2000

Hazardous materials database

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HAZARDOUS MATERIALS DATABASE

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Thesis submitted to the College of Engineering and Mineral Resources at

West Virginia University

in partial fulfillment of the requirements for the degree of

Masters of Science

in

Industrial Engineering

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2000

Keywords: hazardous materials, database, Visual Basic, dismantling

ABSTRACT

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Handling and disposal of a retired object can be a major component of its Life Cycle Cost. Often, during dismantling of a retired object many hazardous materials are released. Disposal of hazardous materials also need to comply with various federal regulations. Agencies like Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) set these safety regulations. It is possible to apply generic exposure and release controls to protect workers from hazardous materials. For the most cost effective hazard controls it is necessary first to identify the materials and their properties of primary concern. There is a need to have an integrated database for properties of Hazardous Materials.

This project developed a database for properties of hazardous materials. The database was implemented in Microsoft Access. Thirty-four chemicals and their categories were identified. These chemicals are encountered during dismantling of a retired object. The database currently contains 60 main fields, which also contain subfields. Information such as its physical properties, chemical properties, health hazards, releases from demolition or various other industrial processes and references to safety, health and environmental regulations can be obtained from this database. A decision support system was developed as a front end to Access. The decision support system was implemented in Visual Basic.

In the future, this database can be expanded to include non-hazardous materials. The database capabilities were demonstrated on the hazardous materials occurring in the ship dismantling industry. It is expected that the database will save significant time and cost in data retrieval. Information retrieval from the database is through an intuitive graphical interface, and suitable for use by a non-computer person.

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ACKNOWLEDGEMENTS

I am thankful to my parents for their unyielding support, sacrifices and encouragement throughout my studies. I am greatly indebted to my research advisors, Dr. Rashpal Singh Ahluwalia and Dr. David Whaley for their invaluable guidance throughout this research. The advice and insight provided by Dr. Ahluwalia in all matters pertaining to research have been extremely invaluable. I was fortunate to have him as a teacher in classroom. Dr. Whaley was extremely kind in explaining important aspects of research. His guidance and encouragement have made a difference. I would like to express special thanks to both of them for their generous time and kind co-operation.

I am grateful to Dr. Robert Creese for his valuable comments and suggestions that improved the quality of the report. His suggestions during the initial stages of the research were also valuable. His kindness is very much appreciated.

My heartfelt thanks to Mr. Wiselin Das Mathuram and Mr. Ravi Gottumukkala for helping me solve problems in visual basic during this research. Finally, I thank IMSE department of WVU for their continued financial support, which was of great help in my pursuit for completion of M.S studies.

CHAPTER 1: INTRODUCTION

Development of the database structure described in this work was originally motivated by the need for an easily used compendium of the properties of materials encountered in dismantling and recycling or disposal of components of retired marine vessels, here called 'ships'. However, the broader need was recognized to create a database structure which could be useful for many activities, including those where materials encountered could harm people or the environment.

This database structure was developed for use in the United States (US), so it contains referrals to applicable US regulations. However, in principle, similar refernces to the requirement of other jurisdictions could easily be incorporated in the future.

1.1 DATABASES AND DECISION SUPPORT SYSTEMS

It is only in recent years that the profound impact of the ongoing explosion of useful information on organizations and individuals has been widely appreciated. Previously, people considered tangible assets whose value could be appraised with reasonable precision [1]. The value of information is harder to define, but nonetheless it can be enormously important. Computers process data to derive and arrange information, and data is often stored in large databases. Complex software called database systems or database management systems have been developed to allow convenient storage and retrieval of data to provide useful information. Until a few years ago, database systems were used almost exclusively in large organizations on mainframes. Today, many people interact with database systems on microcomputers for personal and business applications.

Decision Support Systems (DSS) are computer-based systems that help decision-makers confront ill-structured problems through direct interaction with data and analysis models [3]. In late 1960s and early 1970s, the first DSS began to appear. They were the result of a number of factors such as:

- Emerging computer hardware and software technology
- Research efforts at leading universities

- A growing awareness of how to support decision making
- A desire for better information
- An increasingly turbulent economic environment and
- Stronger competition pressures.

The principal tenets of a Decision Support System are [2]:

- These systems can be designed specifically to facilitate the decision making processes
- These systems support rather than automate decision making, and
- These systems are able to respond quickly to the changing needs of decision-makers.

Decision Support Systems have to balance three system capabilities, ease of use by non-technical users, access to a wide variety of data, and analysis and modeling in a variety of ways. DSS constitute a significant current frontier in the application of computers. DSS help by expediting access to information that would otherwise not be readily available.

1.2 NEED FOR AN INTEGRATED DATABASE FOR HAZARDOUS MATERIAL:

Retirement from use is inevitable for any manufactured or constructed object. Dismantling and disposal are vital parts of Life Cycle Cost (LCC) of a retired object. During dismantling and disposal many things need to be taken into consideration, such as environmental issues and safety regulations. Effects of chemicals released to the environment during dismantling and disposal are a major concern [4], including issues like aquatic fate, terrestrial fate, and atmospheric fate. Within the US, safety regulations set by the Occupational Safety and Health Administration (OSHA), and the Environmental Protection Agency (EPA) have to be strictly followed. A need was recognized for an integrated Hazardous Materials Database (HMD), which has all the above-mentioned characteristics.

1.3 PROBLEM STATEMENT:

There is no database which provides broad coverage for the properties of hazardous chemicals, including the applicable safety and environmental regulations, which can assist the user in handling and disposal of a retired object. The HMD is being developed primarily for assisting

the persons or organizations responsible for handling and disposal of hazardous materials in objects to be dismantled at the end of their useful life. With all of the potential availability among dismantling scenarios, we have recognized the value of assembling a substantial database of recognized properties of materials, hazardous or otherwise, likely to be found on objects to be dismantled and their components recycled or disposed, now and in the future.

During dismantling, and replacing or disposal of components of a retired object the possible effects of chemicals encountered during the process on the people and environment need to be considered. When there is need to determine safe and legal handling and disposal of a particular chemical substance, gathering all its properties (physical, chemical and hazardous), applicable health regulations, and safety and environmental issues is a tedious and a time consuming activity. This led to the idea of developing a database of hazardous chemical substances with all their relevant properties, including health hazards to workers and potential to harm the environment from the chemicals released, and the applicable safety, health and environmental regulations, which would be flexible, easy and rapid for an organization to use, when it is interested in the dismantling and rcycling or disposal of a retired object.

The HMD for chemicals developed here includes metals and nonmetals, as well as organic and inorganic compounds, with access to properties pooled at one place.

1.4 SOLUTION APPROACH:

Keeping in mind the above issues the HMD was developed which can hold extensive information about a chemical. The Database was designed by creating tables and linking them with primary keys. There is one main table called the **Materials Table**, with links to the other tables. The HMD contains a total of 22 tables. Visual Basic (VB) was used as the front-end tool for designing a query engine for the database. VB is flexible, compatible with any database and can be installed on any kind of a computer.

1.5 OBJECTIVES OF THIS RESEARCH:

The objectives of this research are to:

- Design a database for hazardous materials

- Populate this structure with properties of a sample of chemicals encountered in ship dismantling
- Develop a user interface which facilitates accessing data related to any kind of chemical substance, and
- Apply this database finally to ship dismantling.

CHAPTER 2: LITERATURE REVIEW

2.1 EXISTING CHEMICAL DATA SOURCES

CHEMICAL INVENTORY DATABASE is a user-friendly tool to help maintain an inventory of chemicals and produce summary documentation [6]. It is designed so that a user can find where a particular chemical is stored. It helps in saving money by not allowing him to purchase a chemical, which is already in use by the company and also in saving time when keeping the inventory up to date and. It makes printing and editing of the listing easy. This database is suitable for small organizations with a moderate level of inventory of several hundred chemicals. It's designed for use, so that everyone authorized in the organization can easily access the inventory information. This database cannot be used by dismantling industry since it is designed only for maintaining inventory of chemicals.

BRETHERICK'S REACTIVE CHEMICAL HAZARDS DATABASE VERSION 2.0 is a CD ROM, which offers access to information on safe handling and use of reactive chemicals [8]. It includes every chemical for which documented information on reactive hazards has been found. This CD ROM is published by Butterworth-Heinemann, Newton MA.02158 USA. It costs $554.96.

SAMPLE CHEMICAL DATABASE is a chemical database consisting of experimental data and correlations of temperature-dependent properties for 1635 pure chemicals [7]. Collected data have been evaluated, correlated, and checked for thermodynamic consistency. From this database we can view data sets, Design Institute for Physical property Data (DIPPR) approved property constants and regressed correlation coefficients for temperature-dependent properties, as well as calculate temperature-dependent properties in any set of units.

CHEMICAL DATABASE DEVELOPED BY UNITED NUCLEAR SCIENTIFIC EQUIPMENT & SUPPLIES deals with chemicals that are used in Fireworks, Explosives, Rocket Fuels or explosives in themselves [11]. All of the uses are not given and only the related

purposes of each are stated. Whenever possible the following information on chemical formula, melting temperature, decomposition temperature, form (liquid, powder, crystal, etc), whether it will explode, whether it is poisonous, and its usage is provided. These chemicals are offered as a guide for information purposes only and cannot be purchased.

LIGAND CHEMICAL DATABASE FOR ENZYMATIC REACTIONS: A LINK BETWEEN ENZYME STRUCTURES AND CHEMICAL REACTIONS: This database is developed by LIGAND chemical Database for Enzymatic Reactions, which is designed to link enzyme structures with enzyme-catalyzed chemical reactions [10].

GUIDE FOR HANDLING HAZARDOUS MATERIALS: This is designed as a simple guide to Hazardous Materials. United Parcel Service has recognized the need for a manual, which will provide all necessary information, while being simple enough for inexperienced shippers to use [18]. The manual incorporates a large number of products, which do not appear in the official DOT listing. The serial number permits UPS to maintain a record of persons holding copies, with the intent that revision pages will be provided as required.

INDUSTRIAL FIRE HAZARDS HANDBOOK: The purpose of this is to provide a broad yet thorough introduction to major industries and industrial processes, with emphasis on the fire hazards that accompany them. This Handbook, therefore, is intended to complement the NFPA codes and standards, and help the user apply them intelligently. It is meant as a basic reference book, which will serve a broad audience, including fire science students as well as those directly involved in industrial fire protection.

HAZARDOUS MATERIALS HANDBOOK: The design of this handbook enables a firefighter to carry information useful to him primarily during inspections, but also at fires. There are seven headings in the main section of the handbook [19]. These are Name of the material (Description of Flash Point), NFPA 704M ID (The National Fire Prevention Association Classification of the fire hazards of material based on their flash points and boiling points), DOT Classification (The Department of Transportation classification for each hazardous

substance is noted), Firefighting Procedures (FFP), Explosive Hazards, Water and Air Reactivity, Hazardous Mixtures and Toxicity Hazards

EMERGENCY ACTION GUIDE FOR SELECTED HAZARDOUS MATERIALS: This guide was prepared to help emergency service personnel during the first 30 minutes of an accident involving a spill of a volatile, toxic, gaseous and /or flammable material that is shipped in bulk [20]. General and specific safety procedures to follow are provided in spill guides arranged alphabetically by hazardous material. Each left-hand page identifies a specific hazardous material, outlines its potential hazards and provides immediate action information for fires, spills and first aid. Each right hand page specifies recommended evacuation areas and distances for protecting the public from dangerous concentrations of toxic vapors and explosions. Where applicable, necessary water pollution controls are provided.

HAZARDOUS MATERIALS: This book approaches the study of Hazardous Materials from a frame of reference, which explains why the various materials act and react as they do [21]. This explanation is based on the atomic and molecular structure and the chemical reactivity of the materials. This book communicates through the use of common nomenclature, chemical symbols, and structural formulas. The reader is introduced to the laws and principles governing the behavior of hazardous materials as a background for learning to control the behavior. Frequently encountered materials, which have hazardous properties, are identified, both chemically and practically, rationale for fire fighting is based on both their chemical reactivity and their physical properties. Nationally accepted procedures for identifying hazardous chemicals and methods for crisis –handling of them are summarized.

TOXIC METALS POLLUTION CONTROL AND WORKER PROTECTION: This book contains those metals and compounds that are most likely to cause poisoning in industry while being processed, and in general environment while the disposal of their process-effluents is being implemented [22]. What is more important and effective in the prevention of toxic metals poisoning is through removal of toxic agents in a manner that positively precludes ingestion or contact by all potential victims, and therein lies the emphasis and main endeavor of the book. In this book are condensed vital data that are scattered and difficult to pull together. Important

techniques are interpreted and explained by actual case histories. This condensed information will enable the users to establish a sound background for action.

A GUIDE TO WORKING WITH HAZARDOUS MATERIALS – The high degree of concern in the industrial community as well as the public at large, is often needlessly aggravated by unfamiliarity with many of these substances as well as the extent of their presence and potential effects [23]. This book is provided as a resource to help the industrial manager, safety and pollution control engineer establish his/her comprehensive program for information and procedures about hazardous substances in workplace.

2.2 MAJOR DRAWBACKS OF SOME OF EXISTING DATA SOURCES:

CHEMICAL STRUCTURES DATABASE: The chemical structures database contains more than 2250 automatically collected chemical structures from the Internet, complete with the information about HTML page addresses. This database is searchable with usual chemical search operations, full structure and sub structure search, formula search name search and so on [5]. This database makes chemical information much more accessible and boosts publication of quality chemical information with attached chemical structures. But it is temporarily disabled.

HAZARDOUS CHEMICAL DATABASE is a resource of approximately 2000 dangerous chemicals [9]. The database contains information about organic chemicals, inorganic chemicals, data, information, laws and regulations, EPA number, name of chemical substances, molecular formula, molecular weight, physical properties, use of chemical, melting point, boiling point, flash point, vapor pressure, water solubility, acute human health effects, safety protection for workers, first aid, spills and emergencies, handling and storage, fire hazards, work place exposure etc. This data can be obtained in the form of a CD ROM.

2.3 SOURCES USED TO POPULATE THE HAZARDOUS MATERIALS DATABASE (HMD):

HAZARDOUS PROPERTIES OF CHEMICAL SUBSTANCES: A wide range of information about hazardous characteristics, toxic properties of chemical substances, target organs and toxicology, cancer causing chemicals, teratogenic substances, flammable and combustile properties of chemical substances, explosive characteristics of chemical substances are obtained [13].

FATE AND EXPOSURE DATA FOR ORGANIC CHEMICALS: For each chemical, the physical properties as well as the environmental fate and monitoring data were identified by conducting searches of the environmental Fate Data Bases of Syracuse Research Corporation (SRC) [14].

CHEMICAL NAMES AND SYNONYMS: This gives a list of CAS Registry Numbers, Simplified Molecular Input Line Entry System (SMILES) notation, chemical names, chemical synonyms and molecular weights of all the chemicals [15].

HAZARDOUS MATERIALS HANDBOOK: Hazardous Materials Handbook covers nearly 1350 hazardous chemicals found in industrial workplace and frequently transported in bulk. It has a record of all the chemical names, their synonyms, physical description, chemical designation, health hazards, fire hazards, chemical reactivity, environmental, shipping information, hazard classification and physical and chemical properties [16].

ENVIRONMENTAL CONTAMINANT REFERENCE DATA BOOK: It is a reference compendium of physical, chemical and biological effects of environmental contaminants-primarily individual chemicals but also some selected simple and complex mixtures. Each substance is summarized and summaries include information on CAS number, DOT and NIOSH numbers, synonyms various detection limits, environmental transport, fate, and effects (selected narrative information on soil adsorption, volatilization, biodegradation, bioaccumulation, probable exposures and effect types), water hemistry, metabolic pathways, molecular formulas,

regulatory jurisdictions and authorities, standards, reactions, monitoring methods and international standards [17].

CHAPTER 3: DATABASE DESIGN

There are currently a total of 22 tables in the Hazardous Materials Database (HMD), among which the Materials Table is the main table and all the other tables are sub-tables to it. The user can get a wide range of information regarding the materials, which have been entered such as physical properties, chemical properties, environmental transport and fate properties, toxicity etc. We have initially identified 30 chemicals and categories of chemicals, mostly hazardous, occurring in ship dismantling.

HMD is divided into six major groups:

- **PHYSICAL PROPERTIES**
- **CHEMICAL PROPERTIES**
- **HEALTH AND ECOLOGICAL HAZARDS**
- **ENVIRONMENTAL CONCERN**
- **SAFETY AND ENVIRONMENTAL REGULATIONS**
- **EXPOSURE CRITERIA**

3.1 PHYSICAL PROPERTIES

At present physical properties are divided into three tables:

1. Materials Table
2. Percent Dissociated Table
3. Water Solubility

3.1.1 MATERIALS TABLE

Table 3.1.1 gives the Materials Table and its fields. The various fields are explained below:

CAS #: It is a unique identifier assigned to each chemical registered with Chemical Abstracts Services (CAS) of the American Chemical Society. This number is used to identify chemicals on the basis of their molecular structure. CAS numbers, in the format xxx-xx-x, can be used in

conjunction with chemical names for positive identification and searching on computerized databases.

Molecular Formula: The formula is in Hill notation, which is given as the number of carbons followed by the number of hydrocarbons followed by any other elements in alphabetical order.

Wiswesser Line Notation: This is a chemical structure representation that can be used for substructure searching, in order to predict a property from that structure.

Smiles Notation: A different chemical structure representation that can be used for substructure searching, in order to predict a property from that structure.

Boiling Point: Boiling Point at 1 atmosphere is the temperature of a liquid when its vapor pressure is 1 atmosphere. It indicates whether a liquid will boil and become gas at any particular temperature and sea-level atmospheric pressure.

Melting Point: The melting/freezing point is the temperature at which a solid changes to a liquid or a liquid changes to a solid.

Molecular Weight: It is the weight of a molecule of the chemical relative to a value of 12 for one atom of carbon.

Henry's constant: The Henry's Law constant (H), is the air/water partition coefficient, which is published in two forms. A non-dimensional H relates the chemical concentration in the gas phase to its concentration in the water phase. The dimensional H can be determined by dividing the vapor pressure in atmospheres by the water solubility in mole/m3 to give H in atm-m3/mole. H provides an indication of the partition between air and water at equilibrium and also is used to calculate the rate of evaporation from water.

Vapor Pressure: It is defined as the equilibrium pressure of the saturated vapor above the liquid, measured in millimeters of mercury (760mmHg = 14.7 psia) at 20deg C unless another

temperature is specified. The vapor pressure of a chemical provides considerable insight into the transport of a chemical in the environment. The volatility of the pure chemical is dependent upon the vapor pressure, while volatilization from water is dependent upon the vapor pressure and solubility in water.

Log Octanol/Water Partition Coefficient: The octanol water partition coefficient is the ratio of the chemical concentration in Octanol divided by the concentration in water at equilibrium. Occasionally chemical Octanol/water partition coefficients are not calculated because a necessary fragment constant for the chemicals are not available.

Bioconcentration Factor: Certain chemicals due to their hydrophobic nature have a tendency to partition from the water column and bioconcentrate in aquatic organisms. This concentration of chemicals in aquatic organisms is of concern because it can lead to toxic concentrations being reached when the organism is consumed by higher organisms such as wild life and humans. Such bioconcentrations are usually reported as the Bioconcentration factor (BCF), or its log which is the concentration of chemical in the organism at equilibrium divided by the concentration of the chemical in water.

Oral LD50 rat: LD stands for lethal dose. LD50 is the amount of material given all at once, which causes death of 50% (one half) of a group of test animals. LD50 is one way to measure short term poisoning potential (acute toxicity) of a material. Here rat is used as the test animal. For example LD50 (oral rat) 5mg/kg means that 5 milligrams of that chemical for every one-kilogram body weight of the rat, when administered in one dose by mouth causes the death of 50% of the test group.

Table 3.1.1- MATERIALS

Chemical Name	Description
CAS #	Identifier assigned by Chemical Abstaract Society
Smiles	Chemical structure representation
Classification	Which group the chemical belongs to
Wiswesser_Notation	One of chemical structure representation
Molecular_Wt	Weight of molecule of chemical
Molecular_Formula	Number of carbons and hydrocarbons present
Boiling_Point	Temperature at which chemical boils
Boiling_Point_Range	Range of temp at which the chemical boils
Melting_Point	Temperature at which it melts
Melting_Point_Range	Range of temperature at which the chemical melts
Log Octanol Water partition coefficient	Conc in octanol/conc in water at equlibrium
Density	Density of chemical at 25 deg C
VP	Equlibrium pressure of saturated vapor above liquid
Henry's constant	It is the air/water partition coefficient
Bioconcentration factor	Conc of chemical in organism/conc in water
Oral LD50 rat	Dose given causes the death of 50% of test animals
Sources	Sources used to get the information
Notes	Notes for the chemical

3.1.2 PERCENT DISSOCIATED

Table 3.1.2 gives the various fields of Percent Dissociated which are explained below

Dissociation constants: The acid dissociation constant as the negative log (pKa) is given for chemicals that are likely to dissociate at environmental pHs (between 5 and 9). Chemical classes where dissociation is important include phenols, carboxylic acids, and aliphatic aromatic amines. The degree of dissociation affects such processes as photolysis (absorption spectra of chemicals that dissociate can be considerably affected by pH), evaporation from water (ions do not evaporate), soil or sediment adsorption, and bioconcentration.

Table 3.1.2- PERCENT DISSOCIATED

Chemical Name	% Dissociation in aqueous solution
pH2	
pH4	
pH7	
pH9	
pH11	

3.1.3 WATER SOLUBILITY

Table 3.1.3 is Water Solubility, which is explained below

Water Solubility: The water solubility of chemicals provides considerable insight into the fate and transport of a chemical in the environment. High water soluble chemicals, which have a tendency to remain dissolved in the water column and not partition to soil or sediment or bioconcentrate in aquatic organisms, are less likely to volatilize from water and are generally more likely to biodegrade. Low water soluble chemicals are just the opposite; they partition to soil or sediments and bioconcentrate in aquatic organisms, many volatilize more readily from water, and are less likely to be biodegradable. Other fate processes that are or can be affected by water solubility include photolysis, hydrolysis, oxidation, and wash out from the atmosphere by rain or fog. The water solubility Table is shown below.

Table 3.1.3 -WATER SOLUBILITY

Chemical Name	Description
Soluble	If the chemical is soluble (Yes/No)
Low	If the solubility of the chemical is low
Medium	If the solubility of chemical is medium
High	If the solubility of chemical is high

3.2 CHEMICAL PROPERTIES

Chemical Properties are divided into four tables:

1. Reactivity/Instability
2. Flammability/Combustibility
3. Extinguishing Agents

4. Corrosivity

3.2.1. REACTIVITY/INSTABILITY

This Table gives the reactivity of the chemical with oxidizers, titanium, and selenium

Table 3.2.1- REACTIVITY/INSTABILITY

Chemical Name	Description
Oxy	If the chemical reacts with oxidizers
Ti	If the chemical reacts with titanium
Se	If the chemical reacts with selenium

3.2.2 FLAMMABILITY/COMBUSTIBILITY

This table gives information about the flash point, auto ignition temperature and the upper and lower exposure limits of the chemical.

Flash Point: It is defined as the lowest temperature at which vapors above a volatile combustile substance will ignite in air when exposed to a flame.

Flammable limits in air: The percent concentration in air (% by volume) is given for the LEL (lower explosive-flammable limit in air, % by volume) and UEL (upper explosive-flammable limit in air, % by volume) at room temperature unless otherwise specified. The values, along with those in Flash Point and Auto ignition temperature give an indication of relative Flammability of the chemical.

Table 3.2.2 -FLAMMABILITY/ COMBUSTIBILITY

Chemical Name	Description
Non Flammable	If chemical is not flammable
Flash Point	Lowest temp at which chemical vapor ignites when exposed to flame
Auto ignition temp	Lowest temperature at which chemical catches fire
LEL percent	Lower exposure limit
UEL percent	Upper exposure limit

3.2.3 EXTINGUISHING AGENTS

Table 3.2.3 gives whether the chemical is used or not used as an extinguishing agent

Table 3.2.3 - EXTINGUISHING AGENTS

Chemical Name	Description
Use	Any extinguishing agent that can be used in the presence of the chemical
Not Use	Any extinguishing agent that cannot be used in the presence of the chemical

3.2.4 CORROSIVITY

This table gives the information about the reactivity of the chemical towards flesh, towards steel and the material, which corrodes that particular chemical.

Table 3.2.4 - CORROSIVITY

Chemical Name	Description
Toward Metal	Corrosivity of the chemical towards metal
Toward Flesh	Corrosivity of the chemical towards flesh
Towards Glass	Corrosivity of the chemical towards glass

3.3 HEALTH AND ECOLOGICAL HAZARDS

This group is divided into six tables:

1. Aquatic Fate
2. Acute Symptoms
3. Chronic Symptoms
4. Allergen
5. Oral Acute Aquatic Toxicity
6. Cancer

3.3.1 AQUATIC FATE

This section reviews how a chemical will behave if released to fresh, marine, or estuarine surface waters. Field studies or aquatic model ecosystems are used when they provide insight into the overall behavior in water. When field or aquatic ecosystems studies are not available or do not give enough data to make conclusions on the aquatic fate of the chemical, data from appropriate degradation, transport, or monitoring sections will be used to synthesize how a chemical is likely to behave if released to water.

Table 3.3.1– AQUATIC FATE

Chemical Name	Description
Biodegrade	Breakdown by the action of living things
Adsorb to Sediment	Adsorption of chemical to sediment
Photolysis	Destruction of materials initiated by reactions by absorption of light
Photo -Oxidation	Uses light to initiate reactions that destroy contaminants

3.3.2 ACUTE SYMPTOMS AND TOXICITY

Acute Symptoms observed when the chemical is taken inside the body either through inhalation or ingestion or adsorption through skin or eye.

Table 3.3.2 - ACUTE SYMPTOMS AND TOXICITY

Chemical Name	Description
Inhalation	Intake into the body through breathing
Ingestion	Intake into the body through mouth

3.3.3 CHRONIC SYMPTOMS AND TOXICITY

These are the chronic symptoms observed when the chemical is inhaled or taken in by ingestion or by adsorption through the skin.

Table 3.3.3 - CHRONIC SYMPTOMS AND TOXICITY

Chemical Name	Description
Inhalation	Intake into the body through breathing
Ingestion	Intake into the body through mouth

3.3.4 ALLERGENICITY

Table 3.3.4 gives the information about whether the chemical is an allergen to skin, respiratory tract or other organs of the body.

Table 3.3.4 - ALLERGENICITY

Chemical Name	Description
Skin	Allergen to skin
Respiratory	Allergen to lungs
Other	Allergen to other organs

3.3.5 ORAL ACUTE AQUATIC TOXICITY

Toxicity by ingestion: The LD_{50} values are those defined by the National Academy of Sciences, committee on Hazardous Materials. LD_{50} signifies that about 50% of the animals given the specified dose by mouth will die [14]. The values of Water Fowl LD_{50} and Fish LC_{50} for the chemical in table 3.3.5

Table 3.3.5 - ORAL ACUTE AQUATIC TOXICITY

Chemical Name	Name of the chemical
Fish LC_{50}	Amount when taken will kill the fish
Water Fowl LD_{50}	When consumed 50% of the animals will die

3.3.6 CANCER

A carcinogen is a substance capable of causing cancer. Most cancers are induced by many synthetic or naturally occurring chemicals, which include inorganic substances, organics, hormones, and many solid-state materials.

Mutagens: These cause cell mutations, which may or may not later develop into cancer, birth defects or other health effects.

Genotoxic Carcinogens: Carcinogenic chemicals may alter Deoxyribonucleic acid (DNA) to cause uncontrolled cell replication. DNA is a long macromolecule that carries a genetic code through which genotypic characteristics are inherited. A chemical may interact with DNA through the genetic mechanism, altering the structure or number of the chromosomes, causing gene mutation or duplication. Such substances are known as Genotoxic carcinogens.

Teratogens: These are chemical and physical agents that can cause birth defects and mortality among new born, malformations, growth retardation and functional disorders.

Table 3.3.6 - CANCER

Chemical Name	Description
Mutagen	Causes mutations
Genotoxic carcinogen only	Alters genes, can lead to cancer
Promoter carcinogen only	Enhances cell proloferation, can lead to cancer

3.4 ENVIRONMENTAL CONCERN:

This group has three tables under it, which are as follows:

1. Atmospheric Fate
2. BOD
3. Terrestrial Fate

3.4.1 ATMOSPHERIC FATE

This section reviews how a chemical will behave if released to atmosphere. The vapor pressure will be used to determine if the chemical is likely to be in the vapor phase or adsorbed to particulate matter. The water solubility will be used to assess the likelihood of washout with rain.

Table 3.4.1 –Atmospheric Fate

Chemical Name	Description
Reactions	Various other chemicals with which it reacts
$T_{1/2}$ for 24 hrs	Half life for 24 days
$T_{1/2}$ day time	Half life during day
$T_{1/2}$ night time	Half life during night
$T_{1/2}$ Dry sedimentation	Dry remove half life
$T_{1/2}$ Wet deposition	Precipitation washout half life

3.4.2 BOD

Biological Oxygen Demand (BOD): Also called "biochemical oxygen demand", this is a standard way of describing how much oxygen dissolved in water is consumed by biological oxidation of the chemical during the stated period of time. When given in percent, the values indicate the pounds of chemical during the time stated.

Table 3.4.2 - BOD

Chemical Name	Description
BOD 5 day mg/l	Biological oxygen demand for 5day, mg/l
BOD $T_{1/2}$	Biological oxygen demand other formats

3.4.3 TERRESTRIAL FATE

This section shows how a chemical will behave if released to soil or ground water. Field studies or terrestrial model ecosystem studies are used when they provide insight into overall behavior in soil. Quite often, field or terrestrial ecosystem studies either are not available or do not give enough data to make conclusions on the terrestrial fate of a chemical. In these cases, data from sections on biodegradation, abiotic degradation, soil adsorption/mobility, volatilization from water/soil, and any appropriate monitoring data will be used to synthesize how a chemical is likely to behave if released to soil.

Soil Adsorption/Mobility: For many chemicals experimental soil or sediment partition coefficients are available. These values are measured by determining the concentration in both the solution (water) and solid (soil or sediment) phases after shaking for about 24 to 48 hours and using different initial concentrations.

Table 3.4.3 – TERRESTRIAL FATE

Chemical Name	Description
Aerobic Biodegradation	Biodegradation in the presence of air
Anaerobic Biodegradation	Biodegradation in the absence of air
Soil adsorption/Mobility	Conc in both solution / solid after shaking for 24 to 48hrs

3.5 SAFETY AND ENVIRONMENTAL REGULATIONS

This group is divided into three tables:

1. Clean Air Act
2. DOT (U.S Department of Transportation)
3. Resource Conservation and Recovery Act (RCRA, Waste Management)

3.5.1 CLEAN AIR ACT

Table 3.5.1 has three fields

HAP stands for Hazardous Air Pollutant

EHS stands for Extremely Hazardous Substance

HRP stands for High Risk Pollutants

Table 3.5.1- CLEAN AIR ACT

Chemical Name	Description
Criteria Pollutants	Co, SO, NO_x etc
HAP	Hazardous air pollutants
EHS	Extremely hazardous substances
HRP	High risk pollutant

3.5.2 DOT

This is a Hazard identification number that is assigned to the substance by the US Department of Transportation (DOT). This identification number identifies substances regulated by DOT and must appear on shipping documents, the exterior of packages and on specified containers.

FIFRA stands for Federal Insecticide Fungicide Rodenticide Act. Table 3.5.2 has following fields

Table 3.5.2 – DOT

Chemical Name	Description
Water pollutant	If it pollutes water
Hazard class	Rating given to every chemical
Registration pesticide FIFRA	If it can be used as pesticide or insecticide

Table 3.5.3 – Resource Conservation and Recovery Act (RCRA, Waste Management)

Chemical Name	Description
Flammability	Flammability of the chemical
Reactivity	Reactivity of the chemical
Primary valence	Valency of chemical
Ion coordination	Ion coordination of chemical
Corrosivity	Corrosivity of the chemical
Toxicity	Toxicity of the chemical

3.6 EXPOSURE CRITERIA:

This group is divided into three tables:

1. Worker Exposure Criteria (acute- STEL), Short-Term Exposure Limit
2. Worker Exposure Criteria (acute-CEIL), Ceiling Exposure Limit
3. Worker Exposure Criteria (chronic-TWA), Time-Weighted Average Exposure Limit

Exposure Limits:

These are legally enforceable airborne permissible exposure limits (PELs) from OSHA, and recommended airborne exposure limit guidelines called recommended exposure limits (RELs) from National Institute of Ocupational Safety and Health (NIOSH) or called threshold limit values (TLVs) from the American Conference of Government Industrial Hygenists (ACGIH) or called Work Place Environmental Exposure Levels (WEEL) from the American Industrial Hygenists Association.

There are 3 kinds of **TLVs**. A time weighted average TLV (TLV-TWA) is a concentration in breathing air for a normal 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be exposed, day after day without adverse effects. A ceiling TLV value (TLV-C) is the concentration that should not be exceeded during any part of the working exposure. If instantaneous monitoring is not feasible, then the (TLV-C) can be assessed by sampling over 15-minute periods except for those substances that may cause immediate irritation when exposures are short. A short-term exposure limit (TLV-STEL) is a 15-minute TWA exposure concentration in air, which should not be exceeded at any time in a workday, even if the 8-hour TWA is within the TLV-TWA. Exposures above the 8 hour TLV-TWA up to the TLV-STEL should not last more than 15 minutes and should not occur more than 4 times in a work day. This should be atleast 60 minutes between successive exposures in the range.

There are 3 kinds of **PELs.** A time weighted average PEL (PEL-TWA) is a concentration that must not be exceeded during any 8-hour shift or 40-hour workweek. An OSHA ceiling concentration must not be exceeded during any part of the workday; if instantaneous monitoring is not feasible, the ceiling must be assessed as a 15 minute TWA exposure. A short-term exposure limit PEL (PEL_STEL) is defined similarly to a TLV STEL.

All **WEELS** are expressed as either time weighted average (TWA) concentrations or ceiling values**,** however, different time periods are specified depending on the properties of the agent. An 8-hour TWA indicates a time weighted average concentration for a normal 8-hour workday and a 40-hour workweek. A ceiling limit should not be exceeded at any time during the

workday. A short-term TWA is a time weighted average concentration of shorter duration (such as 15 minutes) established to limit excursion levels.

All the above-discussed values for a chemical are tabulated which can be seen from tables 3.6.1, 3.6.2 and 3.6.3.

