		2651	1560
1972		2518	6000

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 4054 76680  
Nutrients in Wet Manure: Nitrogen, Tons 57 529  
Phosphorus, Tons 9 77  
Potash, Tons 41 460

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		318545		
1969		376313		
1972		342445	1200	12000

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
Wet Manure Defecated: Tons, 1972 14194  
Nutrients in Wet Manure: Nitrogen, tons 221 754  
Phosphorus, tons 57 12  
Potash, tons 50 3  
Combined 3

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	15447	3312	187	3499
GRAINS	13360	1510	4	1514
Wheat	2572	374	0	374
Oats	7898	1045	4	1049
Barley	516	55	0	55
Rye	623	10	0	10
OTHER FIELD CROPS	1051	630	0	630
Soybeans	62	2	0	2
Potatoes	614	554	0	554
Sugar beets				
Field beans	167	0	0	0
HAY OR GRASS SILAGE	41289	810	1	811
PASTURED CROPLAND	20755	220	0	220
Cropland used for pasture	17495	173	0	173
Improved pasture	3260	47	0	47
VEGETABLES, SWEET CORN, MELONS	16161	384	154	4038
ORCHARDS	2289	328	18	346
BERRIES	400	86	0	86
NURSERY & GREENHOUSE PRODUCTS	2211	255	8	263
OTHER CROPS	46	10	0	10
Total Fertilizer Used, Tons		11045	372	11417
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	17035
Liquid	1282
Total	18317
Primary Nutrients in Fertilizer	7144
Nitrogen	2215
Phosphorus	2643
Potash	2286

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			16157
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	13000	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 18855		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1334.8	1923.3	1123.5	4381.6
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3672	18	5	14
Cattle: Table 3	436883	2447	437	2184
Sheep: Table 4	4054	57	9	41
Horses: Table 4	76680	529	77	460
Chickens: Table 5	14194	221	57	50
Turkeys: Table 5	754	12	3	3
Total from Livestock, Tons	536237	3284	588	2752
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7		Nitrogen	Phosphorus	Potash
	18317	2215	2643	2286
Lime: Limestone equivalent purchased or applied, tons: Table 8 16157				
Salts: Applied on all highways, tons: Table 9 18855				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 7-59(A)

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Erie 4.0 STATE: New York

PLANNING SUBAREA: East 4.4 COUNTY: Niagara

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	22050	606.3	4900	73.5		
Grains	9053	45.2	3018	30.1		
Hay or Grass Silage	8948	89.4	7457	74.5		
Pastured Cropland	3646	36.4	3646	36.4		
Other Field Crops	223	5.8	158	17.7	153	23.0
Vegetables	2524	85.1	2524	96.9	2524	112.4
Orchards						
Berries	7758	358.2	9508	1585.3	9695	1961.3
Nursery, Greenhouse						
Other Crops						
Totals	54202	1226.4	31211	1914.4	12372	2096.7
Total Herbicides, Insecticides, Fungicides: 100 lbs					97785	5237.5

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
1964	4462	489	449	938
1969	5176	507	383	890
1972	4969	453	402	855
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				6182
Nutrients in Wet Manure: Nitrogen, tons				31
Phosphorus, tons				9
Potash, tons				23

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	23441	11801	11640
1969	23085	10857	12228
1972	19246	11183	8063
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		14694.5	52006
Wet Manure Defecated: Tons, 1972 Combined:		198951	
Nutrients in Wet Manure: Nitrogen, tons		1114	
Phosphorus, tons		199	
Potash, tons		995	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4160	
1969		3912	1107
1972		3716	4218
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		5983	53906
Nutrients in Wet Manure: Nitrogen, Tons		84	372
Phosphorus, Tons		13	54
Potash, Tons		60	323

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		137355		
1969		101107		
1972		92000	50	500
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		3813		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		59		31
Phosphorus, tons		15		0
Potash, tons		13		0

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	14586	2628	542	3170
GRAINS	15088	1811	38	1849
Wheat	6783	962	27	989
Oats	6050	736	2	738
Barley	131	18	0	18
Rye	99	18	1	19
OTHER FIELD CROPS	964	332	0	332
Soybeans	5	1	0	1
Potatoes	199	178	0	178
Sugar beets				
Field beans	432	0	0	0
HAY OR GRASS SILAGE	23520	399	45	444
PASTURED CROPLAND	9272	46	0	46
Cropland used for pasture	8455	41	0	41
Improved pasture	817	5	0	5
VEGETABLES, SWEET CORN, MELONS	2532	845	28	873
ORCHARDS	13115	1693	42	1735
BERRIES	36	4	0	4
NURSERY & GREENHOUSE PRODUCTS	146	13	1	16
OTHER CROPS	79	4	0	4
Total Fertilizer Used, Tons		7775	696	8472
Percent of Fertilizer Used		92	8	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12697
Liquid	956
Total	13653
Primary Nutrients in Fertilizer	5325
Nitrogen	1651
Phosphorus	1970
Potash	1704

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			7849
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4780	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		6933

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	1226.4	1914.4	2096.7	5237.5	
Manure: Kind of Livestock					
		Tons of Materials in Wet Manure Defecated			
		Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2		6182	31	9	23
Cattle: Table 3		198951	1114	199	995
Sheep: Table 4		5983	84	13	60
Horses: Table 4		53906	372	54	323
Chickens: Table 5		3813	59	15	13
Turkeys: Table 5		31	0	0	0
Total from Livestock, Tons		268866	1660	290	1414
Fertilizers: Tons of Commercial Fertilizers Applied					
		Primary Nutrients			
Item	Total	Nitrogen	Phosphorus	Potash	
Applied on Cropland: Table 7	13653	1651	1970	1704	
Lime: Limestone equivalent purchased or applied, tons:					
Table 8		7849			
Salts: Applied on all highways, tons: Table 9 6933					

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



Section 8

MATERIALS USAGE IN THE LAKE ONTARIO BASIN

8.1 Basin Characteristics

This area encompasses 21 New York counties, 6 in the western part of the state (Planning Subarea 5.1), 12 in the central part (Planning Subarea 5.2), and 3 counties in the northern part (Planning Subarea 5.3).

8.1.1 Agricultural Characteristics

This Lake basin has several areas producing fruit and vegetable products. Other crops grown are corn, grains, and hay which primarily support the livestock. Dairying is the major livestock enterprise in all three subareas.

Table 8-1 indicates the relative proportions of materials usage in the Lake Ontario basin as compared to the total U.S. Great Lakes Basin.

Table 8-1

MATERIALS USAGE BASIN RELATIONSHIP -- LAKE ONTARIO 5.0 to GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Lake Ontario basin</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	3.05	2.66
Index of chemicals applied	115	100
Tons livestock manure defecated	4.77	3.37
Index of manure defecated	142	100
Lbs primary nutrients in livestock manure	116	82
Index primary nutrients in manure	141	100
Lbs commercial fertilizer applied	309	321
Percent liquid fertilizer applied	7	22
Index commercial fertilizer applied	96	100
Lbs primary nutrients in commercial fertilizer	120	153
Index primary nutrients in commercial fertilizer	78	100
Lbs of lime applied	198	170
Index of lime applied	116	100
<hr/>		
<u>Per acre of total land area</u>		
Lbs road salts used	59.77	41.74
Index road salts used	143	100
<hr/>		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

### 8.1.2 Materials Usage

An inventory and analysis of materials usage was made based on personal interviews, correspondence and statistics as available from agricultural statistics, census information, state highway departments, universities, private companies, and state and federal agencies. Background for the analysis is presented in the Methodology Section. Table 8-2 summarizes the findings of this inventory and analysis. Detailed statistics are shown in Table 8-3.

Table 8-2  
MATERIALS USAGE  
(in 1972)

<u>Area</u>	<u>Chemicals Applied to Crops (100 lbs)</u>	<u>Livestock Manure (tons)</u>	<u>Commercial Fertilizer on Cropland (tons)</u>	<u>Limestone Purchased or Applied (tons)</u>	<u>Salts Applied to All Highways (tons)</u>
Lake Ontario basin	60,021	9,397,934	304,073	195,173	339,016
PSA 5.1	17,690	2,241,728	108,277	66,825	185,592
PSA 5.2	37,428	4,566,593	168,436	93,608	123,561
PSA 5.3	4,903	2,589,613	27,360	34,740	29,863

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 8.1.2.1 Agricultural Chemicals

Chemical usage is modest in Planning Subarea 5.1, heavy in Planning Subarea 5.2 and light in Planning Subarea 5.3. The chemical usage combines to give a higher than average figure for the area. With the large acreages of fruit and vegetable crops produced, it is projected that there will be increased use of chemicals rather than a decrease or continuance at present levels. There are so many indefinite factors in the chemical field and so many new developments occurring that there are likely to be great changes. An increase in the use of chemicals perhaps as much as 15-20 percent is estimated. Many scientists feel that the likelihood for increased use of herbicides is the greatest, with fungicide use perhaps increasing modestly.

One of the problems concerning the use of chemicals, even if effective in performing their functional roles is that some residues will still remain in the soils. In the case of herbicides, this is known as "carryover" and in the case of insecticides as "persistence". It is believed that the persistence associated with insecticides will be almost entirely eliminated in the future and that carryover in herbicides will be greatly reduced, if not entirely eliminated.

#### 8.1.2.2 Animal Wastes

Dairying is the major livestock enterprise in all three planning subareas. The cows and supporting young cattle produced 88 percent of the livestock manure; horses produced 9 percent while chickens, swine and sheep each produced 1 percent. The manure index was above the Great Lakes Basin average in each of the three subareas. Overall livestock numbers may decrease slightly. Horse numbers may increase but not at recent rates. Manure production may stay about the same or decline slightly, but will continue well above the Basin average for the next 10 years. The 1972 levels were 8,525,800 metric tons (9,397,934 tons) of wet manure produced in the Lake Ontario basin. Nitrogen, phosphorus and potash comprise 1.2 percent of the total manure defecated.

#### 8.1.2.3 Commercial Fertilizers

It is not uncommon for chemical use and fertilizer use to accompany each other. Good farmers use both if needed. In this area nitrogen represented 32 percent of the fertilizer nutrients applied, phosphorus 32 percent and potash 36 percent. This ratio is likely to continue, although it is possible that nitrogen may show a little greater increase, potash second and phosphorus the least. Fertilization rates are likely to increase by at least 15 percent in the next 10 years. A total of 275,855 metric tons (304,073 tons) of commercial fertilizers were applied to crops in the Lake Ontario basin in 1972.

#### 8.1.2.4 Lime

A total of 177,060 metric tons (195,173 tons) of limestone was used in the Lake Ontario basin in 1972. Lime is important in terms of its water quality impacts due to its effects on the pH level of water and subsequent effects on water's acid-base relationships. The possibility of precipitating phosphorus in the water and altering calcium content is also likely.

#### 8.1.2.5 Salts

Road de-icing salts are intensively used in this lake basin, heaviest in PSA 5.1, modest in PSA 5.2, but surprisingly light in PSA 5.3. The severe climatic conditions during winter and resultant heavy snowfalls require using the salts to keep major roadways open. The 1972-73 figures show that 307,555 metric tons (339,016 tons) of road de-icing salts were used in highways in this lake basin. It is projected that this rate will continue to be high for the Lake Ontario area. The primary impact upon ground and surface waters resulting from road de-icing salts comes from chloride discharges which can over time affect the salinity of nearby wells and open water areas. Assuming that chlorides are conservation and that ion exchange between chlorides and various soil types are minimal, most of the chlorides will eventually reach ground and surface water areas.

TABLE 8-3

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York  
West 5.1,  
PLANNING SUBAREA: Central 5.2, East 5.3 COUNTY: 21 County Totals (New York-21)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	458640	12612.0	101920	1528.8		
Grains	190725	952.9	63576	634.9		
Hay or Grass Silage	298334	2982.2	248613	2485.3		
Pastured Cropland	166499	1663.9	166499	1663.9		
Other Field Crops	16446	449.9	13735	1550.9	13464	2019.8
Vegetables	73321	2470.1	73321	2814.0	73321	3265.0
Orchards						
Nursery, Greenhouse	42078	2007.1	48921	8820.4	50037	12100.2
Other Crops						
Totals	1246043	23138.1	716585	19498.2	136822	17385.0
Total Herbicides, Insecticides, Fungicides: 100 lbs					2099450	60021.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	46736	4347	4214	8561
1969	46856	4159	4168	8327
1972	45036	4238	3766	8004
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				57869
Nutrients in Wet Manure: Nitrogen, tons				289
Phosphorus, tons				81
Potash, tons				220

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	897645	537901	359744
1969	785825	449034	336791
1972	795981	462507	333474
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		6077342	2150907
Wet Manure Defecated: Tons, 1972 Combined:		8228249	
Nutrients in Wet Manure: Nitrogen, tons		46078	
Phosphorus, tons		8228	
Potash, tons		41141	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		79096	
1969		63592	19962
1972		60434	68523
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		97299	875724
Nutrients in Wet Manure: Nitrogen, Tons		1362	6042
Phosphorus, Tons		204	876
Potash, Tons		973	5254

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		3314405		
1969		3463154		
1972		3152725	12910	129100
Wet Manure Factor: Lbs. per bird		82.9	365	89.63
Wet Manure Defecated: Tons, 1972		130680		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		2039	127	
Phosphorus, tons		523	32	
Potash, tons		457	28	

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	363163	63005	6605	69610
GRAINS	317878	37219	864	38083
Wheat	101767	13425	438	13863
Oats	192332	21722	366	22088
Barley	10564	1179	45	1224
Rye	5028	438	10	448
OTHER FIELD CROPS	97786	26010	565	26575
Soybeans	2362	230	8	238
Potatoes	18386	12825	42	12867
Sugar beets				
Field beans	12070	106		106
HAY OR GRASS SILAGE	888311	13620	409	14029
PASTURED CROPLAND	653616	5495	207	5702
Cropland used for pasture	546489	4262	153	4415
Improved pasture	107127	1233	54	1287
VEGETABLES, SWEET CORN, MELONS	84706	23852	1156	25008
ORCHARDS	62333	9133	502	9635
BERRIES	613	111	1	112
NURSERY & GREENHOUSE PRODUCTS	2668	454	11	465
OTHER CROPS	1114	150	22	172
Total Fertilizer Used, Tons		179155	10342	189497
Percent of Fertilizer Used		95	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	282787
Liquid	21286
Total	304073
Primary Nutrients in Fertilizer	118588
Nitrogen	36766
Phosphorus	43876
Potash	37946

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			195173
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	233740	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		339016

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
	Herbicides	Insecticides	Fungicides	Total
Table 1	23138.1	19498.2	17385.0	60021.3
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	57869	289	81	220
Cattle: Table 3	8228249	46078	8228	41141
Sheep: Table 4	97299	1362	204	973
Horses: Table 4	875724	6042	876	5254
Chickens: Table 5	130680	2039	523	457
Turkeys: Table 5	8113	127	32	28
Total from Livestock, Tons	9397934	55937	9944	48073
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	304073	36766	43876	37946
Lime: Limestone equivalent purchased or applied, tons: Table 8 195173				
Salts: Applied on all highways, tons: Table 9 339016				

(1) County, land area, acres includes water areas under 40 acres in size.

