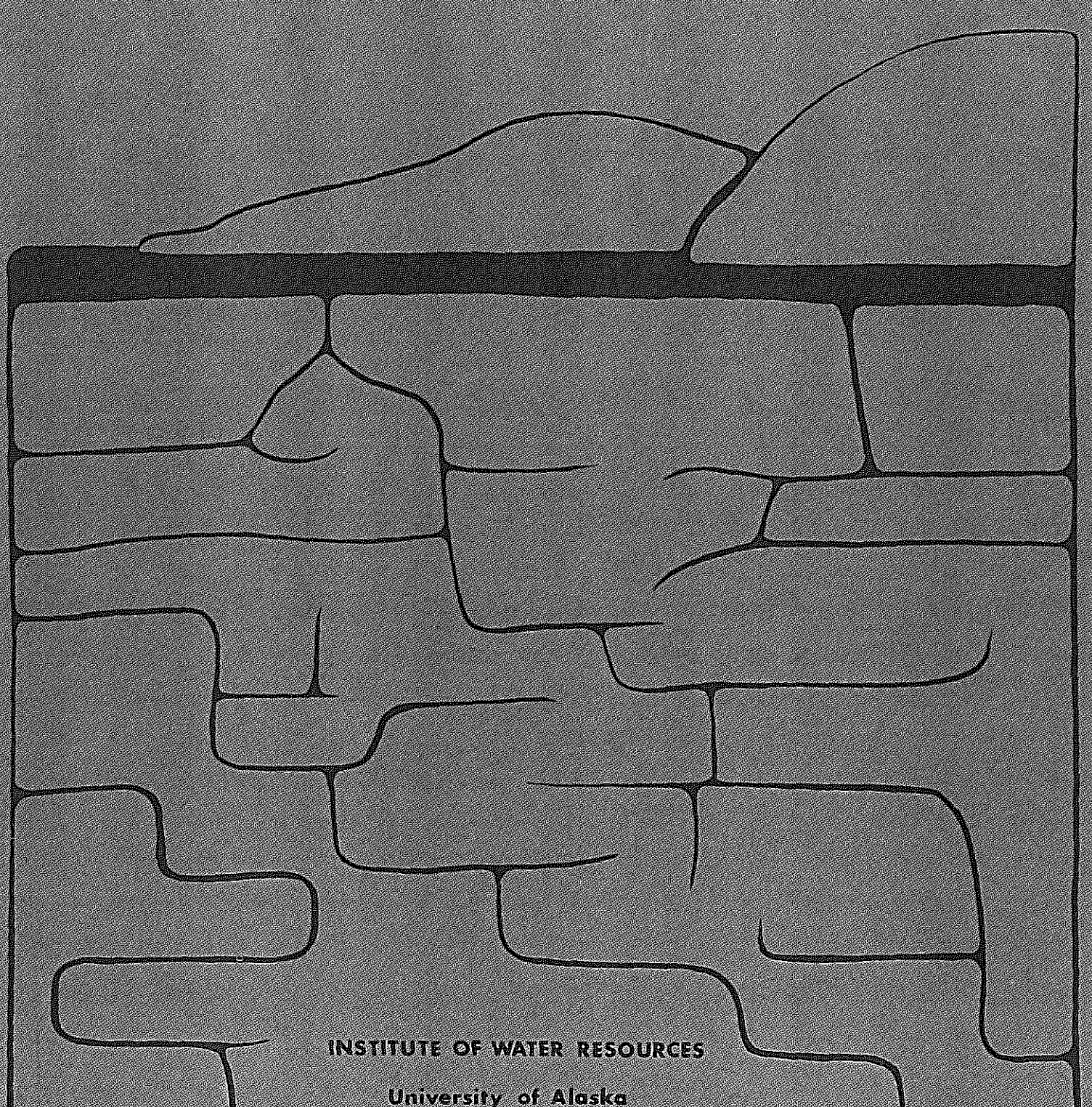
ALASKAN WATER RESOURCES
SELECTED ABSTRACTS – 1974



INSTITUTE OF WATER RESOURCES

University of Alaska

Fairbanks, Alaska 99701

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SELECTED ABSTRACTS - 1974

Compiled and Edited
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Alaskan water resources selected abstracts - 1974
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Report No. IWR-79

February 1977

PREFACE

As one of the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, IWR receives a semi-monthly journal entitled Selected Water Resources Abstracts. The bulletin, published by the Water Resources Scientific Information Center (WRSIC) of the Office of Water Research and Technology, includes abstracts of documents covering the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract in the bulletin is classified into 10 fields and 60 groups of water research categories (see page iii). In addition, the journal contains a subject, author, and organizational index.

In an attempt to keep interested parties abreast of the research being done in water resources in Alaska, the Institute of Water Resources is planning to publish yearly all abstracts listed under the subject index "Alaska." This report covers all citations for 1974.

The Institute of Water Resources is not in a position to provide copies of documents abstracted here; sufficient bibliographic information is given to enable readers to order the documents from local libraries or other sources.