Table 3.6.1 - WORKER EXPOSURE CRITERIA (ACUTE-STEL) mg/m^3

Chemical Name	Description
TLV	Threshold limit value
WEEL	Workplace environmental exposure level

Table 3.6.2 - WORKER EXPOSURE CRITERIA (ACUTE-CEIL) mg/m^3

Chemical Name	Description
PEL	Permissible exposure limit
TLV	Threshold limit value
WEEL	Workplace environmental exposure level

Table 3.6.3 - WORKER EXPOSURE CRITERIA (CHRONIC-TWA) mg/m^3

Chemical Name	Description
TLV	Threshold limit value
WEEL	Workplace environmental exposure level
PEL (respirable)	Permissible exposure limit

CHAPTER 4: IMPLEMENTATION

Microsoft Access is a powerful, yet intuitively easy-to-use, database management system, designed to run in the Windows environment. Its primary purpose is to provide an efficient system for storing large amounts of data - a system in which any one piece of information can be quickly located. Additionally, relationships between data can be established allowing one to additionally retrieve the related information of any one piece of information requested. Access includes many features for manipulating the information that is stored. Using the program, one can

- Sort and rearrange information in various ways
- Extract and work with subsets of the information.

The Database contains a main table and several sub tables under it. These are linked with the help of Primary keys and foreign keys. In HMD the chemical name was made the primary key since most chemicals have a unique name. The relationships diagram can be seen from appendix 26 at the end.

4.1 THE QUERY ENGINE:

A Query engine was developed to assist the user in creating and retrieving data for HMD. Visual Basic was selected to be the front end for accessing data from HMD. It is flexible and compatible with any kind of database. The Graphical User Interface (GUI) an inherent feature of Visual Basic, uses illustrations for text, which enable users to interact with the application.

TABLES SHOWING THE MAIN MENUS THEIR CORRESPONDING FIELDS AND SUB FIELDS:

Table 4.1: MAIN FORM WITH MENUS

File	Tools	Help
Record Maintenance	Search	Help file
Exit	Query	

Table 4.2: RECORD MAINTENANCE

Physical Properties	Chemical Properties	Health Hazards	Safety Regulations	Environmental Concern	Exposure Criteria
Materials	Reactivity /Instability	Aquatic Fate	Clean Air Act	Atmospheric Fate	Worker exposure criteria (STEL)
Percent Dissociated	Flammability /combustibility	Acute symptoms	DOT	Biological Oxygen demand (BOD)	Worker exposure criteria (CEIL)
Water Solubility	Extinguishing Agents	Chronic symptoms	Characteristic RCRA	Terrestrial Fate	Worker exposure criteria (TWA)
	Corrosivity	Allergen			
		Oral Acute Aquatic Tox			
		Cancer			

Table 4.3: TOOLS

Search	Query
By CAS #	On Molecular weight
By Chemical Name	On Boiling Point
By Molecular Formula	On Melting Point
	On Vapor Pressure (VP)
	On classification
	Print

Help: helps the user in using the database

Exit: exits the program

The first screen of HMD Query Engine is shown in Figure 4.1. There are two buttons 1."ENTER" button, which is to enter into the database, and the "EXIT" Button, which is used to end the program.

On clicking the “ENTER” button a new form is opened as shown in Figure 4.2

It asks the user to enter a password. This feature is included for security reasons; only authorized users can access the database

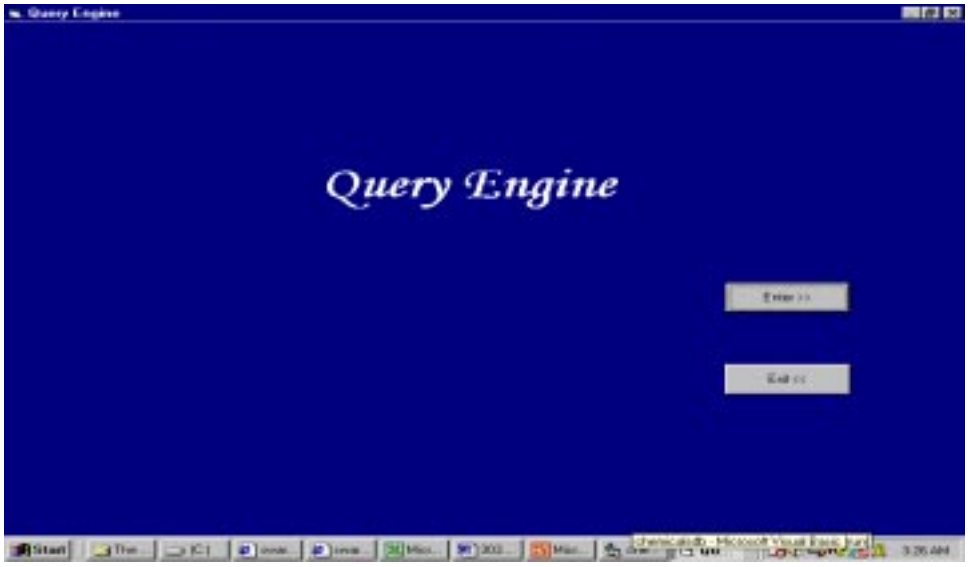

Figure 4.1: HMD Query Engine

Figure 4.2: Password Form

There is a “LOGIN” button, which should be clicked after typing in the password. If an Invalid Password is entered then a message saying “Invalid Password” appears on the screen as shown in

Figure 4.3. If correct password is typed, then the form named home is displayed. The menu items of the home form are

- File
- Tools
- Help

Figure 4.3: Screen showing Invalid Password

When the mouse is placed on top of File, it displays the following pull down menu Figure 4.4

1. Record Maintenance
2. Exit

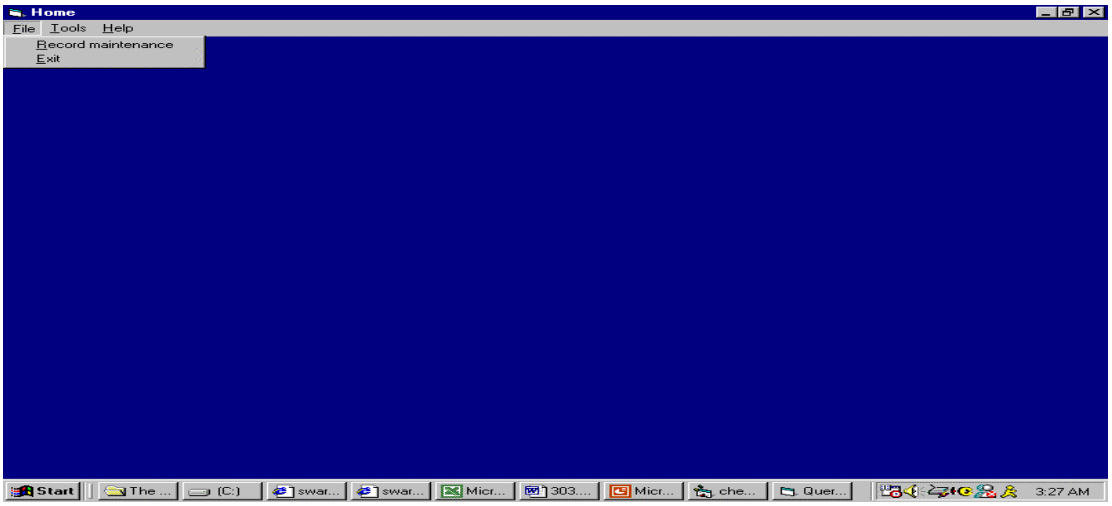

Figure 4.4: Home form with the pull down menu for the file displayed

On the home form when user clicks on the Record Maintenance of the file pull down menu option, another pull down menu, showing the following properties appears Figure 4.5.

a) Physical properties
b) Chemical Properties
c) Health and Ecological Hazards
d) Exposure Criteria
e) Safety and Environmental Regulations and
f) Environmental concern

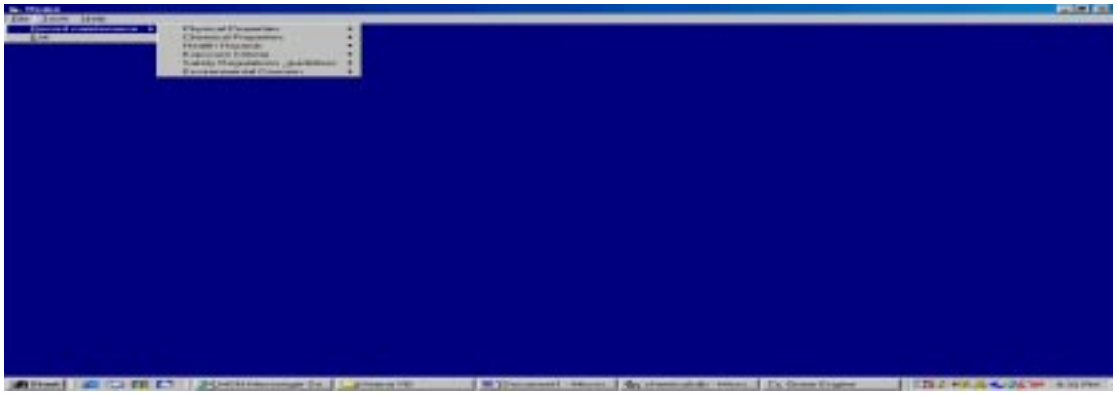

Figure 4.5: Showing the pull down menu of Record Maintenance

Clicking on the physical properties leads to another pull down menu, which has the following:

1) Materials
2) Water solubility and
3) Percent Dissociated tables as shown in the Figure 4.6 below

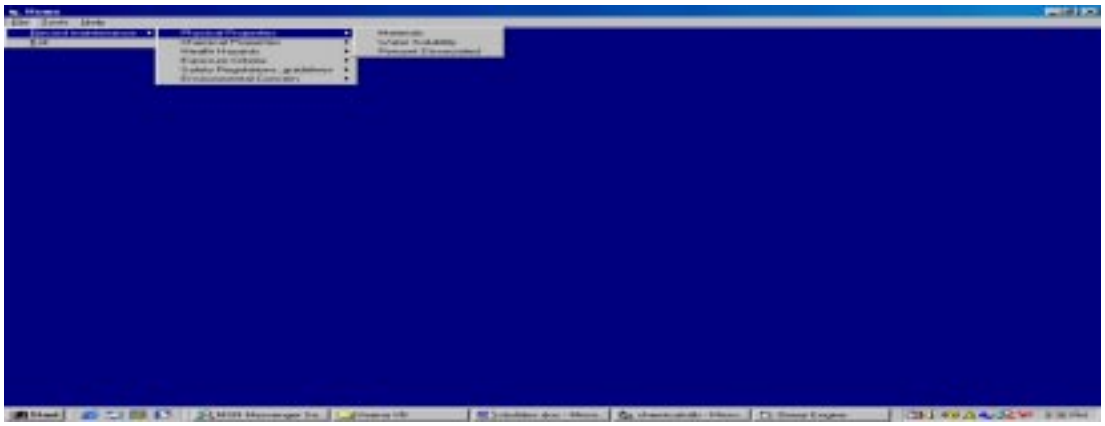

Figure 4.6: Listing the items in pull down menu for Physical Properties

Clicking on the chemical properties leads to another pull down menu of the following items:

1) Flammability/Combustibility
2) Extinguishing Agents
3) Reactivity/ Instability and
4) Corrosivity

as shown in the Figure 4.7 below

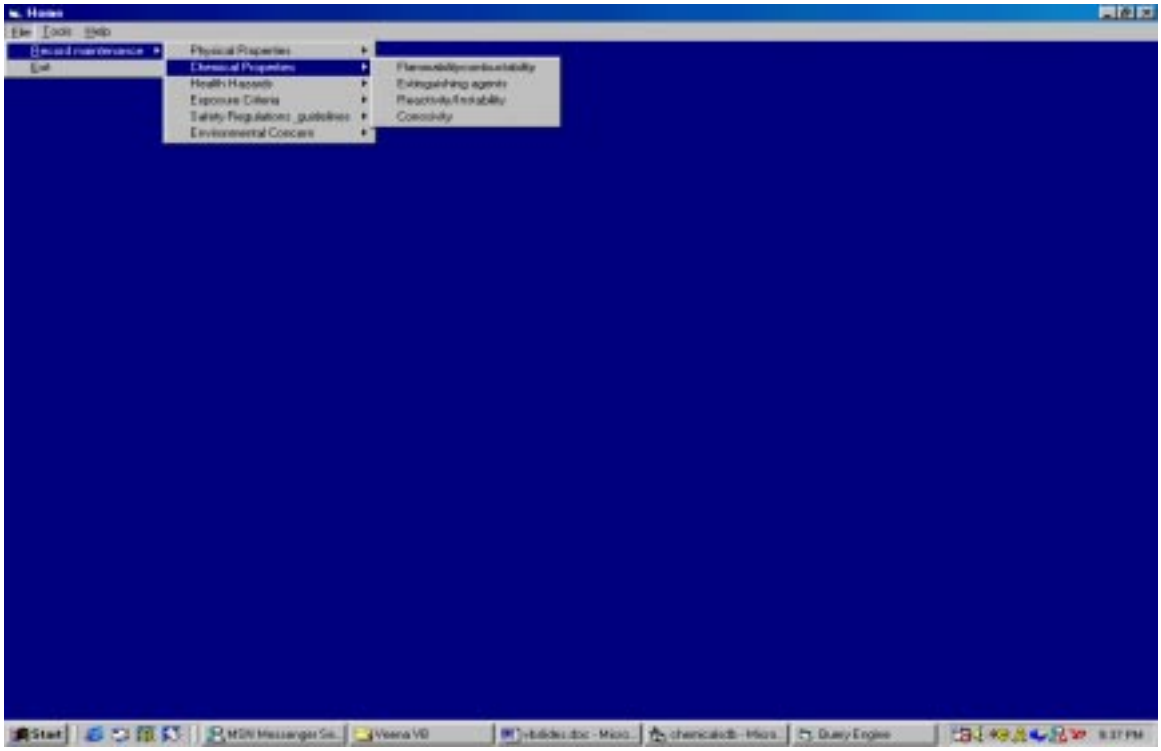

Figure 4.7: Showing the list of items in the pull down menu for Chemical Properties

Clicking on the Health Hazards leads to another pull down menu of the following items:

1) Cancer
2) Aquatic Fate
3) Acute Symptoms and Toxicity
4) Chronic Symptoms and Toxicity
5) Allergenicity and
6) Oral acute aquatic Toxicity

as shown in the Figure 4.8 below

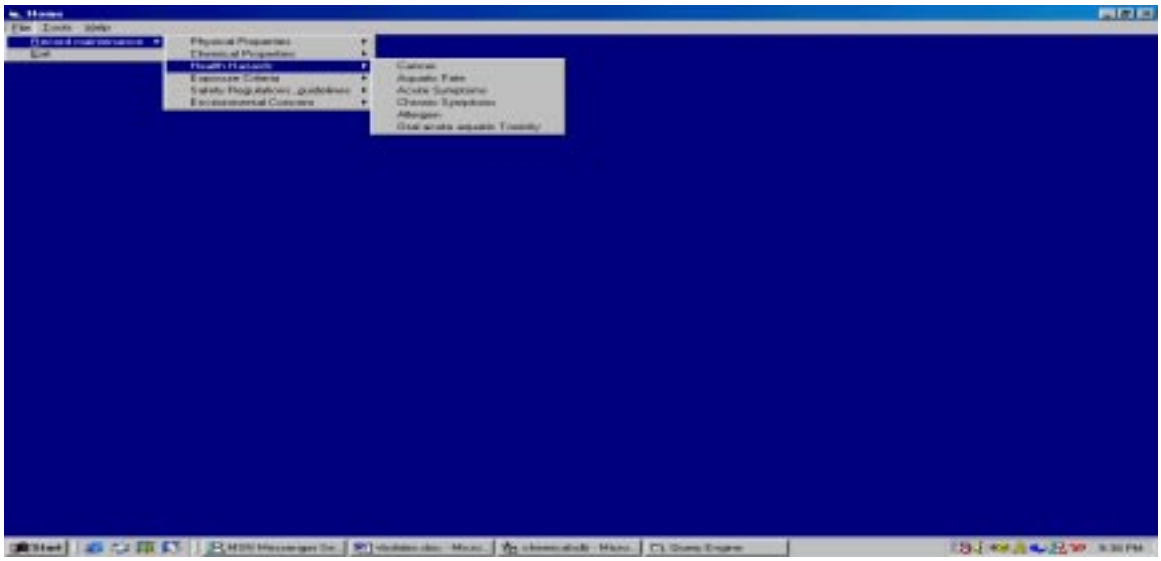

Figure 4.8: showing the pull down menu for Health Hazards

Clicking on the Safety Regulations and guidelines on the Record Maintenance leads to another pull down menu of the following items:

1) DOT
2) Clean Air Act and
3) RCRA

which are shown in the Figure 4.9 below

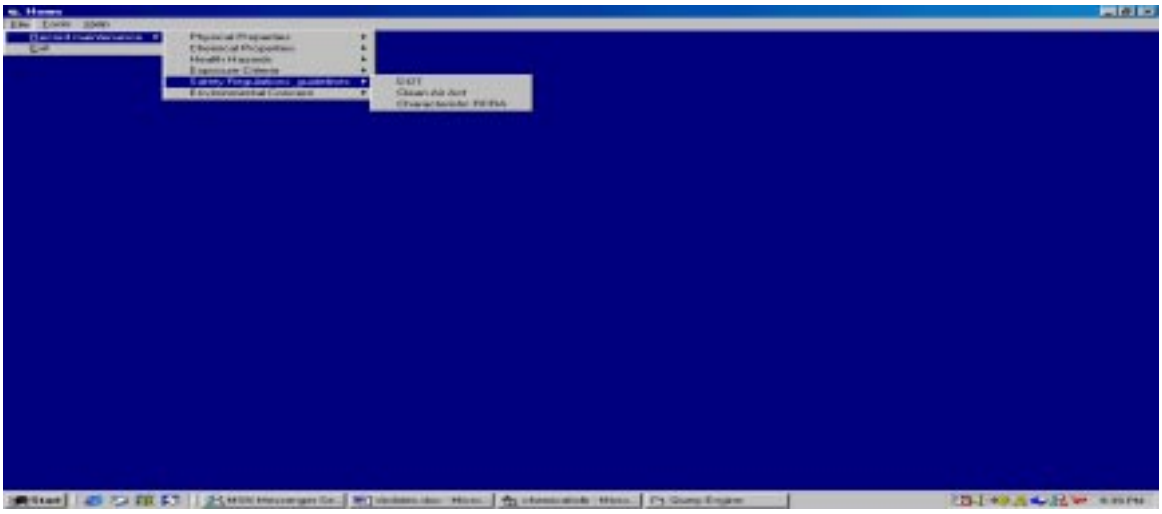

Figure 4.9: Showing the pull down menu for Safety and Environmental Regulations

Clicking on the Exposure Criteria leads to another pull down menu of the following items:

1) Worker Exposure Criteria (acute-STEL)
2) Worker Exposure Criteria (acute-CEIL) and
3) Worker Exposure Criteria (chronic- TWA)

as shown in the Figure 4.10 below

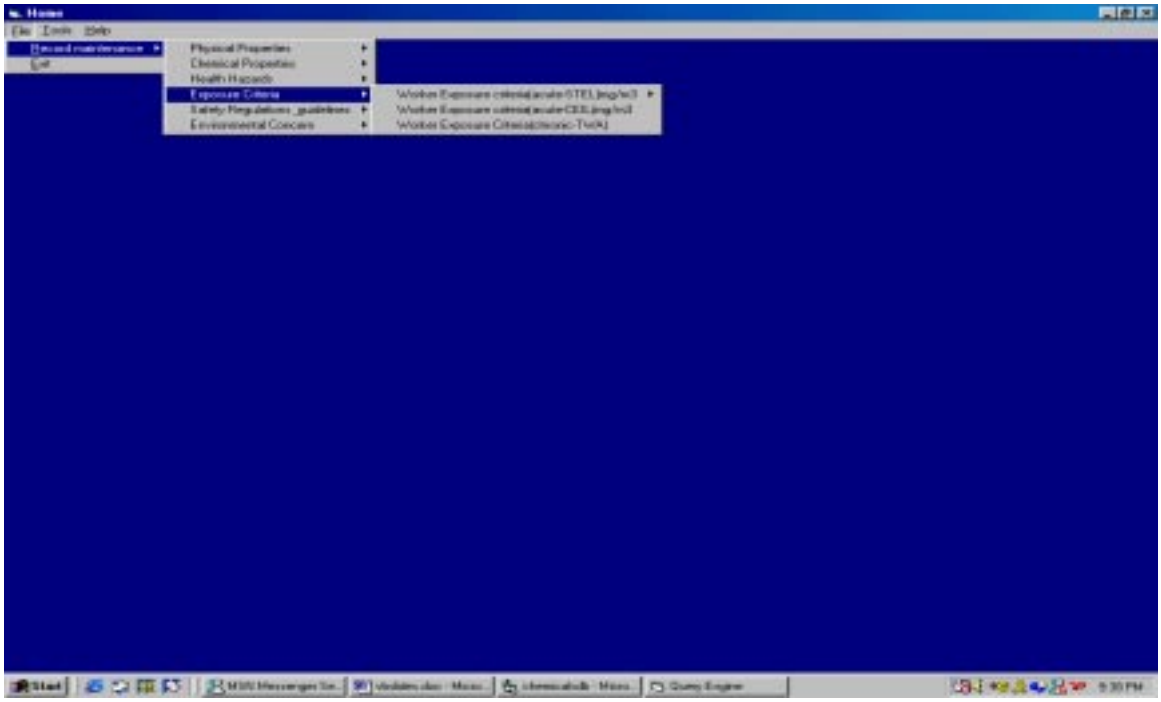

Figure 4.10: Showing the pull down menu for Exposure Criteria

Clicking on the Environmental Concern on the Record Maintenance menu selection leads to another pull down menu of the following:

1) Toxicity
2) Atmospheric Fate
3) Terrestrial Fate and
4) BOD

which is shown in the Figure 4.11 below

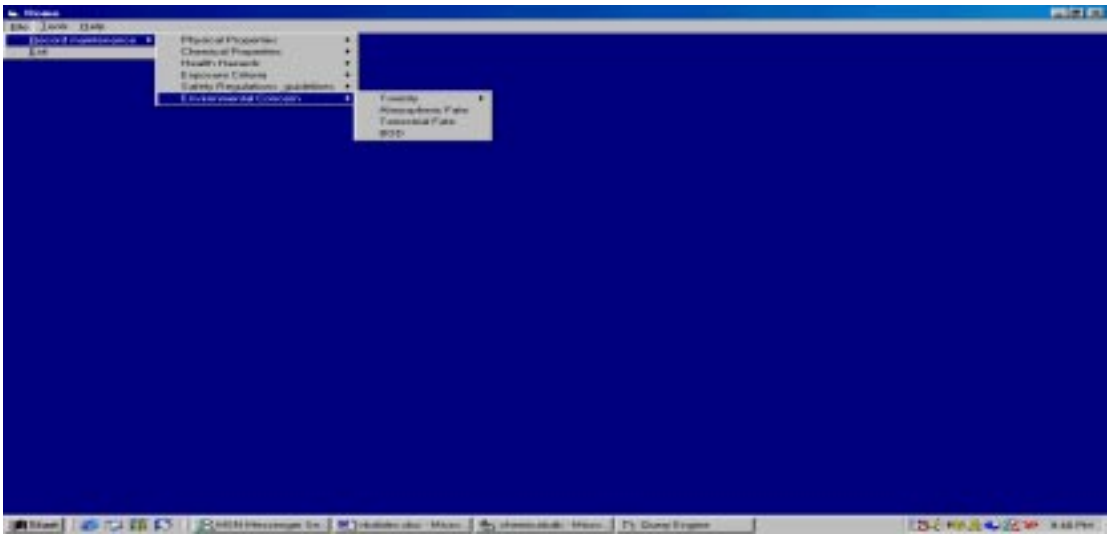

Figure 4.11: Showing the pull down menu for Environmental Concern

When the user clicks on the menu item Search, of the Tools, a form is displayed with the following three options

a) By CAS#
b) By Chemical Name
c) By Molecular Formula as shown in Figure 4.12 below

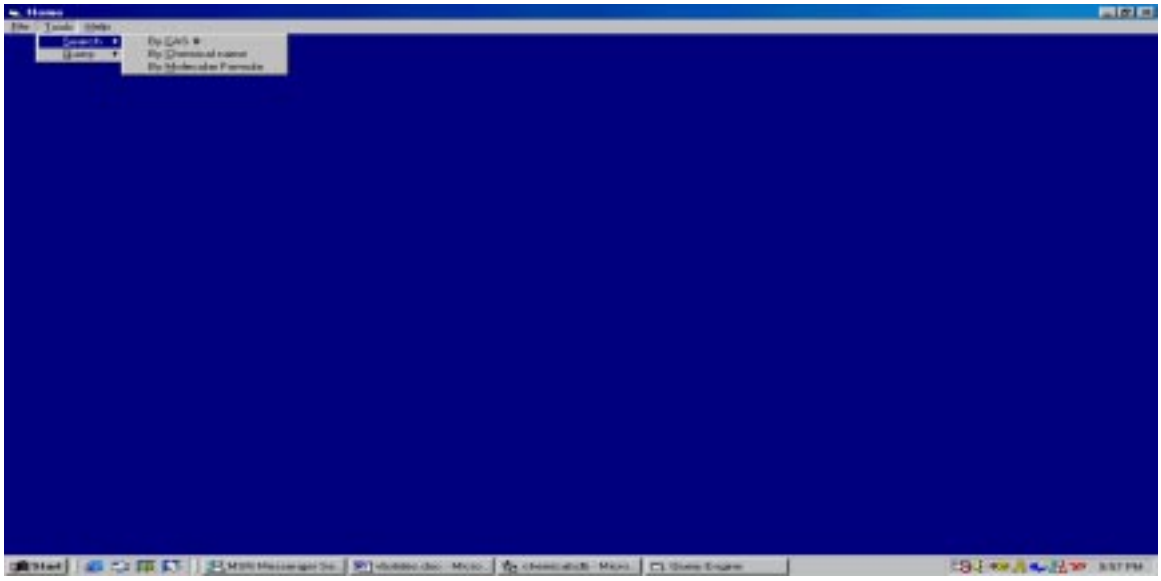

Figure 4.12: Showing the pull down menu for Search

When the user clicks on the menu item Query of the Tools, the form as shown in Figure 4.13 below is displayed with the following seven options

d) On Molecular Weight
e) On Boiling point
f) On Melting point
g) Molecular formula
h) Save query as and
i) Print

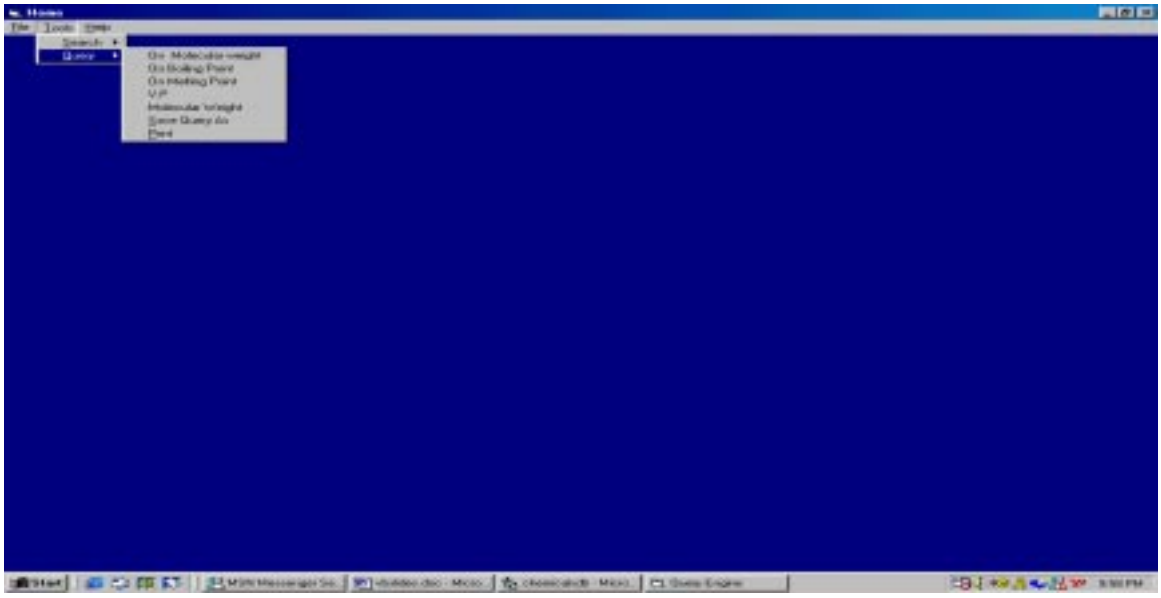

Figure 4.13: Showing the pull down menu for query

HELP: The Help option in the main menu helps the user in using the frontend for the Hazardous Materials Database effectively. It guides the user by providing information about all the forms and how to use them.

CHAPTER 5: APPLICATION

5.1 SHIP DISPOSAL APPLICATION:

The database can be applied to handling and disposal of many kinds of retired objects. The object may be as simple thing as a pen or as a complex as a ship. During dismantling of a ship many hazardous substances are released. These are of major concern to workers, communities and the environment, so they should be dealt with carefully during disposal. Chemical substances like asbestos, cadmium, lead, and tributyl tin are released. To illustrate how we can utilize the Hazardous Material Database (HMD) we will use as an example a small sample of the above-mentioned chemicals, and apply the HMD to it.

Physical Properties:

We can get the Physical properties of the chemical from the Materials Table, Percent Dissociated table and the Water Solubility Table. From the HMD database Molecular Weight of Cadmium is found to be 112.4. Its Melting Point 321 deg C and Boiling Point is 767 deg C. Vapor pressure is 0.12mg/m3 at 25 deg C.

When the user clicks on the menu item Materials of the Physical Properties pull down menu the form shown in Figure 5.1 is displayed. All the tables in the database can be accessed through the front end. The user can add, update, delete and refresh the records in the database.

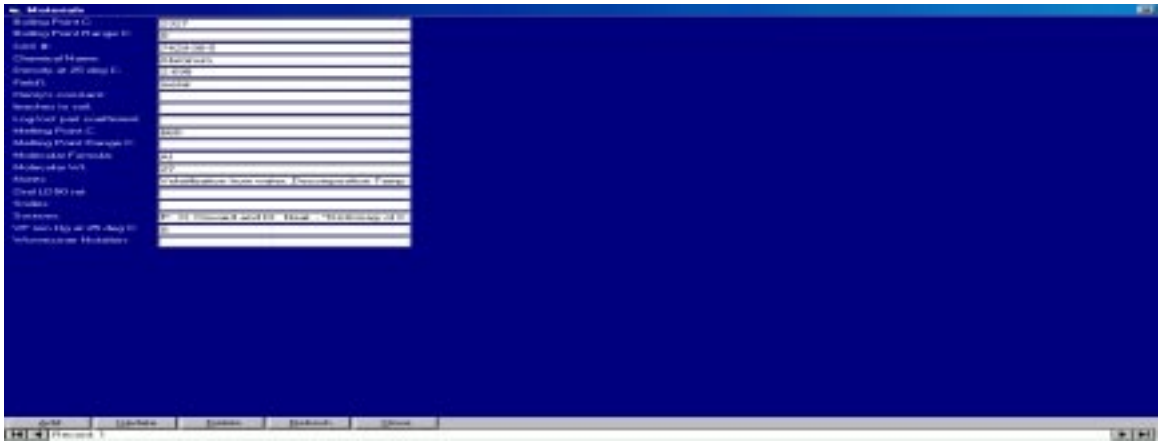

Figure 5.1: Physical Properties

When the user clicks on the menu item Water Solubility of the Physical Properties, the form shown in Figure 5.2 is displayed

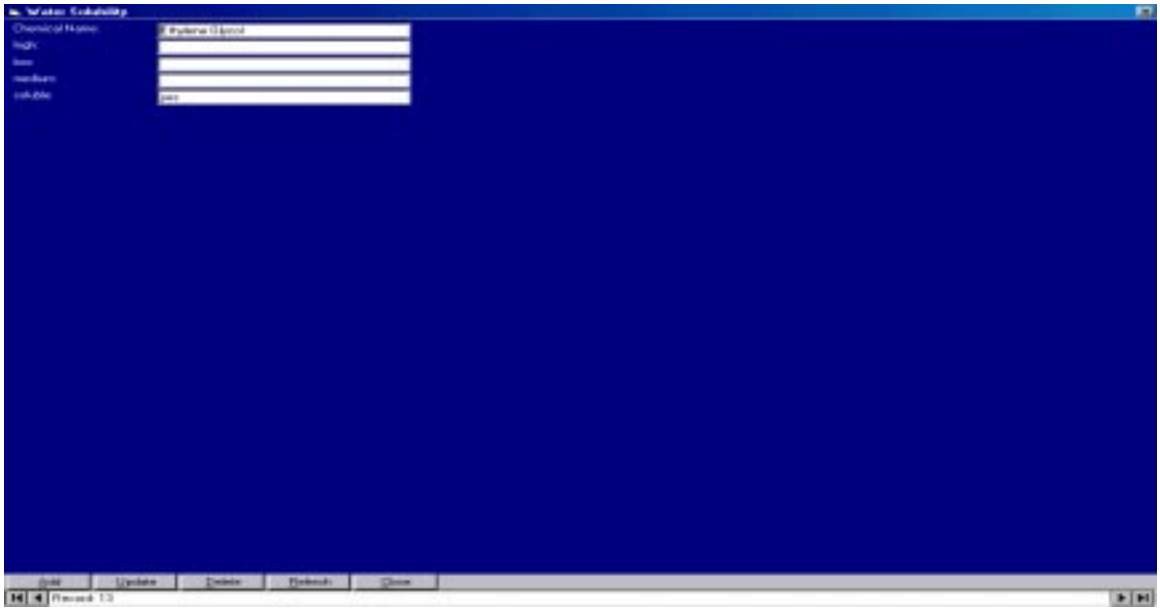

Figure 5.2: Water Solubility

When the user clicks on the menu item Percent Dissociated of the Physical Properties, the form as shown in Figure 5.3 below is displayed

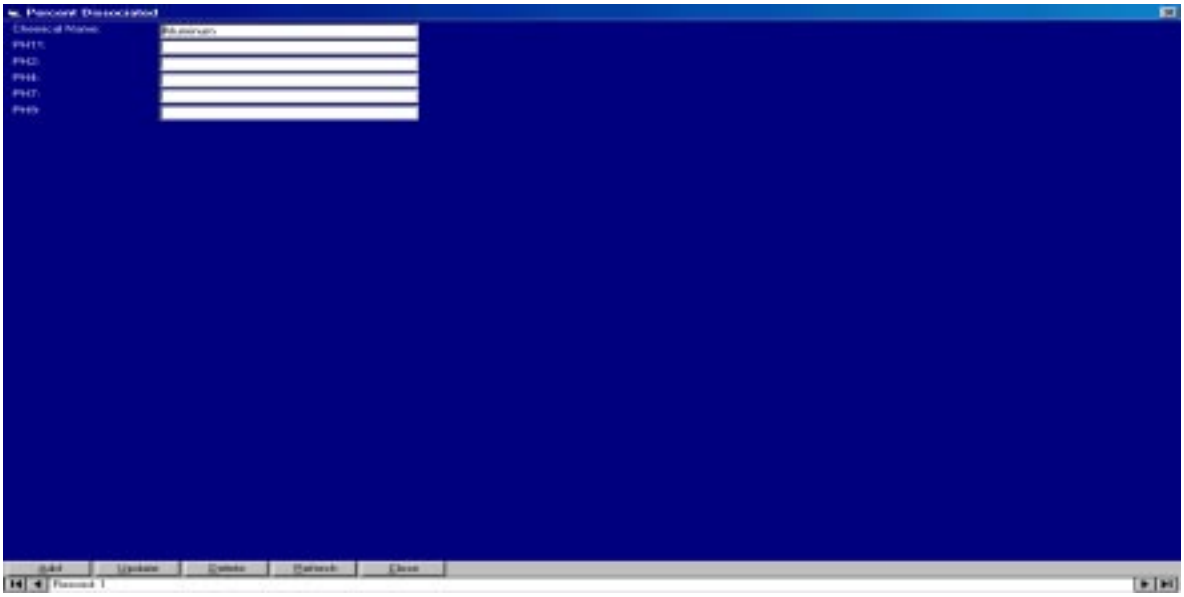

Figure 5.3: Percent Dissociated Table of Physical Properties

Chemical properties: These can be obtained from the Flammability/Combustibility, Extinguishing Agents, Reactivity/Instability and Corrosivity Tables. Since it is a metal, cadmium doesn't have a flash point, auto ignition temperature and upper and lower exposure limits. It is not corrosive.