To Convert From To Multiply By  
Pounds (lb) Kilograms (kg) 0.453  
Acres (acre) Hectare (ha) .4047  
Tons (ton) Kilograms (kg) 907.2

## 8.2 Planning Subarea 5.1

Planning Subarea 5.1 comprises six western New York counties extending from the shores of Lake Ontario southward to the Pennsylvania border to Allegany County. The largest urban concentration is in Monroe County where Rochester and other cities are located.

### 8.2.1 Agricultural Characteristics

Fruits and vegetables are the major agricultural activities. Apples are the most important fruit crop and are found primarily in Orleans and Monroe Counties. These two counties plus Genesee County produce the majority of the vegetables. Major vegetable crops raised are snap beans, sweet corn, cabbage, onions and tomatoes. Potatoes are grown primarily in Wyoming and Orleans Counties. Dairying is the major livestock enterprise with over 100,000 head of dairy cows and heifers.

Table 8-4 indicates the relative proportions of materials usage in Planning Subarea 5.1 in comparison with the total Great Lakes Basin.

Table 8-4

#### MATERIALS USAGE BASIN RELATIONSHIP -- PSA 5.1 to GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 5.1</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	3.11	2.66
Index of chemicals applied	117	100
Tons of livestock manure defecated	3.95	3.37
Index of manure defecated	117	100
Lbs primary nutrients in livestock manure	97	82
Index primary nutrients in manure	118	100
Lbs commercial fertilizer applied	381	321
Percent liquid fertilizer applied	7	22
Index commercial fertilizer applied	119	100
Lbs primary nutrients in commercial fertilizer	149	153
Index primary nutrients in commercial fertilizer	97	100
Lbs of lime applied	235	170
Index of lime used	138	100
<hr/>		
<u>Per acre of total land</u>		
Lbs road salts used	150.44	41.74
Index road salts used	360	100
<hr/>		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907



### 8.2.2 Materials Usage

Table 8-5 lists by county the material usage inventory for Planning Subarea 5.1. Detailed statistics are shown on Tables 8-6 to 8-12.

Table 8-5  
MATERIALS USAGE  
(in 1972)

PSA 5.1	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salt Applied to all Highways (tons)
<u>New York</u>					
Allegany	1022	382688	6874	13159	4931
Genesee	2621	378703	20618	7370	38146
Livingston	2612	427774	20866	8451	22510
Monroe	3346	206175	16026	6056	88242
Orleans	5658	207958	22736	11447	12328
Wyoming	2431	638430	21157	20342	19435
TOTAL	17690	2241728	108277	66825	185592

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lbs)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 8.2.2.1 Agricultural Chemicals

Agricultural chemicals used in PSA 5.1 totaled 802,410 kilograms (1,769,020 lbs) during 1972. The fruit, vegetable and potato crops account for the fact that 31 percent of the chemicals used are fungicides. Forty percent of the chemicals used are herbicides and 29 percent insecticides. Usage during the next 10 years will increase 15-25 percent overall.

#### 8.2.2.2 Animal Wastes

The cattle produce 84 percent of the manure, horses 12, sheep 2 and chickens and swine 1 percent each. There are about 30,000 head of sheep and 660,000 chickens. Livestock manure production in the subarea is 17 percent above the Basin average. All livestock types have either been decreasing or holding their own, except for horses. Horses may increase further in number, but not at the rapid rates of recent years. Manure production should continue to run above average. The 1972 figures for manure production show that 2,033,696 metric tons (2,241,728 tons) were produced.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-6

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: West 5.1 COUNTY: 6 County Totals (New York-6)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	138870	3818.7	30860	462.9		
Grains	67339	336.5	22447	224.3		
Hay or Grass Silage	68203	681.7	56837	568.1		
Pastured Cropland	35071	350.4	35071	350.4		
Other Field Crops	7927	221.3	7079	803.2	6977	1046.6
Vegetables	33657	1133.9	33657	1291.7	33657	1498.7
Orchards						
Berries	10125	493.4	11855	1370.2	11904	3038.2
Nursery, Greenhouse						
Other Crops						
Totals	361192	7035.9	197806	5970.8	52538	5583.5
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					611536	17690.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	19814	1871	1789	3660
1969	19732	1585	1537	3122
1972	18947	1587	1415	3002
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 21704				
Nutrients in Wet Manure: Nitrogen, tons 109				
Phosphorus, tons 30				
Potash, tons 82				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	221087	123180	97907
1969	193274	102443	90831
1972	181597	105517	76080
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 1386493 490716			
Wet Manure Defecated: Tons, 1972 Combined: 1877209			
Nutrients in Wet Manure: Nitrogen, tons 10512			
Phosphorus, tons 1877			
Potash, tons 9386			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		37750	
1969		31781	6715
1972		30198	20829
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 48619 266195			
Nutrients in Wet Manure: Nitrogen, Tons 681 1837			
Phosphorus, Tons 102 266			
Potash, Tons 486 1597			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		661387		
1969		728962		
1972		663391	800	8000
Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63				
Wet Manure Defecated: Tons, 1972 27498				
Nutrients in Wet Manure: Combined 503				
Nitrogen, tons 429 8				
Phosphorus, tons 110 2				
Potash, tons 96 2				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	106018	19490	1661	21151
GRAINS	112232	13961	377	14320
Wheat	48538	6533	197	6730
Oats	56337	6701	145	6846
Barley	3795	415	13	428
Rye	2106	214	3	217
OTHER FIELD CROPS	50284	13409	383	13792
Soybeans	756	76		76
Potatoes	9602	6819	38	6857
Sugar beets				
Field beans	1987	54		54
HAY OR GRASS SILAGE	199035	3093	37	3130
PASTURED CROPLAND	133817	1495	50	1545
Cropland used for pasture	111569	1221	31	1252
Improved pasture	22248	274	19	293
VEGETABLES, SWEET CORN, MELONS	39131	10187	743	10930
ORCHARDS	17305	2216	7	2223
BERRIES	110	10		10
NURSERY & GREENHOUSE PRODUCTS	1656	340	6	346
OTHER CROPS	240	30	17	47
Total Fertilizer Used, Tons		64285	3263	67548
Percent of Fertilizer Used		95	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	100697
Liquid	7580
Total	108277
Primary Nutrients in Fertilizer	42228
Nitrogen	13092
Phosphorus	15624
Potash	13512

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			66825
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	127960	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 185592		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	7035.9	5070.8	5583.5	17690.2
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	21704	109	30	82
Cattle: Table 3	1877209	10912	1877	9386
Sheep: Table 4	48619	681	102	486
Horses: Table 4	266195	1837	266	1597
Chickens: Table 5	27498	429	110	96
Turkeys: Table 5	503	8	2	2
Total from Livestock, Tons	2241728	13576	2387	11649
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
	108277	13092	15624	13512
Lime: Limestone equivalent purchased or applied, tons: Table 8 66825				
Salts: Applied on all highways, tons: Table 9 185592				

To Convert From Pounds (lb) Acres (acre) Tons (ton) To Kilograms (kg) Hectare (ha) Kilograms (kg) Multiply By 0.453 .4047 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-7

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: West 5.1 COUNTY: Allegany

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	10800	297.0	2400	36.0		
Grains	7589	37.9	2530	25.3		
Hay or Grass Silage	15815	158.1	13179	131.7		
Pastured Cropland	9657	96.5	9657	96.5		
Other Field Crops	194	5.8	215	24.7	215	32.2
Vegetables	48	1.6	48	1.8	48	21.1
Orchards						
Berries	136	6.7	157	32.7	163	35.3
Nursery, Greenhouse						
Other Crops						
Totals	44239	603.6	28186	348.7	426	69.6
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					72851	1021.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1428	104	83	187
1969	1952	162	186	348
1972	1874	177	157	334
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				2415
Nutrients in Wet Manure:				
Nitrogen, tons				12
Phosphorus, tons				3
Potash, tons				9

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	39912	22615	17297
1969	35080	18651	16429
1972	33062	19211	13851
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		252433	89339
Wet Manure Defecated: Tons, 1972 Combined:		341772	
Nutrients in Wet Manure:			
Nitrogen, tons		1914	
Phosphorus, tons		342	
Potash, tons		1709	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		7476	
1969		6821	1091
1972		6480	1800
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		10433	23004
Nutrients in Wet Manure:			
Nitrogen, Tons		146	159
Phosphorus, Tons		22	23
Potash, Tons		104	138

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		90685		
1969		130926		
1972		119143	200	2000
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		4938		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		77	126	
Phosphorus, tons		20	1	
Potash, tons		17	0	

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	8059	1483	104	1587
GRAINS	12649	1347	24	1371
Wheat	645	68	0	68
Oats	11278	1215	24	1239
Barley	451	30	0	30
Rye	8	0	0	0
OTHER FIELD CROPS	533	263	0	263
Soybeans	0	0	0	0
Potatoes	298	226	0	226
Sugar beets				
Field beans	359	14	0	14
HAY OR GRASS SILAGE	43162	670	0	670
PASTURED CROPLAND	35133	306	21	327
Cropland used for pasture		195	19	214
Improved pasture		6872	111	113
VEGETABLES, SWEET CORN, MELONS	57	9	0	9
ORCHARDS	140	27	0	27
BERRIES	2	1	0	1
NURSERY & GREENHOUSE PRODUCTS	4	1	0	1
OTHER CROPS	4	0	0	0
Total Fertilizer Used, Tons		4121	149	4270
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops:	
Solid	6393
Liquid	481
Total	6874
Primary Nutrients in Fertilizer	2681
Nitrogen	831
Phosphorus	992
Potash	858

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			13159
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3400	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		4931

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	603.6	348.7	69.6	1021.9	
Manure: Kind of Livestock					
		Tons of Materials in Wet Manure Defecated			
		Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2		2415	12	3	9
Cattle: Table 3		341772	1914	342	1709
Sheep: Table 4		10433	146	22	104
Horses: Table 4		23004	159	23	138
Chickens: Table 5		4938	77	20	17
Turkeys: Table 5		126	2	1	0
Total from Livestock, Tons		382688	2310	411	1977
Fertilizers: Tons of Commercial Fertilizers Applied					
		Primary Nutrients			
Item	Total	Nitrogen	Phosphorus	Potash	
Applied on Cropland: Table 7	6874	831	992	858	
Lime: Limestone equivalent purchased or applied, tons:					
Table 8		13159			
Salts: Applied on all highways, tons: Table 9		4931			

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 8-8

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: West 5.1 COUNTY: Genesee

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	30150	829.1	6700	100.5		
Grains	13710	68.5	4570	15.7		
Hay or Grass Silage	10763	107.6	8969	89.6		
Pastured Cropland	3554	35.5	3554	35.5		
Other Field Crops	389	11.0	358	40.7	354	53.1
Vegetables	9893	333.3	9893	379.7	9893	440.5
Orchards						
Berries	105	6.7	113	13.5	116	30.7
Nursery, Greenhouse						
Other Crops						
Totals	68564	1391.7	34157	705.2	10363	524.3
Total Herbicides, Insecticides, Fungicides: 100 lbs 113084 2621.2						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	4391	376	350	726
1969	2687	229	188	417
1972	2580	218	220	438

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 3384  
 Nutrients in Wet Manure: Nitrogen, tons 17  
 Phosphorus, tons 5  
 Potash, tons 13

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	36148	20038	16110
1969	31152	16638	14514
1972	29493	17137	12356

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 225180 79696  
 Wet Manure Defecated: Tons, 1972 Combined: 304876  
 Nutrients in Wet Manure: Nitrogen, tons 1707  
 Phosphorus, tons 305  
 Potash, tons 1524

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5856	---
1969		5337	1133
1972		5070	4317

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 8163 55171  
 Nutrients in Wet Manure: Nitrogen, Tons 114 381  
 Phosphorus, Tons 17 55  
 Potash, Tons 82 331

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		142135	---	---
1969		188471	---	---
1972		171509	---	---

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 7109  
 Nutrients in Wet Manure: Nitrogen, tons 111  
 Phosphorus, tons 28  
 Potash, tons 25

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	22204	4063	357	4420
GRAINS	22850	2925	80	3005
Wheat	11923	1660	53	1713
Oats	9010	1073	16	1089
Barley	1080	143	11	154
Rye	475	35	0	35
OTHER FIELD CROPS	9806	1766	69	1835
Soybeans	31	3	0	3
Potatoes	490	276	0	276
Sugar beets				
Field seeds	246	5	0	5
HAY OR GRASS SILAGE	32401	408	2	410
PASTURED CROPLAND	13992	176	6	182
Cropland used for pasture	11709	157	6	163
Improved pasture	2283	19	0	19
VEGETABLES, SWEET CORN, MELONS	11559	2666	203	2869
ORCHARDS	59	9	0	9
BERRIES	25	0	0	0
NURSERY & GREENHOUSE PRODUCTS	273	133	0	133
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		12151	717	12868
Percent of Fertilizer Used		94	6	100

COUNTY, land area, acres (1) 320576 Number I-V farms 618  
 Number of farms 1029 Acres in I-V farms 166615  
 Acres in farms 196648 Cropland I-V farms 130027  
 Cropland in farms 148781 Harvested cropland I-V farms 97718  
 Harvested cropland in farms 105228

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	19175
Liquid	1443
Total	20618
Primary Nutrients in Fertilizer	8041
Nitrogen	2493
Phosphorus	2975
Potash	2573

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			7370
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	26300	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 38146		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1391.7	705.2	524.3	2621.2
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2384	17	5	13
Cattle: Table 3	304876	1707	305	1524
Sheep: Table 4	8163	114	17	82
Horses: Table 4	55171	381	55	331
Chickens: Table 5	7109	111	28	25
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	378703	2330	410	1975
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	20618	2493	2975	2573
Lime: Limestone equivalent purchased or applied, tons: Table 8 7370				
Salts: Applied on all highways, tons: Table 9 38146				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-9

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0

STATE: New York

PLANNING SUBAREA: West 5.1

COUNTY: Livingston

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	33660	925.6	7480	112.2		
Grains	15134	75.6	5045	50.4		
Hay or Grass Silage	11608	116.0	9674	96.7		
Pastured Cropland	7485	74.8	7485	74.8		
Other Field Crops	1817	49.8	1530	172.9	1501	225.2
Vegetables	3909	131.7	3909	150.0	3909	174.1
Orchards						
Berries	309	14.2	362	86.8	375	81.4
Nursery, Greenhouse						
Other Crops						
Totals	73922	1387.7	35485	743.8	5785	480.7
Total Herbicides, Insecticides, Fungicides:		100 lbs		115192		2612.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	3716	285	326	611
1969	5392	421	490	911
1972	5176	463	412	875
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		6326		
Nutrients in Wet Manure: Nitrogen, tons		32		
Phosphorus, tons		9		
Potash, tons		24		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	40994	21592	19402
1969	35083	17745	17338
1972	31455	18277	13178
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		240160	84998
Wet Manure Defecated: Tons, 1972 Combined:		325158	
Nutrients in Wet Manure: Nitrogen, tons		1821	
Phosphorus, tons		325	
Potash, tons		1626	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		10711	
1969		9473	1584
1972		9000	6035
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		14490	77127
Nutrients in Wet Manure: Nitrogen, Tons		203	532
Phosphorus, Tons		30	77
Potash, Tons		145	463

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		150135		
1969		123889		
1972		112739		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		4673		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		73		
Phosphorus, tons		19		
Potash, tons		16		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)		Number I-V farms		
408448		627		
Number of farms		1038		
Acres in farms		249290		
Cropland in farms		178295		
Harvested cropland in farms		113795		
		Acres in I-V farms 205418		
		Cropland I-V farms 152394		
		Harvested cropland I-V farms 105580		
Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	26433	4238	416	4654
GRAINS	25223	3074	84	3158
Wheat	12253	1652	20	1672
Oats	11663	1303	63	1366
Barley	847	100	0	100
Rye	193	9	0	9
OTHER FIELD CROPS	14808	3137	133	3270
Soybeans	138	41	0	41
Potatoes	2064	1275	0	1275
Sugar beets				
Field beans	592	3	0	3
HAY OR GRASS SILAGE	34002	418	2	420
PASTURED CROPLAND	28075	362	0	362
Cropland used for pasture	24170	306	0	306
Improved pasture	3905	56	0	56
VEGETABLES, SWEET CORN, MELONS	4535	886	149	1035
ORCHARDS	386	80	0	80
BERRIES	3	0	0	0
NURSERY & GREENHOUSE PRODUCTS	864	34	0	34
OTHER CROPS	12	2	1	3
Total Fertilizer Used, Tons		12234	785	13019
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	19405
Liquid	1461
Total	20866
Primary Nutrients in Fertilizer	8136
Nitrogen	2523
Phosphorus	3011
Potash	2604

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			8451
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	15520	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		22510

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1387.7	743.8	480.7	2612.2
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	6326	32	9	24
Cattle: Table 3	325158	1821	325	1626
Sheep: Table 4	14490	203	30	145
Horses: Table 4	77127	532	77	463
Chickens: Table 5	4673	73	19	16
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	427774	2661	460	2274
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	20866	2523	3011	2604
Lime: Limestone equivalent purchased or applied, tons: Table 8	8451			
Salts: Applied on all highways, tons: Table 9 22510				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: West 5.1 COUNTY: Monroe

TABLE 8-10

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	16650	457.8	3700	55.5		
Grains	11201	56.0	3734	37.3		
Hay or Grass Silage	7237	72.3	6031	60.3		
Pastured Cropland	3760	37.6	3760	37.6		
Other Field Crops	1012	24.9	549	59.5	515	77.3
Vegetables	7588	255.6	7588	291.2	7588	337.9
Orchards						
Berries	3107	152.5	3627	411.0	3643	922.0
Nursery, Greenhouse						
Other Crops						
Totals	50555	1056.7	28989	952.4	11746	1337.2
Total Herbicides, Insecticides, Fungicides: 100 lbs						
91290 3346.3						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	3902	453	450	903
1969	2445	55	70	125
1972	2347	64	56	120
Wet Manure Factor: Tons per litter farrowed 7.23				
Wet Manure Defecated: Tons, 1972 868				
Nutrients in Wet Manure: Nitrogen, tons 4				
Phosphorus, tons 1				
Potash, tons 3				

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	26770	14536	12234
1969	18582	9193	9389
1972	16296	9469	6827
Wet Manure Factor: Tons Per Animal 13.14 6.45			
Wet Manure Defecated: Tons, 1972 124423 44034			
Wet Manure Defecated: Tons, 1972 Combined: 168457			
Nutrients in Wet Manure: Nitrogen, tons 943			
Phosphorus, tons 168			
Potash, tons 842			

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1337	--
1969		872	1281
1972		828	2482
Wet Manure Factor: Tons per animal 1.61 12.78			
Wet Manure Defecated: Tons, 1972 1333 31720			
Nutrients in Wet Manure: Nitrogen, tons 19 219			
Phosphorus, tons 3 32			
Potash, tons 13 190			

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		132095	--	--
1969		20660	--	--
1972		82500	600	6000
Wet Manure Factor: Lbs. per bird 82.9 365.0 89.53				
Wet Manure Defecated: Tons, 1972 3420				
Nutrients in Wet Manure: Combined 377				
Nitrogen, tons 53 6				
Phosphorus, tons 11 2				
Potash, tons 12 7				

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	11111	1949	200	2149
GRAINS	18668	2293	135	2428
Wheat	10498	1353	100	1453
Oats	6656	782	30	812
Barley	553	59	2	61
Rye	797	94	3	97
OTHER FIELD CROPS	7406	1497	61	1558
Soybeans	147	5	0	5
Potatoes	693	124	5	129
Sugar beets				
Field seeds	155	0	0	0
HAY OR GRASS SILAGE	20821	300	29	329
PASTURED CROPLAND	14193	73	21	94
Cropland used for pasture	11043	62	4	66
Improved pasture	3150	11	17	28
VEGETABLES, SWEET CORN, MELONS	8722	2221	192	2413
ORCHARDS	5646	866	7	873
BERRIES	60	7	0	7
NURSERY & GREENHOUSE PRODUCTS	459	105	6	111
OTHER CROPS	199	26	16	42
Total Fertilizer Used, Tons		9337	667	10004
Percent of Fertilizer Used		93	7	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14904
Liquid	1122
Total	16026
Primary Nutrients in Fertilizer	6250
Nitrogen	1938
Phosphorus	2312
Potash	2000

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			6056
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	60840	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 88242		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1056.7	952.4	1337.2	3346.3
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	868	4	1	3
Cattle: Table 3	168457	943	168	842
Sheep: Table 4	1333	19	3	13
Horses: Table 4	31720	219	32	190
Chickens: Table 5	3420	53	14	12
Turkeys: Table 5	377	6	2	1
Total from Livestock, Tons	206175	1244	220	1061
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	16026	1938	2312	2000
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	6056			
Salts: Applied on all highways, tons: Table 9 88242				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-11

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0

STATE: New York

PLANNING SUBAREA: West 5.1

COUNTY: Orleans

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	21690	596.4	4520	72.3		
Grains	8683	43.4	2894	28.9		
Hay or Grass Silage	5616	56.1	4680	46.8		
Pastured Cropland	3329	33.9	3399	33.9		
Other Field Crops	1922	52.5	1599	180.5	1567	235.0
Vegetables	11552	389.2	11552	443.4	11552	514.4
Orchards						
Berries	6153	297.0	7234	769.7	7239	1864.1
Nursery, Greenhouse						
Other Crops						
Totals	59015	1468.5	36178	1575.5	20358	2613.5
Total Herbicides, Insecticides, Fungicides: 100 lbs					115551	5657.5

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	5262	522	462	984
1969	6041	524	509	1033
1972	5800	525	470	995
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				7194
Nutrients in Wet Manure: Nitrogen, tons				36
Phosphorus, tons				10
Potash, tons				27

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	20572	9679	10893
1969	19740	7958	11782
1972	14109	8197	5912
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		107709	38132
Wet Manure Defecated: Tons, 1972 Combined:		145841	
Nutrients in Wet Manure: Nitrogen, tons		817	
Phosphorus, tons		146	
Potash, tons		729	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		7521	---
1969		6544	814
1972		6220	3216
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		10014	41100
Nutrients in Wet Manure: Nitrogen, tons		140	284
Phosphorus, tons		21	41
Potash, tons		100	247

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		79367	---	---
1969		100946	---	---
1972		91900	---	---
Wet Manure Factor: Lbs. per bird		82.9	---	---
Wet Manure Defecated: Tons, 1972		3809	---	---
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		59	---	---
Phosphorus, tons		15	---	---
Potash, tons		13	---	---

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	15193	3116	223	3339
GRAINS	114472	1969	22	1991
Wheat	8394	1177	22	1199
Oats	5337	723	0	729
Barley	415	48	0	48
Rye	200	17	0	17
OTHER FIELD CROPS	8710	2615	81	2696
Soybeans	400	20	0	20
Potatoes	2170	1257	0	1257
Sugar beets	---	---	---	---
Field seeds	140	12	0	12
HAY OR GRASS SILAGE	16217	227	0	227
PASTURED CROPLAND	12125	243	1	244
Cropland used for pasture	10910	232	1	233
Improved pasture	1215	11	0	11
VEGETABLES, SWEET CORN, MELONS	13535	4224	198	4422
ORCHARDS	10735	1196	0	1196
BERRIES	5	2	0	2
NURSERY & GREENHOUSE PRODUCTS	56	67	0	67
OTHER CROPS	15	0	0	0
Total Fertilizer Used, Tons		13671	525	14196
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	21144
Liquid	1592
Total	22736
Primary Nutrients in Fertilizer	8867
Nitrogen	2749
Phosphorus	3281
Potash	2837

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			11447
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	8500	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 12328		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1468.5	1575.5	2613.5	5657.5
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	7194	36	10	27
Cattle: Table 3	145841	817	146	729
Sheep: Table 4	10014	140	21	100
Horses: Table 4	41100	284	41	247
Chickens: Table 5	3809	59	15	13
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	207958	1336	233	1116
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	22736	2749	3281	2837
Lime: Limestone equivalent purchased or applied, tons: Table 8	11447			
Salts: Applied on all highways, tons: Table 9 12328				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-12

PLANNING AREA: Lake Ontario 5.0 STATE: New York  
 PLANNING SUBAREA: West 5.1 COUNTY: Wyoming

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	25920	712.8	5760	86.4		
Grains	11022	55.1	3674	36.7		
Hay or Grass Silage	17164	171.6	14304	143.0		
Pastured Cropland	7216	72.1	7216	72.1		
Other Field Crops	2593	77.3	2828	324.9	2825	423.8
Vegetables	667	22.5	667	25.6	667	29.7
Orchards						
Berries	315	16.3	362	56.5	368	104.7
Nursery, Greenhouse						
Other Crops						
Totals	64897	1127.7	34811	745.2	3860	558.2
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					103568	2431.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1115	131	118	249
1969	1215	124	94	218
1972	1170	110	100	210
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				1516
Nutrients in Wet Manure: Nitrogen, tons				8
Phosphorus, tons				2
Potash, tons				6

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	56691	34720	21971
1969	53637	32258	21379
1972	57182	33226	23956
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		436590	154516
Wet Manure Defecated: Tons, 1972 Combined:		591106	
Nutrients in Wet Manure: Nitrogen, tons		3310	
Phosphorus, tons		591	
Potash, tons		2956	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		4849	
1969		2734	782
1972		2600	2979
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		4186	38072
Nutrients in Wet Manure: Nitrogen, Tons		59	263
Phosphorus, Tons		9	38
Potash, Tons		42	228

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		66970		
1969		94070		
1972		85600		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3548		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		55		
Phosphorus, tons		14		
Potash, tons		12		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	23018	4641	361	5002
GRAINS	18370	2353	14	2367
Wheat	4825	623	2	625
Oats	12393	1605	12	1671
Barley	449	35	0	35
Rye	433	59	0	59
OTHER FIELD CROPS	8991	4131	39	4170
Soybeans	40	7	0	7
Potatoes	3887	3361	33	3394
Sugar beets				
Field beans	495	20	0	20
HAY OR GRASS SILAGE	52432	1070	4	1074
PASTURED CROPLAND	30299	335	1	336
Cropland used for pasture	25476	269	1	270
Improved pasture	4823	66	0	66
VEGETABLES, SWEET CORN, MELONS	723	181	1	182
ORCHARDS	339	38	0	38
BERRIES	15	0	0	0
NURSERY & GREENHOUSE PRODUCTS	0	0	0	0
OTHER CROPS	10	2	0	2
Total Fertilizer Used, Tons		12771	420	13191
Percent of Fertilizer Used		97	3	0

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	19676
Liquid	1481
Total	21157
Primary Nutrients in Fertilizer	8251
Nitrogen	2558
Phosphorus	3053
Potash	2640

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			20342
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	13400	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
		19435

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Table 1	Hundredweight Applied on Cropland			
	Herbicides	Insecticides	Fungicides	Total
	1127.7	745.2	558.2	2431.1
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
Swine: Table 2	1518	8	2	6
Cattle: Table 3	591106	3310	591	2956
Sheep: Table 4	4186	59	9	42
Horses: Table 4	38072	263	38	228
Chickens: Table 5	3548	55	14	12
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	638430	3695	654	3244
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		
Applied on Cropland: Table 7	21157	Nitrogen	Phosphorus	Potash
		2558	3053	2640
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	20342			
Salts: Applied on all highways, tons: Table 9				
		19435		

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.



#### 8.2.2.3 Commercial Fertilizers

Fertilization rates are running well above the Basin average in this planning subarea and are projected to continue with perhaps some increases, especially in nitrogen. The 1972 total of commercial fertilizer applied to cropland was 98,229 metric tons (108,277 tons). Nitrogen accounted for 31 percent, phosphorus 37 percent, and potash 32 percent of the primary nutrients in the commercial fertilizer.