When the user clicks on the menu item Flammability/Combustibility of the Physical Properties, the form shown in Figure 5.4 is displayed

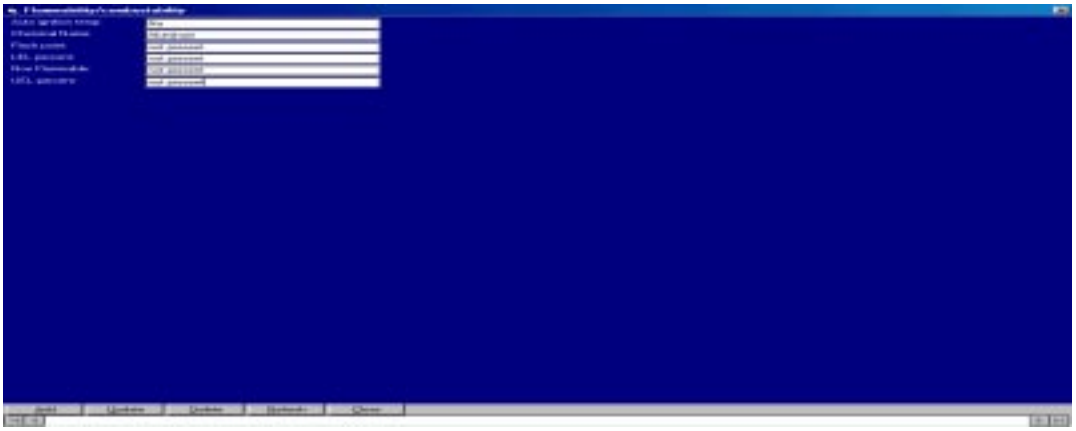

Figure 5.4: showing Flammability/Combustibility Table

When the user clicks on the menu item Extinguishing Agents of the Chemical Properties, a form as shown in Figure 5.5 below is displayed

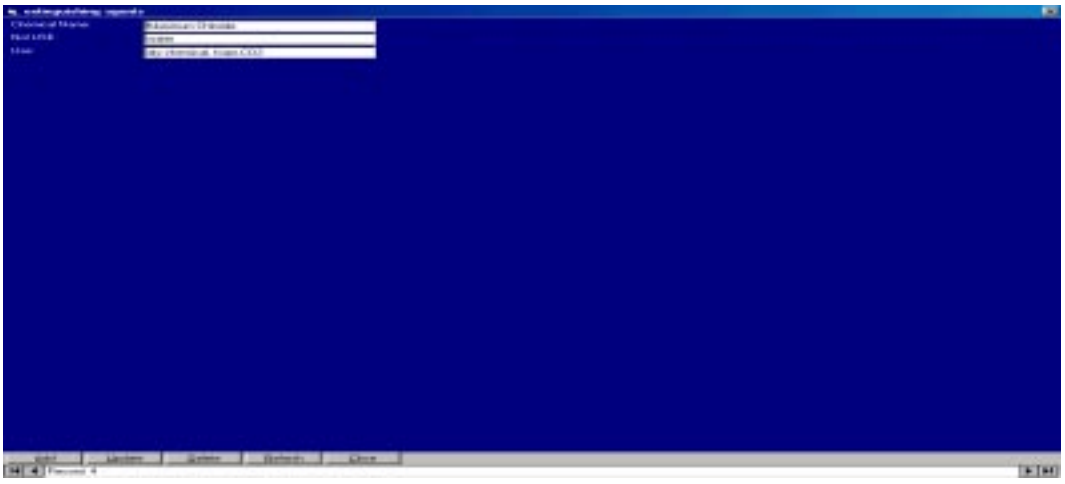

Figure 5.5: Extinguishing Agents Table of Chemical Properties

When the user clicks on the menu item Reactivity/Instability of the Chemical Properties, form as shown in Figure 5.6 below is displayed

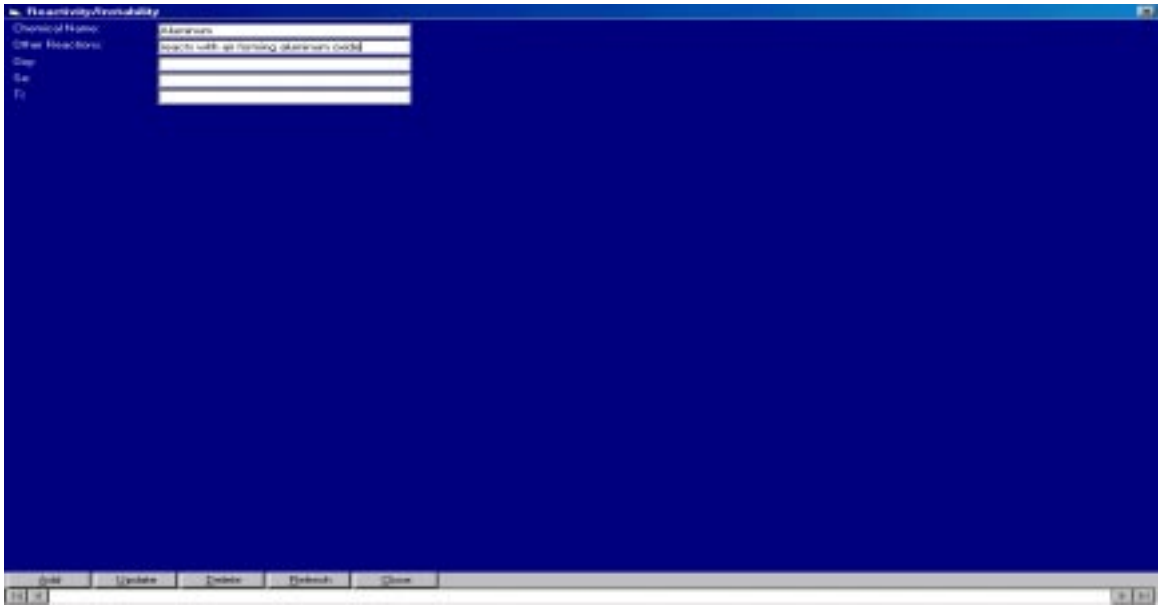

Figure 5.6: Reactivity/Instability Table of Chemical properties

When the user clicks on the menu item Corrosivity of the Chemical Properties, the form as shown in Figure 5.7 below is displayed

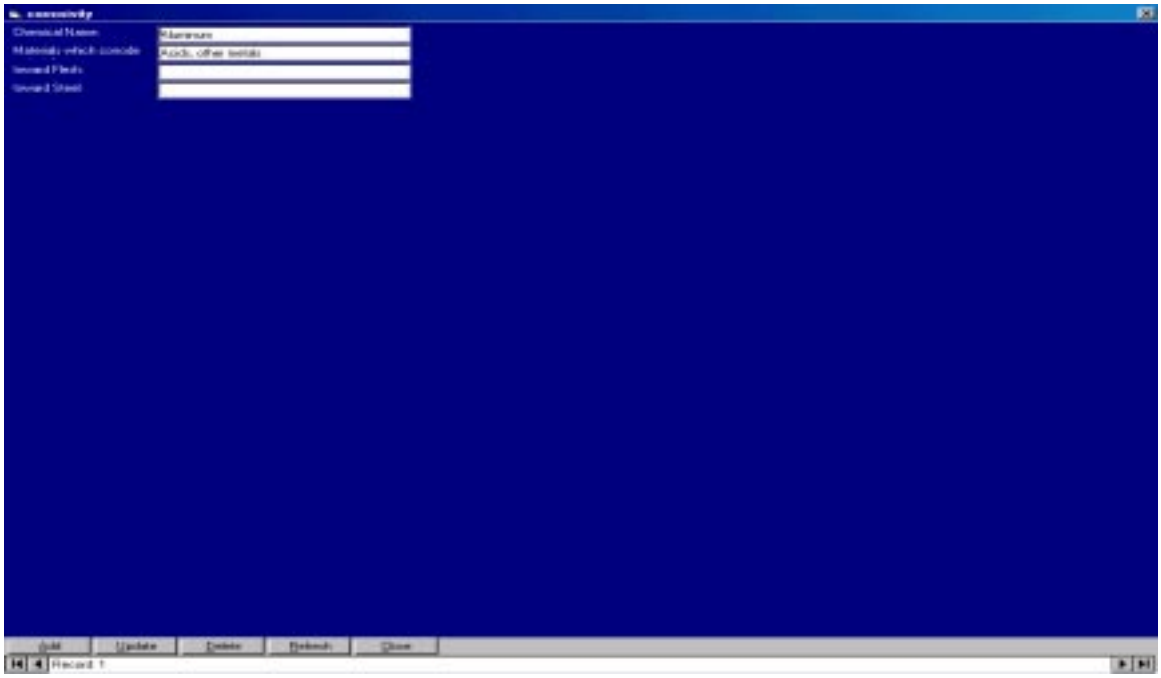

Figure 5.7: Corrosivity Table of chemical Properties

Health and Ecological Hazards: These can be obtained from Cancer, Aquatic Fate, Acute Symptoms, Chronic Symptoms, Allergen and Oral Acute Aquatic Toxicity tables. Cadmium is genotoxic, has acute symptoms from both inhalation and ingestion, has chronic symptoms both from inhalation and ingestion, and damages the liver badly.

When the user clicks on the menu item Cancer of the Health and Ecological Hazards, the form as shown in Figure 5.8 below is displayed

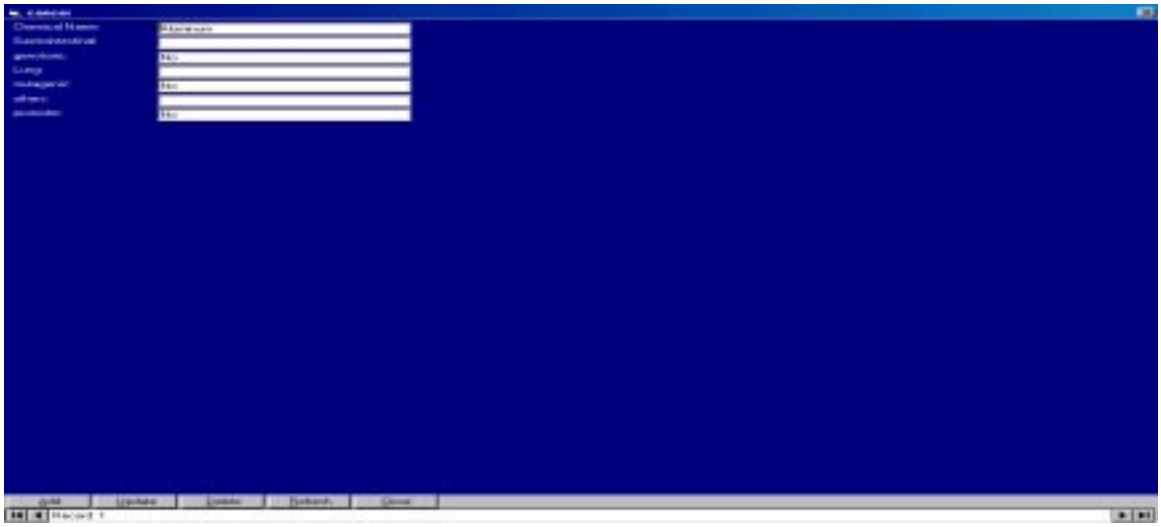

Figure 5.8: Cancer Table of the Health and Ecological Hazards

When the user clicks on the menu item Aquatic Fate of the Health and Ecological Hazards, the form below in Figure 5.9 is displayed

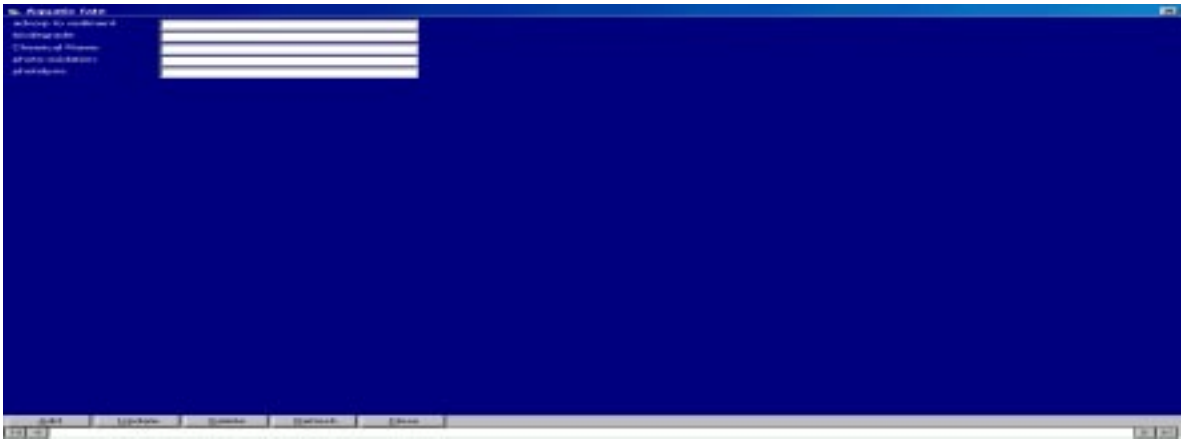

Figure 5.9: Showing the Aquatic Fate Table

When the user clicks on the menu item acute symptoms of the Health and Ecological Hazards, the form as shown in Figure 5.10 is displayed

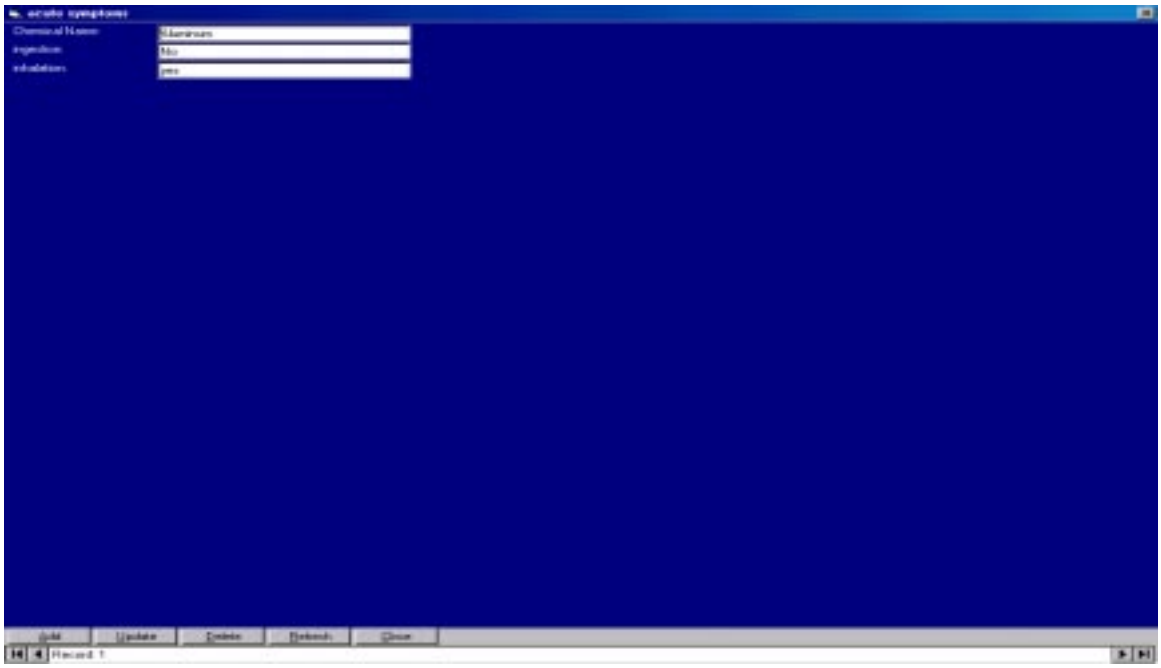

Figure 5.10: Acute Symptoms Table of Health and Ecological Hazards

When the user clicks on the menu item chronic symptoms of the Health and Ecological Hazards, form as shown in Figure 5.11 below is displayed

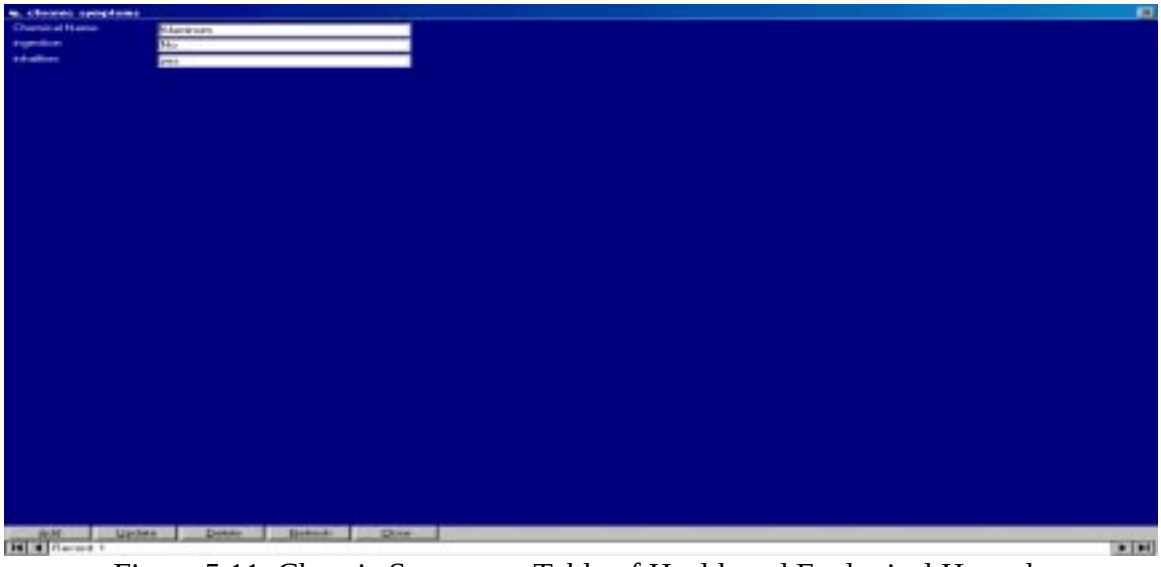

Figure 5.11: Chronic Symptoms Table of Health and Ecological Hazards

When the user clicks on the menu item Allergen of the Health and Ecological Hazards, the form as shown in Figure 5.12 below is displayed

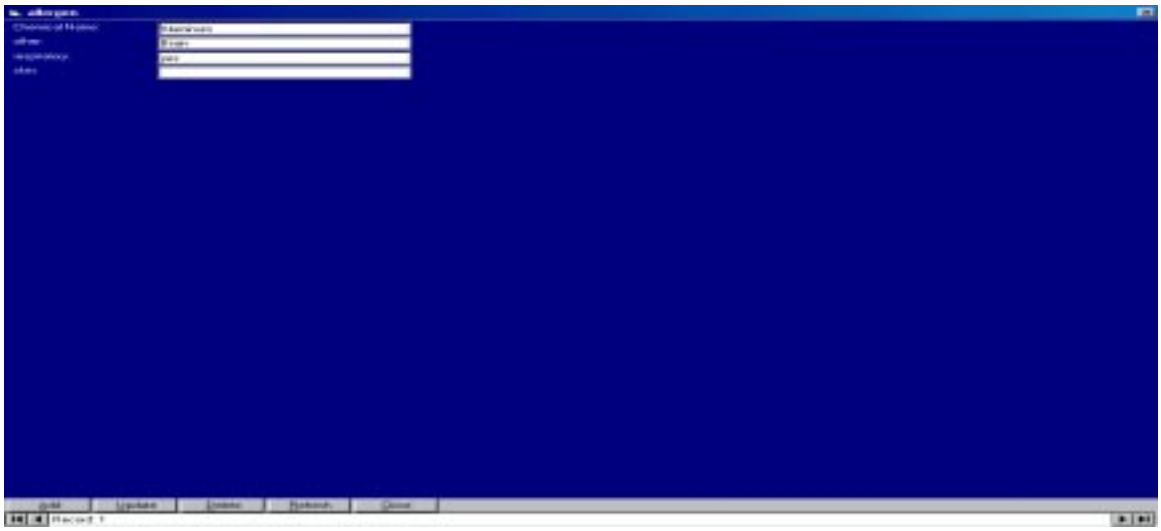

Figure 5.12: Allergen Table of Health and Ecological Hazards

When the user clicks on the menu item Oral Acute Aquatic Toxicity of the Health and Ecological Hazards, the form below in Figure 5.13 is displayed

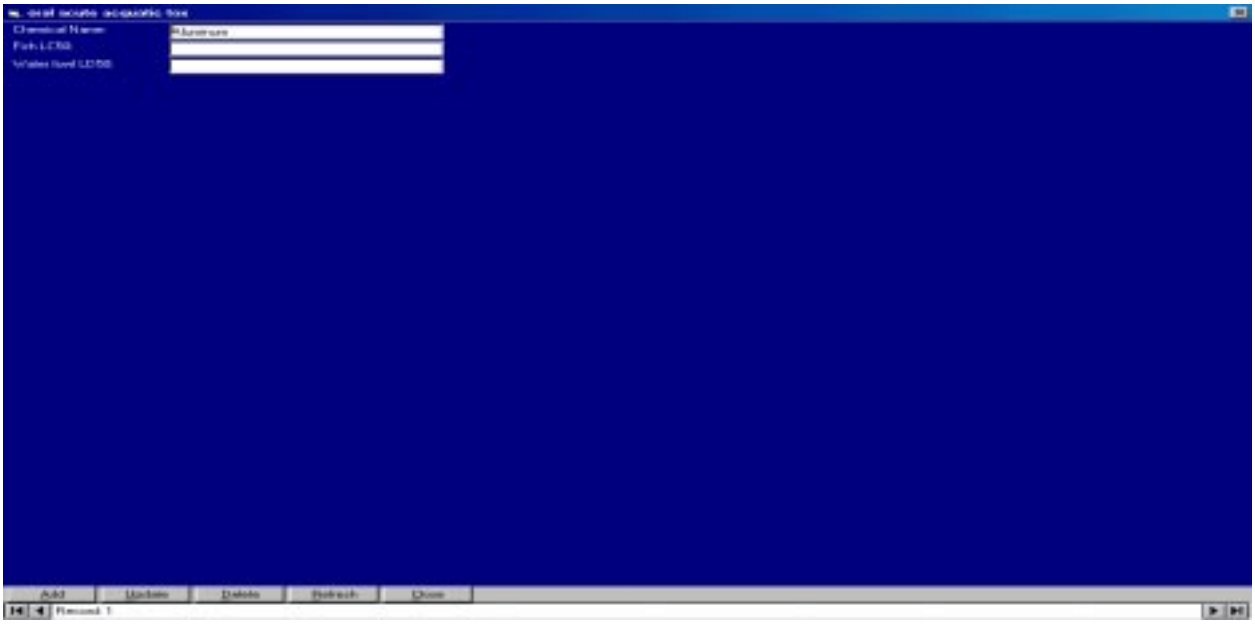

Figure 5.13 - Oral Acute Aquatic Toxicity Table

Safety and Environmental Regulations:

These can be obtained from Clean Air Act, Clean Water Act, RCRA, and DOT tables.

When the user clicks on the menu item Clean Air Act of the Safety and Environmental Regulations, the form below in Figure 5.14 is displayed

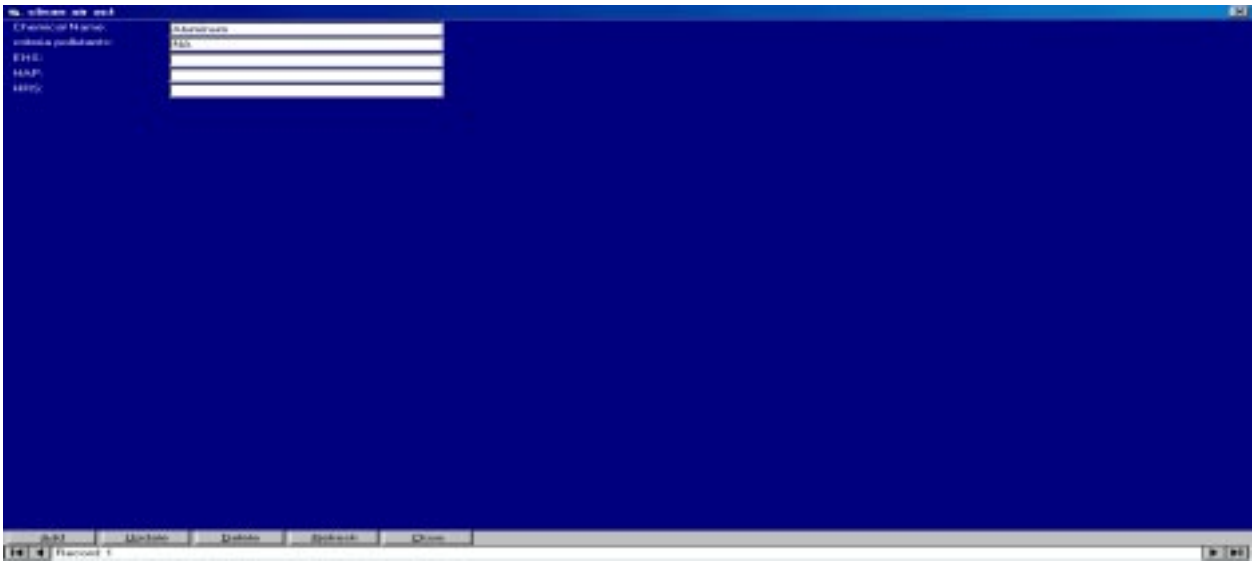

Figure 5.14: Showing the Clean Air Act Table

When the user clicks on the menu item RCRA table of the Safety and Environmental Regulations, the form below in Figure 5.15 is displayed

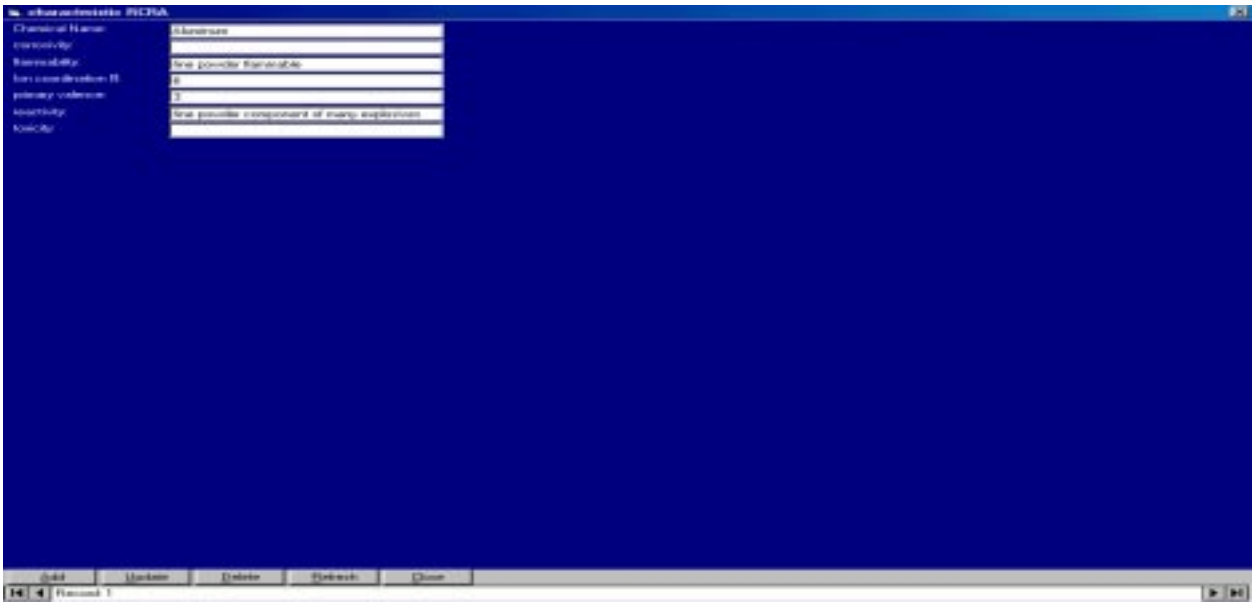

Figure 5.15: Showing the RCRA Table

When the user clicks on the menu item DOT of the Safety and Environmental Regulations, the form as shown in Figure 5.16 below is displayed

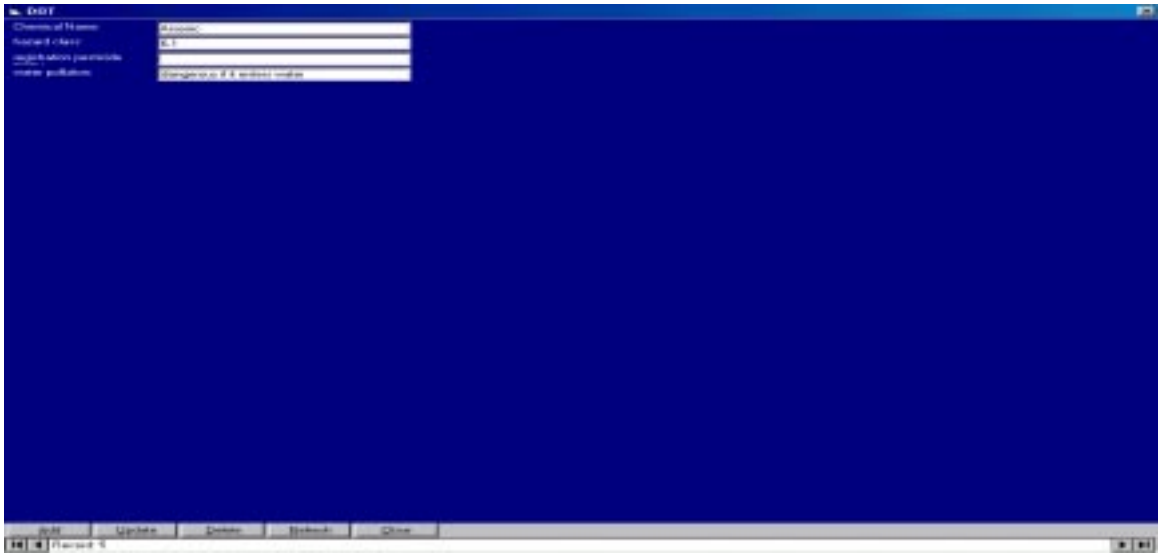

Figure 5.16: DOT Table of Safety and Environmental Regulations

Environmental Concern: These can be obtained from Atmospheric Fate, Terrestrial Fate and BOD tables.