#### 8.2.2.4 Lime

Lime rates are also applied at rates above Basin average. These levels are expected to continue into the near future. The amount of lime purchased or applied in PSA 5.1 was 60,624 metric tons (66,825 tons) for 1972.

#### 8.2.2.5 Salts

Road de-icers are used in greater quantities in PSA 5.1 than for the Basin as a whole. Highway people expect future quantities used to depend more on increased road mileage rather than higher usage rates. The total amount of salts applied to highways in this area (1972-73) was 168,369 metric tons (185,592 tons).

### 8.3 Planning Subarea 5.2

Planning Subarea 5.2 extends from Rochester on the west, east through the Finger Lake regions encompassing the city of Syracuse and then to Oneida and Herkimer Counties. It is a large land area and diversified in its agriculture. These counties follow along the southern shores of Lake Ontario. Most of the counties do not border directly on the lake.

#### 8.3.1 Agricultural Characteristics

Planning Subarea 5.2 is generally a strong agricultural area. The general crops grown are corn, grains and hay primarily to support the livestock, which is mainly dairy. Fruit and vegetable crops are also very important. Apples, and to a lesser extent, cherries, are important in Wayne County. There are nearly 4,000 hectares (10,000 acres) of grapes in the subarea with Yates County being the heaviest producer. The major vegetable crops are snap beans, sweet corn, cabbage, onions and tomatoes.

Table 8-13 indicates the relative proportions of materials usage in Planning Subarea 5.2 in comparison with the total Great Lakes Basin.

Table 8-13

## MATERIALS USAGE BASIN RELATIONSHIP -- PSA 5,2 to GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 5.2</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	3.78	2.66
Index of chemicals applied	142	100
Tons of livestock manure defecated	4.61	3.37
Index of manure defecated	137	100
Lbs primary nutrients in livestock manure	113	82
Index primary nutrients in manure	138	100
Lbs commercial fertilizer applied	340	321
Percent liquid fertilizer applied	7	22
Index commercial fertilizer applied	106	100
Lbs primary nutrients in commercial fertilizer	133	153
Index primary nutrients in commercial fertilizer	87	100
Lbs of lime applied	189	170
Index of lime used	111	100
<hr/>		
<u>Per acre of total land area</u>		
Lbs road salts used	45.33	41.74
Index road salts used	109	100
<hr/>		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

## 8.3.2 Materials Usage

Table 8-14 lists by county the material usage inventory for PSA 5.2. Detailed statistics are shown in Table 8-15 to 8-27.

Table 8-14  
MATERIALS USAGE  
(in 1972)

PSA 5.2 New York	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
Cayuga	2946	500081	25077	6899	7470
Herkimer	1048	521176	5357	8123	4206
Madison	1860	654286	13122	12061	6092
Oneida	2463	821125	15184	19324	14649
Onondaga	2316	458764	15158	6480	29008
Ontario	3902	379330	25728	3278	8572
Oswego	1485	298448	8235	7639	16100
Schuyler	1502	96427	2685	3291	5802
Seneca	1320	123045	12106	3727	3916
Tompkins	926	277805	7973	8453	5700
Wayne	12632	287394	26942	10592	19435
Yates	5028	148713	10869	3741	2611
<b>TOTAL</b>	<b>37428</b>	<b>4566593</b>	<b>168436</b>	<b>93608</b>	<b>123561</b>

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 8.3.2.1 Agricultural Chemicals

A total of 1,699,200 kilograms (3,742,790 lbs) of agricultural chemicals were used in this area during 1972. Fruit and vegetable crops along with potatoes account for 31 percent of the chemical usage being fungicides. Thirty five percent are herbicides and 34 percent insecticides. The use of chemicals will increase 15-20 percent in the next 10 years.

#### 8.3.2.2 Animal Wastes

There are 4,142,813 metric tons (4,566,593 tons) of wet manure produced from livestock in PSA 5.2. Cattle contribute 86 percent of the manure, horses 10, chickens 2 and swine and sheep each 1 percent. The manure production index is above average. Manure rates may stay about the same or even decrease some but are expected to still continue above the Basin average. Nitrogen, phosphorus, and potash combined comprise 1.2 percent of the total manure tonnage.

#### 8.3.2.3 Commercial Fertilizers

Fertilizer use in Planning Subarea 5.2 is slightly above the Basin average. Thirty one percent of the primary nutrients are nitrogen, thirty two percent potash. Fertilizer usage will increase 10-20 percent in the next 10 years. The 1972 usage totaled 152,805 metric tons (168,436 tons) of commercial fertilizer that was applied to croplands.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-15

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: 12 County Totals (New York-12)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	265770	7308.4	59060	885.9		
Grains	103344	516.3	34448	343.9		
Hay or Grass Silage	132110	1320.5	110092	1100.5		
Pastured Cropland	75404	753.4	75404	753.4		
Other Field Crops	8227	219.8	6331	710.3	6162	924.4
Vegetables	39456	1329.2	39456	1514.3	39456	1737.1
Orchards						
Berries	31875	1508.6	36983	7435.9	38046	9046.0
Nursery, Greenhouse						
Other Crops						
Totals	656186	12956.2	361774	12744.2	83664	11727.5
Total Herbicides, Insecticides, Fungicides: 100 lbs					1101624	37427.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	22672	2144	2113	4257
1969	23815	2229	2315	4544
1972	22869	2313	2055	4368

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 31581  
Nutrients in Wet Manure: Nitrogen, tons 158  
Phosphorus, tons 44  
Potash, tons 120

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	434748	260132	174616
1969	377387	214482	162905
1972	380202	220917	159285

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 2902849 1027388  
Wet Manure Defecated: Tons, 1972 Combined: 3930237  
Nutrients in Wet Manure: Nitrogen, tons 22009  
Phosphorus, tons 3930  
Potash, tons 19651

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		37644	
1969		30133	9934
1972		28639	36059

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 46109 460834  
Nutrients in Wet Manure: Nitrogen, Tons 646 3180  
Phosphorus, Tons 97 461  
Potash, Tons 461 2765

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		2203190		
1969		2474048		
1972		2252438	7110	71100

Wet Manure Factor: Lbs. per bird 82.9 365 89.63  
Wet Manure Defecated: Tons, 1972 93364  
Nutrients in Wet Manure: Combined 4468  
Nitrogen, tons 1456 70  
Phosphorus, tons 373 18  
Potash, tons 327 16

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	208306	35778	4587	40365
GRAINS	172241	20132	505	20637
Wheat	52336	6795	241	7036
Oats	104338	12068	221	12289
Barley	6344	731	32	763
Rye	2901	219	7	226
OTHER FIELD CROPS	47013	12353	182	12535
Soybeans	1606	154	8	162
Potatoes	8345	5767	4	5771
Sugar beets				
Field beans	9383	47		47
HAY OR GRASS SILAGE	388835	6479	355	6834
PASTURED CROPLAND	298775	2691	136	2827
Cropland used for pasture	242536	1985	102	2087
Improved pasture	56239	706	34	740
VEGETABLES, SWEET CORN, MELONS	45358	13621	413	14034
ORCHARDS	44979	6912	495	7407
BERRIES	487	101	1	102
NURSERY & GREENHOUSE PRODUCTS	947	113	4	117
OTHER CROPS	798	120	5	125
Total Fertilizer Used, Tons		98347	6683	105030
Percent of Fertilizer Used		94	6	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	156646
Liquid	11790
Total	168436
Primary Nutrients in Fertilizer	65690
Nitrogen	20366
Phosphorus	24304
Potash	21020

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			93608
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	85190	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		123561

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
	Herbicides	Insecticides	Fungicides	Total
Table 1	12956.2	12744.2	11727.5	37437.9
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	31581	158	44	120
Cattle: Table 3	3930237	22009	3930	19651
Sheep: Table 4	46109	646	97	461
Horses: Table 4	460834	3180	461	2765
Chickens: Table 5	93364	1456	373	327
Turkeys: Table 5	4468	70	16	16
Total from Livestock, Tons	4566593	27519	4923	23340
Fertilizers: Tons of Commercial Fertilizers Applied				
	Primary Nutrients			
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	168436	20366	24304	21020
Lime: Limestone equivalent purchased or applied, tons: Table 8 93608				
Salts: Applied on all highways, tons: Table 9 123561				

To Convert From To Multiply By  
Pounds (lb) Kilograms (kg) 0.453  
Acres (acre) Hectare (ha) .4047  
Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-16

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5,0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Cayuga

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	47700	1311.7	10600	159.0		
Grains	16422	82.1	5474	54.7		
Hay or Grass Silage	14736	147.3	12280	122.8		
Pastured Cropland	6432	64.3	6432	64.3		
Other Field Crops	971	26.7	819	92.5	803	120.5
Vegetables	3866	130.2	3866	148.4	3866	172.2
Orchards						
Berries	468	23.3	568	82.3	574	143.8
Nursery, Greenhouse						
Other Crops						
Totals	90595	1785.6	40039	724.0	5253	436.5
Total Herbicides, Insecticides, Fungicides:		100 lbs		135877		2946.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	3041	334	315	649
1969	3684	258	317	575
1972	3537	293	259	552
Wet Manure Factor: Tons per litter farrowed		7.23		
Wet Manure Defecated: Tons, 1972		3991		
Nutrients in Wet Manure: Nitrogen, tons		20		
Phosphorus, tons		6		
Potash, tons		15		

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	44895	26240	18655
1969	41791	23719	18072
1972	42046	24431	17615
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		323023	113617
Wet Manure Defecated: Tons, 1972 Combined:		434640	
Nutrients in Wet Manure: Nitrogen, tons		2434	
Phosphorus, tons		435	
Potash, tons		2173	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3885	
1969		2425	897
1972		2304	3418
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		3709	43682
Nutrients in Wet Manure: Nitrogen, Tons		52	301
Phosphorus, Tons		8	44
Potash, Tons		37	262

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		313175		
1969		372726		
1972		339181		
Wet Manure Factor: lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		14059		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		219		
Phosphorus, tons		56		
Potash, tons		49		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	35207	6077	1102	7179
GRAINS	27370	3380	182	3562
Wheat	8705	1216	87	1303
Oats	15829	1879	73	1952
Barley	1655	209	17	226
Rye	268	21	5	26
OTHER FIELD CROPS	9870	2393	78	2471
Soybeans	102	13	6	19
Potatoes	1104	940	0	940
Sugar beets				
Field beans	375	2	0	2
HAY OR GRASS SILAGE	44474	876	109	985
PASTURED CROPLAND	24224	266	45	311
Cropland used for pasture	20920	244	29	273
Improved pasture	3304	22	16	38
VEGETABLES, SWEET CORN, MELONS	4407	992	49	1041
ORCHARDS	568	53	1	54
BERRIES	1	0	0	0
NURSERY & GREENHOUSE PRODUCTS	32	1	0	1
OTHER CROPS	11	1	1	2
Total Fertilizer Used, Tons		14041	1567	15608
Percent of Fertilizer Used		90	10	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	23322
Liquid	1755
Total	25077
Primary Nutrients in Fertilizer	9780
Nitrogen	3032
Phosphorus	3619
Potash	3129

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			6899
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	5150	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		7470

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	1785.6	724.0	436.5	2946.1
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
Swine: Table 2	3991	20	6	5
Cattle: Table 3	434640	2434	435	2173
Sheep: Table 4	3709	52	8	37
Horses: Table 4	43682	301	44	262
Chickens: Table 5	14059	219	56	49
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	500081	3026	549	2526
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7				
Item	Total	Nitrogen	Phosphorus	Potash
Table 7	25077	3032	3619	3129
Lime: Limestone equivalent purchased or applied, tons: Table 8				
	6899			
Salts: Applied on all highways, tons: Table 9				
				7470

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

TABLE 8-17

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Herkimer

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	12870	353.9	2860	42.9		
Grains	3797	18.9	1266	12.6		
Hay or Grass Silage	16606	166.0	13838	138.3		
Pastured Cropland	9907	99.0	9907	99.0		
Other Field Crops	41	1.2	45	5.1	45	6.7
Vegetables	639	21.5	639	24.5	639	25.5
Orchards						
Berries	54	2.7	63	12.9	65	14.0
Nursery, Greenhouse						
Other Crops						
Totals	43914	663.2	28618	335.3	749	49.2
Total Herbicides, Insecticides, Fungicides: 100 lbs					73281	1047.7

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	633	34	58	92
1969	187	43	23	66
1972	180	33	31	64

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 463  
 Nutrients in Wet Manure: Nitrogen, tons 2  
 Phosphorus, tons 1  
 Potash, tons 2

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	52953	35072	17881
1969	41738	26946	14792
1972	47765	27754	20011

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 364688 129071  
 Wet Manure Defecated: Tons, 1972 Combined: 493759  
 Nutrients in Wet Manure: Nitrogen, tons 2765  
 Phosphorus, tons 494  
 Potash, tons 2469

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		248	
1969		294	515
1972		280	1962

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 451 25074  
 Nutrients in Wet Manure: Nitrogen, tons 6 173  
 Phosphorus, tons 1 25  
 Potash, tons 5 150

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		51265		
1969		37894		
1972		34484		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 1429  
 Nutrients in Wet Manure: Nitrogen, tons 22  
 Phosphorus, tons 6  
 Potash, tons 5

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	11467	1640	138	1778
GRAINS	6328	507	4	511
Wheat	158	16	1	17
Oats	6024	479	3	482
Barley	83	4	0	4
Eye	0	0	0	0
OTHER FIELD CROPS	60	60	0	60
Soybeans				
Potatoes	60	60	0	60
Sugar beets				
Field beans	11	2	0	2
HAY OR GRASS SILAGE	51993	594	21	615
PASTURED CROPLAND	43286	257	10	267
Cropland used for pasture	32275	172	0	172
Improved pasture	11711	85	10	95
VEGETABLES, SWEET CORN, MELONS	729	82	9	91
ORCHARDS	67	3	0	3
BERRIES	4	0	0	0
NURSERY & GREENHOUSE PRODUCTS	4	0	0	0
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		3145	182	3327
Percent of Fertilizer Used		95	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	4982
Liquid	375
Total	5357
Primary Nutrients in Fertilizer	2089
Nitrogen	648
Phosphorus	773
Potash	668

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			8123
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2900	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 4206		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	663.2	335.3	49.2	1047.7
Manure: Kind of Livestock	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	463	2	1	2
Cattle: Table 3	493759	2765	494	2469
Sheep: Table 4	451	6	1	5
Horses: Table 4	25074	173	25	180
Chickens: Table 5	1429	22	6	5
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	521176	2968	527	2631
Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	5357	648	773	668
Lime: Limestone equivalent purchased or applied, tons: Table 8	8123			
Salts: Applied on all highways, tons: Table 9 4206				

To Convert From	To	Multiply By
Pounds (lb)	Kilograms (kg)	0.453
Acres (acre)	Hectare (ha)	.4047
Tons (ton)	Kilograms (kg)	907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-18

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Madison

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	28350	779.6	6300	94.5		
Grains	6821	34.1	2274	22.7		
Hay or Grass Silage	16815	168.1	14013	140.1		
Pastured Cropland	8394	83.9	8394	83.9		
Other Field Crops	890	26.5	973	111.8	972	145.8
Vegetables	751	25.3	751	28.8	751	33.4
Orchards						
Berries	148	7.5	170	25.1	172	48.3
Nursery, Greenhouse						
Other Crops						
Totals	62169	1125.0	32875	506.9	1895	227.5
Total Herbicides, Insecticides, Fungicides: 100 lbs					96939	1859.4

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	524	22	35	57
1969	331	19	21	40
1972	318	20	18	38
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				275
Nutrients in Wet Manure:				
Nitrogen, tons				1
Phosphorus, tons				0
Potash, tons				1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves		
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves	
1964	61050	38701	22349	
1969	53674	33067	20607	
1972	58616	34059	24557	
Wet Manure Factor: Tons Per Animal				13.14
Wet Manure Defecated: Tons, 1972				447535
Wet Manure Defecated: Tons, 1972 Combined:				605928
Nutrients in Wet Manure:				
Nitrogen, tons				3393
Phosphorus, tons				606
Potash, tons				3030

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		578	
1969		1059	865
1972		1006	3296
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1620	42123
Nutrients in Wet Manure:			
Nitrogen, Tons		23	291
Phosphorus, Tons		3	42
Potash, Tons		16	253

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		122825		
1969		115091		
1972		104733		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		4341		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		68		
Phosphorus, tons		17		
Potash, tons		15		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	24637	4032	300	4332
GRAINS	11369	1270	4	1274
Wheat	401	57	0	57
Oats	10565	1175	4	1179
Barley	171	20	0	20
Rye	13	1	0	1
OTHER FIELD CROPS	2483	1043	11	1054
Soybeans	12	1	0	1
Potatoes	1340	836	0	836
Sugar beets				
Field beans				
HAY OR GRASS SILAGE	51978	766	59	825
PASTURED CROPLAND	40508	282	3	285
Cropland used for pasture	30562	137	3	140
Improved pasture	9946	145	0	145
VEGETABLES, SWEET CORN, MELONS	852	366	3	369
ORCHARDS	130	16	0	16
BERRIES	2	0	0	0
NURSERY & GREENHOUSE PRODUCTS	5	0	0	0
OTHER CROPS	13	0	0	0
Total Fertilizer Used, Tons		7775	380	8155
Percent of Fertilizer Used		95	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	12203
Liquid	919
Total	13122
Primary Nutrients in Fertilizer	5117
Nitrogen	1586
Phosphorus	1893
Potash	1638

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			12061
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4200	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
6092		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1125.0	506.9	227.5	1859.4
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	275	1	0	1
Cattle: Table 3	605928	3393	606	3030
Sheep: Table 4	1620	23	3	16
Horses: Table 4	42123	291	42	253
Chickens: Table 5	4341	68	17	15
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	654287	3776	668	3315
Fertilizers: Tons of Commercial Fertilizers Applied				
Applied on Cropland: Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
	13122	1586	1893	1638
Lime: Limestone equivalent purchased or applied, tons: Table 8				
12061				
Salts: Applied on all highways, tons: Table 9				
6092				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-19

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Oneida

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	29790	819.2	6620	99.3		
Grains	7128	35.6	2376	23.7		
Hay or Grass Silage	21945	219.4	18287	182.8		
Pastured Cropland	15806	158.0	15806	158.0		
Other Field Crops	485	14.1	488	55.8	485	72.8
Vegetables	4484	151.1	4484	172.1	4484	199.7
Orchards						
Berries	188	9.6	215	36.7	220	55.5
Nursery, Greenhouse						
Other Crops						
Totals	79826	1407.0	48276	728.4	5189	328.0
Total Herbicides, Insecticides, Fungicides: 100 lbs 133291 2463.4						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2008	133	177	310
1969	1562	193	102	295
1972	1500	150	133	283
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				2046
Nutrients in Wet Manure: Nitrogen, tons				10
Phosphorus, tons				3
Potash, tons				8

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	79785	51354	28431
1969	68792	41235	27557
1972	73094	42472	30622
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		558082	197512
Wet Manure Defecated: Tons, 1972 Combined:		755594	
Nutrients in Wet Manure: Nitrogen, tons		4231	
Phosphorus, tons		756	
Potash, tons		3778	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		423	
1969		167	1173
1972		160	4469
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		258	57114
Nutrients in Wet Manure: Nitrogen, tons		4	394
Phosphorus, tons		1	57
Potash, tons		3	343

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		137415		
1969		162076		
1972		147500		
Wet Manure Factor: Lbs. per bird		82.90		
Wet Manure Defecated: Tons, 1972		6114		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		95		
Phosphorus, tons		24		
Potash, tons		21		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	83125	4134	297	4431
GRAINS	11880	1442	7	1449
Wheat	986	124	0	124
Oats	10261	1262	6	1268
Barley	383	28	0	28
Rye	53	6	0	6
OTHER FIELD CROPS	1340	844	0	844
Soybeans	20	1	0	1
Potatoes	666	663	0	663
Sugar beets				
Field beans	63	3	0	3
HAY OR GRASS SILAGE	64599	1137	20	1157
PASTURED CROPLAND	64510	513	4	517
Cropland used for pasture	51027	333	2	335
Improved pasture	13483	180	2	182
VEGETABLES, SWEET CORN, MELONS	5073	1016	1	1017
ORCHARDS	200	26	0	26
BERRIES	1	0	0	0
NURSERY & GREENHOUSE PRODUCTS	8	1	1	2
OTHER CROPS	129	16	0	16
Total Fertilizer Used, Tons		9132	330	9462
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14121
Liquid	1063
Total	15184
Primary Nutrients in Fertilizer	5922
Nitrogen	1836
Phosphorus	2191
Potash	1895

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			19324
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "g" Mile
1970-71		
1971-72		
1972-73	10100	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		14649

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1497.0	728.4	328.0	2463.4
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2046	10	3	8
Cattle: Table 3	755594	4231	756	3778
Sheep: Table 4	258	4	1	3
Horses: Table 4	57114	394	57	343
Chickens: Table 5	6114	95	24	21
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	821126	4734	841	4153
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	15184	1836	2191	1895
Lime: Limestone equivalent purchased or applied, tons: Table 8 19324				
Salts: Applied on all highways, tons: Table 9 14649				

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.



TABLE 8-20

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0

STATE: New York

PLANNING SUBAREA: Central 5.2

COUNTY: Onondaga

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	30600	841.5	6800	102.0		
Grains	10526	52.6	3509	35.0		
Hay or Grass Silage	12808	128.0	10673	106.7		
Pastured Cropland	6328	63.2	6328	63.2		
Other Field Crops	159	4.5	152	17.3	150	22.5
Vegetables	2856	96.2	2856	109.6	2856	127.2
Orchards						
Berries	1050	59.0	1168	138.1	1181	349.4
Nursery, Greenhouse						
Other Crops						
Totals	64327	1245.0	31486	571.9	4187	499.1
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					100000	2316.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1794	150	135	285
1969	1827	182	184	366
1972	1754	186	165	351
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				2538
Nutrients in Wet Manure: Nitrogen, tons				13
Phosphorus, tons				4
Potash, tons				10

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	40841	24601	16240
1969	35634	20361	15273
1972	36093	20972	15121
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		275572	97530
Wet Manure Defecated: Tons, 1972 Combined:		373102	
Nutrients in Wet Manure: Nitrogen, tons		2089	
Phosphorus, tons		373	
Potash, tons		1866	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1676	
1969		1335	1434
1972		1080	5464
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1739	69830
Nutrients in Wet Manure: Nitrogen, Tons		24	482
Phosphorus, Tons		4	70
Potash, Tons		17	419

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		230025		
1969		189713		
1972		172640	7000	70000
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		7156		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		112	69	4399
Phosphorus, tons		29	18	
Potash, tons		25	15	

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	23727	4028	700	4728
GRAINS	17544	2058	71	2129
Wheat	4480	574	22	596
Oats	12336	1400	48	1448
Barley	441	61	1	62
Rye	215	14	0	14
OTHER FIELD CROPS	1690	383	9	392
Soybeans	19	0	0	0
Potatoes	187	148	0	148
Sugar beets				
Field beans	105	0	0	0
HAY OR GRASS SILAGE	37620	762	40	802
PASTURED CROPLAND	23530	225	2	227
Cropland used for pasture				
Improved pasture	20038	184	2	186
	3492	41	0	41
VEGETABLES, SWEET CORN, MELONS	3167	892	3	895
ORCHARDS	1507	178	0	178
BERRIES	113	43	0	43
NURSERY & GREENHOUSE PRODUCTS	161	7	1	8
OTHER CROPS	123	28	4	32
Total Fertilizer Used, Tons		8604	830	9434
Percent of Fertilizer Used		91	9	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	14097
Liquid	1061
Total	15158
Primary Nutrients in Fertilizer	5912
Nitrogen	1833
Phosphorus	2187
Potash	1892

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			6480
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	20000	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
29008		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
	Herbicides	Insecticides	Fungicides	Total
Table 1	1245.0	571.9	499.1	2316.0
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2538	13	4	10
Cattle: Table 3	373102	2089	373	1866
Sheep: Table 4	1739	24	4	17
Horses: Table 4	69830	482	70	419
Chickens: Table 5	7156	112	29	25
Turkeys: Table 5	4399	69	18	15
Total from Livestock, Tons	458764	2789	498	2352
Fertilizers: Tons of Commercial Fertilizers Applied				
	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	15158	1833	2187	1892
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	6480			
Salts: Applied on all highways, tons: Table 9				
29008				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-21

PLANNING AREA: Lake Ontario 5.0 STATE: New York  
 PLANNING SUBAREA: Central 5.2 COUNTY: Ontario

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	33300	915.7	7400	111.0		
Grains	17371	86.8	5790	57.9		
Hay or Grass Silage	11484	114.8	9570	95.7		
Pastured Cropland	4944	49.4	4944	49.4		
Other Field Crops	326	7.6	134	13.9	120	18.0
Vegetables	9291	313.0	9291	356.6	9291	413.7
Orchards						
Berries	1781	83.3	1990	830.2	2177	384.6
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>78497</b>	<b>1570.6</b>	<b>39119</b>	<b>1514.7</b>	<b>11588</b>	<b>816.3</b>
<b>Total Herbicides, Insecticides, Fungicides: 100 lbs</b>						
					<b>129204</b>	<b>3901.6</b>

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	4056	367	362	729
1969	3171	194	191	385
1972	3050	195	175	370

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 2675  
 Nutrients in Wet Manure: Nitrogen, tons 13  
 Phosphorus, tons 4  
 Potash, tons 10

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	34716	18248	16468
1969	29003	13840	15163
1972	24533	14255	10278

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 187311 66293  
 Wet Manure Defecated: Tons, 1972 Combined: 253604  
 Nutrients in Wet Manure: Nitrogen, tons 1420  
 Phosphorus, tons 254  
 Potash, tons 1268

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		10273	
1969		8854	1424
1972		8411	7500

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 13542 95850  
 Nutrients in Wet Manure: Nitrogen, Tons 190 661  
 Phosphorus, Tons 28 96  
 Potash, Tons 135 575

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		283575		
1969		361319		
1972		328800	50	500

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
 Wet Manure Defecated: Tons, 1972 13629  
 Nutrients in Wet Manure: Combined 31  
 Nitrogen, tons 0  
 Phosphorus, tons 0  
 Potash, tons 0

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

COUNTY, land area, acres (1)	416512	Number I-V farms	790
Number of farms	1364	Acres in I-V farms	193003
Acres in farms	242716	Cropland I-V farms	149626
Cropland in farms	178129	Harvested cropland	
Harvested cropland in farms	124952	I-V farms	114237

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	26513	5000	490	5490
GRAINS	28952	3443	52	3495
Wheat	14084	1764	50	1814
Oats	12620	1490	1	1491
Barley	1027	132	1	133
Rye	625	36	0	36
OTHER FIELD CROPS	12243	2192	17	2209
Soybeans	140	21	0	21
Potatoes	153	162	0	162
Sugar beets				
Field beans	2073	5	0	5
HAY OR GRASS SILAGE	33090	563	0	563
PASTURED CROPLAND	16471	150	5	155
Cropland used for pasture	14356	140	5	145
Improved pasture	2115	10	0	10
VEGETABLES, SWEET CORN, MELONS	10791	3384	270	3654
ORCHARDS	2036	448	6	454
BERRIES	112	20	0	20
NURSERY & GREENHOUSE PRODUCTS	246	32	0	32
OTHER CROPS	189	35	0	35
Total Fertilizer Used, Tons		15272	840	16112
Percent of Fertilizer Used		95	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	23927
Liquid	1801
<b>Total</b>	<b>25728</b>
Primary Nutrients in Fertilizer	10034
Nitrogen	3111
Phosphorus	3713
Potash	3210

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3278
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	5910	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed <u>8572</u>		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides 1570.6	Insecticides 1514.7	Fungicides 816.3	Total 3901.6
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	2675	13	4	10
Cattle: Table 3	253604	1420	254	1268
Sheep: Table 4	13542	190	28	135
Horses: Table 4	95850	661	96	575
Chickens: Table 5	13629	213	55	48
Turkeys: Table 5	31	0	0	0
Total from Livestock, Tons	379331	2497	437	2036
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	25728	3111	3713	3210
Lime: Limestone equivalent purchased or applied, tons: Table 8 <u>3278</u>				
Salts: Applied on all highways, tons: Table 9 <u>8572</u>				