When the user clicks on the menu item Terrestrial Fate of the Environmental Concern, the form as shown in Figure 5.17 below is displayed

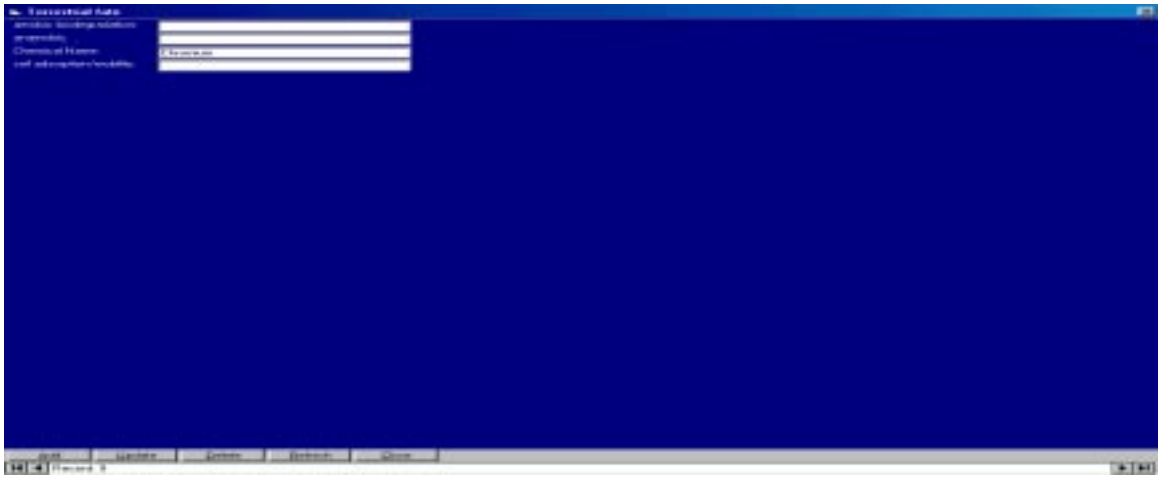

Figure 5.17: Terrestrial Fate Table

When the user clicks on the menu item Atmospheric Fate of the Environmental Concern menu selection the form as shown in Figure 5.18 below is displayed

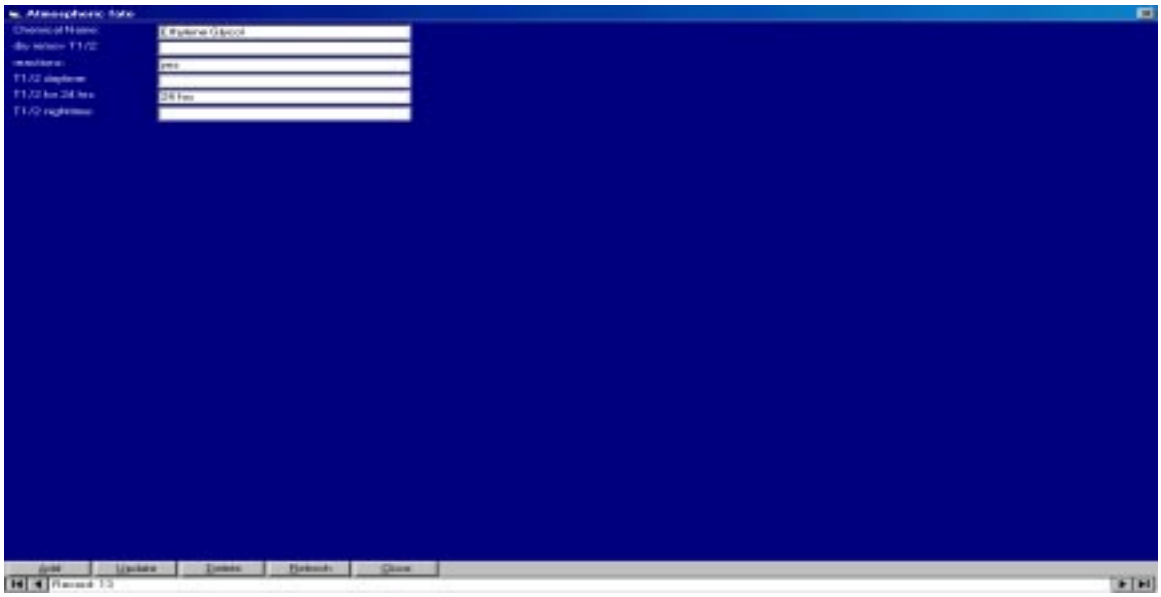

Figure 5.18: Atmospheric Fate Table

When the user clicks on the menu item BOD of the Environmental Concern pull, the form below in Figure 5.19 is displayed

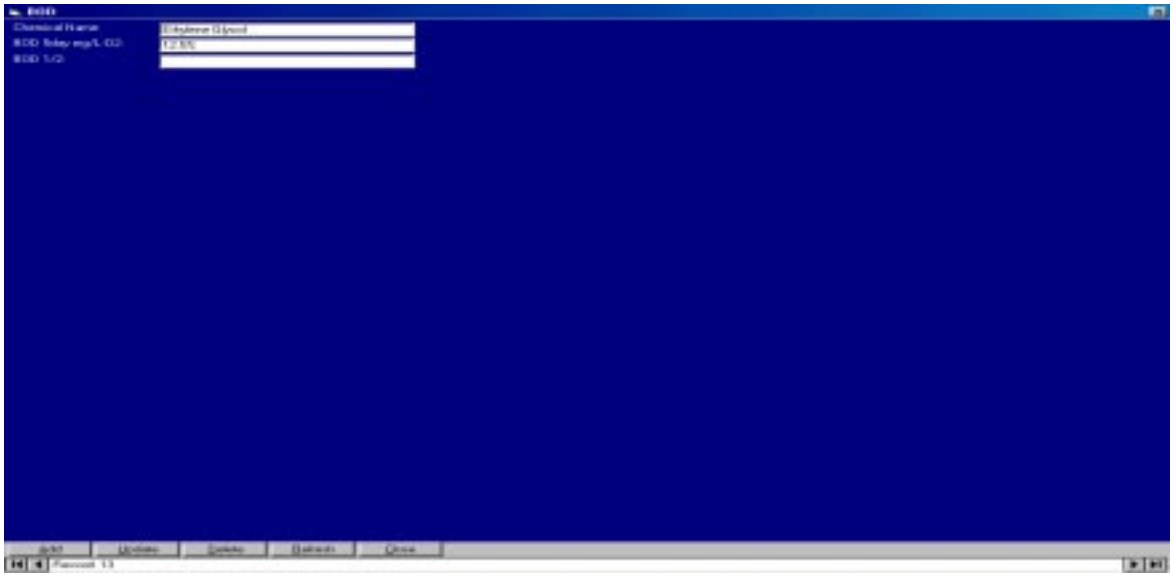

Figure 5.19: BOD Table

Exposure Criteria: These can be obtained from Worker Exposure Criteria (acute- STEL), Worker Exposure Criteria (acute-CEIL) and Worker Exposure Criteria (chronic-TWA) tables. Cadmium has a TWA TLV of 0.05 mg/m^3 and TWA PEL of 0.3mg/m^3.

When the user clicks on the menu item Worker Exposure Criteria (acute-STEL) of the Exposure Criteria, the form as shown in Figure 5.20 below is displayed

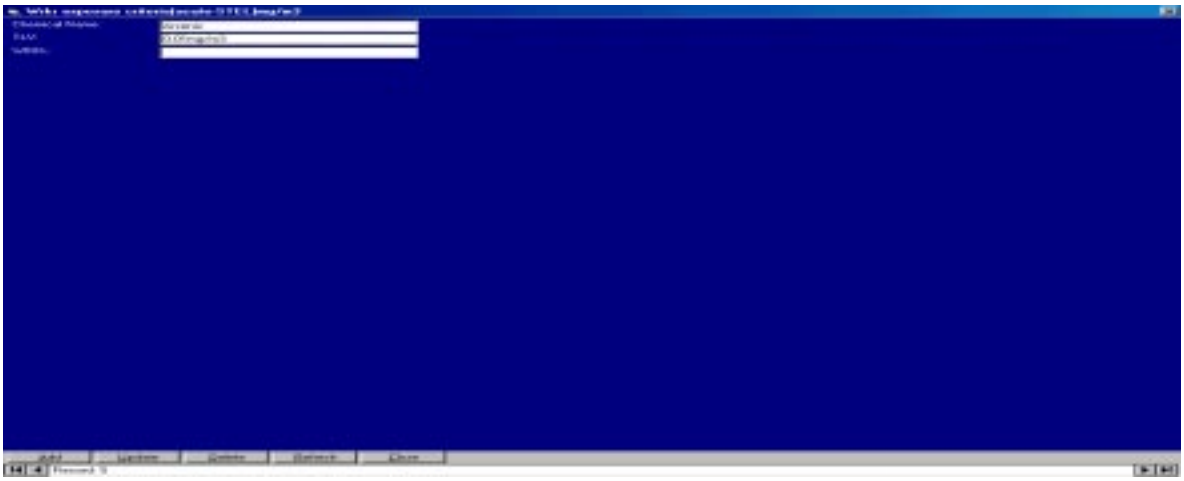

Figure 5.20: Worker Exposure Criteria (acute-STEL) Table

When the user clicks on the menu item Worker Exposure Criteria (acute-CEIL) of the Exposure Criteria, the form below in Figure 5.21 is displayed

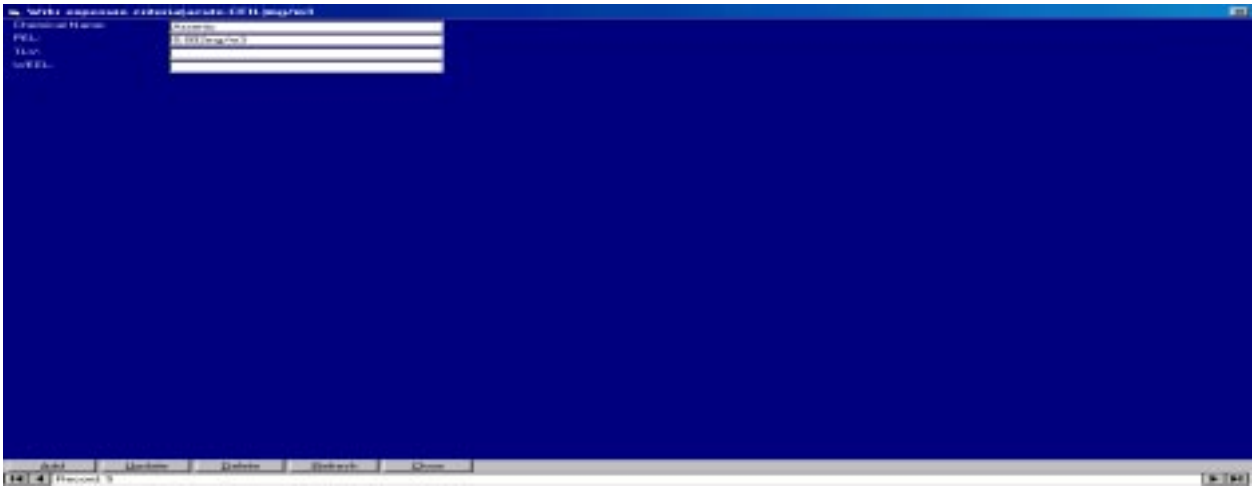

Figure 5.21: Worker Exposure Criteria (acute-CEIL) Table

When the user clicks on the menu item Worker Exposure Criteria (chronic-TWA) of the Exposure Criteria, the form below in Figure 5.22 is displayed.

Figure 5.22: Worker Exposure Criteria (chronic-TWA) Table

When the user clicks on the menu item Search, of the Tools a form is displayed with the following three options

j) By CAS#

k) By Chemical Name

l) By Molecular Formula as shown in Figure 5.23 below

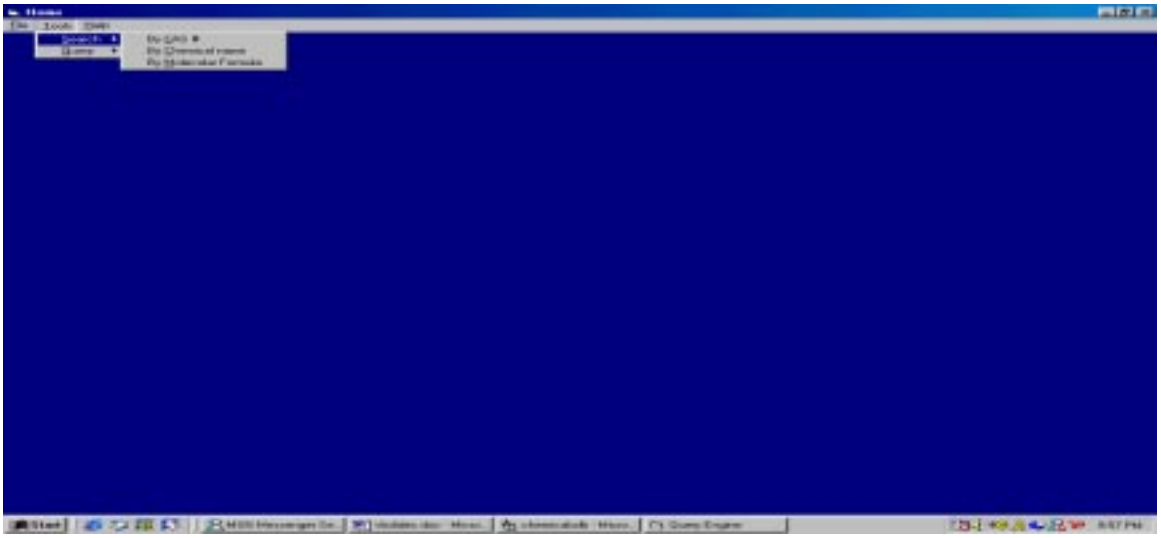

Figure 5.23: Pull down menu for Search

The user can get specific information desired such as, he can search for a specific Chemical and its properties from the database by inputting the CAS # or Molecular Formula and vice versa.

When the user clicks on " By CAS#" in the Search the form shown below opens. A drop down list of all CAS numbers in the database is provided at "Enter the CAS#" in the form at the top. User can chose any CAS# from the drop down list and get the corresponding properties of that particular chemical. The form is as shown in Figure 5.24 below

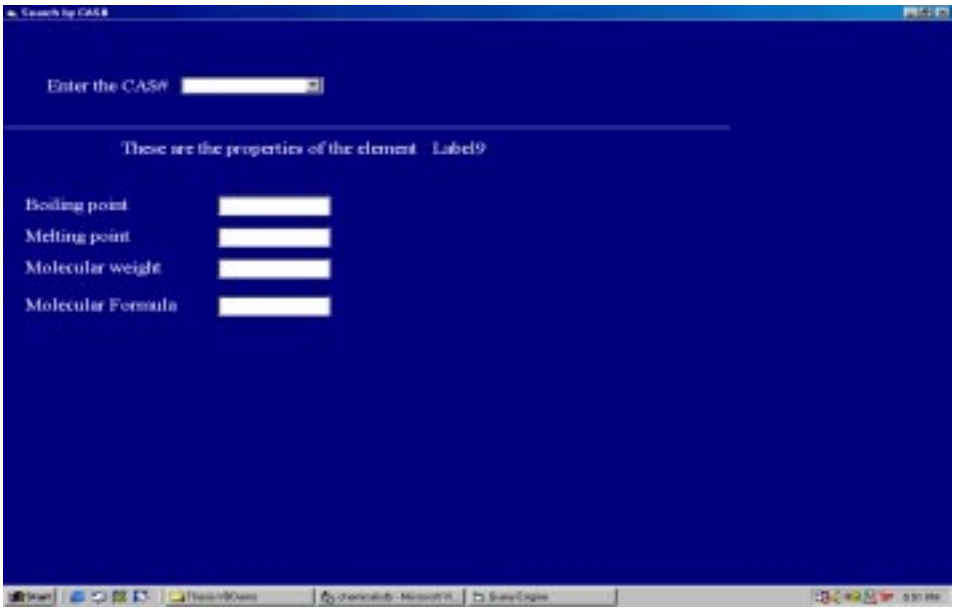

Figure 5.24: Form to enter CAS#

Let's say the user chose '7429-30-5' from the drop down list of CAS numbers, the search program will search the database and gets the corresponding chemical name and its properties as shown in Figure 5.25 below

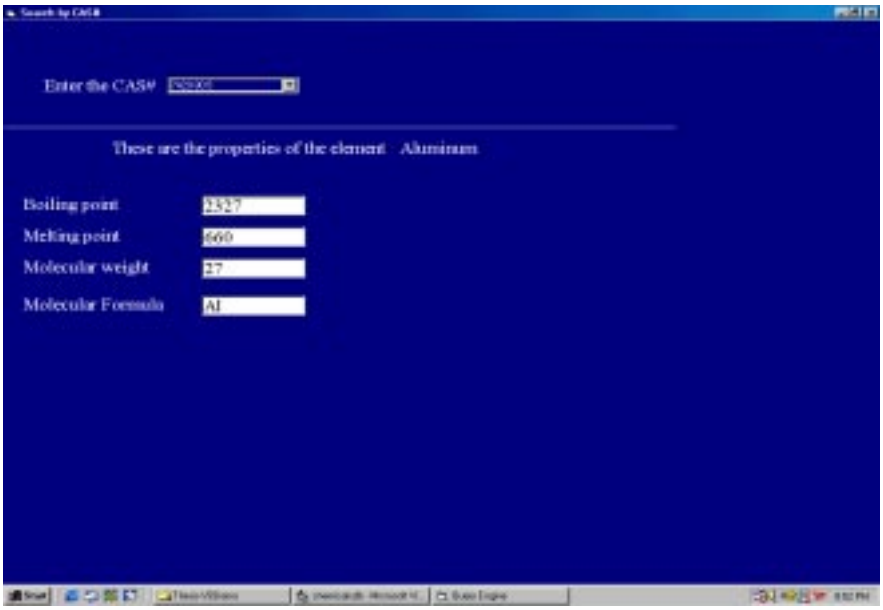

Figure 5.25: Chemical Name and its Properties

When the user clicks on " By Chemical Name" in the Search, a form shown below opens Figure 5.26. A drop down list of all chemical Names in the database is provided at "Enter the Chemical name" in the form at the top. User can chose any Chemical from the drop down list and get the corresponding properties of that particular chemical along with its CAS#.

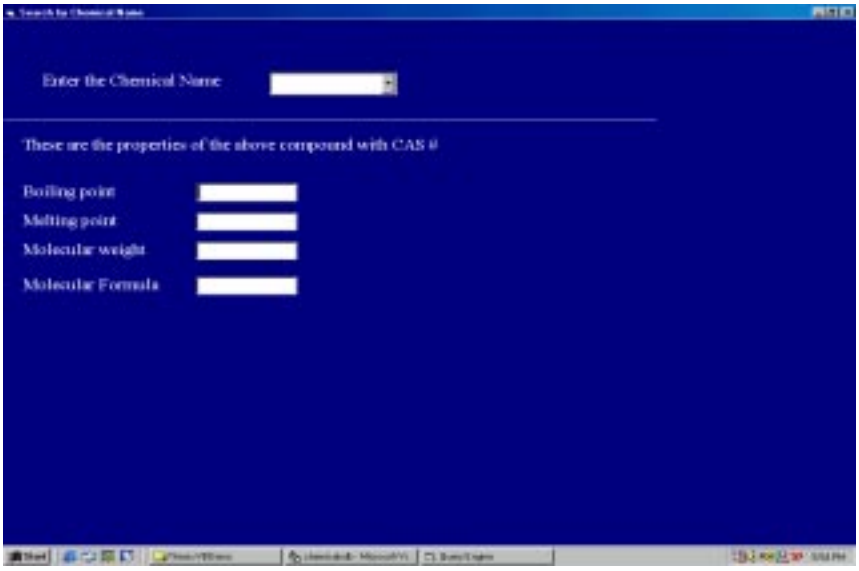

Figure 5.26: Search by Chemical Name

Let's say the user chose 'Ethylene Glycol', the search program will search the database and gives the corresponding CAS# and its properties as shown in Figure 5.27 below

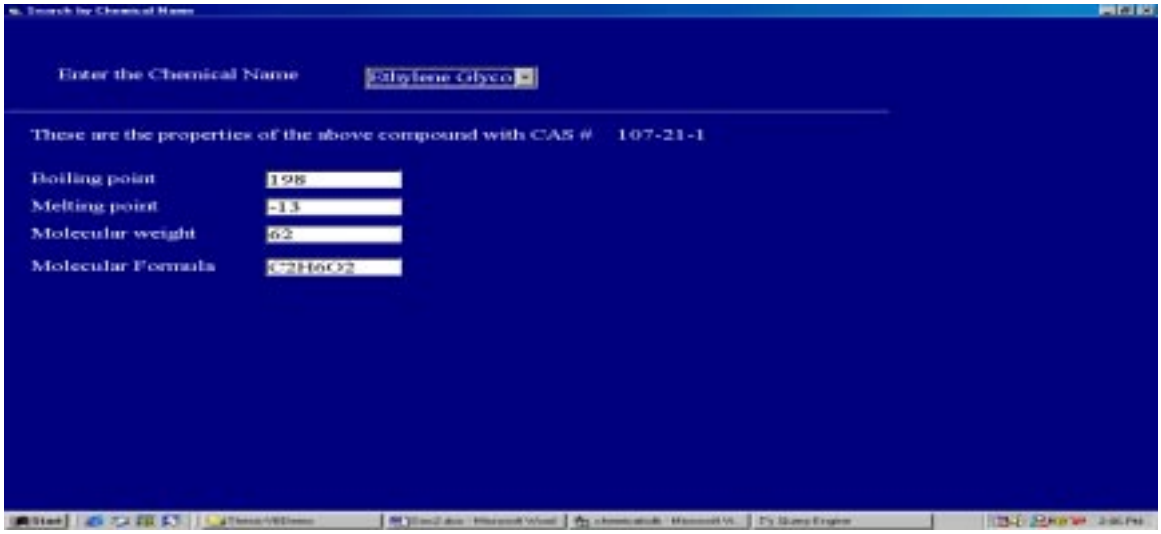

Figure 5.27: Form to choose a Chemical

When the user clicks on " By Molecular Formula" in the Search, the form shown below Figure 5.28 opens. A drop down list of all Molecular Formulas in the database is provided at "Enter the Molecular Formula" in the form at the top. User can chose Molecular Formula of any Chemical from the drop down list and get the corresponding properties of that particular chemical.

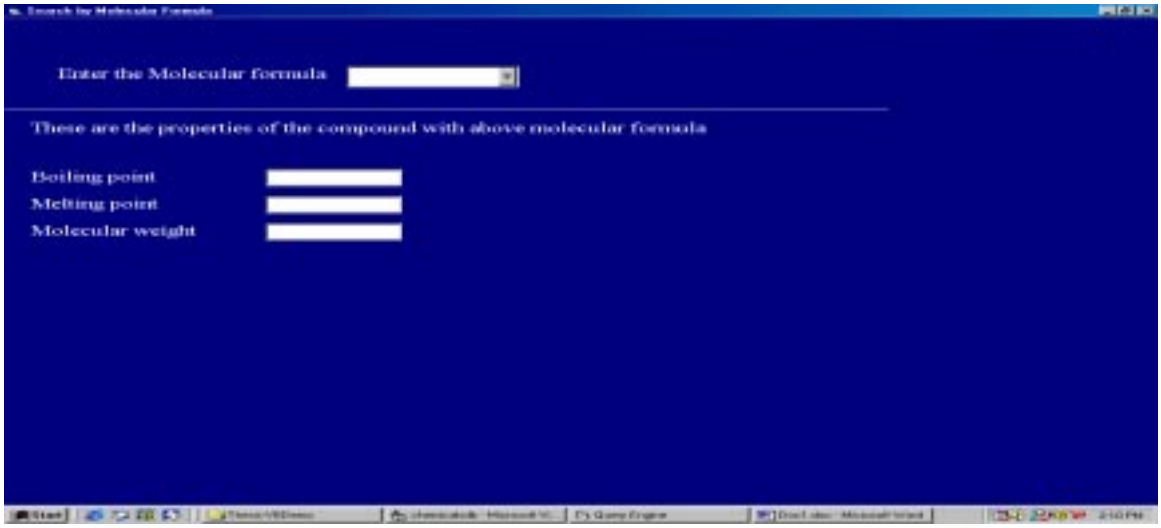

Figure 5.28: Form to Search by Molecular Formula

Let's say the user chose 'C2H6O2' which is the molecular formula of Ethylene Glycol. The search program will search the database and gives the corresponding chemical name and its properties as shown in Figure 5.29 below

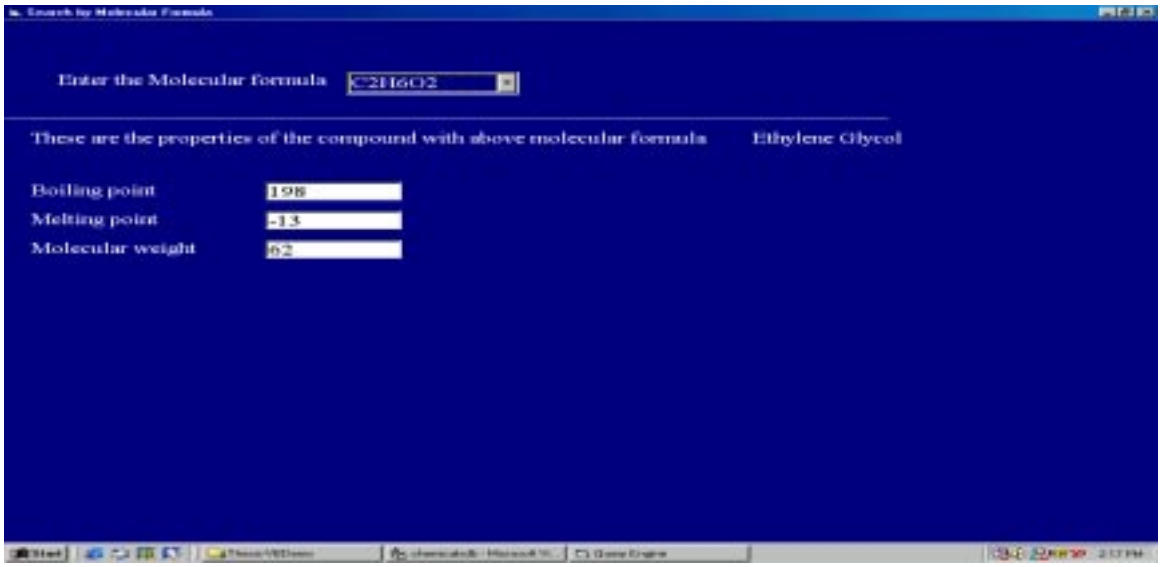

Figure 5.29: Search Results Form

When the user clicks on the menu item Query of the Tools pull down menu the form as in Figure 5.30 shown below is displayed with the following seven options

a) On Molecular Weight
b) On Boiling point
c) On Melting point
d) Molecular formula
e) Save query as and
f) Print

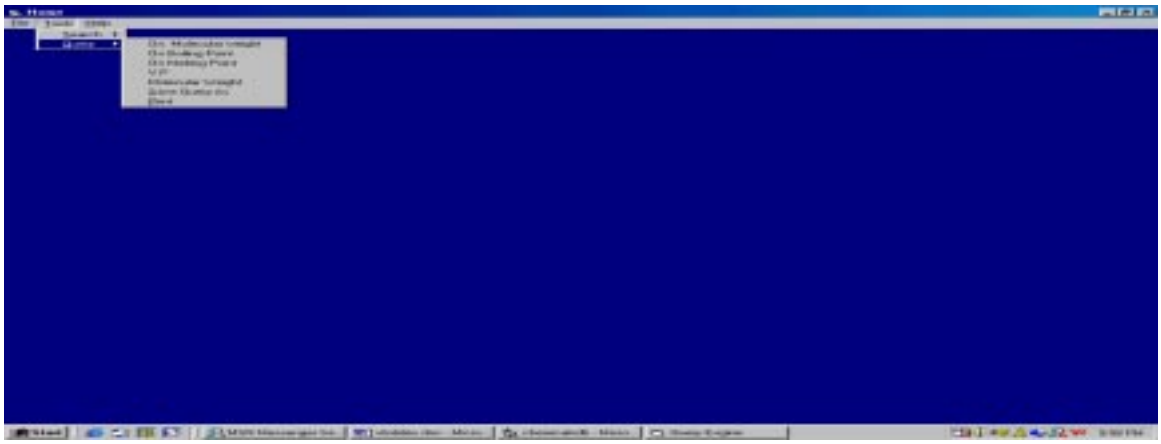

Figure 5.30: Pull Down Menu

Querying with molecular Weight form looks like the Figure 5.31 shown below. This is useful when he wants chemicals and its properties with molecular weight greater or less than certain value.

Figure 5.31: Molecular Weight Query

Let's say the user enters a value of 100 and he selects greater than, he can do this as shown below Figure 5.32

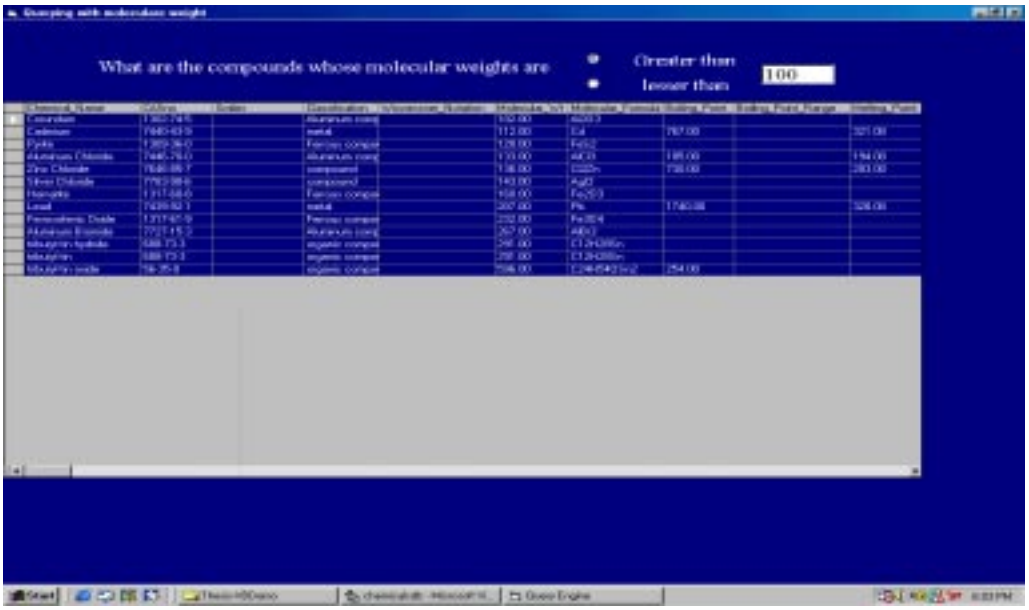

Figure 5.32: Search Criteria Form.

After the selection on clicking Enter all the chemicals with molecular weight greater than 100 and their corresponding properties are displayed. This can be seen from the form below Figure 5.33

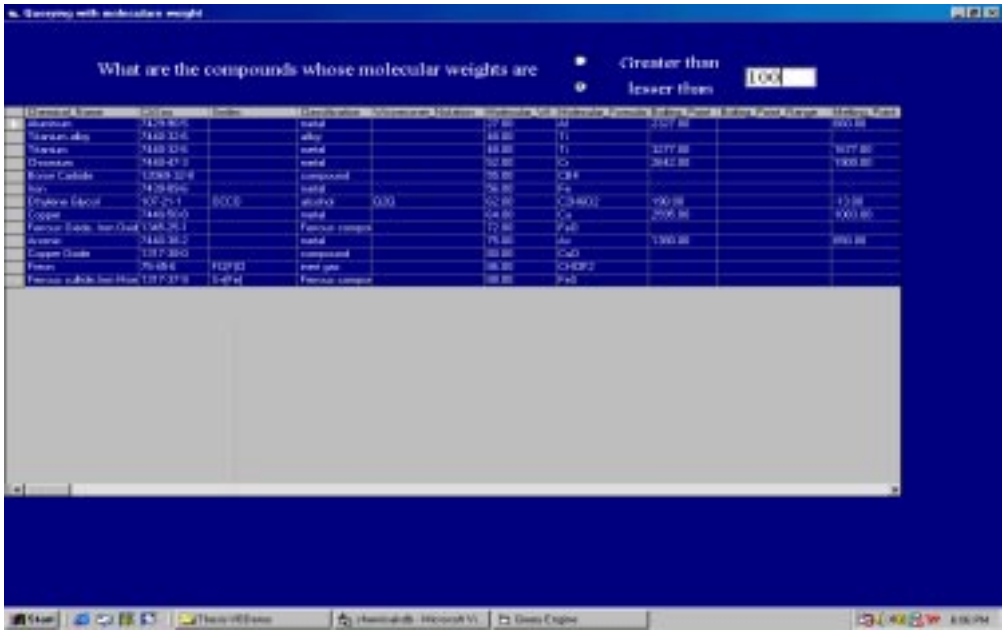

Figure 5.33: Search Results Form

Note: the query is executed and the results will be displayed only after the user enters the specified value and clicks “Enter”

Querying with Boiling Point form looks like the Figure 5.34 shown below. This is useful when user wants chemicals and its properties with boiling point greater or less than certain value.

Figure 5.34: Boiling Point Query

Let’s say the user enters a value of 1000 and he selects lesser than, as shown below- Figure 5.35

Figure 5.35: Boiling Point Criteria

The results are as shown below Figure 5.36

Figure 5.36: Query Results

Querying with Melting Point looks like the Figure 5.37 shown below. This is useful when user wants chemicals and their properties with melting point greater or less than certain value.

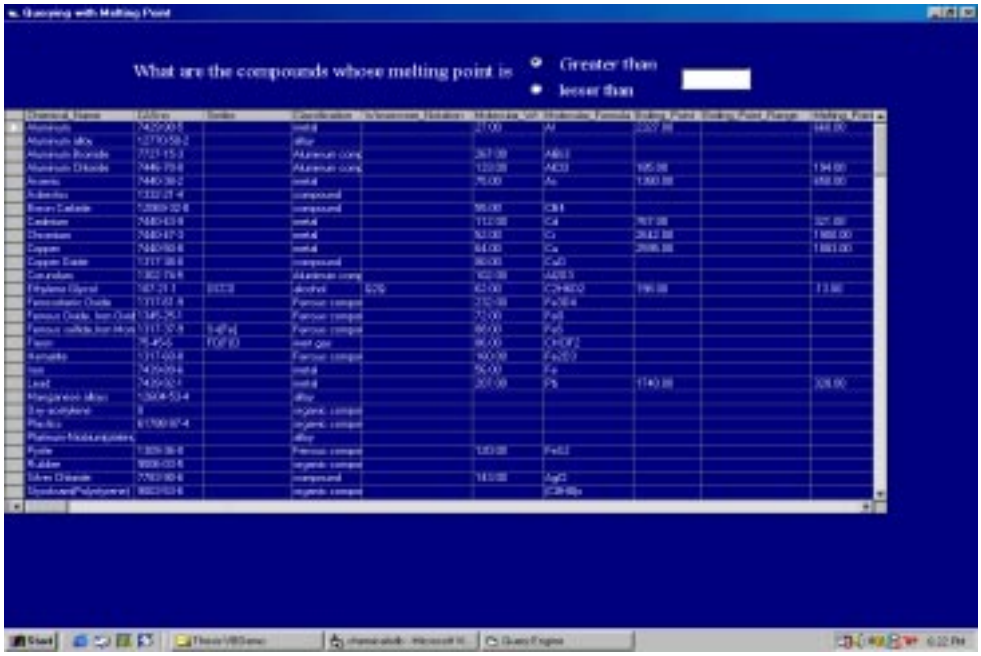

Figure 5.37: Melting Point Query

Let’s say the user enters a value of 500 and he selects greater than, the following results are displayed as shown in Figure 5.38 below

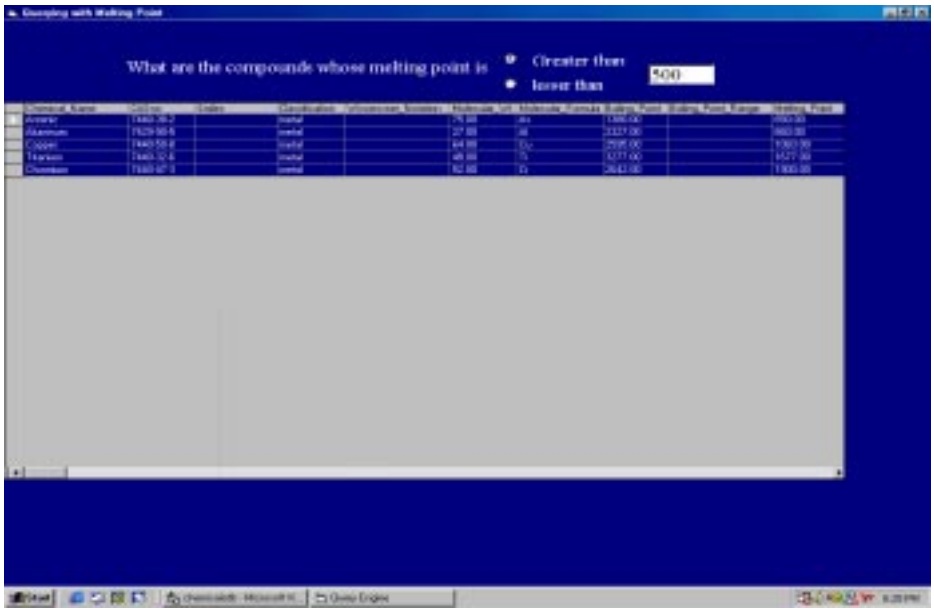

Figure 5.38: Results of Query

The user has an option of finding out what all compounds belonging to a certain family by the following query Figure 5.39

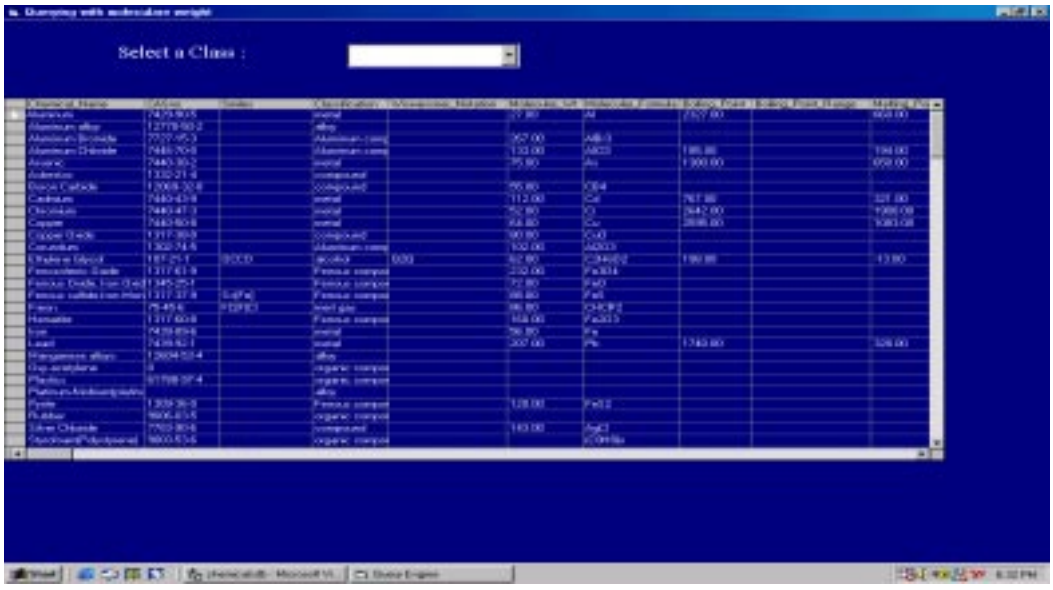

Figure 5.39: Select Any Class Form

Figure 5.40 below shows the drop down list of various classes of chemicals present

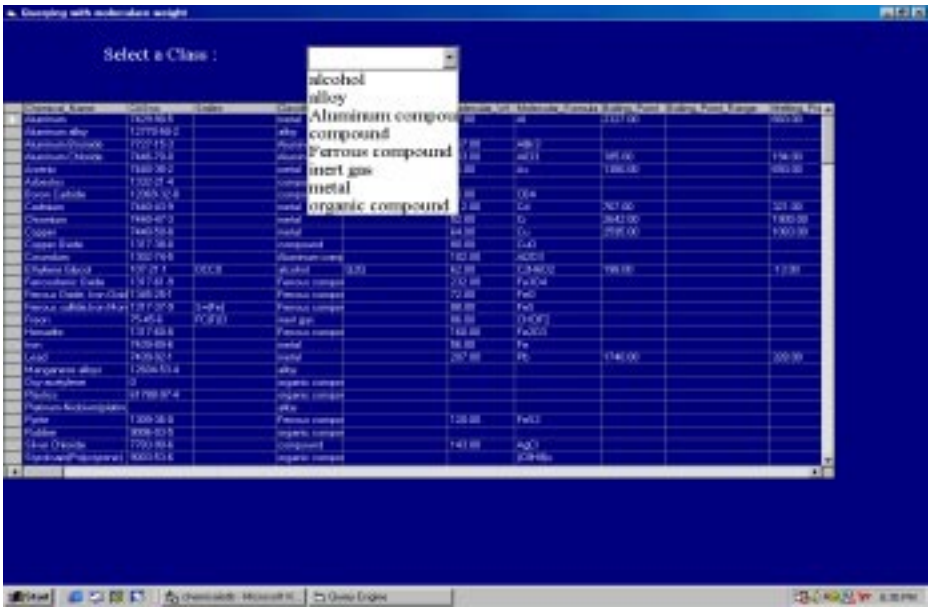

Figure 5.40: Drop down list of various classes of compounds

Lets say the user selected “organic compound”, then the following results are displayed Figure 5.41

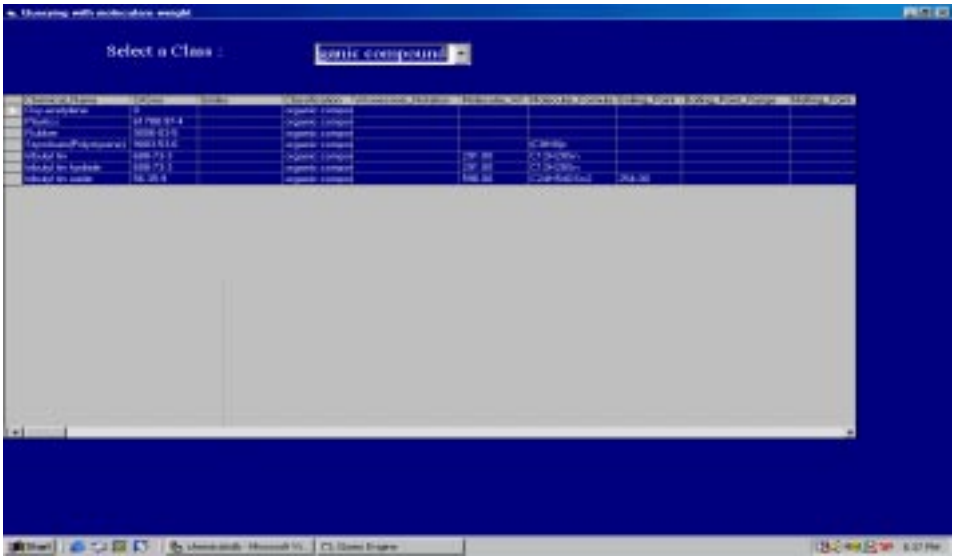

Figure 5.41: Results of Query

Querying with Vapor pressure form looks like the Figure 5.42 shown below. This is useful when he wants chemicals and their properties with Vapor pressure greater or less than certain value.

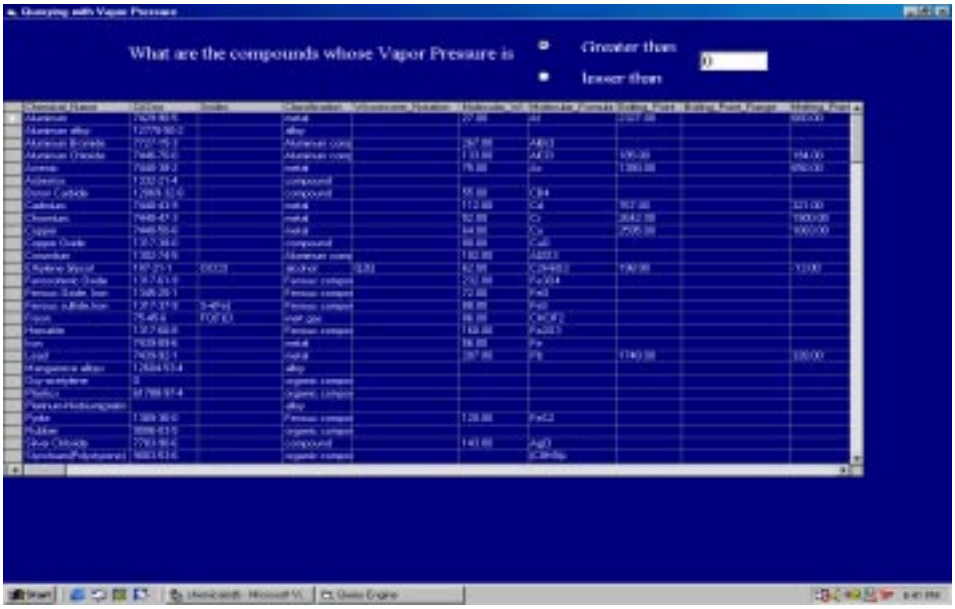

Figure 5.42: Vapor Pressure Query

For example if 0 is entered and greater than is chosen as the option then the following results are displayed Figure 5.43

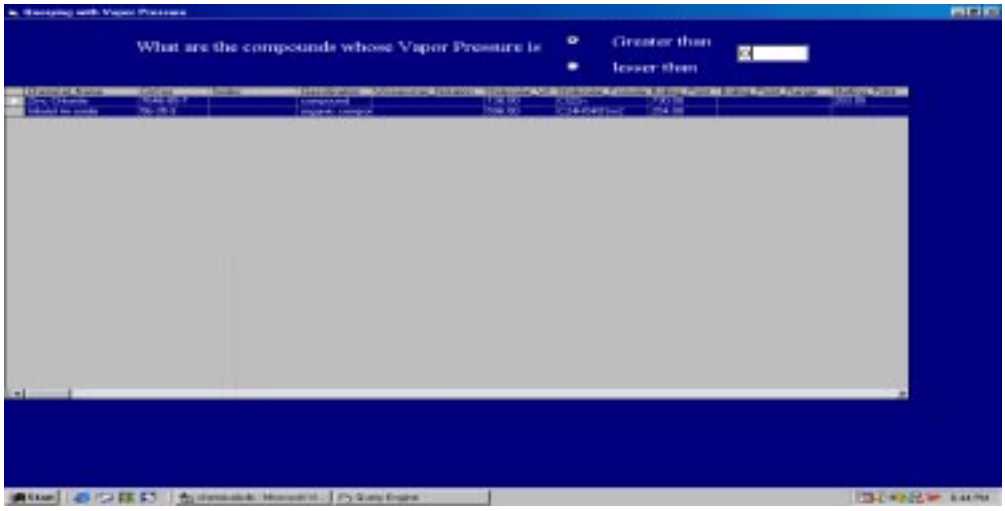

Figure 5.43: Results of Query

When user clicks on the “help” of the main menu the following screen pops up which helps the user to understand the front end well. Helps him in accessing data using front end

This can be seen from the form below Figure 5.44

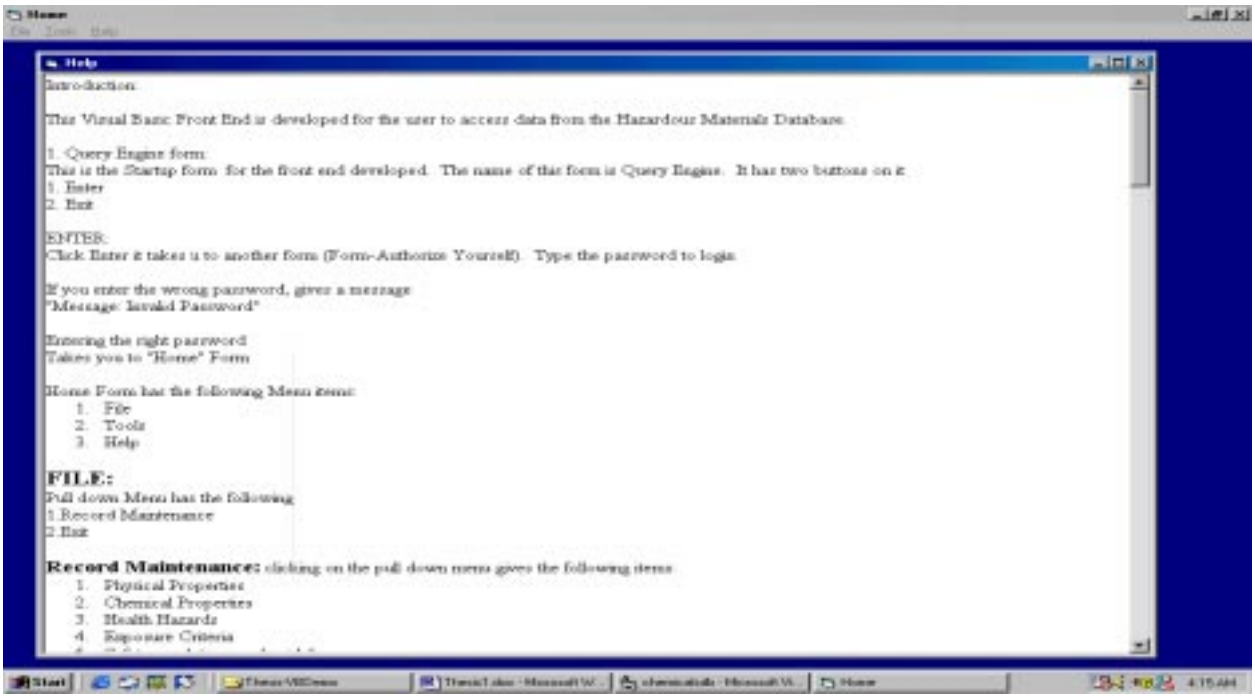

Figure 5.44: Help

CHAPTER 6: CONCLUSIONS AND FUTURE WORK

6.1 Conclusions

A Hazardous Materials Database (HMD) was developed. HMD stores physical and chemical properties of the chemicals along with their CAS numbers. It also stores data on health hazards, safety regulations and guidelines set by agencies like ACGIH, EPA, and OSHA on exposure criteria and environmental concern. Since this database has all the properties pooled at a single place, it saves look up time. The HMD is made available to a user through a front end developed in Visual Basic. The Graphical User Interface of Visual Basic is easy to use.

The HMD presently has a total of 34 hazardous chemicals with all the above listed properties. The names of the chemicals include aluminum, aluminum alloy, aluminum bromide, aluminum chloride, arsenic, asbestos, boron carbide, cadmium, chromium, copper, copper oxide, corundum, ethylene glycol, ferrosoferric oxide, ferrous oxide, ferrous sulfide, freon, hematite, iron, lead, manganese alloy, oxy acetylene, plastic, platinum-niobium alloy, pyrite, rubber, silver chloride, styrofoam, titanium, titanium alloy, tri butyl tin hydride, tri butyl tin oxide, tri butyl tin, zinc chloride. The Hazardous Materials Database is presently being applied to ship dismantling. By knowing various properties of the chemical the necessary safety measures can be implemented which help in safe handling and disposal of the product, without any detrimental impact on the environment.

6.2 Future work

The database can be expanded to Non Hazardous Materials. Apart from the disposal application the HMD database can also be used for recycling of a retired object. This database could be web based so that, it will be easy to access for anyplace and anytime.

The front end of the database is designed only for physical properties. In future the front-end design can be expanded to chemical properties, health hazards, safety regulations and guidelines exposure criteria and environmental concern.

The database can be used for the entire Life Cycle Design of a Product, from the beginning stages, that is, collection of raw materials to disposal of the product, including recycling.
This is illustrated below.

Expansion of Database to be used over the Life Cycle of a Product:

Database is designed in such a way that it can be useful over the entire life cycle of a product. To demonstrate this we have added four more tables to the database as shown below, for the example of a ship scrapping.

The different tables added are as follows:

- Main Table
- Ships Table
- Dismantling sites table and
- Cutting technology table

Main Table which has the following fields

- Chemical Name
- Cutting technology
- Ship Type
- Country

Ships table has the following fields:

- Name
- Ship type
- Flag state
- Dead Weight (DWT)
- Build Date
- Retrofit
- Estimated Volume of Hazardous Materials

Dismantling sites Table has the following fields

- Country

- City
- Capacity
- Safety Record
- Hazardous Material Handling Capability
- Health Hazards
- Labor Cost

Cutting Technology Table has the following fields

- Cutting Technology
- Cutting tool
- Energy Requirement
- Energy Cost

This Database can be used to get many kinds of information regarding a ship, like its location, name of the ship, type of the ship, the different cutting technologies used etc. The whole history of the ship, how it is constructed, what are the hazardous materials that are released during disposal, safety regulations to be followed, health hazards from chemicals released and much more.

References

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6. http://www.tus.com.au/default.htm - The Chemical Inventory Database
7. http://dippr.byu.edu/samplesite/chemsearch.asp - Sample chemical Database
8. http://math.cd-rom-di…/482.Brethericks.Reactive.Chemical.Hazards.Databas.shtm-Bretherick's Reactive Chemical Hazards Database Version 2.0
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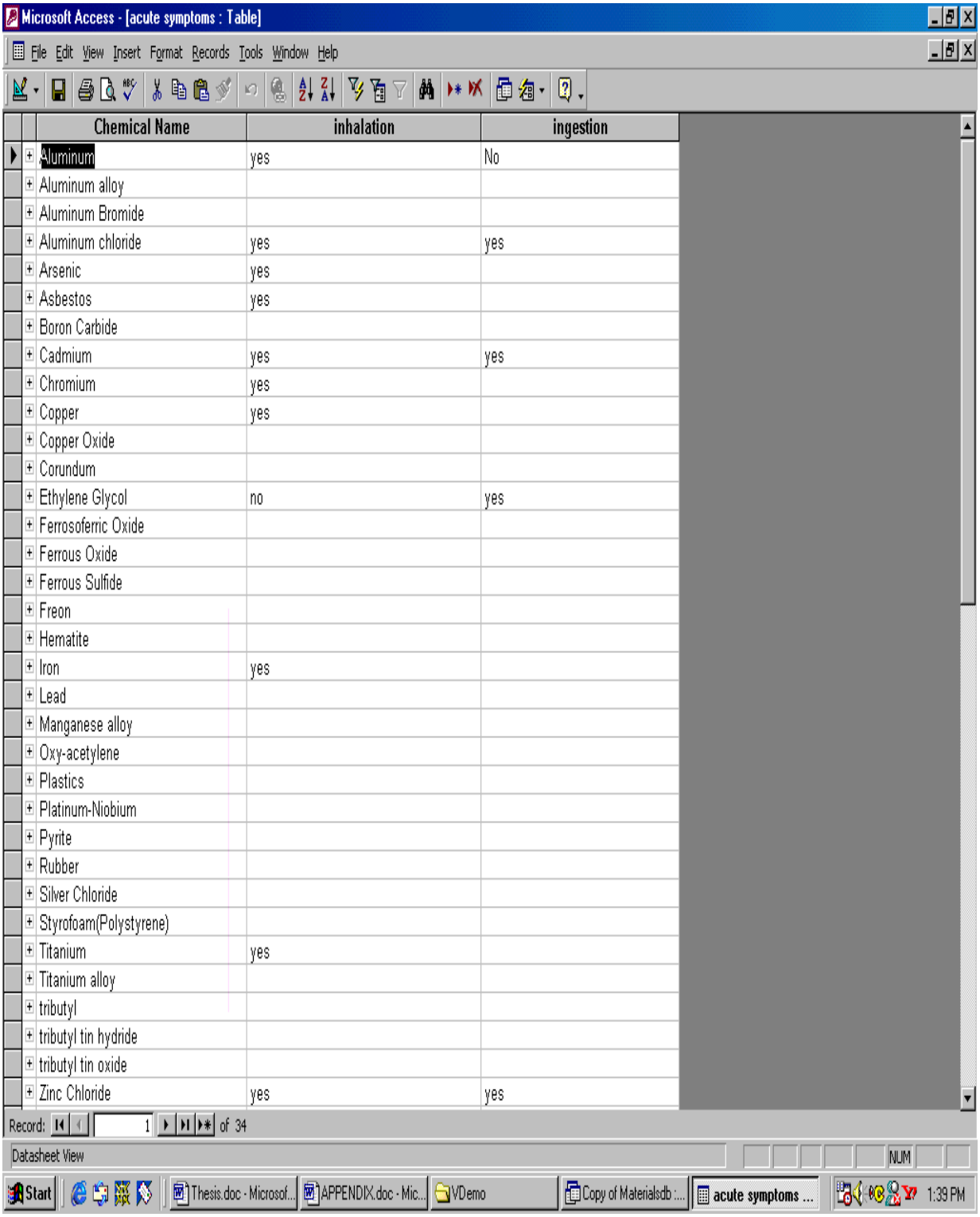
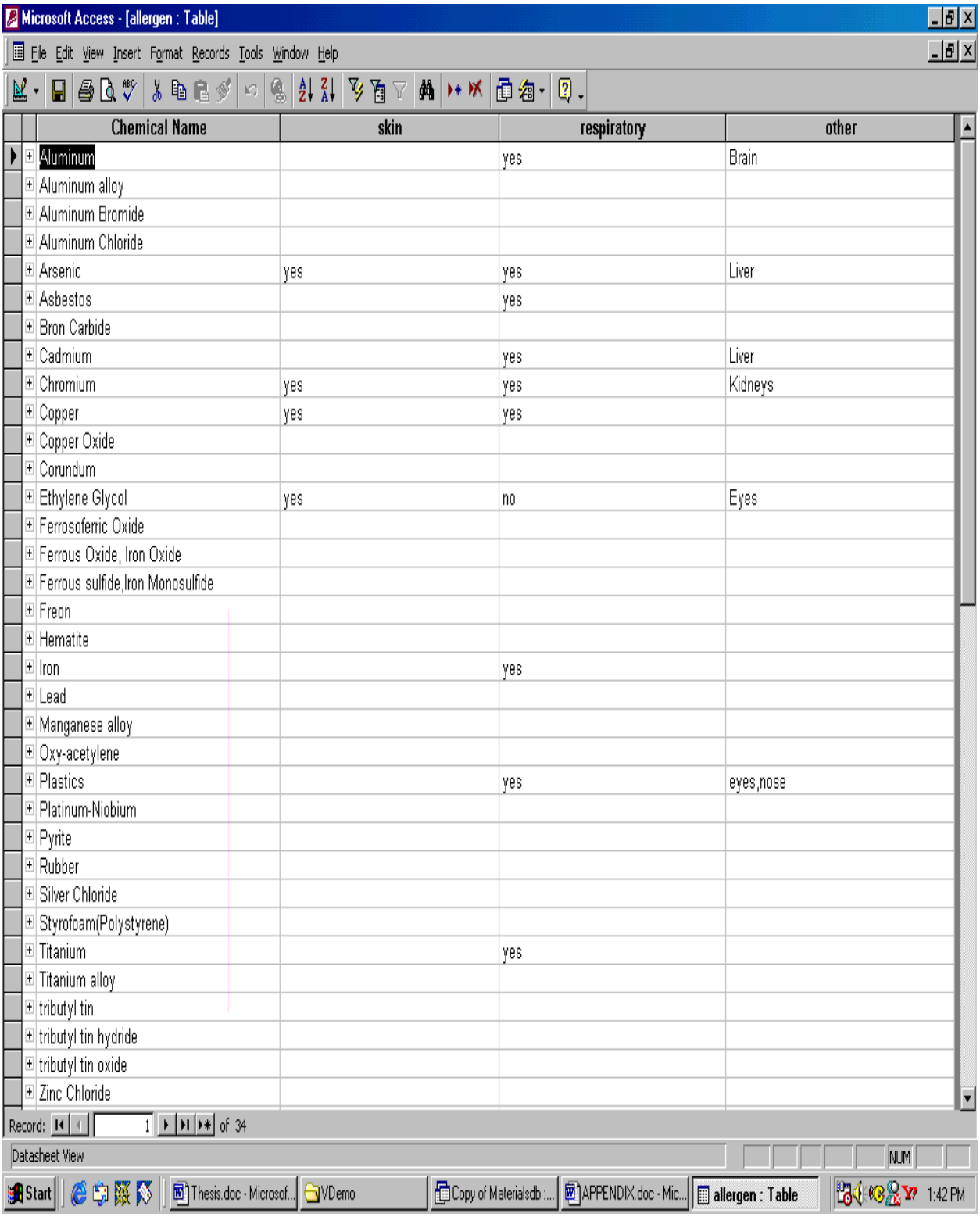
APPENDIX 1 - ACUTE SYMPTOMS TABLE



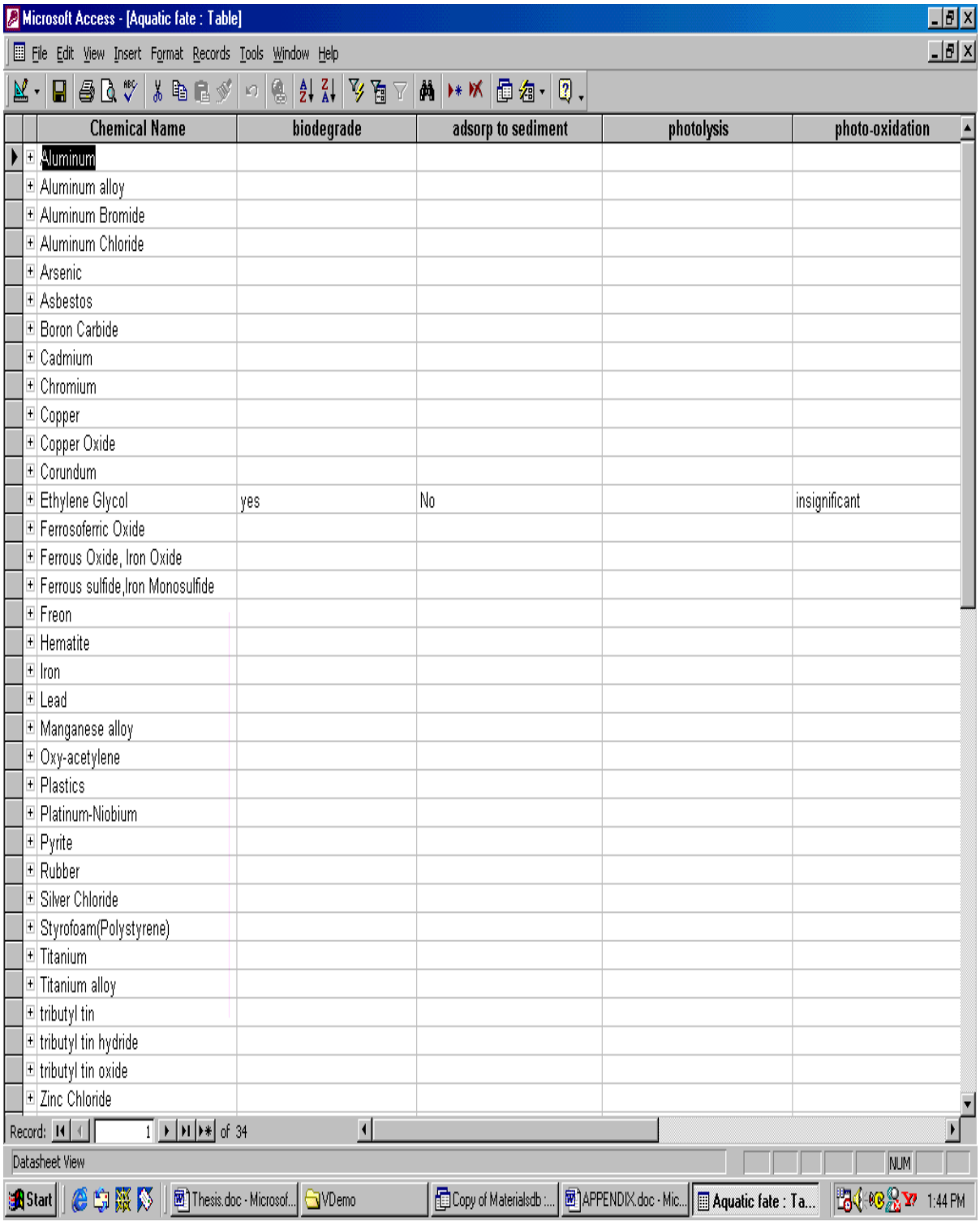
Chemical Name	inhalation	ingestion
Aluminum	yes	No
Aluminum alloy		
Aluminum Bromide		
Aluminum chloride	yes	yes
Arsenic	yes	
Asbestos	yes	
Boron Carbide		
Cadmium	yes	yes
Chromium	yes	
Copper	yes	
Copper Oxide		
Corundum		
Ethylene Glycol	no	yes
Ferrosoferric Oxide		
Ferrous Oxide		
Ferrous Sulfide		
Freon		
Hematite		
Iron	yes	
Lead		
Manganese alloy		
Oxy-acetylene		
Plastics		
Platinum-Niobium		
Pyrite		
Rubber		
Silver Chloride		
Styrofoam(Polystyrene)		
Titanium	yes	
Titanium alloy		
tributyl		
tributyl tin hydride		
tributyl tin oxide		
Zinc Chloride	yes	yes

APPENDIX 2 – ALLERGEN TABLE



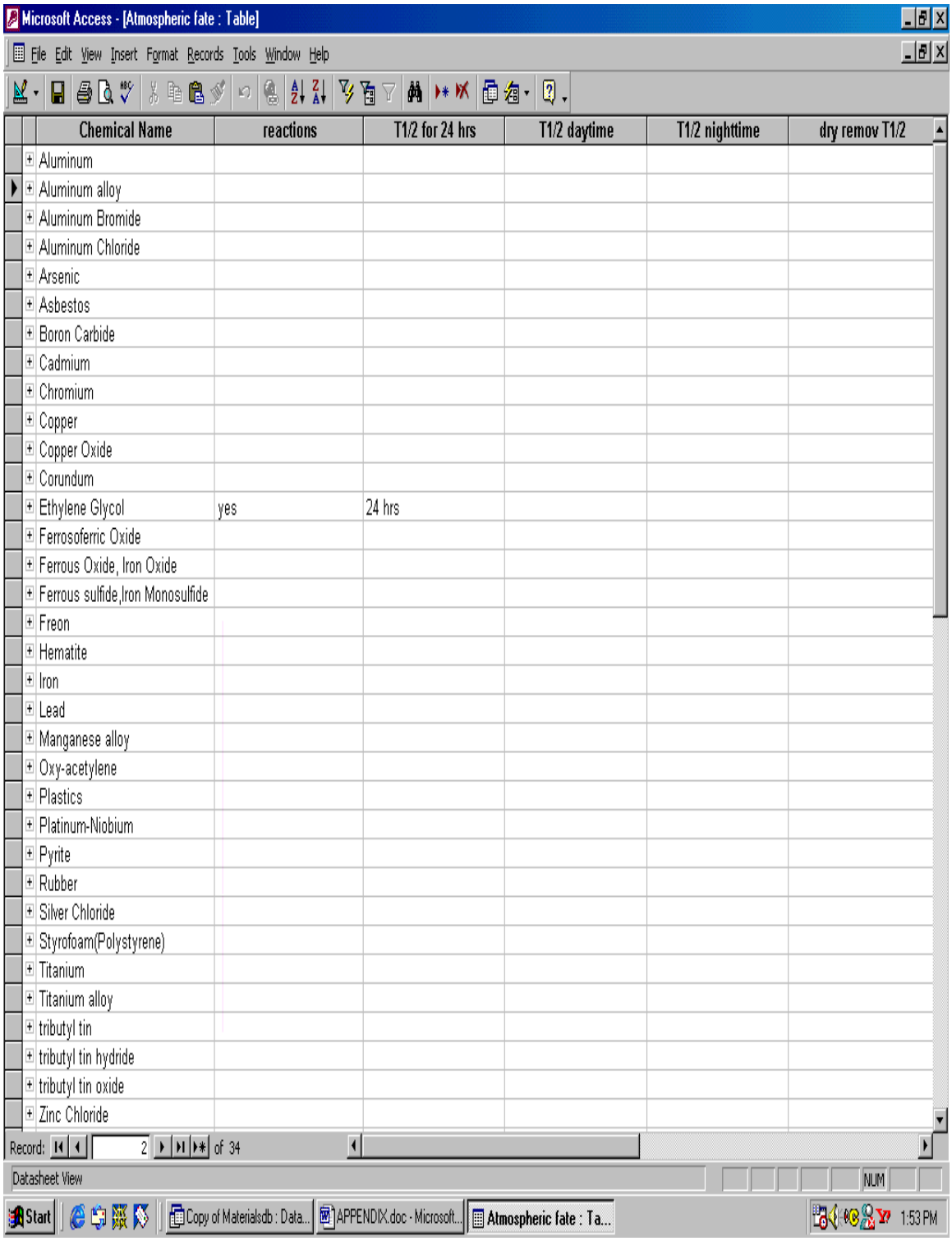
Chemical Name	skin	respiratory	other
Aluminum		yes	Brain
Aluminum alloy			
Aluminum Bromide			
Aluminum Chloride			
Arsenic	yes	yes	Liver
Asbestos		yes	
Bron Carbide			
Cadmium		yes	Liver
Chromium	yes	yes	Kidneys
Copper	yes	yes	
Copper Oxide			
Corundum			
Ethylene Glycol	yes	no	Eyes
Ferrosoferric Oxide			
Ferrous Oxide, Iron Oxide			
Ferrous sulfide,Iron Monosulfide			
Freon			
Hematite			
Iron		yes	
Lead			
Manganese alloy			
Oxy-acetylene			
Plastics		yes	eyes,nose
Platinum-Niobium			
Pyrite			
Rubber			
Silver Chloride			
Styrofoam(Polystyrene)			
Titanium		yes	
Titanium alloy			
tributyl tin			
tributyl tin hydride			
tributyl tin oxide			
Zinc Chloride			