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-22

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Oswego

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	9000	247.5	2000	30.0		
Grains	1885	9.4	628	6.2		
Hay or Grass Silage	9054	90.5	7545	75.4		
Pastured Cropland	6062	60.6	6062	60.6		
Other Field Crops	238	7.1	264	30.4	264	39.6
Vegetables	4625	155.8	4625	177.5	4625	206.0
Orchards						
Berries	603	34.2	768	83.5	776	171.0
Nursery, Greenhouse						
Other Crops						
Totals	31467	605.1	21892	463.6	5665	416.6
Total Herbicides, Insecticides, Fungicides: 100 lbs				59024		1485.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1097	89	67	156
1969	1623	154	108	262
1972	1560	135	115	250
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				1808
Nutrients in Wet Manure: Nitrogen, tons				9
Phosphorus, tons				3
Potash, tons				7

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	32502	18503	13999
1969	25973	14417	11556
1972	25557	14850	10707
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		195129	69060
Wet Manure Defecated: Tons, 1972 Combined:		264189	
Nutrients in Wet Manure: Nitrogen, tons		1479	
Phosphorus, tons		264	
Potash, tons		1321	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		696	
1969		491	601
1972		470	2226
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		757	28448
Nutrients in Wet Manure: Nitrogen, Tons		11	196
Phosphorus, Tons		2	28
Potash, Tons		8	171

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		145935		
1969		86038		
1972		78300		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		3246		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		51		
Phosphorus, tons		13		
Potash, tons		11		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	6966	1230	123	1353
GRAINS	3141	399	12	411
Wheat	398	70	1	71
Oats	2516	223	11	334
Barley	15	2	0	2
Rye	46	4	0	4
OTHER FIELD CROPS	634	357	0	357
Soybeans				
Potatoes	359	290	0	290
Sugar beets				
Field beans	107	0	0	0
HAY OR GRASS SILAGE	25470	356	46	402
PASTURED CROPLAND	22195	175	30	205
Cropland used for pasture	19064	150	30	180
Improved pasture	3131	25	0	25
VEGETABLES, SWEET CORN, MELONS	5347	2264	16	2280
ORCHARDS	1304	107	7	114
BERRIES	60	8	0	8
NURSERY & GREENHOUSE PRODUCTS	48	5	1	6
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		4901	235	5136
Percent of Fertilizer Used		95	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	7659
Liquid	576
Total	8235
Primary Nutrients in Fertilizer	3212
Nitrogen	996
Phosphorus	1188
Potash	1028

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			7639
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	11100	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
		16100

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	605.1	463.6	416.6	1485.3
Manure: Kind of Livestock				
Tons of Materials in Wet Manure Defecated				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1808	9	3	7
Cattle: Table 3	264189	1479	264	1321
Sheep: Table 4	757	11	2	8
Horses: Table 4	28448	196	28	171
Chickens: Table 5	3246	51	13	11
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	298448	1746	310	1518
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	8235	996	1188	1028
Lime: Limestone equivalent purchased or applied, tons: Table 8				
	7639			
Salts: Applied on all highways, tons: Table 9				
				16100

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Schuyler

TABLE 8-23

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	4680	128.7	1040	15.6		
Grains	3049	15.2	1016	10.1		
Hay or Grass Silage	4216	42.1	3514	35.1		
Pastured Cropland	3506	35.0	3506	35.0		
Other Field Crops	30	.9	33	3.8	33	5.0
Vegetables	130	4.4	130	5.0	130	5.8
Orchards						
Berries	1332	54.3	1494	726.0	1653	380.0
Nursery, Greenhouse						
Other Crops						
Totals	16943	280.6	10733	830.6	1816	390.8
Total Herbicides, Insecticides, Fungicides: 100 lbs				29492		1502.0

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	617	78	51	129
1969	749	48	25	73
1972	720	37	33	70

Wet Manure Factor: Tons per litter farrowed 7.23  
Wet Manure Defecated: Tons, 1972 506  
Nutrients in Wet Manure: Nitrogen, tons 3  
Phosphorus, tons 1  
Potash, tons 2

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	9923	5216	4707
1969	10786	4331	6455
1972	7677	4461	3216

Wet Manure Factor: Tons Per Animal 13.14 6.45  
Wet Manure Defecated: Tons, 1972 58618 20743  
Wet Manure Defecated: Tons, 1972 Combined: 79361  
Nutrients in Wet Manure: Nitrogen, tons 444  
Phosphorus, tons 79  
Potash, tons 397

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		5383	
1969		4554	381
1972		4330	400

Wet Manure Factor: Tons per animal 1.61 12.78  
Wet Manure Defecated: Tons, 1972 6971 5112  
Nutrients in Wet Manure: Nitrogen, Tons 98 35  
Phosphorus, Tons 15 5  
Potash, Tons 70 31

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		152745		
1969		117690		
1972		108000		

Wet Manure Factor: Lbs. per bird 82.9  
Wet Manure Defecated: Tons, 1972 4477  
Nutrients in Wet Manure: Nitrogen, tons 70  
Phosphorus, tons 18  
Potash, tons 16

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	3484	414	74	488
GRAINS	5082	611	12	623
Wheat	1422	191	3	194
Oats	3275	384	9	393
Barley	102	12	0	12
Rye	33	6	0	6
OTHER FIELD CROPS	377	71	2	73
Soybeans				
Potatoes	37	18	0	18
Sugar beets				
Field beans	584	0	0	0
HAY OR GRASS SILAGE	10387	78	22	100
PASTURED CROPLAND	10753	47	16	63
Cropland used for pasture	5766	47	16	63
Improved pasture	937	0	0	0
VEGETABLES, SWEET CORN, MELONS	141	37	1	38
ORCHARDS	1711	280	0	280
BERRIES	15	1	0	1
NURSERY & GREENHOUSE PRODUCTS	111	8	1	9
OTHER CROPS	4	1	0	1
Total Fertilizer Used, Tons		1548	128	1676
Percent of Fertilizer Used		92	8	100

TABLE 7--FERTILIZER USED IN 1972 TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Item	Tons	Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
Fertilizer Used on Crops: Solid	2497				
Liquid	188				
Total	2685	1972			3291
Primary Nutrients in Fertilizer	1047				
Nitrogen	325				
Phosphorus	387				
Potash	335				

Tonnages for Other Recent Years

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	4000	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed	5802	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	280.6	830.6	390.8	1502.0

Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
Table	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	506	3	1	2
Cattle: Table 3	79361	444	79	397
Sheep: Table 4	6971	98	15	70
Horses: Table 4	5112	35	5	31
Chickens: Table 5	4477	70	18	16
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	96427	650	118	516

Fertilizers:	Tons of Commercial Fertilizers Applied			
Item	Total	Primary Nutrients		
Table 7		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	2685	325	387	335

Lime: Limestone equivalent purchased or applied, tons: Table 8 3291  
Salts: Applied on all highways, tons: Table 9 5802

To Convert From To Multiply By  
Pounds (lb) Kilograms (kg) 0.453  
Acres (acre) Hectare (ha) .4047  
Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-24

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Seneca

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	18000	495.0	4000	60.0		
Grains	15480	77.4	5160	51.6		
Hay or Grass Silage	4934	49.3	4112	41.1		
Pastured Cropland	1836	18.3	1836	18.3		
Other Field Crops	2263	51.0	751	75.4	646	96.9
Vegetables	80	2.7	80	3.1	80	3.6
Orchards						
Berries	407	19.1	457	150.4	487	106.7
Nursery, Greenhouse						
Other Crops						
Totals	43000	712.8	16396	399.9	1213	207.2
Total Herbicides, Insecticides, Fungicides: 100 lbs					60609	1319.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2095	156	189	345
1969	2372	221	323	544
1972	2275	275	250	525
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				3796
Nutrients in Wet Manure: Nitrogen, tons				19
Phosphorus, tons				5
Potash, tons				14

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	13088	6902	6186
1969	11762	5522	6240
1972	9792	5688	4104
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		74740	26471
Wet Manure Defecated: Tons, 1972 Combined:		101211	
Nutrients in Wet Manure: Nitrogen, tons		567	
Phosphorus, tons		101	
Potash, tons		506	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		2059	
1969		3104	453
1972		2950	623
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		4750	7962
Nutrients in Wet Manure: Nitrogen, Tons		66	55
Phosphorus, Tons		10	8
Potash, Tons		48	48

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		141495		
1969		141051		
1972		128500		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		5326		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		83		
Phosphorus, tons		21		
Potash, tons		19		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	11430	1927	414	2341
GRAINS	25800	2936	57	2993
Wheat	7668	1010	25	1035
Oats	12652	1559	24	1583
Barley	1680	164	6	170
Rye	742	72	0	72
OTHER FIELD CROPS	6630	1375	35	1410
Soybeans	1073	97	1	98
Potatoes	897	480	0	480
Sugar beets				
Field beans	3605	32	0	32
HAY OR GRASS SILAGE	14530	378	10	388
PASTURED CROPLAND	7312	175	1	176
Cropland used for pasture	6328	113	1	114
Improved pasture	984	62	0	62
VEGETABLES, SWEET CORN, MELONS	81	35	2	37
ORCHARDS	636	161	0	161
BERRIES	9	5	0	5
NURSERY & GREENHOUSE PRODUCTS	2	0	0	0
OTHER CROPS	152	13	0	13
Total Fertilizer Used, Tons		7037	159	7556
Percent of Fertilizer Used		93	7	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	11259
Liquid	847
Total	12106
Primary Nutrients in Fertilizer	4722
Nitrogen	1464
Phosphorus	1747
Potash	1511

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3727
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	2700	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 3916		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	712.8	399.9	207.2	1319.9
Manure: Kind of Livestock				
Table 2	Manure	Nitrogen	Phosphorus	Potash
Swine:	3796	19	5	14
Cattle:	101211	567	101	506
Sheep:	4750	66	10	48
Horses:	7962	55	8	48
Chickens:	5326	83	21	19
Turkeys:	0	0	0	0
Total from Livestock, Tons	123045	790	145	635
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland:	12106	1464	1747	1511
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	3727			
Salts: Applied on all highways, tons: Table 9 3916				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-25

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Tompkins

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	16830	462.8	3740	56.1		
Grains	5004	25.0	1668	16.6		
Hay or Grass Silage	7695	76.9	6412	64.1		
Pastured Cropland	3689	36.8	3689	36.8		
Other Field Crops	99	2.5	63	6.9	60	9.0
Vegetables	285	9.6	285	10.9	285	12.7
Orchards						
Berries						
Nursery, Greenhouse	173	8.7	197	51.2	232	39.3
Other Crops						
Totals	33775	622.3	16054	242.6	577	61.0
Total Herbicides, Insecticides, Fungicides:		100 lbs		50406		925.9

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1476	140	147	287
1969	485	64	79	143
1972	465	74	66	140

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 1012  
 Nutrients in Wet Manure: Nitrogen, tons 5  
 Phosphorus, tons 1  
 Potash, tons 4

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	24210	13505	10705
1969	22780	12590	10190
1972	22318	12968	9350

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 170400 60308  
 Wet Manure Defecated: Tons, 1972 Combined: 230708  
 Nutrients in Wet Manure: Nitrogen, tons 1292  
 Phosphorus, tons 231  
 Potash, tons 1154

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3784	
1969		2710	700
1972		2575	2500

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 4146 31950  
 Nutrients in Wet Manure: Nitrogen, Tons 58 220  
 Phosphorus, Tons 9 32  
 Potash, Tons 41 192

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		240585		
1969		264827		
1972		241000		

Wet Manure Factor: Lbs. per bird 82.9  
 Wet Manure Defecated: Tons, 1972 9989  
 Nutrients in Wet Manure: Combined  
 Nitrogen, tons 156  
 Phosphorus, tons 40  
 Potash, tons 35

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	14824	2545	569	3114
GRAINS	8340	897	66	963
Wheat	1935	225	33	258
Oats	5687	623	29	652
Barley	183	21	3	24
Rye	50	5	0	5
OTHER FIELD CROPS	850	139	1	140
Soybeans	35	6	0	6
Potatoes	4	3	0	3
Sugar beets				
Field beans	694	0	0	0
HAY OR GRASS SILAGE	21323	405	14	419
PASTURED CROPLAND	15103	265	9	274
Cropland used for pasture	11379	185	8	193
Improved pasture	3724	80	1	81
VEGETABLES, SWEET CORN, MELONS	233	50	0	50
ORCHARDS	5	4	0	4
BERRIES	12	3	0	3
NURSERY & GREENHOUSE PRODUCTS	2	0	0	0
OTHER CROPS	77	2	0	2
Total Fertilizer Used, Tons		4310	659	4969
Percent of Fertilizer Used		87	13	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	7415
Liquid	558
Total	7973
Primary Nutrients in Fertilizer	3109
Nitrogen	964
Phosphorus	1150
Potash	995

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			8453
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3930	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5700

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	622.3	242.6	61.0	925.9
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	1012	5	1	4
Cattle: Table 3	230708	1292	231	1154
Sheep: Table 4	4146	58	9	41
Horses: Table 4	31950	220	32	192
Chickens: Table 5	9989	156	40	35
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	277805	1731	313	1426
Fertilizers: Tons of Commercial Fertilizers Applied				
Primary Nutrients				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	7973	964	1150	995
Lime: Limestone equivalent purchased or applied, tons: Table 8 8453				
Salts: Applied on all highways, tons: Table 9 5700				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-26

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY: Wayne

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	20790	571.7	4620	69.3		
Grains	8565	42.8	2855	28.5		
Hay or Grass Silage	7153	71.5	5961	59.6		
Pastured Cropland	5992	59.9	5992	59.9		
Other Field Crops	2401	70.9	2549	292.4	2542	381.3
Vegetables	8000	269.5	8000	307.0	8000	356.2
Orchards						
Berries	20911	1008.6	24562	2664.3	24597	6318.9
Nursery, Greenhouse						
Other Crops						
Totals	73812	2094.9	54539	3481.0	35139	7056.4
Total Herbicides, Insecticides, Fungicides: 100 lbs					163490	12632.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2831	292	278	570
1969	3429	417	377	794
1972	3290	405	360	765

Wet Manure Factor: Tons per litter farrowed 7.23  
 Wet Manure Defecated: Tons, 1972 5531  
 Nutrients in Wet Manure: Nitrogen, tons 28  
 Phosphorus, tons 8  
 Potash, tons 21

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	27226	14574	12652
1969	24030	12509	11521
1972	22173	12884	9289