APPENDIX 3 – AQUATIC FATE TABLE



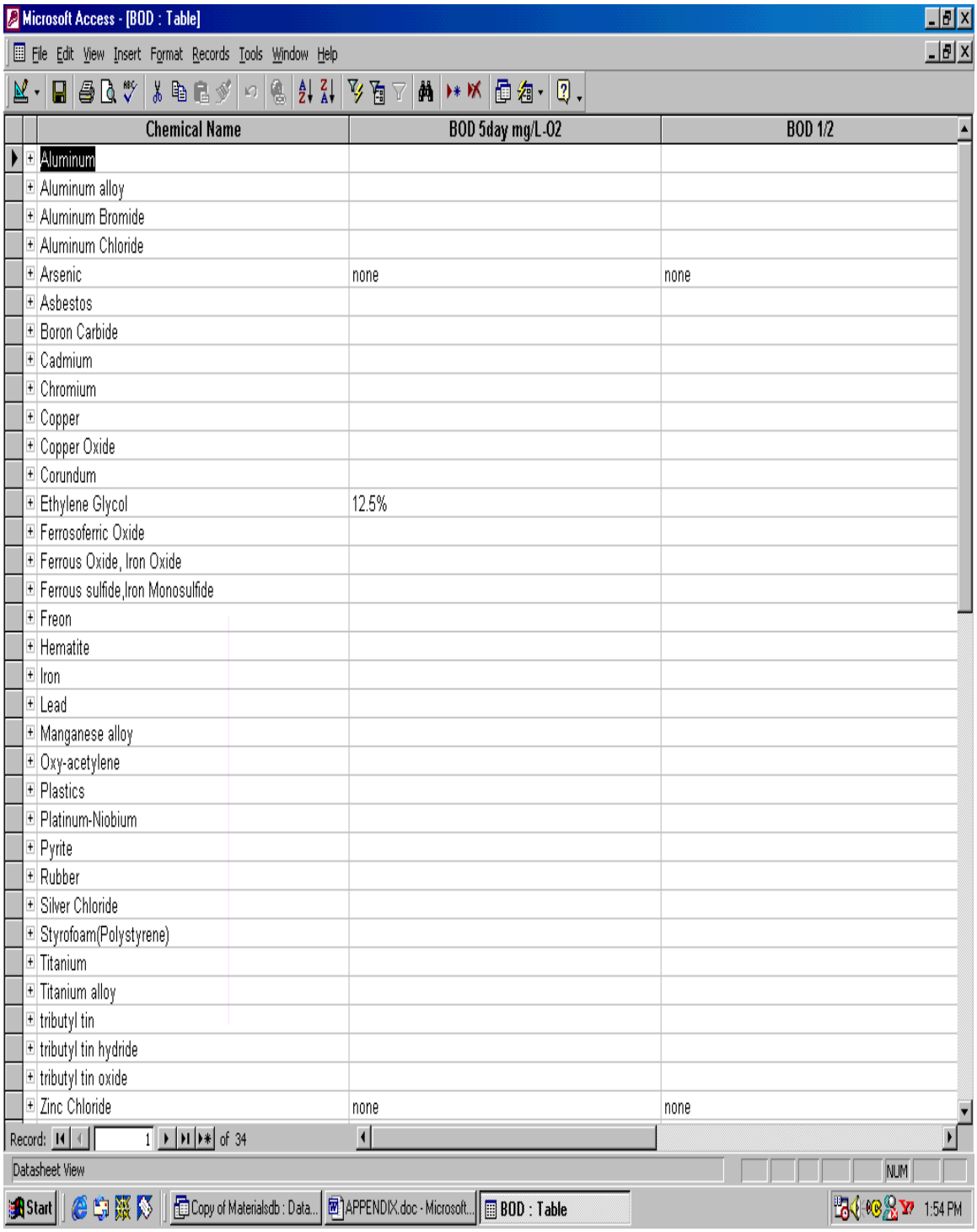
Chemical Name	biodegrade	adsorp to sediment	photolysis	photo-oxidation
Aluminum				
Aluminum alloy				
Aluminum Bromide				
Aluminum Chloride				
Arsenic				
Asbestos				
Boron Carbide				
Cadmium				
Chromium				
Copper				
Copper Oxide				
Corundum				
Ethylene Glycol	yes	No		insignificant
Ferrosoferric Oxide				
Ferrous Oxide, Iron Oxide				
Ferrous sulfide,Iron Monosulfide				
Freon				
Hematite				
Iron				
Lead				
Manganese alloy				
Oxy-acetylene				
Plastics				
Platinum-Niobium				
Pyrite				
Rubber				
Silver Chloride				
Styrofoam(Polystyrene)				
Titanium				
Titanium alloy				
tributyl tin				
tributyl tin hydride				
tributyl tin oxide				
Zinc Chloride				

APPENDIX 4 – ATMOSPHERIC FATE TABLE

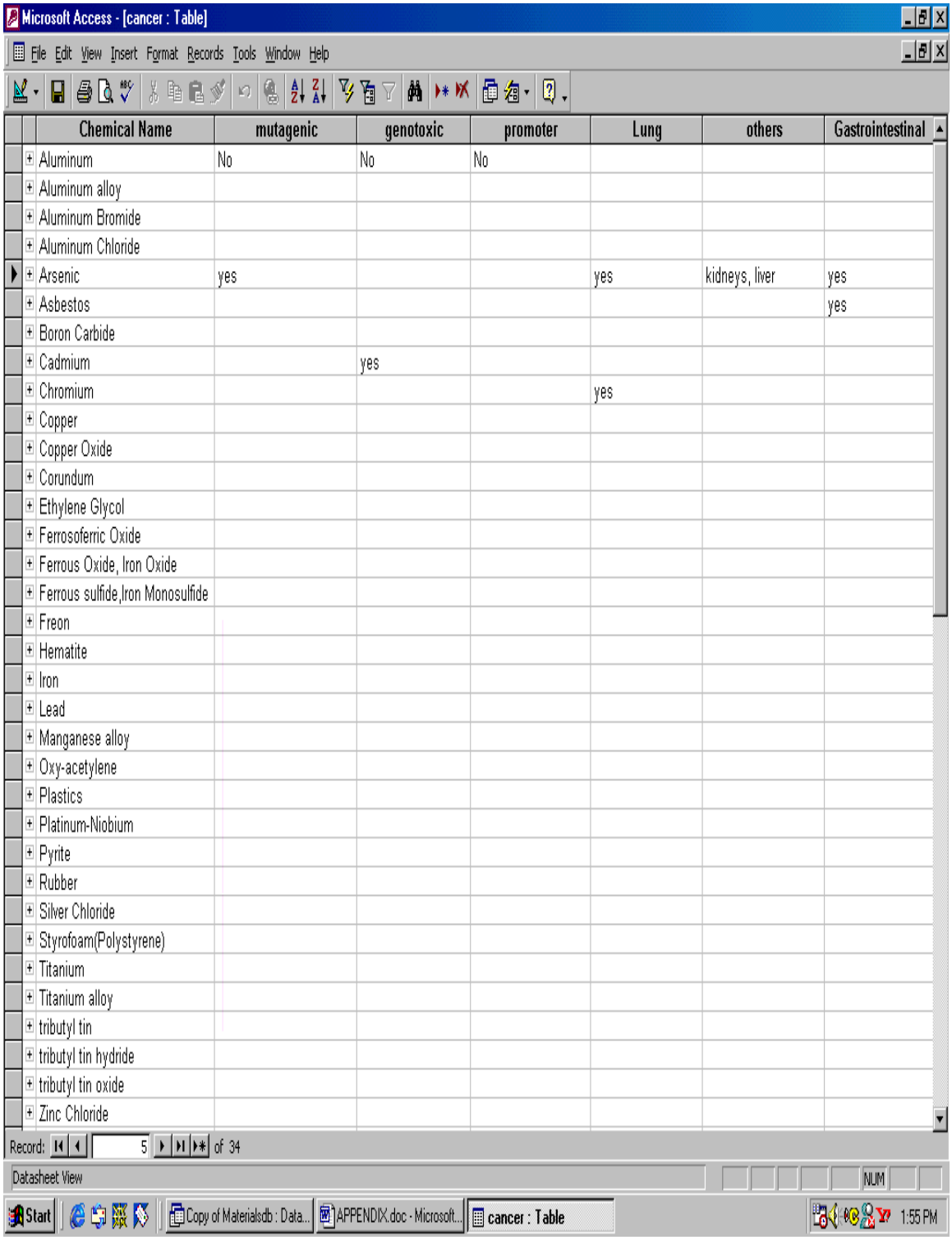


Chemical Name	reactions	T1/2 for 24 hrs	T1/2 daytime	T1/2 nighttime	dry remov T1/2
Aluminum					
Aluminum alloy					
Aluminum Bromide					
Aluminum Chloride					
Arsenic					
Asbestos					
Boron Carbide					
Cadmium					
Chromium					
Copper					
Copper Oxide					
Corundum					
Ethylene Glycol	yes	24 hrs			
Ferrosoferric Oxide					
Ferrous Oxide, Iron Oxide					
Ferrous sulfide,Iron Monosulfide					
Freon					
Hematite					
Iron					
Lead					
Manganese alloy					
Oxy-acetylene					
Plastics					
Platinum-Niobium					
Pyrite					
Rubber					
Silver Chloride					
Styrofoam(Polystyrene)					
Titanium					
Titanium alloy					
tributyl tin					
tributyl tin hydride					
tributyl tin oxide					
Zinc Chloride					

APPENDIX 5 – BOD TABLE

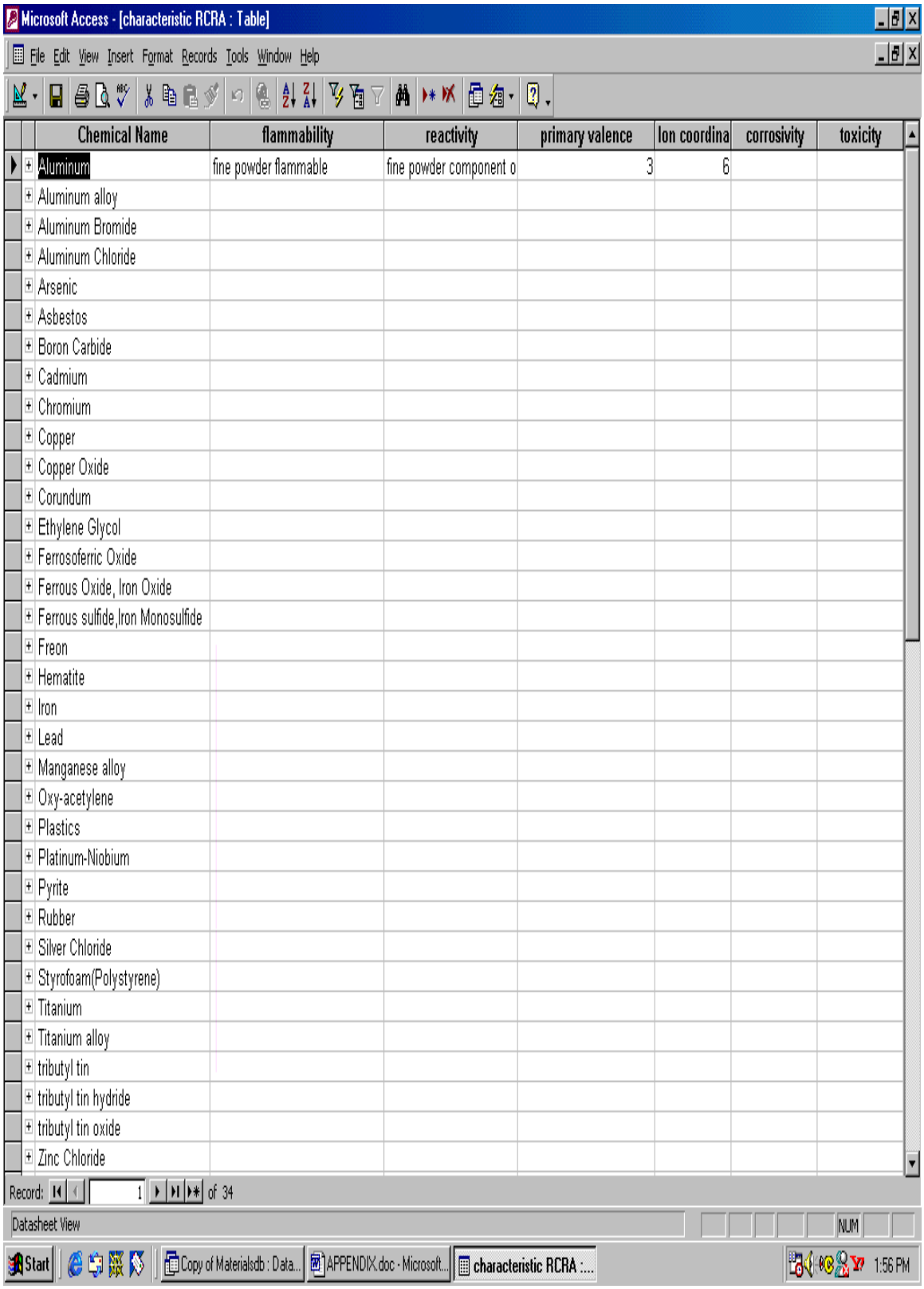


APPENDIX 6 – CANCER TABLE

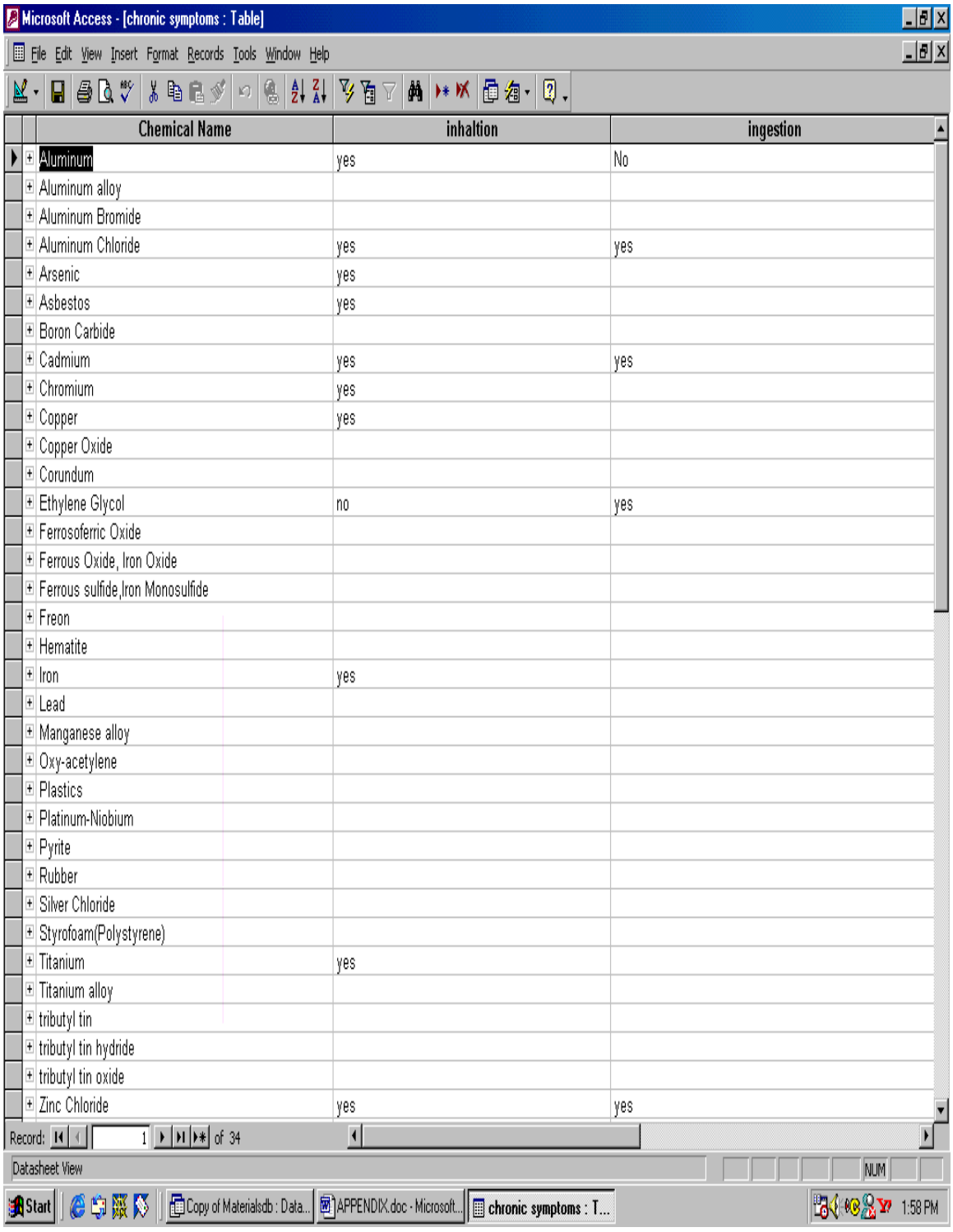


Chemical Name	mutagenic	genotoxic	promoter	Lung	others	Gastrointestinal
Aluminum	No	No	No			
Aluminum alloy						
Aluminum Bromide						
Aluminum Chloride						
Arsenic	yes			yes	kidneys, liver	yes
Asbestos						yes
Boron Carbide						
Cadmium		yes				
Chromium				yes		
Copper						
Copper Oxide						
Corundum						
Ethylene Glycol						
Ferrosoferric Oxide						
Ferrous Oxide, Iron Oxide						
Ferrous sulfide,Iron Monosulfide						
Freon						
Hematite						
Iron						
Lead						
Manganese alloy						
Oxy-acetylene						
Plastics						
Platinum-Niobium						
Pyrite						
Rubber						
Silver Chloride						
Styrofoam(Polystyrene)						
Titanium						
Titanium alloy						
tributyl tin						
tributyl tin hydride						
tributyl tin oxide						
Zinc Chloride						

APPENDIX 7 – RCRA TABLE

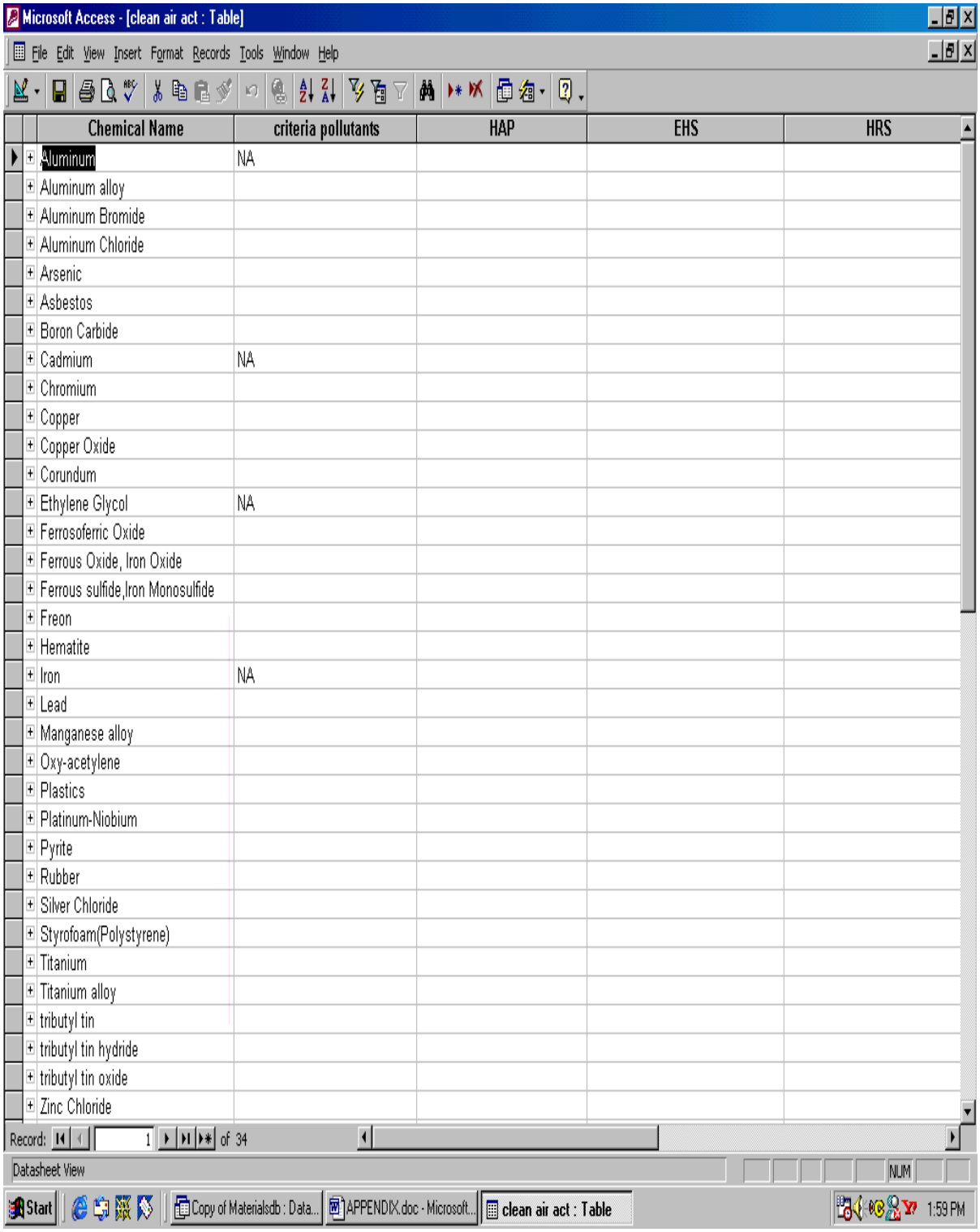


APPENDIX 8 – CHRONIC SYMPTOMS TABLE

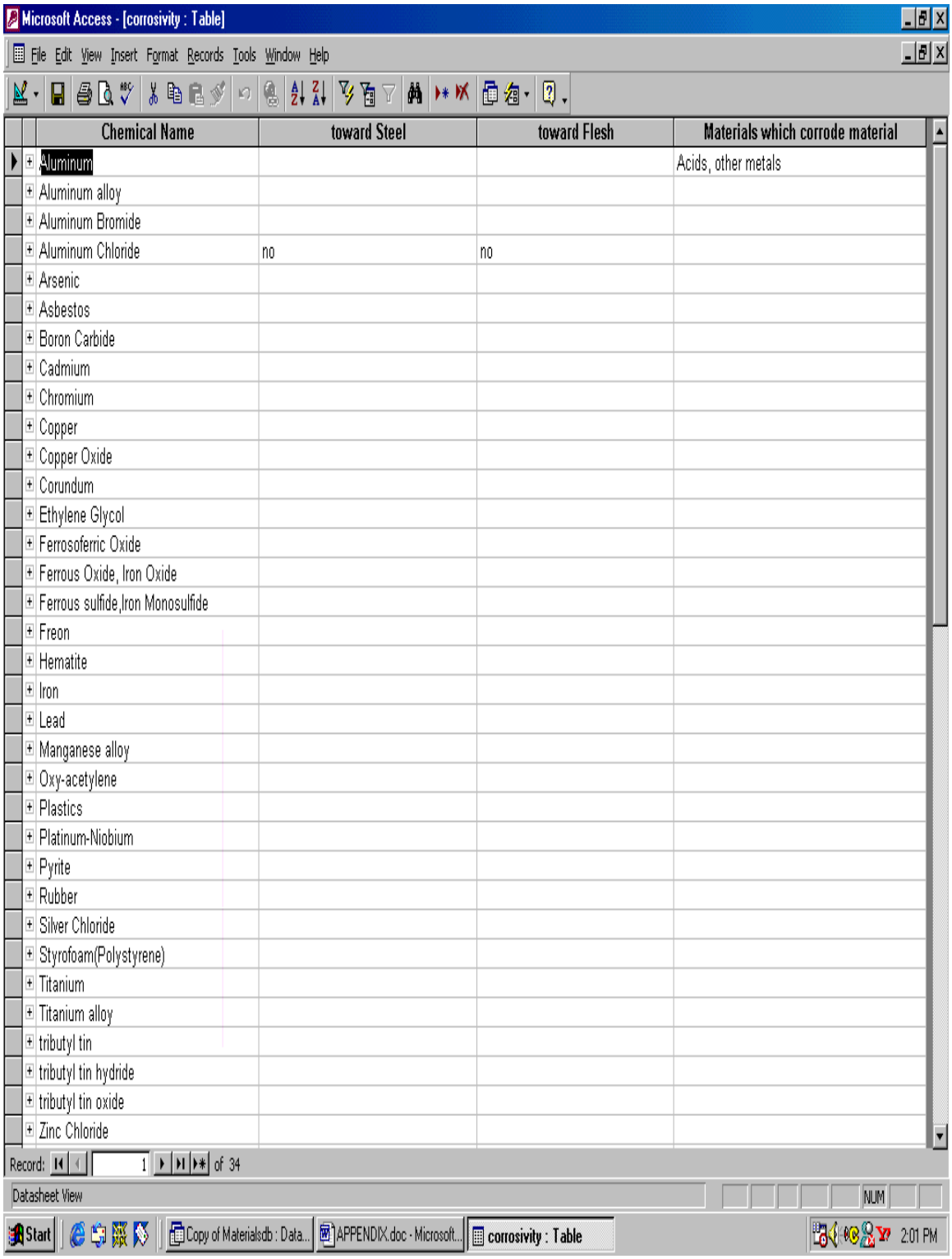


Chemical Name	inhaltion	ingestion
Aluminum	yes	No
Aluminum alloy		
Aluminum Bromide		
Aluminum Chloride	yes	yes
Arsenic	yes	
Asbestos	yes	
Boron Carbide		
Cadmium	yes	yes
Chromium	yes	
Copper	yes	
Copper Oxide		
Corundum		
Ethylene Glycol	no	yes
Ferrosoferric Oxide		
Ferrous Oxide, Iron Oxide		
Ferrous sulfide,Iron Monosulfide		
Freon		
Hematite		
Iron	yes	
Lead		
Manganese alloy		
Oxy-acetylene		
Plastics		
Platinum-Niobium		
Pyrite		
Rubber		
Silver Chloride		
Styrofoam(Polystyrene)		
Titanium	yes	
Titanium alloy		
tributyl tin		
tributyl tin hydride		
tributyl tin oxide		
Zinc Chloride	yes	yes

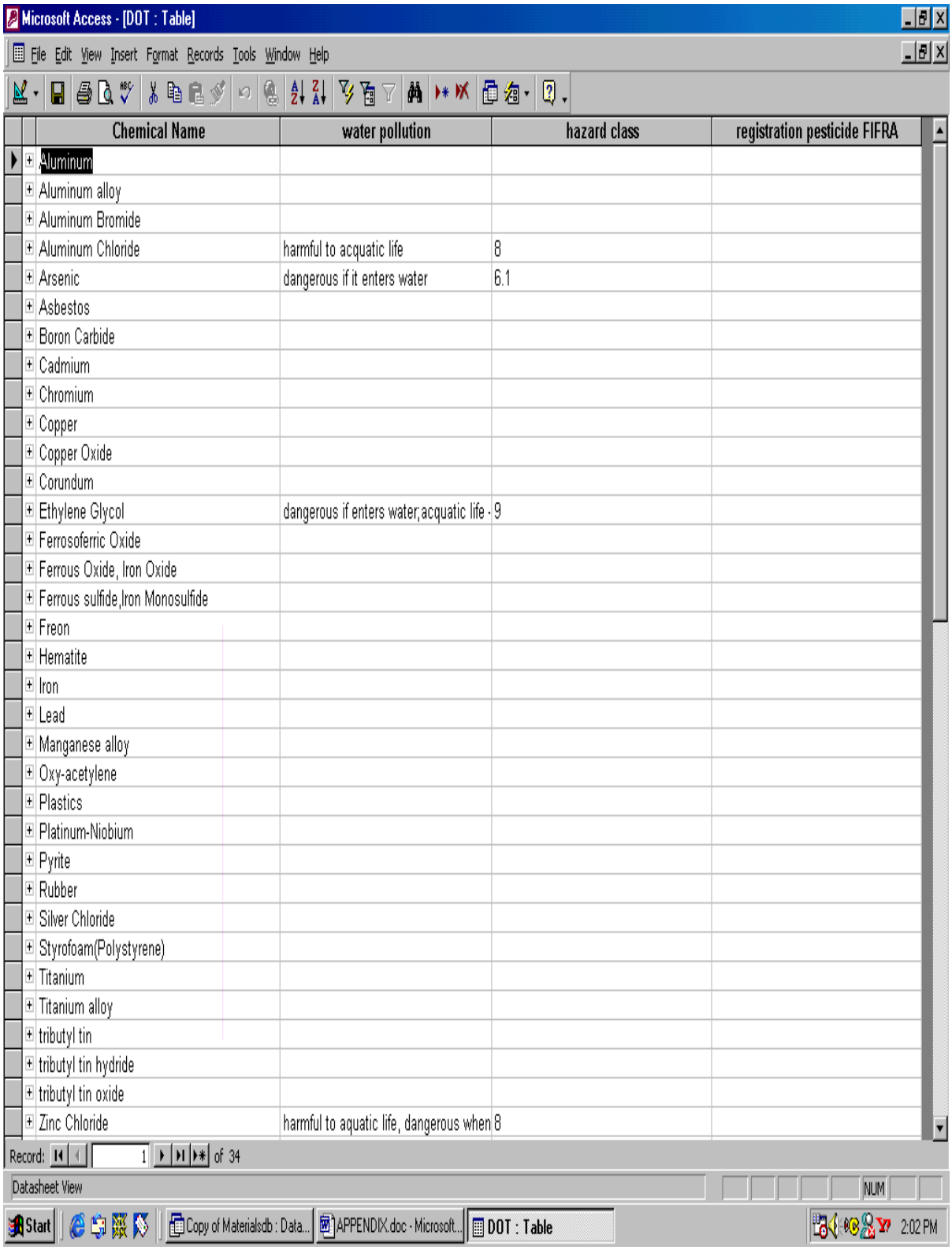
APPENDIX 9 – CLEAN AIR ACT TABLE



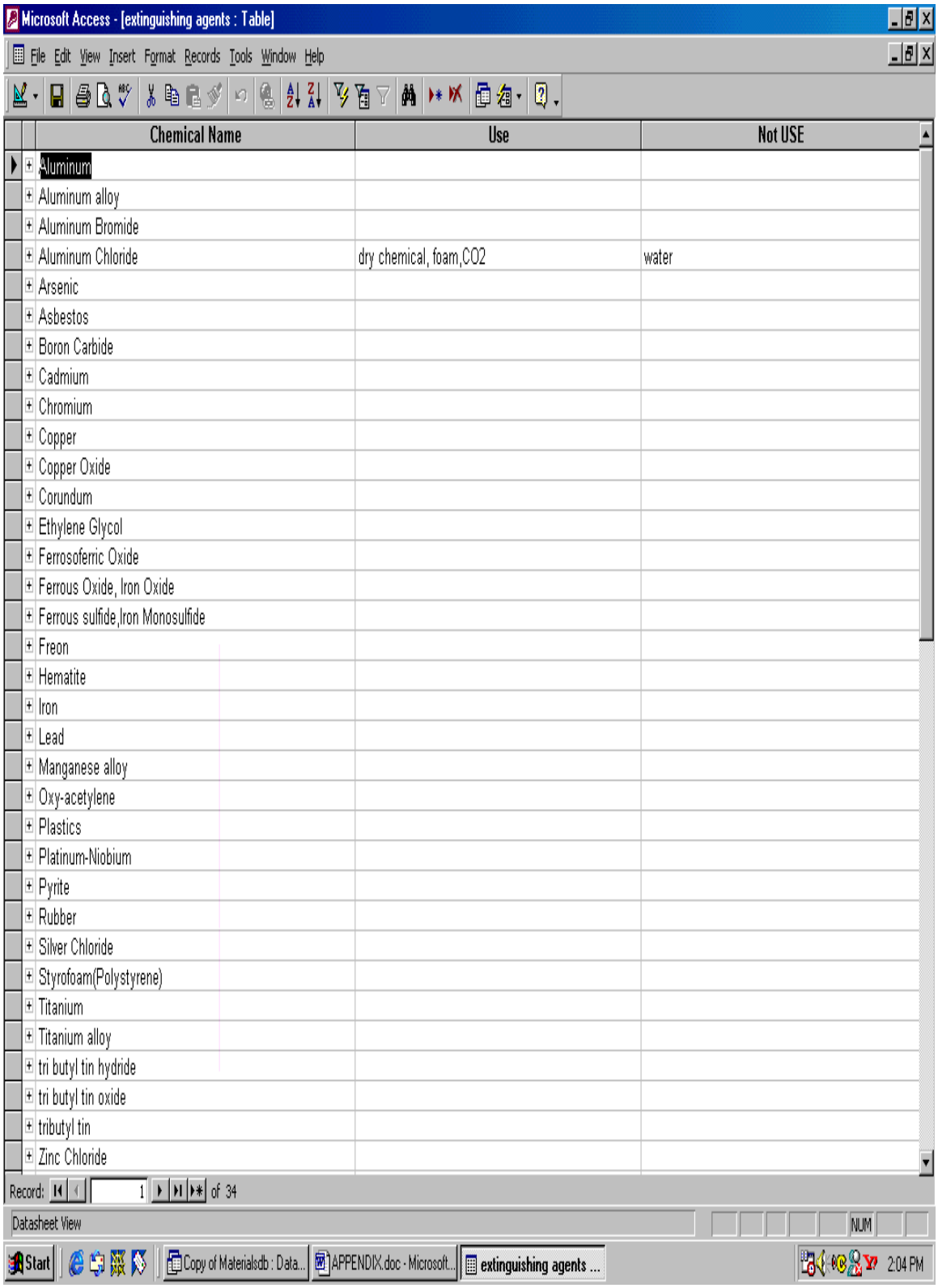
APPENDIX 10 – CORROSIVITY TABLE



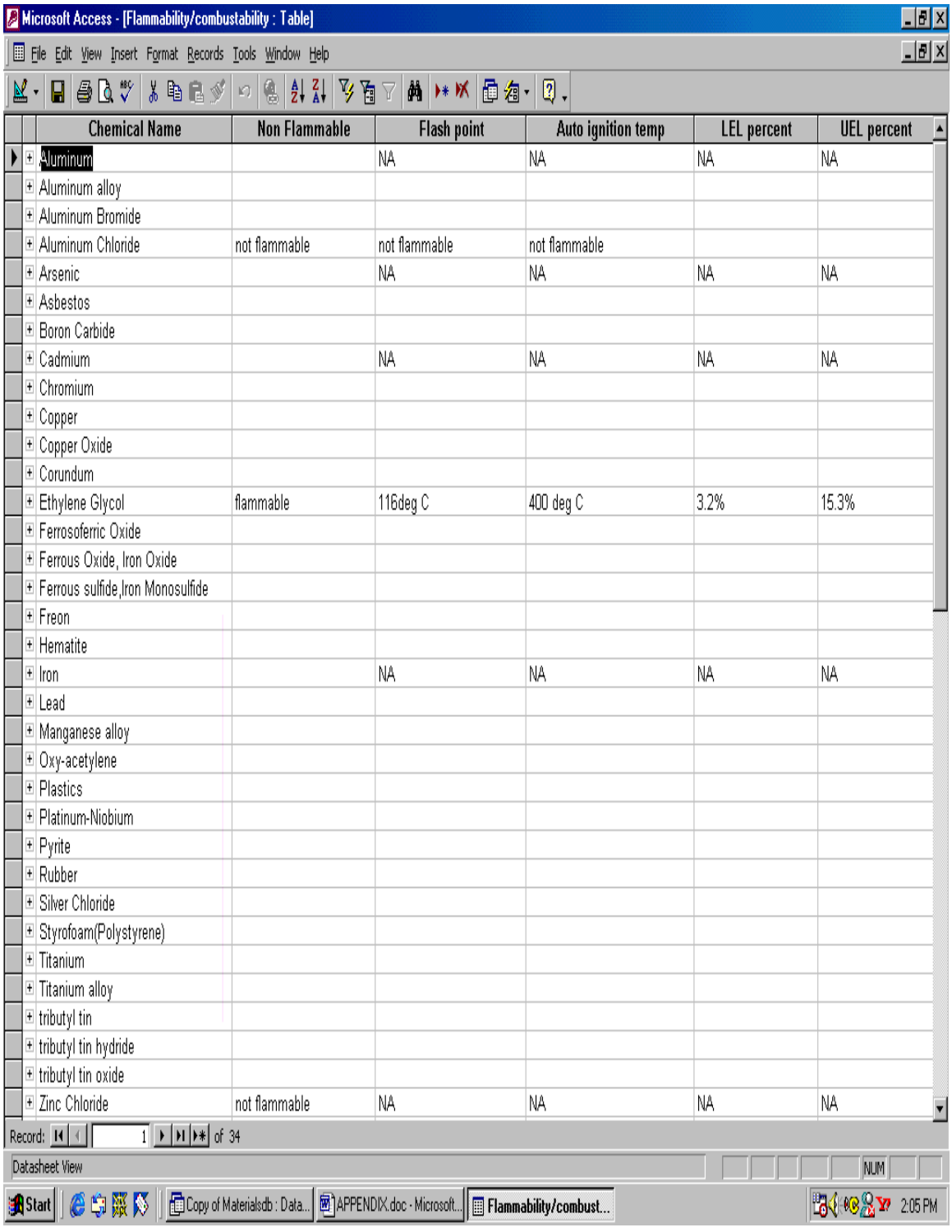
APPENDIX 11 – DOT TABLE



APPENDIX 12 – EXTINGUISHING AGENTS TABLE

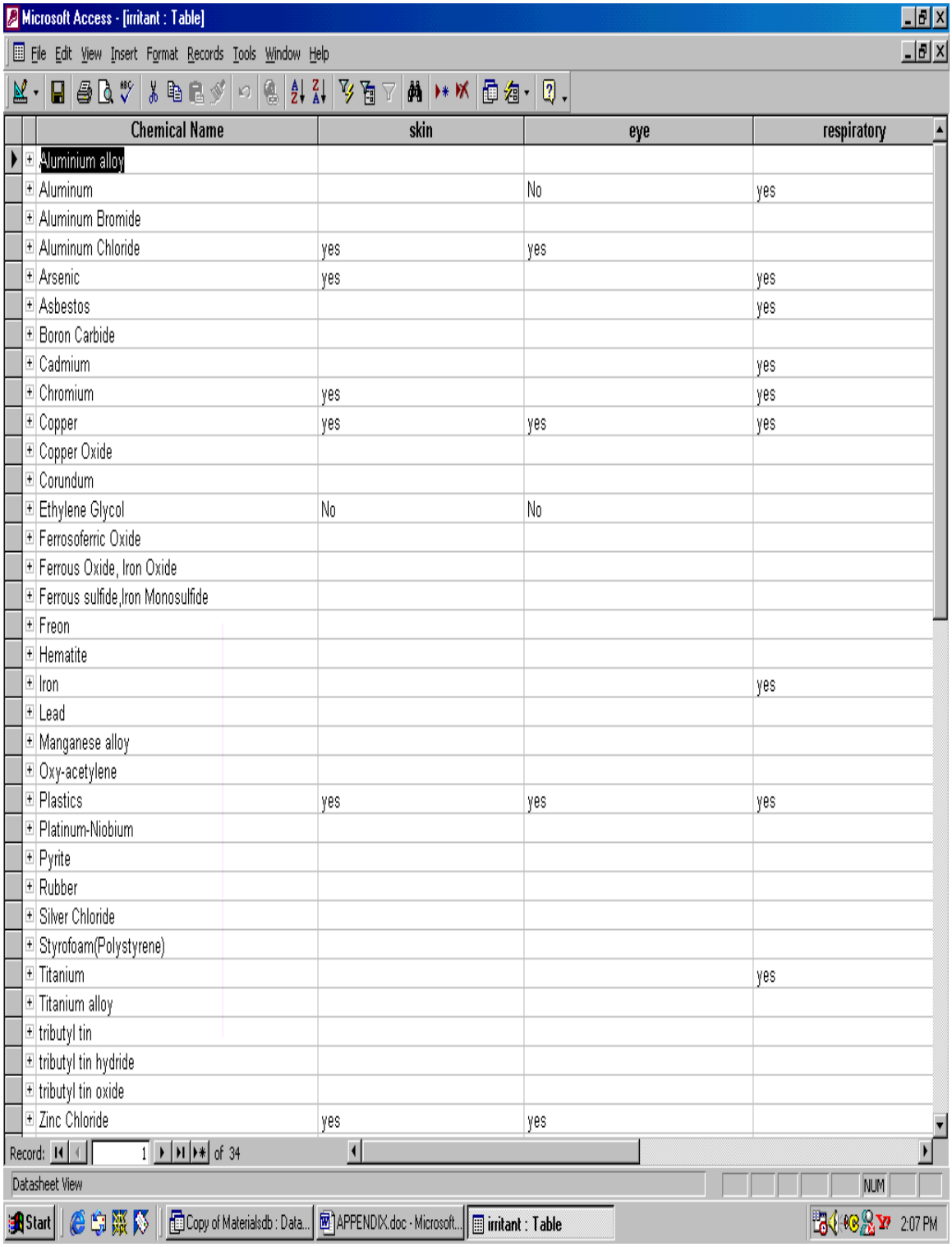


APPENDIX 13 – FLAMMABILITY/COMBUSTIBILITY TABLE



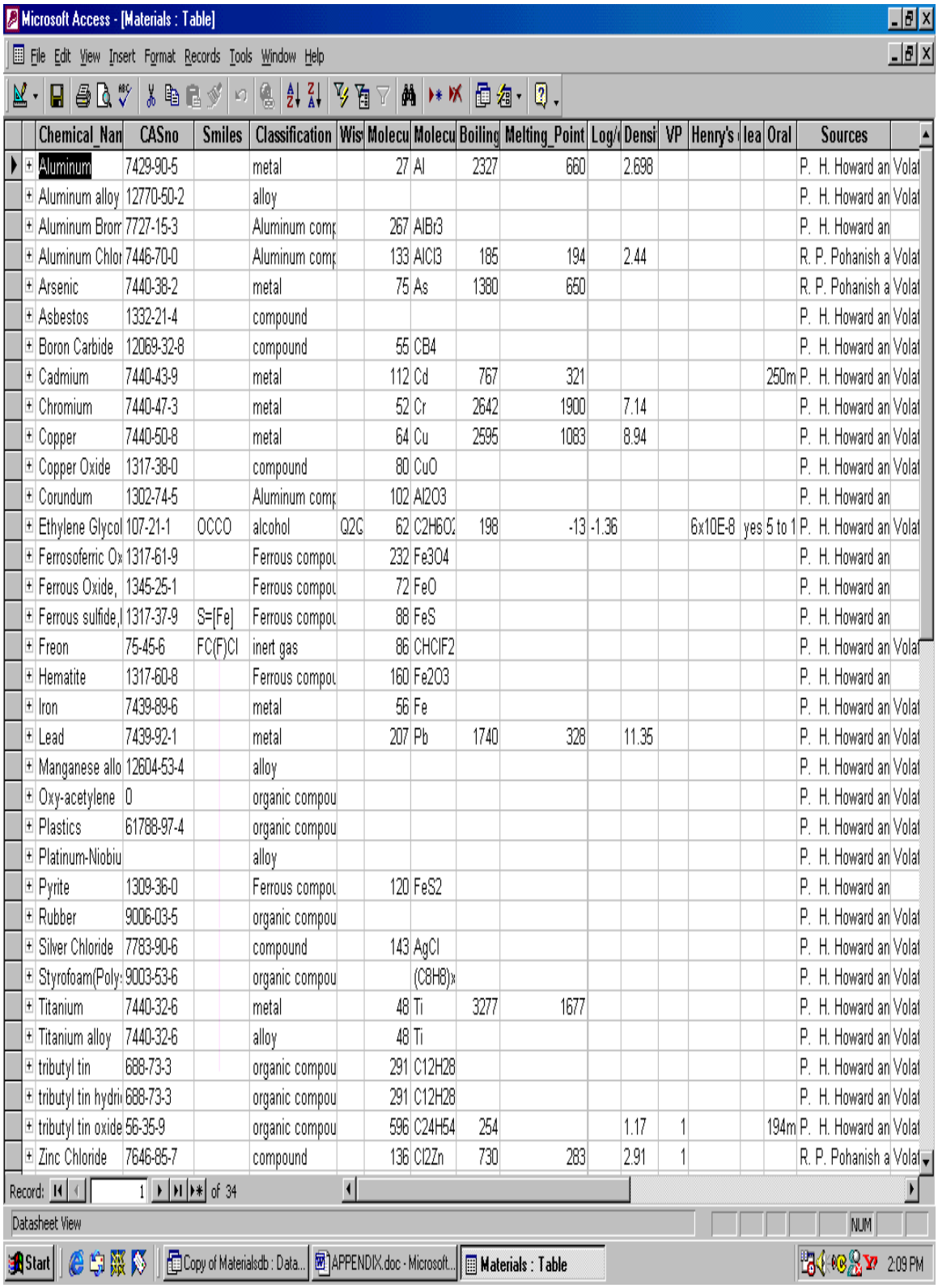
Chemical Name	Non Flammable	Flash point	Auto ignition temp	LEL percent	UEL percent
Aluminum		NA	NA	NA	NA
Aluminum alloy					
Aluminum Bromide					
Aluminum Chloride	not flammable	not flammable	not flammable		
Arsenic		NA	NA	NA	NA
Asbestos					
Boron Carbide					
Cadmium		NA	NA	NA	NA
Chromium					
Copper					
Copper Oxide					
Corundum					
Ethylene Glycol	flammable	116deg C	400 deg C	3.2%	15.3%
Ferrosoferric Oxide					
Ferrous Oxide, Iron Oxide					
Ferrous sulfide,Iron Monosulfide					
Freon					
Hematite					
Iron		NA	NA	NA	NA
Lead					
Manganese alloy					
Oxy-acetylene					
Plastics					
Platinum-Niobium					
Pyrite					
Rubber					
Silver Chloride					
Styrofoam(Polystyrene)					
Titanium					
Titanium alloy					
tributyl tin					
tributyl tin hydride					
tributyl tin oxide					
Zinc Chloride	not flammable	NA	NA	NA	NA

APPENDIX 14 – IRRITANT TABLE



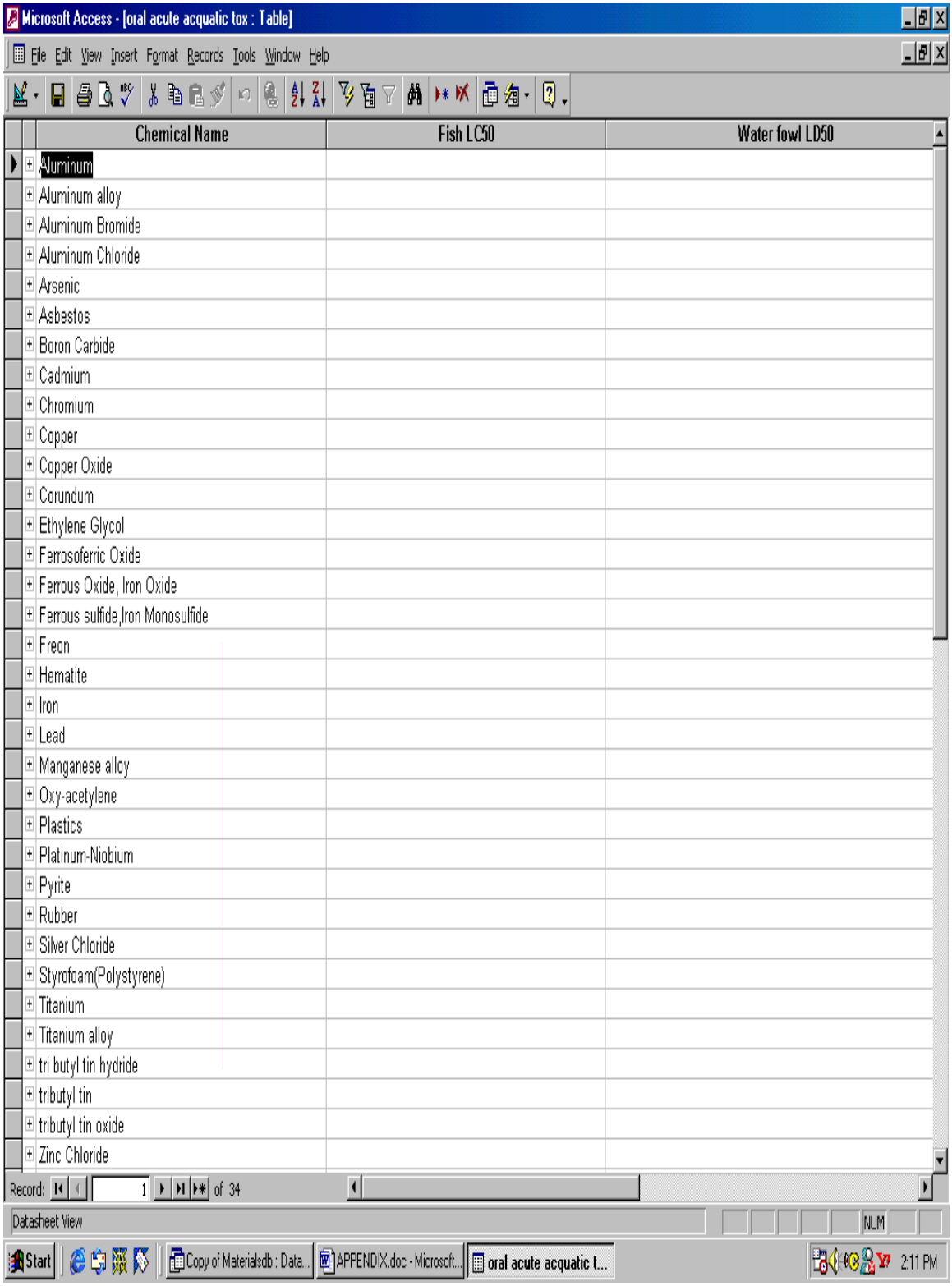
Chemical Name	skin	eye	respiratory
Aluminium alloy			
Aluminum		No	yes
Aluminum Bromide			
Aluminum Chloride	yes	yes	
Arsenic	yes		yes
Asbestos			yes
Boron Carbide			
Cadmium			yes
Chromium	yes		yes
Copper	yes	yes	yes
Copper Oxide			
Corundum			
Ethylene Glycol	No	No	
Ferrosoferric Oxide			
Ferrous Oxide, Iron Oxide			
Ferrous sulfide,Iron Monosulfide			
Freon			
Hematite			
Iron			yes
Lead			
Manganese alloy			
Oxy-acetylene			
Plastics	yes	yes	yes
Platinum-Niobium			
Pyrite			
Rubber			
Silver Chloride			
Styrofoam(Polystyrene)			
Titanium			yes
Titanium alloy			
tributyl tin			
tributyl tin hydride			
tributyl tin oxide			
Zinc Chloride	yes	yes	

APPENDIX 15 – MATERIALS TABLE

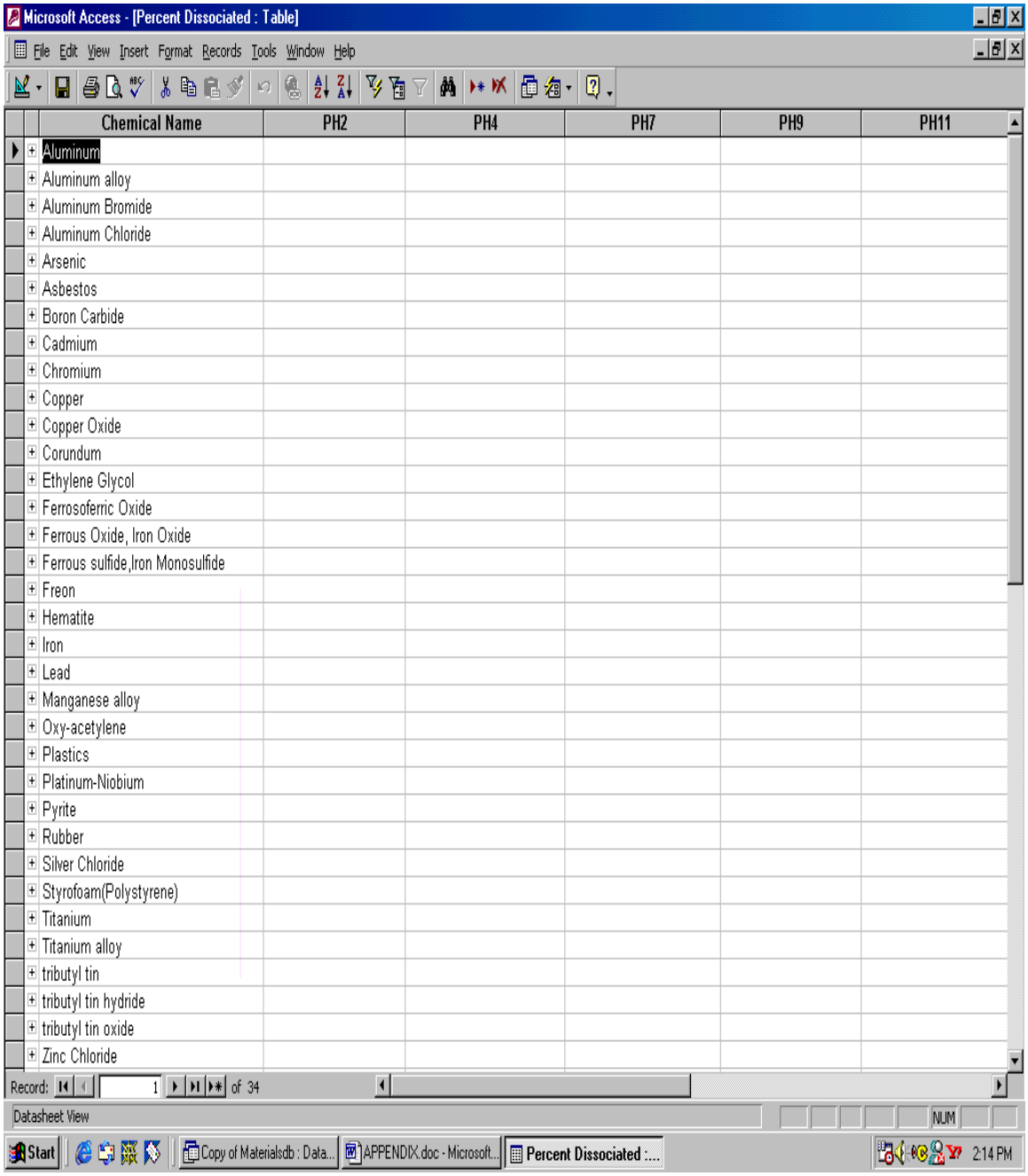


Chemical_Nan	CASno	Smiles	Classification	Wis	Molecu	Molecu	Boiling	Melting_Point	Log/	Densi	VP	Henry's	lea	Oral	Sources	
Aluminum	7429-90-5		metal		27	Al	2327	660		2.698					P. H. Howard an	Volat
Aluminum alloy	12770-50-2		alloy												P. H. Howard an	Volat
Aluminum Brom	7727-15-3		Aluminum comp		267	AlBr3									P. H. Howard an	
Aluminum Chlor	7446-70-0		Aluminum comp		133	AlCl3	185	194		2.44					R. P. Pohanish a	Volat
Arsenic	7440-38-2		metal		75	As	1380	650							R. P. Pohanish a	Volat
Asbestos	1332-21-4		compound												P. H. Howard an	Volat
Boron Carbide	12069-32-8		compound		55	CB4									P. H. Howard an	Volat
Cadmium	7440-43-9		metal		112	Cd	767	321						250m	P. H. Howard an	Volat
Chromium	7440-47-3		metal		52	Cr	2642	1900		7.14					P. H. Howard an	Volat
Copper	7440-50-8		metal		64	Cu	2595	1083		8.94					P. H. Howard an	Volat
Copper Oxide	1317-38-0		compound		80	CuO									P. H. Howard an	Volat
Corundum	1302-74-5		Aluminum comp		102	Al2O3									P. H. Howard an	
Ethylene Glycol	107-21-1	OCCO	alcohol	Q2C	62	C2H6O2	198	-13	-1.36			6x10E-8	yes	5 to 1	P. H. Howard an	Volat
Ferrosoferric Ox	1317-61-9		Ferrous compou		232	Fe3O4									P. H. Howard an	
Ferrous Oxide,	1345-25-1		Ferrous compou		72	FeO									P. H. Howard an	
Ferrous sulfide,I	1317-37-9	S=[Fe]	Ferrous compou		88	FeS									P. H. Howard an	
Freon	75-45-6	FC(F)Cl	inert gas		86	CHClF2									P. H. Howard an	Volat
Hematite	1317-60-8		Ferrous compou		160	Fe2O3									P. H. Howard an	
Iron	7439-89-6		metal		56	Fe									P. H. Howard an	Volat
Lead	7439-92-1		metal		207	Pb	1740	328		11.35					P. H. Howard an	Volat
Manganese allo	12604-53-4		alloy												P. H. Howard an	Volat
Oxy-acetylene	0		organic compou												P. H. Howard an	Volat
Plastics	61788-97-4		organic compou												P. H. Howard an	Volat
Platinum-Niobiu			alloy												P. H. Howard an	Volat
Pyrite	1309-36-0		Ferrous compou		120	FeS2									P. H. Howard an	
Rubber	9006-03-5		organic compou												P. H. Howard an	Volat
Silver Chloride	7783-90-6		compound		143	AgCl									P. H. Howard an	Volat
Styrofoam(Poly	9003-53-6		organic compou			(C8H8)x									P. H. Howard an	Volat
Titanium	7440-32-6		metal		48	Ti	3277	1677							P. H. Howard an	Volat
Titanium alloy	7440-32-6		alloy		48	Ti									P. H. Howard an	Volat
tributyl tin	688-73-3		organic compou		291	C12H28									P. H. Howard an	Volat
tributyl tin hydri	688-73-3		organic compou		291	C12H28									P. H. Howard an	Volat
tributyl tin oxide	56-35-9		organic compou		596	C24H54	254			1.17	1			194m	P. H. Howard an	Volat
Zinc Chloride	7646-85-7		compound		136	Cl2Zn	730	283		2.91	1				R. P. Pohanish a	Volat

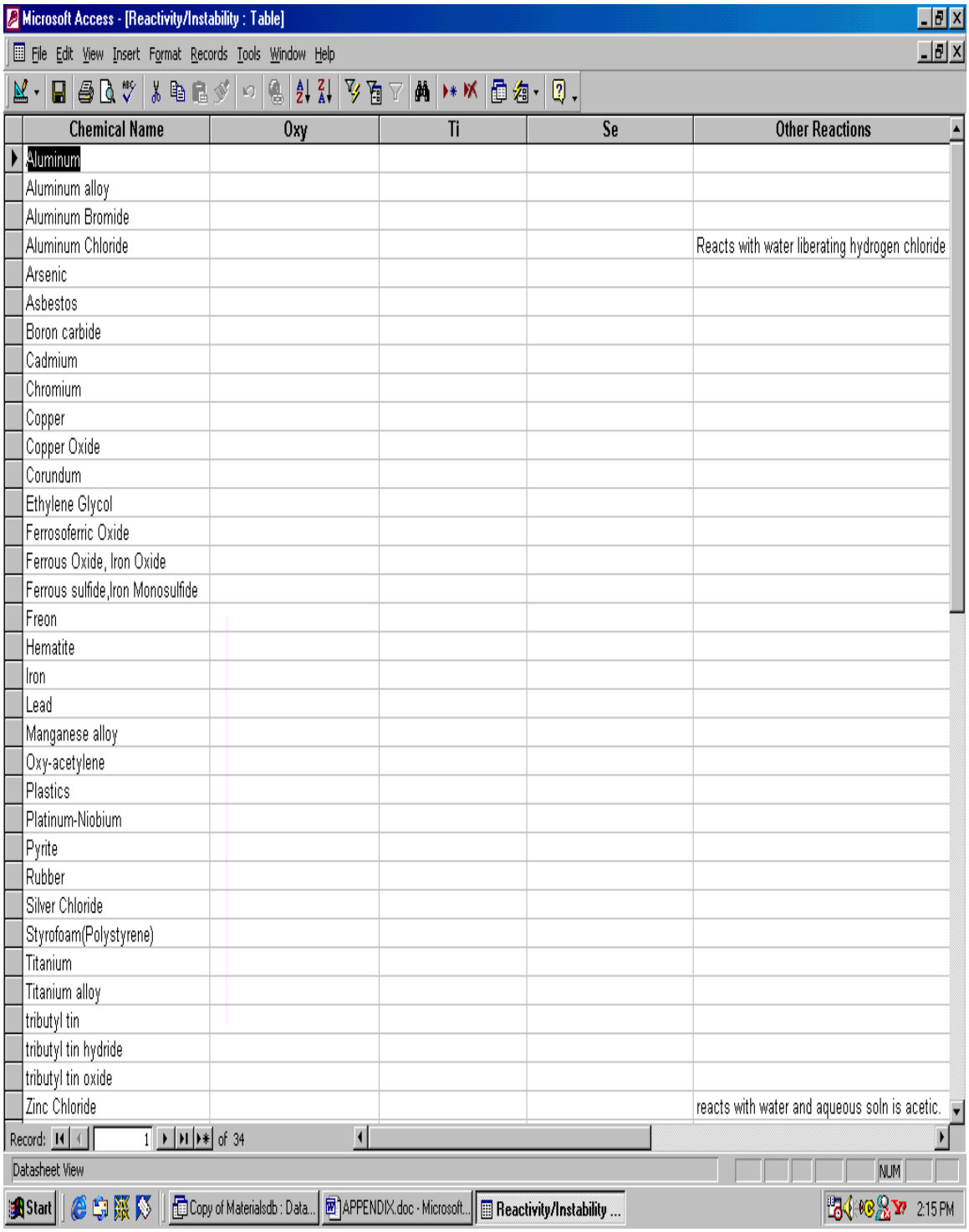
APPENDIX 16 – ORAL ACUTE AQUATIC TOXICITY TABLE



APPENDIX 17 – PERCENT DISSOCIATED TABLE

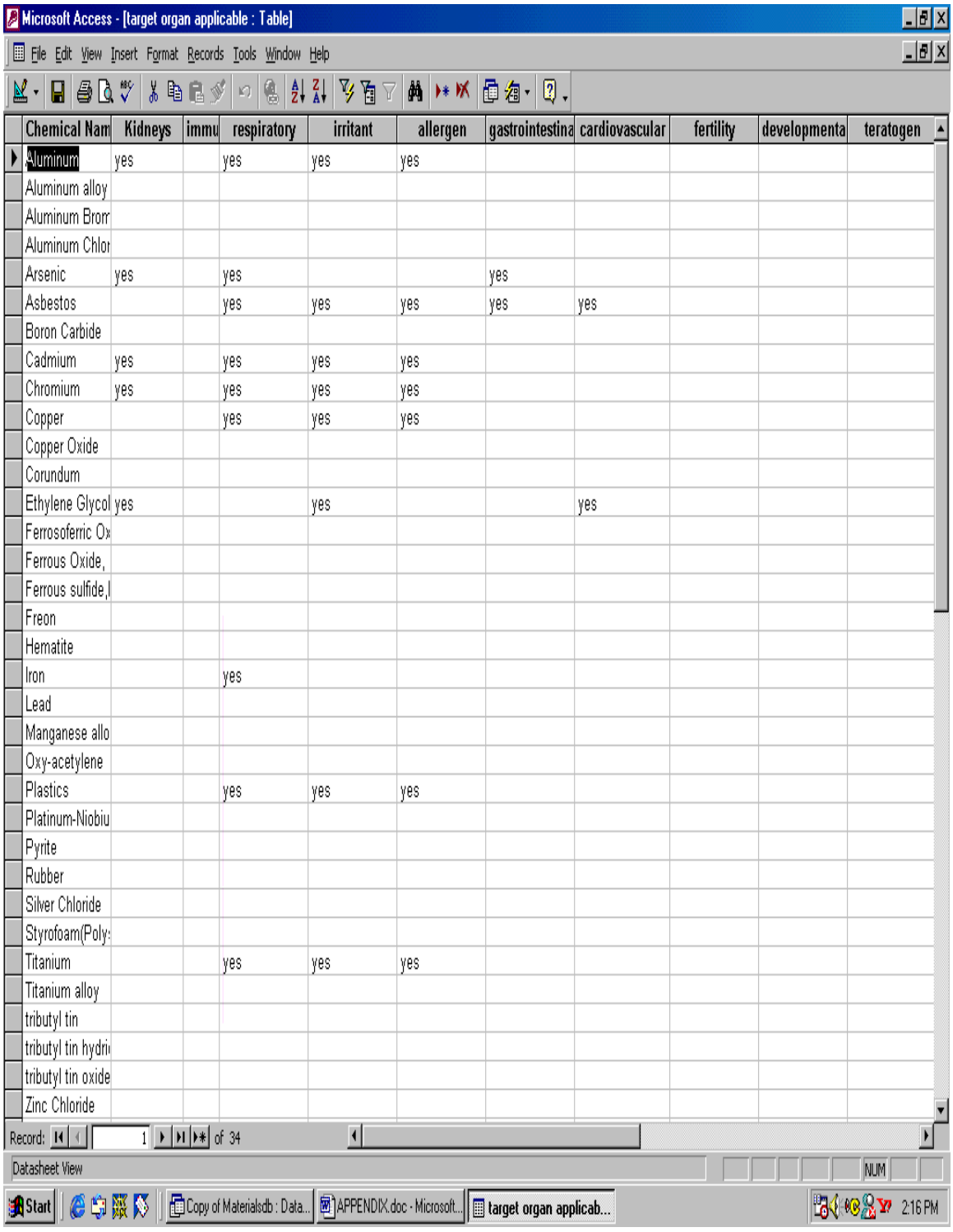


APPENDIX 18 – REACTIVITY/INSTABILITY TABLE



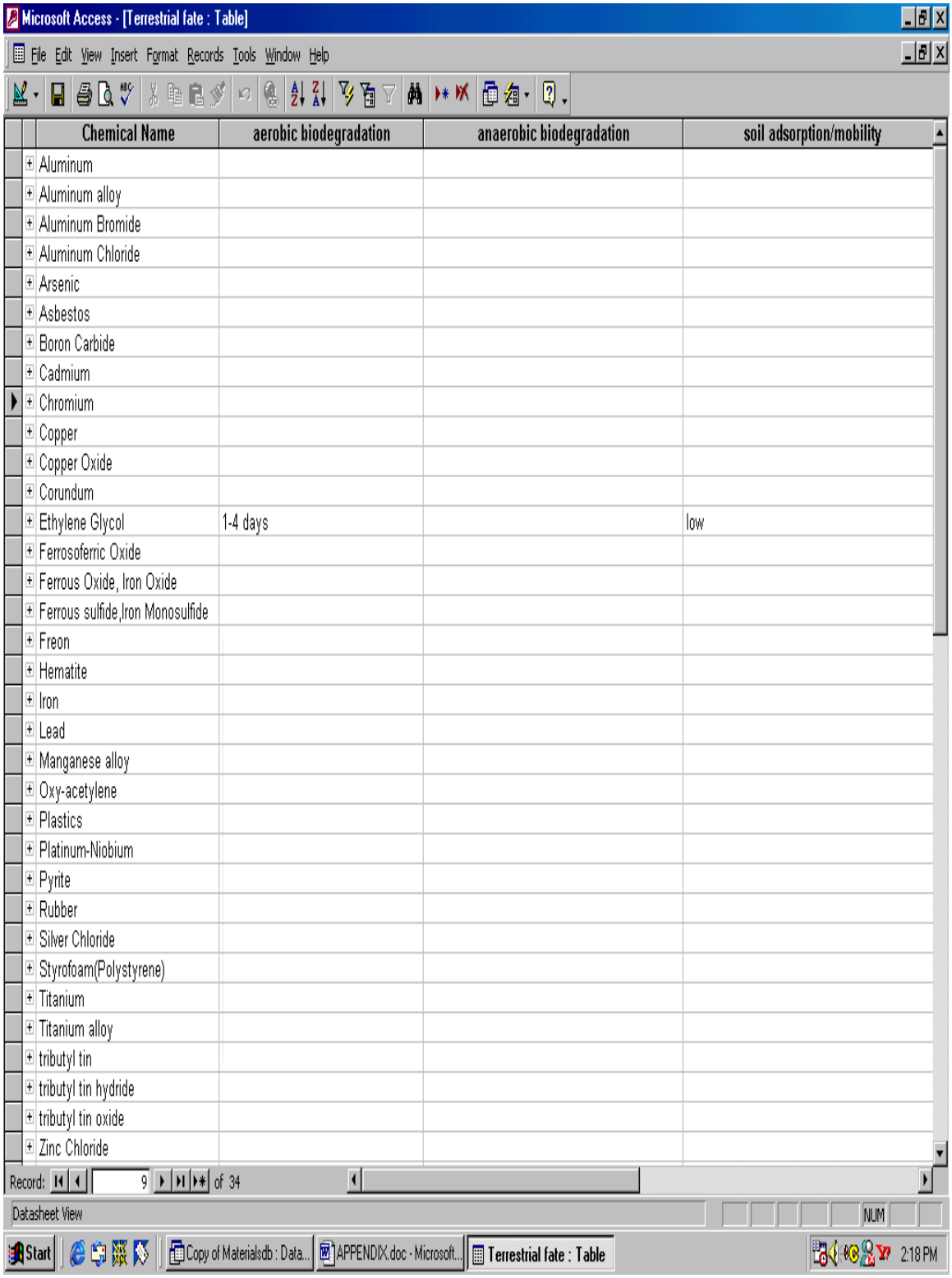
Chemical Name	Oxy	Ti	Se	Other Reactions
Aluminum				
Aluminum alloy				
Aluminum Bromide				
Aluminum Chloride				Reacts with water liberating hydrogen chloride
Arsenic				
Asbestos				
Boron carbide				
Cadmium				
Chromium				
Copper				
Copper Oxide				
Corundum				
Ethylene Glycol				
Ferrosoferric Oxide				
Ferrous Oxide, Iron Oxide				
Ferrous sulfide,Iron Monosulfide				
Freon				
Hematite				
Iron				
Lead				
Manganese alloy				
Oxy-acetylene				
Plastics				
Platinum-Niobium				
Pyrite				
Rubber				
Silver Chloride				
Styrofoam(Polystyrene)				
Titanium				
Titanium alloy				
tributyl tin				
tributyl tin hydride				
tributyl tin oxide				
Zinc Chloride				reacts with water and aqueous soln is acetic.