Wet Manure Factor: Tons Per Animal 13.14 6.45  
 Wet Manure Defecated: Tons, 1972 169296 59914  
 Wet Manure Defecated: Tons, 1972 Combined: 229210  
 Nutrients in Wet Manure: Nitrogen, tons 1284  
 Phosphorus, tons 229  
 Potash, tons 1146

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1009	
1969		728	1097
1972		692	2700

Wet Manure Factor: Tons per animal 1.61 12.78  
 Wet Manure Defecated: Tons, 1972 1114 34506  
 Nutrients in Wet Manure: Nitrogen, Tons 16 238  
 Phosphorus, Tons 2 35  
 Potash, Tons 11 207

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		259525		
1969		450609		
1972		410000	60	600

Wet Manure Factor: Lbs. per bird 82.9 365.0 89.63  
 Wet Manure Defecated: Tons, 1972 16995  
 Nutrients in Wet Manure: Combined 38  
 Nitrogen, tons 265 1  
 Phosphorus, tons 68 0  
 Potash, tons 59 0

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	16119	2997	164	3161
GRAINS	14275	1811	9	1820
Wheat	6117	818	4	822
Oats	7387	915	5	920
Barley	349	53	0	53
Rye	293	19	0	19
OTHER FIELD CROPS	7695	3015	15	3030
Soybeans	37	7	0	7
Potatoes	3479	2137	4	2141
Sugar beets				
Field beans	509	3	0	3
HAY OR GRASS SILAGE	19950	382	0	382
PASTURED CROPLAND	20871	260	11	271
Cropland used for pasture	18930	224	6	230
Improved pasture	1941	36	5	41
VEGETABLES, SWEET CORN, MELONS	9316	3144	6	3150
ORCHARDS	31360	4449	464	4913
BERRIES	51	11	0	11
NURSERY & GREENHOUSE PRODUCTS	319	58	0	58
OTHER CROPS	100	24	0	24
Total Fertilizer Used, Tons		16154	669	16823
Percent of Fertilizer Used		96	4	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	29056
Liquid	1886
Total	26942
Primary Nutrients in Fertilizer	10507
Nitrogen	3257
Phosphorus	3888
Potash	3362

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			10592
Tonnes for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	13400	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed 19435		

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland					
Table 1	Herbicides	Insecticides	Fungicides	Total	
	2094.9	3481.0	7056.4	12362.3	
Manure: Kind of Livestock					
Table 2	Tons of Materials in Wet Manure Defecated				
	Manure	Nitrogen	Phosphorus	Potash	
Swine: Table 2	5531	28	8	21	
Cattle: Table 3	229210	1284	229	1146	
Sheep: Table 4	1114	16	2	11	
Horses: Table 4	34506	238	35	207	
Chickens: Table 5	16995	265	68	59	
Turkeys: Table 5	38	1	0	0	
Total from Livestock, Tons	287394	1832	342	1444	
Fertilizers: Tons of Commercial Fertilizers Applied					
Table 7	Primary Nutrients				
	Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7		26942	3257	3888	3362
Lime: Limestone equivalent purchased or applied, tons: Table 8 10592					
Salts: Applied on all highways, tons: Table 9 19435					

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-27

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: Central 5.2 COUNTY:  Yates

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	13860	381.1	3080	46.2		
Grains	7296	36.4	2432	24.3		
Hay or Grass Silage	4664	46.6	3887	38.8		
Pastured Cropland	2508	25.0	2508	25.0		
Other Field Crops	324	6.8	60	5.0	42	6.3
Vegetables	4449	149.9	4449	170.8	4449	198.1
Orchards						
Berries	4760	198.3	5331	2635.2	5912	1034.5
Nursery, Greenhouse						
Other Crops						
<b>Totals</b>	<b>37861</b>	<b>844.1</b>	<b>21747</b>	<b>2945.3</b>	<b>10403</b>	<b>1238.9</b>
Total Herbicides, Insecticides, Fungicides: 100 lbs						
					70011	5028.3

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2500	349	299	648
1969	4395	436	565	1001
1972	4220	510	450	960
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				6941
Nutrients in Wet Manure: Nitrogen, tons				35
Phosphorus, tons				10
Potash, tons				26

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	13559	7216	6343
1969	11424	5945	5479
1972	10538	6123	4415
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		80456	28477
Wet Manure Defecated: Tons, 1972 Combined:		108933	
Nutrients in Wet Manure: Nitrogen, tons		109	
Phosphorus, tons		545	
Potash, tons		545	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		7630	
1969		4612	349
1972		4381	1501
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		7053	19183
Nutrients in Wet Manure: Nitrogen, Tons		99	132
Phosphorus, Tons		15	19
Potash, Tons		71	115

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		124625		
1969		175014		
1972		159300		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		6603		
Nutrients in Wet Manure:			Combined	
Nitrogen, tons		103		
Phosphorus, tons		26		
Potash, tons		23		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	10787	1754	216	1970
GRAINS	12160	1378	29	1407
Wheat	5982	730	15	745
Oats	5186	579	8	587
Barley	255	25	4	29
Rye	563	35	2	37
OTHER FIELD CROPS	3141	481	14	495
Soybeans	168	8	1	9
Potatoes	59	30	0	30
Sugar beets				
Field beans	1257	0	0	0
HAY OR GRASS SILAGE	13421	182	14	196
PASTURED CROPLAND	9312	76	0	76
Cropland used for pasture	7891	96	0	96
Improved pasture	1421	20	0	20
VEGETABLES, SWEET CORN, MELONS	5221	1359	53	1412
ORCHARDS	5455	1187	17	1204
BERRIES	107	10	1	11
NURSERY & GREENHOUSE PRODUCTS	9	1	0	1
OTHER CROPS	0	0	0	0
Total Fertilizer Used, Tons		6428	344	6772
Percent of Fertilizer Used		95	5	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	10108
Liquid	761
Total	10869
Primary Nutrients in Fertilizer	4239
Nitrogen	1314
Phosphorus	1568
Potash	1357

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			3741
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	1800	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		
	2611	

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	844.1	2945.3	1236.9	5028.3
Manure: Kind of Livestock				
Table 2	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	6941	35	10	26
Cattle: Table 3	108933	610	109	545
Sheep: Table 4	7053	99	15	71
Horses: Table 4	19183	132	19	115
Chickens: Table 5	6603	103	26	23
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	148713	979	179	780
Fertilizers: Tons of Commercial Fertilizers Applied				
Table 7	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	10869	1314	1568	1356
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	3741			
Salts: Applied on all highways, tons: Table 9				
	2611			

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.



### 8.3.2.4 Lime

Limestone application rates have been and are likely to continue to be above Basin average. However these rates are not expected to increase. There were 84,921 metric tons (93,608 tons) of lime purchased or applied to this area in 1972.

### 8.3.2.5 Salts

Road de-icing salts applied to all highways in this planning subarea amounted to 112,095 metric tons (123,561 tons) in 1972-73. The rate of application is not likely to increase; however, if highway miles increase, total salt quantities used will increase proportionately.

## 8.4 Planning Subarea 5.3

The three counties of Planning Subarea 5.3 are at the eastern end of Lake Ontario. They are large counties covering a land area of 1.4 million hectares (3.4 million acres). Only about 162,000 hectares (400,000 acres) represent harvested cropland.

### 8.4.1 Agricultural Characteristics

These three counties are primarily dairy counties. The crops raised are primarily to support the dairy livestock program.

This represents a less intensive type of crop agriculture than is found generally throughout the entire Basin, except possibly for that found in the northern parts of the Great Lake states.

Table 8-28 indicates the relative proportions of materials usage in Planning Subarea 5.3 in comparison with the total Great Lakes Basin.

Table 8-28

#### MATERIALS USAGE BASIN RELATIONSHIP -- PSA 5.3 to GREAT LAKES

<u>Per harvested acre of cropland</u>	<u>Planning Subarea 5.3</u>	<u>Great Lakes Basin</u>
Lbs of chemicals applied	1.19	2.66
Index of chemicals applied	45	100
Tons of livestock manure defecated	6.29	3.37
Index of manure defecated	187	100
Lbs primary nutrients in livestock manure	149	82
Index primary nutrients in manure	182	100
Lbs commercial fertilizer applied	133	321
Percent liquid fertilizer applied	7	22
Index commercial fertilizer applied	41	100
Lbs primary nutrients in commercial fertilizer	52	153
Index primary nutrients in commercial fertilizer	34	100
Lbs of lime applied	169	170
Index of lime applied	99	100
-----		
<u>Per acre of total land area</u>		
Lbs road salts used	17.43	41.74
Index road salts used	42	100
-----		
<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

#### 8.4.2 Materials Usage

Table 8-29 lists by county the material usage inventory for PSA 5.3. Detailed statistics are shown on Tables 8-30 to 8-33.

Table 8-29  
MATERIALS USAGE  
(in 1972)

PSA 5.3	Chemicals Applied to Crops (100 lbs)	Livestock Manure (tons)	Commercial Fertilizer on Cropland (tons)	Limestone Purchased or Applied (tons)	Salts Applied to all Highways (tons)
<u>New York</u>					
Jefferson	1983	927132	10582	16556	13851
Lewis	874	600468	6696	10454	5134
St. Lawrence	2046	1062013	10082	7730	10878
TOTAL	4903	2589613	27360	34740	29863

<u>To Convert From</u>	<u>To</u>	<u>Multiply By</u>
Pounds (lb)	Kilograms (kg)	0.454
Tons (ton)	Kilograms (kg)	907.2
	Metric Tons	0.907

##### 8.4.2.1 Agricultural Chemicals

Chemicals used are 64 percent herbicides, 34 insecticides and only 2 percent fungicides. The herbicides are used primarily on corn and the other general farm crops. Chemicals applied in this subarea may increase some but will likely remain comparatively modest. Most of the increase will be in the herbicide class. The amounts used in 1972 were 22,400 kilograms (49,320 lbs) of agricultural chemicals.

##### 8.4.2.2 Animal Wastes

Livestock production in this planning subarea is important and this is indicated by the manure index. Cattle provide 93 percent of the livestock manure, horses 6 percent and chickens 1 percent. Horse numbers which have been increasing will probably level out. Dairy numbers will probably continue to decrease some. However, manure production rates in this subarea will continue well above the average for the Basin. The 1972 manure production totalled 2,349,297 metric tons (2,589,613 tons) for this area. This represents 28 percent of the total manure produced in the Lake Ontario basin. Nitrogen, phosphorus, and potash combined comprise 1.2 percent of the total manure tonnage.

##### 8.4.2.3 Commercial Fertilizers

A total of 24,820 metric tons (27,360 tons) of commercial fertilizers were applied to croplands in PSA 5.3. Of the primary nutrients in the fertilizers, nitrogen accounted for 31 percent, phosphorus 37 percent and potash 32 percent. It is projected that commercial fertilizer use will increase 5-15 percent in the next 10 years.

TABLE 8-30

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0

STATE: New York

PLANNING SUBAREA: East 5.3

COUNTY: 3 County Totals (New York-3)

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	54000	1484.9	12000	180.0		
Grains	20042	100.1	6681	66.7		
Hay or Grass Silage	98021	980.0	81684	816.7		
Pastured Cropland	56024	560.1	56024	560.1		
Other Field Crops	292	8.8	325	37.4	325	48.8
Vegetables	208	7.0	208	8.0	208	9.2
Orchards						
Berries	78	5.1	83	14.3	87	16.0
Nursery, Greenhouse						
Other Crops						
Totals	228665	3146.0	157005	1683.2	620	74.0
Total Herbicides, Insecticides, Fungicides: 100 lbs					386290	4903.2

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	4250	332	312	644
1969	3309	345	316	661
1972	3220	338	296	634
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				4584
Nutrients in Wet Manure: Nitrogen, tons				23
Phosphorus, tons				6
Potash, tons				17

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	241810	154589	87221
1969	215164	132109	83055
1972	234182	136073	98109
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		1787999	632803
Wet Manure Defecated: Tons, 1972 Combined:		2420802	
Nutrients in Wet Manure: Nitrogen, tons		13556	
Phosphorus, tons		2421	
Potash, tons		12104	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		3702	
1969		1578	3313
1972		1597	11635
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		2571	148695
Nutrients in Wet Manure: Nitrogen, Tons		36	1026
Phosphorus, Tons		5	149
Potash, Tons		26	892

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		449828		
1969		260144		
1972		236896	5000	50000
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		9819		
Nutrients in Wet Manure:		Combined		3142
Nitrogen, tons		133		49
Phosphorus, tons		39		13
Potash, tons		34		11

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	48839	7737	357	8094
GRAINS	33405	3126		3126
Wheat	893	97		97
Oats	31657	2953		2953
Barley	425	33		33
Rye	21	5		5
OTHER FIELD CROPS	489	248		248
Soybeans				
Potatoes	439	239		239
Sugar beets				
Field beans	700	5		5
HAY OR GRASS SILAGE	300441	4048	17	4065
PASTURED CROPLAND	221024	1309	21	1330
Cropland used for pasture	192384	1056	20	1076
Improved pasture	28640	253	1	254
VEGETABLES, SWEET CORN, MELONS	217	44		44
ORCHARDS	49	5		5
BERRIES	16			
NURSERY & GREENHOUSE PRODUCTS	65	1	1	2
OTHER CROPS	76			
Total Fertilizer Used, Tons		16523	396	16919
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	25444
Liquid	1916
Total	27360
Primary Nutrients in Fertilizer	10670
Nitrogen	3308
Phosphorus	3948
Potash	3414

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			34740
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	20590	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		29863

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	3146.0	1683.2	74.0	4903.2
Manure: Kind of Livestock				
	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	4584	23	6	17
Cattle: Table 3	2420802	13556	2421	12104
Sheep: Table 4	2571	36	5	26
Horses: Table 4	148695	1026	149	892
Chickens: Table 5	9819	153	39	34
Turkeys: Table 5	3142	49	13	11
Total from Livestock, Tons	2589613	14843	2633	13084
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	27360	3308	3948	3414
Lime: Limestone equivalent purchased or applied, tons: Table 8 34740				
Salts: Applied on all highways, tons: Table 9 29863				

To Convert From

Pounds (lb)  
Acres (acre)  
Tons (ton)

To

Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By

0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-31

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: East 5.3 COUNTY: Jefferson