APPENDIX 19 – TARGET ORAN APPLICABLE TABLE



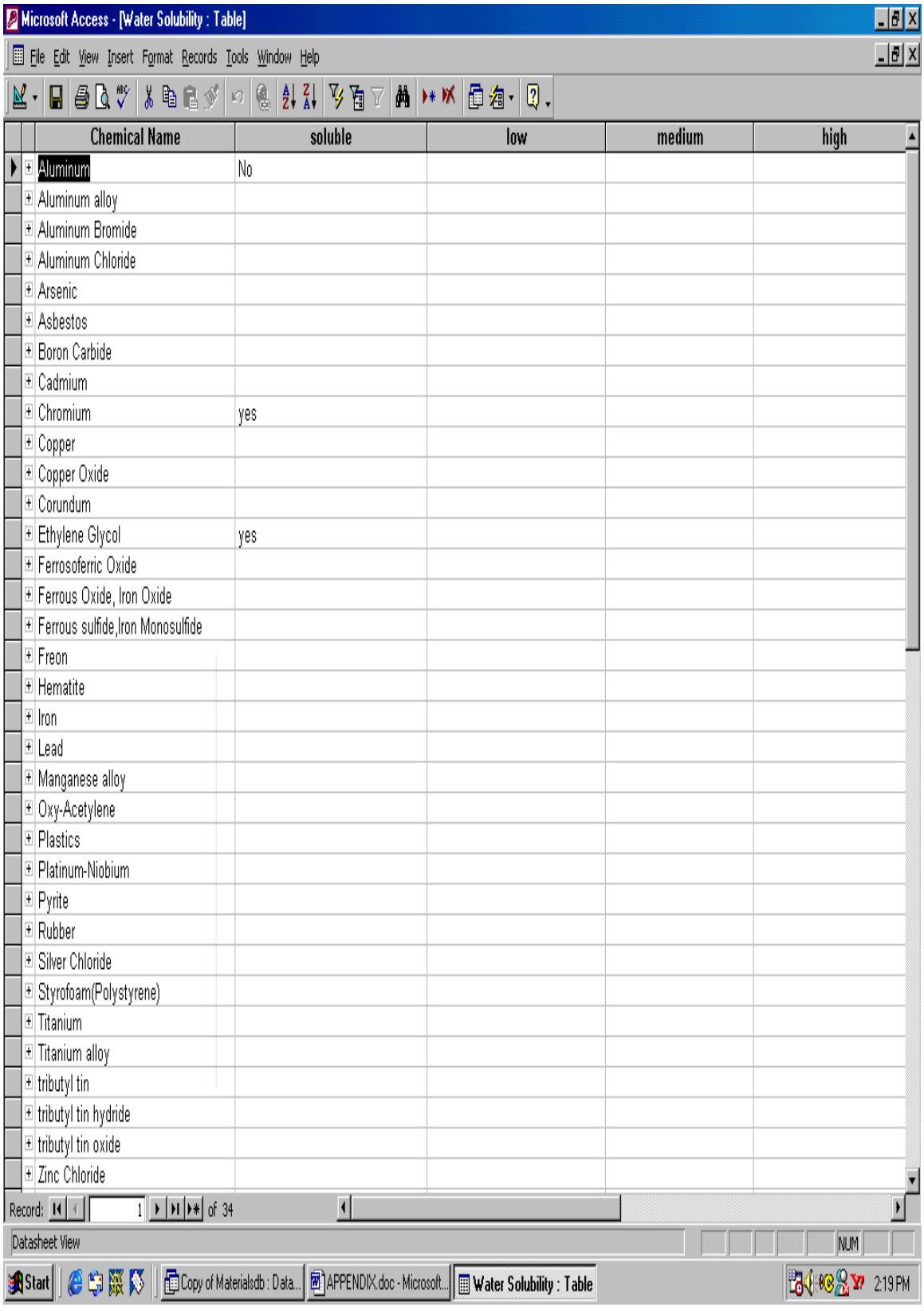
Chemical Nam	Kidneys	immu	respiratory	irritant	allergen	gastrointestina	cardiovascular	fertility	developmenta	teratogen
Aluminum	yes		yes	yes	yes					
Aluminum alloy										
Aluminum Brom										
Aluminum Chlor										
Arsenic	yes		yes			yes				
Asbestos			yes	yes	yes	yes	yes			
Boron Carbide										
Cadmium	yes		yes	yes	yes					
Chromium	yes		yes	yes	yes					
Copper			yes	yes	yes					
Copper Oxide										
Corundum										
Ethylene Glycol	yes			yes			yes			
Ferrosoferric Ox										
Ferrous Oxide,										
Ferrous sulfide,I										
Freon										
Hematite										
Iron			yes							
Lead										
Manganese allo										
Oxy-acetylene										
Plastics			yes	yes	yes					
Platinum-Niobiu										
Pyrite										
Rubber										
Silver Chloride										
Styrofoam(Poly:										
Titanium			yes	yes	yes					
Titanium alloy										
tributyl tin										
tributyl tin hydri										
tributyl tin oxide										
Zinc Chloride										

APPENDIX 20 – TERRESTRIAL FATE TABLE

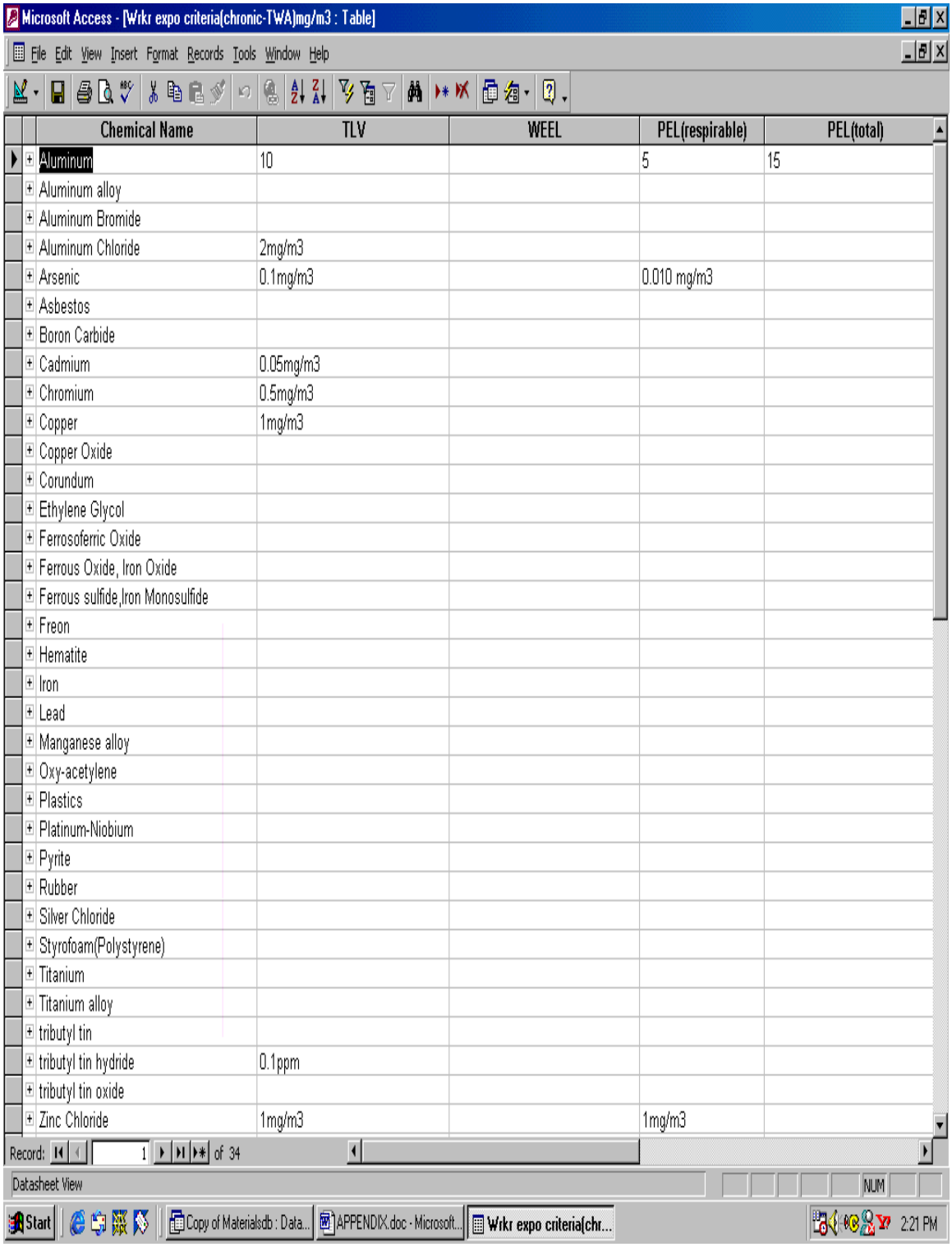


Chemical Name	aerobic biodegradation	anaerobic biodegradation	soil adsorption/mobility
Aluminum			
Aluminum alloy			
Aluminum Bromide			
Aluminum Chloride			
Arsenic			
Asbestos			
Boron Carbide			
Cadmium			
Chromium			
Copper			
Copper Oxide			
Corundum			
Ethylene Glycol	1-4 days		low
Ferrosoferric Oxide			
Ferrous Oxide, Iron Oxide			
Ferrous sulfide,Iron Monosulfide			
Freon			
Hematite			
Iron			
Lead			
Manganese alloy			
Oxy-acetylene			
Plastics			
Platinum-Niobium			
Pyrite			
Rubber			
Silver Chloride			
Styrofoam(Polystyrene)			
Titanium			
Titanium alloy			
tributyl tin			
tributyl tin hydride			
tributyl tin oxide			
Zinc Chloride			

APPENDIX 21 – WATER SOLUBILITY TABLE

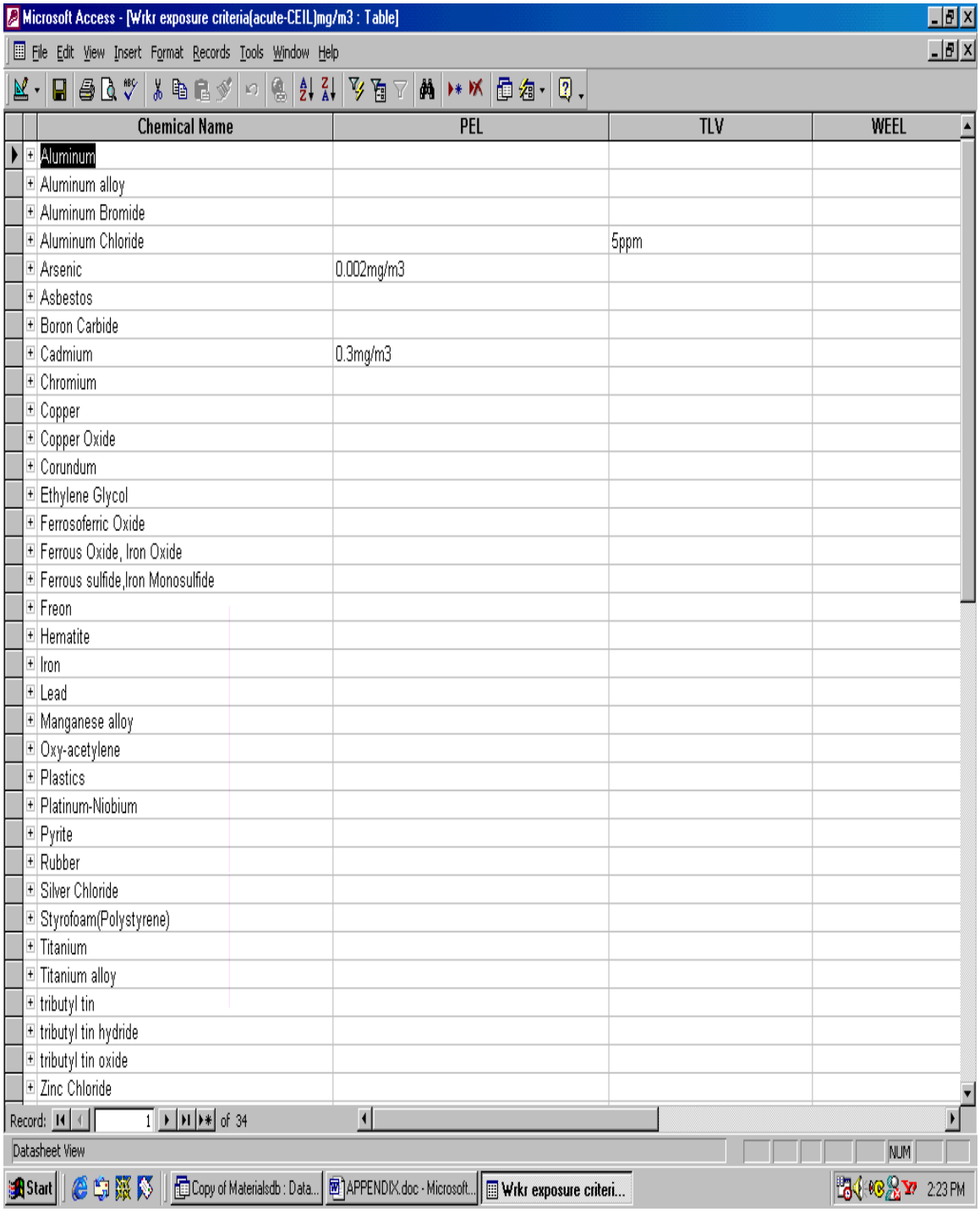


APPENDIX 22 – WORKER EXPOSURE CRITERIA (CHRONIC-TWA) TABLE



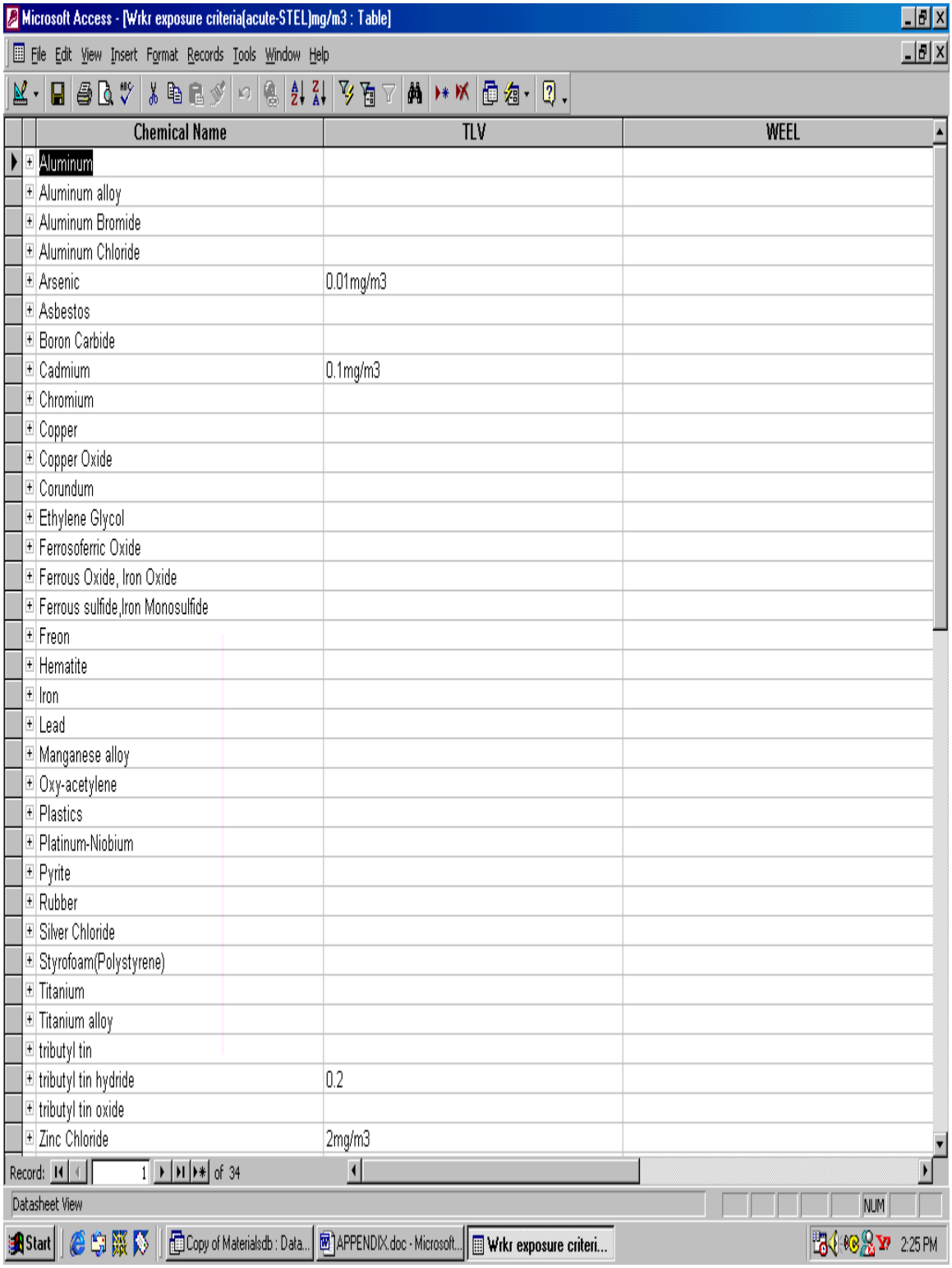
Chemical Name	TLV	WEEL	PEL(respirable)	PEL(total)
Aluminum	10		5	15
Aluminum alloy				
Aluminum Bromide				
Aluminum Chloride	2mg/m3			
Arsenic	0.1mg/m3		0.010 mg/m3	
Asbestos				
Boron Carbide				
Cadmium	0.05mg/m3			
Chromium	0.5mg/m3			
Copper	1mg/m3			
Copper Oxide				
Corundum				
Ethylene Glycol				
Ferrosoferric Oxide				
Ferrous Oxide, Iron Oxide				
Ferrous sulfide,Iron Monosulfide				
Freon				
Hematite				
Iron				
Lead				
Manganese alloy				
Oxy-acetylene				
Plastics				
Platinum-Niobium				
Pyrite				
Rubber				
Silver Chloride				
Styrofoam(Polystyrene)				
Titanium				
Titanium alloy				
tributyl tin				
tributyl tin hydride	0.1ppm			
tributyl tin oxide				
Zinc Chloride	1mg/m3		1mg/m3	

APPENDIX 23 – WORKER EXPOSURE CRITERIA (ACUTE-CEIL) TABLE



Chemical Name	PEL	TLV	WEEL
Aluminum			
Aluminum alloy			
Aluminum Bromide			
Aluminum Chloride		5ppm	
Arsenic	0.002mg/m3		
Asbestos			
Boron Carbide			
Cadmium	0.3mg/m3		
Chromium			
Copper			
Copper Oxide			
Corundum			
Ethylene Glycol			
Ferrosoferric Oxide			
Ferrous Oxide, Iron Oxide			
Ferrous sulfide,Iron Monosulfide			
Freon			
Hematite			
Iron			
Lead			
Manganese alloy			
Oxy-acetylene			
Plastics			
Platinum-Niobium			
Pyrite			
Rubber			
Silver Chloride			
Styrofoam(Polystyrene)			
Titanium			
Titanium alloy			
tributyl tin			
tributyl tin hydride			
tributyl tin oxide			
Zinc Chloride			

APPENDIX 24 – WORKER EXPOSURE CRITERIA(ACUTE-STEL) TABLE



Chemical Name	TLV	WEEL
Aluminum		
Aluminum alloy		
Aluminum Bromide		
Aluminum Chloride		
Arsenic	0.01mg/m3	
Asbestos		
Boron Carbide		
Cadmium	0.1mg/m3	
Chromium		
Copper		
Copper Oxide		
Corundum		
Ethylene Glycol		
Ferrosoferric Oxide		
Ferrous Oxide, Iron Oxide		
Ferrous sulfide,Iron Monosulfide		
Freon		
Hematite		
Iron		
Lead		
Manganese alloy		
Oxy-acetylene		
Plastics		
Platinum-Niobium		
Pyrite		
Rubber		
Silver Chloride		
Styrofoam(Polystyrene)		
Titanium		
Titanium alloy		
tributyl tin		
tributyl tin hydride	0.2	
tributyl tin oxide		
Zinc Chloride	2mg/m3	

APPENDIX - 25

25.1 Acute Symptoms Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub
```

```
Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.2 Allergen form Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub
```

```
Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr
```

```
  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.3 Aquatic Fate form Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub
```

25.4 Atmospheric Fate form Code

```
Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub




Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
```

```
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
```

```
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.5 BOD form Code :

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
```

```
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.6 Clean Air Act Code:

```
rivate Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
```

```
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
```

```
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.7 Cancer form Code :

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
```

```
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.8 Chronic symptoms form Code:

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
```

```
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.9 Corrosivity form Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean
```

```
  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub
```

```
Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.10 Characteristic RCRA form Code :

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
```

```
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.11 DOT Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub
```

```
Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr
```

```
  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.12 Extinguishing Agents form Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
```

```
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.13 File Maintenance form Code:

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub
```

```
Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
```

```
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.14 Flammability/Combustibility form Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
```

```
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.15 Main Form Code:

```
Private Sub AC_Click()
frmacutesymptoms.Show 1
End Sub

Private Sub AF_Click()
```

```
frmaquaticfate.Show 1
End Sub

Private Sub allergen_Click()
frmallergen.Show 1
End Sub

Private Sub ATF_Click()
frmatmfate.Show 1
End Sub

Private Sub bod_Click()
frmbod.Show 1
End Sub

Private Sub Boilingpoint_Click()
frmquerybp.Show 1
End Sub

Private Sub CAA_Click()
frmcaa.Show 1
End Sub

Private Sub cancer_Click()
frmcancer.Show 1
End Sub

Private Sub casno_Click()
frmsearchcsno.Show 1
End Sub

Private Sub chemicalname_Click()
frmsearchchname.Show 1
End Sub

Private Sub Co_Click()
frmcorrosivity.Show 1
End Sub

Private Sub CRCRA_Click()
frmcrcra.Show 1
End Sub

Private Sub CS_Click()
frmchronicsymptoms.Show 1
End Sub

Private Sub DOt_Click()
frmdot.Show 1
End Sub

Private Sub Ea_Click()
frmextinguishingagents.Show 1
End Sub

Private Sub exit_Click()
```

```
Unload frmmain
End Sub

Private Sub FC_Click()
frmflammabilitycombustibility.Show 1
End Sub

Private Sub materials_Click()
frmmaterial.Show 1
End Sub

Private Sub melting_Click()
frmquerymeltingpoint.Show 1
End Sub

Private Sub MF_Click()
frmsearchmolfor.Show 1
End Sub

Private Sub mnuClassify_Click()
frmqueryclass.Show 1
End Sub

Private Sub molweight_Click()
frmquerymw.Show 1
End Sub

Private Sub OAAT_Click()
frmoralacuteaquatictox.Show 1
End Sub

Private Sub PD_Click()
frmpercentdissociated.Show 1
End Sub

Private Sub records_Click()
"frmpassword1.Show 1
'Unload frmpassword1
End Sub

Private Sub RI_Click()
frmReactivityInstability.Show 1
End Sub

Private Sub TF_Click()
frmtf.Show 1
End Sub

Private Sub vp_Click()
frmqueryvp.Show 1
End Sub

Private Sub WECCEIL_Click()
frmwecceil.Show 1
End Sub
```

```
Private Sub WECSTEL_Click()
frmwecstel.Show 1
End Sub

Private Sub WECTWA_Click()
frmwectwa.Show 1
End Sub

Private Sub WL_Click()

End Sub

Private Sub WS_Click()
frmwatersolubility.Show 1
End Sub
```

25.16 Materials form Code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select
```

```
  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  'On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
 ' Exit Sub
'UpdateErr:
  'MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.17 Oral Acute aquatic Tox Form – code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub
```

```
Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
```

```
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.18 Invalid Password Code:

```
Private Sub Command1_Click()
If Text1.Text = "a" Then
Unload frmpassword
frmmain.Show 1
Else
Unload frmpassword
MsgBox ("Invalid password")
frmpassword.Show 1
Text1.Text = ""
End If
End Sub
```

25.19 Percent Dissociated Code:

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub
```

```
Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
```

```
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.20 Form Query on boiling point:

```
Private optCheck As Boolean

Private Sub Option1_Click()
optCheck = True
End Sub

Private Sub Option2_Click()
optCheck = False
End Sub


Private Sub Text1_KeyPress(KeyAscii As Integer)

If KeyAscii = 13 Then
   If Text1.Text = "" Then
      MsgBox "Please enter a value for Boiling Point"
      Exit Sub
   Else
      If optCheck Then
         adoQmw.RecordSource = "select * from materials where boiling_point is not null and boiling_point > " &
Text1.Text & " order by boiling_point"
         adoQmw.Refresh
      Else
         adoQmw.RecordSource = "select * from materials where boiling_point is not null and boiling_point< " &
Text1.Text & " order by boiling_point"
         adoQmw.Refresh
      End If
   End If
End If
End Sub
```

25.21 Query on Classification form code:

```
Private optCheck As Boolean
```

```
Private Sub Option1_Click()
optCheck = True
End Sub

Private Sub Option2_Click()
optCheck = False
End Sub
Private Sub Combo1_click()
adoQmw.RecordSource = "select * from materials where classification ='" & Combo1.Text & "'"
adoQmw.Refresh
End Sub
Private Sub Form_Load()
Dim dbcs As Database
Dim rscs As Recordset
Dim i
Set dbcs = DBEngine.Workspaces(0).OpenDatabase("c:\vdemo\db2.mdb")
Set rscs = dbcs.OpenRecordset("select distinct classification from materials")
Do Until rscs.EOF
   If rscs.Fields("classification") <> "" Then
      Combo1.AddItem rscs!classification
   End If
   rscs.MoveNext
Loop
rscs.Close
dbcs.Close
End Sub
```

25.22 Query on Melting point code

```
Private optCheck As Boolean

Private Sub Option1_Click()
optCheck = True
End Sub

Private Sub Option2_Click()
optCheck = False
End Sub


Private Sub Text1_KeyPress(KeyAscii As Integer)

If KeyAscii = 13 Then
   If Text1.Text = "" Then
      MsgBox "Please enter a value for Melting Point"
      Exit Sub
   Else
      If optCheck Then
         adoQmw.RecordSource = "select * from materials where melting_point is not null and melting_point > " &
Text1.Text & " order by melting_point"
         adoQmw.Refresh
      Else
         adoQmw.RecordSource = "select * from materials where melting_point is not null and melting_point< " &
Text1.Text & " order by melting_point"
```

```
        adoQmw.Refresh
      End If
   End If
End If
End Sub
```

25.23 Query on Molecular Weight code:

```
Private optCheck As Boolean

Private Sub Option1_Click()
optCheck = True
End Sub

Private Sub Option2_Click()
optCheck = False
End Sub


Private Sub Text1_KeyPress(KeyAscii As Integer)

If KeyAscii = 13 Then
   If Text1.Text = "" Then
      MsgBox "Please enter a value for Molecular weight"
      Exit Sub
   Else
      If optCheck Then
         adoQmw.RecordSource = "select * from materials where molecular_wt is not null and molecular_wt > " &
Text1.Text & " order by molecular_wt"
         adoQmw.Refresh
      Else
         adoQmw.RecordSource = "select * from materials where molecular_wt is not null and molecular_wt< " &
Text1.Text & " order by molecular_wt"
         adoQmw.Refresh
      End If
   End If
End If
End Sub
```

25.24 Query on VP Code

```
Private optCheck As Boolean

Private Sub Option1_Click()
optCheck = True
End Sub

Private Sub Option2_Click()
optCheck = False
End Sub


Private Sub Text1_KeyPress(KeyAscii As Integer)
```

```
If KeyAscii = 13 Then
   If Text1.Text = "" Then
      MsgBox "Please enter a value for Vapor Pressure"
      Exit Sub
   Else
      If optCheck Then
         adoQmw.RecordSource = "select * from materials where vp is not null and vp > " & Text1.Text & " order by
vp"
         adoQmw.Refresh
      Else
         adoQmw.RecordSource = "select * from materials where vp is not null and vp < " & Text1.Text & " order by
vp"
         adoQmw.Refresh
      End If
   End If
End If
End Sub
```

25.25 Reactivity/Instability form code:

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
```

```
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.26 Search By chemical Name Form code:

```
Option Explicit
Private dbcs As Database
Private rscs As Recordset
```

```
Private Sub dbcmbcs_Click()
Dim strsql As String
Dim i As Field
Set rscs = dbcs.OpenRecordset("select * from materials where chemical_name = '" & dbcmbcs.Text & "'",
dbOpenSnapshot)
   txtmw.Text = IIf(IsNull(rscs!molecular_wt), "Not Available", rscs!molecular_wt)
   txtbp.Text = IIf(IsNull(rscs!boiling_point), "Not Available", rscs!boiling_point)
   txtmp.Text = IIf(IsNull(rscs!melting_point), "Not Available", rscs!melting_point)
   txtmf.Text = IIf(IsNull(rscs!molecular_formula), "Not Available", rscs!molecular_formula)
   lblcn.Caption = IIf(IsNull(rscs!casno), "Not available", rscs!casno)
End Sub
Private Sub Form_Load()
Dim i
Set dbcs = DBEngine.Workspaces(0).OpenDatabase("c:\vdemo\db2.mdb")
Set rscs = dbcs.OpenRecordset("materials")
Do Until rscs.EOF
   If rscs.Fields("casno") <> "" Then
      dbcmbcs.AddItem rscs.Fields("chemical_name").Value
   End If
   rscs.MoveNext
Loop
rscs.Close
End Sub

Private Sub Form_Unload(Cancel As Integer)
dbcs.Close
End Sub
```

25.27 Search By CAS number code:

```
Option Explicit
Private dbcs As Database
Private rscs As Recordse
Private Sub dbcmbcs_Click()
Dim strsql As String
Dim i As Field
Set rscs = dbcs.OpenRecordset("select * from materials where casno = '" & dbcmbcs.Text & "'", dbOpenSnapshot)
   txtmw.Text = IIf(IsNull(rscs!molecular_wt), "Not Available", rscs!molecular_wt)
   txtbp.Text = IIf(IsNull(rscs!boiling_point), "Not Available", rscs!boiling_point)
   txtmp.Text = IIf(IsNull(rscs!melting_point), "Not Available", rscs!melting_point)
   txtmf.Text = IIf(IsNull(rscs!molecular_formula), "Not Available", rscs!molecular_formula)
   lblcn.Caption = IIf(rscs!chemical_name = Null, "Not available", rscs!chemical_name)
End Sub
Private Sub Form_Load()
Dim i
Set dbcs = DBEngine.Workspaces(0).OpenDatabase("c:\vdemo\db2.mdb")
Set rscs = dbcs.OpenRecordset("materials")
Do Until rscs.EOF
   If rscs.Fields("casno") <> "" Then
      dbcmbcs.AddItem rscs.Fields("casno").Value
   End If
   rscs.MoveNext
Loop
rscs.Close
```

```
End Sub

Private Sub Form_Unload(Cancel As Integer)
dbcs.Close
End Sub
```

25.28 Search by Molecular Formula Code

```
Option Explicit
Private dbcs As Database
Private rscs As Recordset
Private Sub dbcmbcs_Click()
Dim strsql As String
Dim i As Field
Set rscs = dbcs.OpenRecordset("select * from materials where molecular_formula = '" & dbcmbcs.Text & "'",
dbOpenSnapshot)
   txtmw.Text = IIf(IsNull(rscs!molecular_wt), "Not Available", rscs!molecular_wt)
   txtbp.Text = IIf(IsNull(rscs!boiling_point), "Not Available", rscs!boiling_point)
   txtmp.Text = IIf(IsNull(rscs!melting_point), "Not Available", rscs!melting_point)
    lblcn.Caption = IIf(rscs!chemical_name = Null, "Not available", rscs!chemical_name)
End Sub
Private Sub Form_Load()
Dim i
Set dbcs = DBEngine.Workspaces(0).OpenDatabase("c:\vdemo\db2.mdb")
Set rscs = dbcs.OpenRecordset("materials")
Do Until rscs.EOF
   If rscs.Fields("molecular_formula") <> "" Then
      dbcmbcs.AddItem rscs.Fields("molecular_formula").Value
   End If
   rscs.MoveNext
Loop
rscs.Close
End Sub

Private Sub Form_Unload(Cancel As Integer)
dbcs.Close
End Sub
```

25.29 Start up form code*:*

```
Private Sub Command1_Click()
   frmpassword.Show 1
End Sub

Private Sub Command2_Click()
   End
End Sub
```

25.30 Terrestrial Fate form code:

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
```

```
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.31 Water Solubility Form code:

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean
```

```
  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub
```

```
Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.32 Worker Exposure Criteria (acute-CEIL) CODE;

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
```

```
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.33 Worker Exposure Criteria (acute-STEL) code

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
```

```
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub

Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
```

```
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

25.34 Worker Exposure Criteria (chronicTWA) code:

```
Private Sub Form_Unload(Cancel As Integer)
  Screen.MousePointer = vbDefault
End Sub

Private Sub datPrimaryRS_Error(ByVal ErrorNumber As Long, Description As String, ByVal Scode As Long,
ByVal Source As String, ByVal HelpFile As String, ByVal HelpContext As Long, fCancelDisplay As Boolean)
  'This is where you would put error handling code
  'If you want to ignore errors, comment out the next line
  'If you want to trap them, add code here to handle them
  MsgBox "Data error event hit err:" & Description
End Sub

Private Sub datPrimaryRS_MoveComplete(ByVal adReason As ADODB.EventReasonEnum, ByVal pError As
ADODB.Error, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This will display the current record position for this recordset
  datPrimaryRS.Caption = "Record: " & CStr(datPrimaryRS.Recordset.AbsolutePosition)
End Sub

Private Sub datPrimaryRS_WillChangeRecord(ByVal adReason As ADODB.EventReasonEnum, ByVal cRecords
As Long, adStatus As ADODB.EventStatusEnum, ByVal pRecordset As ADODB.Recordset)
  'This is where you put validation code
  'This event gets called when the following actions occur
  Dim bCancel As Boolean

  Select Case adReason
  Case adRsnAddNew
  Case adRsnClose
  Case adRsnDelete
  Case adRsnFirstChange
  Case adRsnMove
  Case adRsnRequery
  Case adRsnResynch
  Case adRsnUndoAddNew
  Case adRsnUndoDelete
  Case adRsnUndoUpdate
  Case adRsnUpdate
  End Select

  If bCancel Then adStatus = adStatusCancel
End Sub
```

```
Private Sub cmdAdd_Click()
  On Error GoTo AddErr
  datPrimaryRS.Recordset.AddNew

  Exit Sub
AddErr:
  MsgBox Err.Description
End Sub

Private Sub cmdDelete_Click()
  On Error GoTo DeleteErr
  With datPrimaryRS.Recordset
    .Delete
    .MoveNext
    If .EOF Then .MoveLast
  End With
  Exit Sub
DeleteErr:
  MsgBox Err.Description
End Sub

Private Sub cmdRefresh_Click()
  'This is only needed for multi user apps
  On Error GoTo RefreshErr
  datPrimaryRS.Refresh
  Exit Sub
RefreshErr:
  MsgBox Err.Description
End Sub

Private Sub cmdUpdate_Click()
  On Error GoTo UpdateErr

  datPrimaryRS.Recordset.UpdateBatch adAffectAll
  Exit Sub
UpdateErr:
  MsgBox Err.Description
End Sub

Private Sub cmdClose_Click()
  Unload Me
End Sub
```

APPENDIX 26 - RELATIONSHIPS DIAGRAM OF TABLES IN THE DATABASE