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	24120	663.3	5360	80.4		
Grains	13061	65.3	4354	43.5		
Hay or Grass Silage	34249	342.4	28541	285.4		
Pastured Cropland	19105	191.0	19105	191.0		
Other Field Crops	275	8.3	306	35.2	306	45.9
Vegetables	32	1.1	32	1.2	32	1.4
Orchards						
Berries	53	2.9	60	12.0	62	12.9
Nursery, Greenhouse						
Other Crops						
Totals	90895	1274.3	57758	648.7	400	60.2
Total Herbicides, Insecticides, Fungicides: 100 lbs						
149053 1983.2						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	1163	78	99	177
1969	516	35	36	71
1972	495	36	32	68
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				492
Nutrients in Wet Manure: Nitrogen, tons				2
Phosphorus, tons				1
Potash, tons				2

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	85477	54306	31171
1969	75513	46451	29062
1972	82341	47845	34496
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		628683	222499
Wet Manure Defecated: Tons, 1972 Combined:		851182	
Nutrients in Wet Manure: Nitrogen, tons		4767	
Phosphorus, tons		851	
Potash, tons		4256	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1984	
1969		451	1268
1972		428	5000
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		689	63900
Nutrients in Wet Manure: Nitrogen, Tons		10	441
Phosphorus, Tons		1	64
Potash, Tons		7	383

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		264125		
1969		204860		
1972		186423	5000	50000
Wet Manure Factor: Lbs. per bird		82.9	365.0	89.63
Wet Manure Defecated: Tons, 1972		7727		
Nutrients in Wet Manure: Combined		3142		
Nitrogen, tons		49		
Phosphorus, tons		13		
Potash, tons		11		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	21491	3295	184	3479
GRAINS	21769	1874	0	1874
Wheat	734	84	0	84
Oats	20547	1754	0	1754
Barley	310	23	0	23
Rye	9	1	0	1
OTHER FIELD CROPS	421	233	0	233
Soybeans				
Potatoes	421	233	0	233
Sugar beets				
Field beans	566	0	0	0
HAY OR GRASS SILAGE	105551	811	9	820
PASTURED CROPLAND	74134	125	2	127
Cropland used for pasture	66078	109	1	110
Improved pasture	8056	16	1	17
VEGETABLES, SWEET CORN, MELONS	28	5	0	5
ORCHARDS	48	5	0	5
BERRIES	1	0	0	0
NURSERY & GREENHOUSE PRODUCTS	9	1	1	2
OTHER CROPS	38	0	0	0
Total Fertilizer Used, Tons		6349	196	6545
Percent of Fertilizer Used		97	3	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	9841
Liquid	741
Total	10582
Primary Nutrients in Fertilizer	4127
Nitrogen	1279
Phosphorus	1527
Potash	1321

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			16556
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	9550	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		13851

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1274.3	648.7	60.2	1983.2
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	492	2	1	2
Cattle: Table 3	851182	4767	851	4256
Sheep: Table 4	689	10	1	7
Horses: Table 4	63900	441	64	383
Chickens: Table 5	7727	121	31	27
Turkeys: Table 5	3142	49	13	11
Total from Livestock, Tons	927132	5390	961	4686
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	10582	1279	1527	1321
Lime: Limestone equivalent purchased or applied, tons: Table 8 16556				
Salts: Applied on all highways, tons: Table 9 13851				

To Convert From To Multiply By  
 Pounds (lb) Kilograms (kg) 0.453  
 Acres (acre) Hectare (ha) .4047  
 Tons (ton) Kilograms (kg) 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

TABLE 8-32

## GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

PLANNING AREA: Lake Ontario 5.0 STATE: New York

PLANNING SUBAREA: East 5.3 COUNTY: Lewis

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	10170	279.6	2260	33.9		
Grains	3847	19.2	1282	12.8		
Hay or Grass Silage	17477	174.7	14704	145.6		
Pastured Cropland	9966	99.6	9966	99.6		
Other Field Crops	8	.2	9	1.0	9	1.4
Vegetables	20	.7	20	.8	20	.9
Orchards						
Berries	16.	1.5	15	.9	16	1.7
Nursery, Greenhouse						
Other Crops						
Totals	41504	575.5	28116	294.6	45	4.0
Total Herbicides, Insecticides, Fungicides: 100 lbs					69665	874.1

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31	June 1-Nov. 30	
		Spring	Fall	
1964	718	48	51	99
1969	261	26	17	43
1972	250	22	19	41
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				296
Nutrients in Wet Manure: Nitrogen, tons				1
Phosphorus, tons				0
Potash, tons				1

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	49288	34600	14688
1969	47477	31901	15576
1972	56549	32858	23691
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		431754	152807
Wet Manure Defecated: Tons, 1972 Combined:		584561	
Nutrients in Wet Manure: Nitrogen, tons		3274	
Phosphorus, tons		585	
Potash, tons		2923	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		166	
1969		46	298
1972		44	1135
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		71	14505
Nutrients in Wet Manure: Nitrogen, Tons		1	100
Phosphorus, Tons		0	15
Potash, Tons		1	87

TABLE 5--MANURE FROM CHICKENS &amp; TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		60748		
1969		27443		
1972		24973		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1035		
Nutrients in Wet Manure: Nitrogen, tons		16	Combined	
Phosphorus, tons		4		
Potash, tons		4		

TABLE 6--CROP ACREAGES &amp; FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
COUNTY, land area, acres (1)	826432			
Number of farms	905			
Acres in farms	219117			
Cropland in farms	120236			
Harvested cropland in farms	73988			
Number I-V farms	746			
Acres in I-V farms	194604			
Cropland I-V farms	112590			
Harvested cropland I-V farms	70883			
CORN	9555	1602	91	1693
GRAINS	6412	739	0	739
Wheat	48	0	0	0
Oats	6141	714	0	714
Barley	55	6	0	6
Rye	0	0	0	0
OTHER FIELD CROPS	56	13	0	13
Soybeans				
Potatoes	6	4	0	4
Sugar beets				
Field beans	30	0	0	0
HAY OR GRASS SILAGE	55472	1245	0	1245
PASTURED CROPLAND	42856	452	1	453
Cropland used for pasture	36427	335	1	336
Improved pasture	6429	117	0	117
VEGETABLES, SWEET CORN, MELONS	17	7	0	7
ORCHARDS	1	0	0	0
BERRIES	13	0	0	0
NURSERY & GREENHOUSE PRODUCTS	1	0	0	0
OTHER CROPS	30	0	0	0
Total Fertilizer Used, Tons		4058	92	4150
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	6227
Liquid	469
Total	6696
Primary Nutrients in Fertilizer	2611
Nitrogen	810
Phosphorus	966
Potash	835

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			10454
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, &amp; MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	3540	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		5134

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals:	Hundredweight Applied on Cropland			
Table 1	Herbicides	Insecticides	Fungicides	Total
	575.5	294.6	4.0	874.1
Manure: Kind of Livestock	Tons of Materials in Wet Manure Defecated			
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	296	1	0	1
Cattle: Table 3	584561	3274	585	2923
Sheep: Table 4	71	1	0	1
Horses: Table 4	14505	100	15	87
Chickens: Table 5	1035	16	4	4
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	600468	3392	604	3016
Fertilizers:	Tons of Commercial Fertilizers Applied			
	Total	Primary Nutrients		
		Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	6696	810	966	835
Lime: Limestone equivalent purchased or applied, tons: Table 8	10454			
Salts: Applied on all highways, tons: Table 9				5134

To Convert From  
Pounds (lb)  
Acres (acre)  
Tons (ton)

To  
Kilograms (kg)  
Hectare (ha)  
Kilograms (kg)

Multiply By  
0.453  
.4047  
907.2

(1) County, land area, acres includes water areas under 40 acres in size.

GREAT LAKES BASIN MATERIAL USAGE INVENTORY

Agricultural Chemicals, Manures, Fertilizers, Lime and Highway De-Icing Compounds

TABLE 8-33

PLANNING AREA: Lake Ontario 5.0 STATE: New York  
 PLANNING SUBAREA: East 5.3 COUNTY: St. Lawrence

TABLE 1--ESTIMATED AMOUNTS OF CHEMICALS USED ON CROPS, 1972

Crop Group or Crops	Herbicides		Insecticides		Fungicides	
	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs	Acres Treated	Amount Used 100 lbs
Corn	19710	542.0	4380	55.7		
Grains	3134	15.6	1045	10.4		
Hay or Grass Silage	46295	462.9	38579	385.7		
Pastured Cropland	26953	269.5	26953	269.5		
Other Field Crops	9	.3	10	1.2	10	1.5
Vegetables	156	5.2	156	6.0	156	6.9
Orchards						
Berries	9	.7	8	1.4	9	1.4
Nursery, Greenhouse						
Other Crops						
Totals	96266	1296.2	71131	739.9	175	9.8
Total Herbicides, Insecticides, Fungicides: 100 lbs 167572 2045.9						

TABLE 2--MANURE FROM SWINE

Year	Hog & Pig Inventory Dec. 1	Number Sows Farrowing		Total
		Dec. 1-May 31 Spring	June 1-Nov. 30 Fall	
1964	2369	206	162	368
1969	2577	284	263	547
1972	2475	280	245	525
Wet Manure Factor: Tons per litter farrowed				7.23
Wet Manure Defecated: Tons, 1972				3796
Nutrients in Wet Manure: Nitrogen, tons				19
Phosphorus, tons				5
Potash, tons				14

TABLE 3--MANURE FROM CATTLE

Year	Total	Number Cattle and Calves	
		Cows & Heifers Calved	Heifers, Steers, Bulls, Calves
1964	107045	65683	41362
1969	92174	53757	38417
1972	95292	55370	39922
Wet Manure Factor: Tons Per Animal		13.14	6.45
Wet Manure Defecated: Tons, 1972		727562	257497
Wet Manure Defecated: Tons, 1972 Combined:		985095	
Nutrients in Wet Manure: Nitrogen, tons		5516	
Phosphorus, tons		985	
Potash, tons		4925	

TABLE 4--MANURE FROM SHEEP AND HORSES

Year	Item	Sheep & Lambs	Horses & Ponies
1964		1552	
1969		1181	1747
1972		1125	5300
Wet Manure Factor: Tons per animal		1.61	12.78
Wet Manure Defecated: Tons, 1972		1811	70290
Nutrients in Wet Manure: Nitrogen, tons		25	485
Phosphorus, tons		4	70
Potash, tons		18	422

TABLE 5--MANURE FROM CHICKENS & TURKEYS

Year	Item	Chickens	Turkey Hens	Turkeys Raised
1964		124955		
1969		27841		
1972		25500		
Wet Manure Factor: Lbs. per bird		82.9		
Wet Manure Defecated: Tons, 1972		1057		
Nutrients in Wet Manure:		Combined		
Nitrogen, tons		16		
Phosphorus, tons		4		
Potash, tons		4		

TABLE 6--CROP ACREAGES & FERTILIZER USED--CLASS I-V CENSUS FARMS, 1969

Crops	Crop Acres	Tons of Fertilizer Used		
		Dry	Liquid	Total
CORN	17793	2840	82	2922
GRAINS	5224	513	0	513
Wheat	111	13	0	13
Oats	4969	485	0	485
Barley	60	4	0	4
Eye	12	4	0	4
OTHER FIELD CROPS	12	2	0	2
Soybeans				
Potatoes	12	2	0	2
Sugar beets				
Field beans	104	5	0	5
HAY OR GRASS SILAGE	139418	1992	8	2000
PASTURED CROPLAND	104034	732	18	750
Cropland used for pasture	89879	612	18	630
Improved pasture	14155	120	0	120
VEGETABLES, SWEET CORN, MELONS	172	32	0	32
ORCHARDS	0	0	0	0
BERRIES	2	0	0	0
NURSERY & GREENHOUSE PRODUCTS	55	0	0	0
OTHER CROPS	10	0	0	0
Total Fertilizer Used, Tons		6116	108	6224
Percent of Fertilizer Used		98	2	100

TABLE 7--FERTILIZER USED IN 1972

Item	Tons
Fertilizer Used on Crops: Solid	9376
Liquid	706
Total	10082
Primary Nutrients in Fertilizer	3932
Nitrogen	1219
Phosphorus	1455
Potash	1258

TABLE 8--GROUND LIMESTONE EQUIVALENT APPLIED

Year	Tonnage Government Cost/Shared	Tonnage not Government Cost/Shared	Total Tonnage
1972			7730
Tonnages for Other Recent Years			

TABLE 9--SALTS APPLIED TO FEDERAL, STATE, COUNTY, & MUNICIPAL HIGHWAYS

Year	Tons Purchased Through State	Tons Applied Per "E" Mile
1970-71		
1971-72		
1972-73	7500	
Total Estimated Tons Applied on All Highways in 1972-73, As Computed		10878

TABLE 10--SUMMARY OF AGRICULTURAL MATERIALS AND HIGHWAY DE-ICING

Chemicals: Hundredweight Applied on Cropland				
Table 1	Herbicides	Insecticides	Fungicides	Total
	1296.2	739.9	9.8	2045.9
Manure: Kind of Livestock				
	Manure	Nitrogen	Phosphorus	Potash
Swine: Table 2	3796	19	5	14
Cattle: Table 3	985099	5516	985	4925
Sheep: Table 4	1811	25	4	18
Horses: Table 4	70290	485	70	422
Chickens: Table 5	1057	16	4	4
Turkeys: Table 5	0	0	0	0
Total from Livestock, Tons	1062013	6061	1068	5383
Fertilizers: Tons of Commercial Fertilizers Applied				
Item	Total	Nitrogen	Phosphorus	Potash
Applied on Cropland: Table 7	10082	1219	1455	1258
Lime: Limestone equivalent purchased or applied, tons:				
Table 8	7730			
Salts: Applied on all highways, tons: Table 9				
				10878

To Convert From  
 Pounds (lb)  
 Acres (acre)  
 Tons (ton)

To  
 Kilograms (kg)  
 Hectare (ha)  
 Kilograms (kg)

Multiply By  
 0.453  
 .4047  
 907.2

(1) County, land area, acres includes water areas under 40 acres in size.

#### 8.4.2.4 Lime

Lime applications have been at about the same level in PSA 5.3 as the average for the entire Basin. There are few reasons that would warrant projecting much change. Figures for 1972 show 31,516 metric tons (34,740 tons) of lime were purchased or applied to croplands in PSA 5.3.

#### 8.4.2.5 Salts

Road de-icing rates have been below Basin average in this subarea. Additional amounts in the future will depend more on increased road mileage rather than increases in rates per mile. The 1972-73 amounts show that 27,092 metric tons (29,863 tons) of road de-icing salts were applied to all highways in this subarea.

Section 9

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