SUBJECT FIELDS AND GROUPS

*Water Resources Scientific Information Center subject fields numbers 1, 3, 9 and 10 have no Alaskan abstracts listed for 1974.

2. WATER CYCLE

2A. General

HYDROLOGY OF THE CENTRAL ARCTIC RIVER BASINS OF ALASKA.
Alaska Univ., College. Inst. of Water Resources.
D.L. Kane, and R.F. Carlson.
Available from National Technical Information Service as PB-228 011 $3.75 in paper copy, $1.45 in microfiche. Report No. IWR-41, December, 1973. 51 p, 14 fig, 5 tab. OWRR A-031-ALAS(6).

Descriptors: Hydrology, Runoff, Precipitation (Atmospheric), Evapotranspiration, *Arctic, *Alaska, Permafrost, *River basins, Snow, *Streamflow, Evaporation, Hydrologic data.

In 1969, a study of the water resources of Alaska's Arctic was initiated in response to the area's large scale petroleum exploration and extraction activities. A summary of the work is presented through a discussion of the basic features of the hydrologic system; the physical system, climatic input, and hydrologic output, with particular emphasis given to the Kuparuk, the Sagavanirktok, and the Putuligayuk Rivers. Precipitation acts as the controlling input function for the overall system. It occurs as snowfall in the eight winter months and as rainfall in June, July, August, and most of September. Comparison of precipitation records are made for Barrow, Barter Island and Prudhoe Bay. Other input variables which were examined are solar radiation, wind speed, and temperature. The output variables of the hydrologic system are evaporation and streamflow. Streamflow values collected by the U.S. Geological Survey for a two to three year period for the Putuligayuk, the Kuparuk, the Sagavanirktok Rivers indicate peak values and approximate summer mean values of 25, 20 and 20 cfs/mi2 and .01, 0.1, 1.0 cfs/mi2 respectively. The streamflow begins with a precipitious rise at the beginning of June and recedes to a sustained amount for the remainder of the summer until September after which the winter flow becomes nearly neglibible. The most severe restriction on hydrologic studies in this and other arctic areas is the lack of long term data.
W74-04304 May 1, 1974

2C. Snow, Ice, and Frost

DEVELOPMENT OF A SNOWMELT-RUNOFF MODEL FOR THE U.S. TUNDRA BIOME, PROGRESS REPORT.
S.L. Dingman.
International Biological Program, U.S. Tundra Biome Report 73-3, June 1973. 43 p, 10 fig, 4 tab, 14 ref, 4 append.

Descriptors: *Snowmelt, *Runoff, *Arctic, *Alaska, *Streamflow forecasting, Mathematical models, River basins, Equations, Dead storage, Topography, Flow rates, Snowpacks, Water equivalent.
Identifiers: *Barrow (Alaska).

Progress in applying a simple three-parameter equation to the simulation of snowmelt runoff on the Arctic Coastal Plain is described. The parameters are: (1) the amount of water held in 'dead storage' on the basin, S2; (2) a timing parameter, K, that depends on the physical characteristics of the basin; and (3) a parameter, N, that depends on the mode of flow within the basin. The three parameters are best determined by examining streamflow records from the basin to be modeled. The equation is incorporated and tested in a series of three computer simulation programs of increasing complexity. The final form included an accounting for varying water equivalents on varying proportions of the basin. The results of the tests of this model against measured snowmelt runoff from a 1.45 sq mi basin near Barrow, Alaska, indicate that the model is very promising, and should be tested and developed further. Data requirements, advantages, and disadvantages of the model are discussed. (Woodard-USGS)
W74-01094 January 15, 1974

SEISMIC EVIDENCE FOR GLACIER MOTION,
Alaska Univ., College. Geophysical Inst.
D. VanWormer, and E. Berg.
Journal of Glaciology, Vol 12, No 65, p 259-265, 1973. 6 fig, 1 tab, 2 ref.

Descriptors: *Glaciers, *Movement, *Seismic studies, *Alaska, Shear, Strain.
Identifiers: *College Fjord (Alas).

Unusual seismic signals with weak P phases and well-developed monochromatic shear-wave trains were recorded and their sources located near College Fjord, Alaska. Epicentral determinations show that they originate on or near glaciers. Some of the events have equivalent earthquake magnitudes of 2.0 to 2.5. These energy sources seem to be compatible with spasmodic glacier movement. Smaller events occur often-as many as 60 per day. (Knapp-USGS)
W74-01378 February 1, 1974

ON THE FORMATION OF SMALL MARGINAL LAKES ON THE JUNEAU ICEFIELD, SOUTH-EASTERN ALASKA, U.S.A.,
Turku Univ. (Finland). Institutum Geographicum.
M. Seppala.
Journal of Glaciology, Vol 12, No 65, p 267-273, 1973. 7 fig, 9 ref.

Descriptors: *Lakes, *Glaciers, *Wind erosion, *Blowouts, Glaciohydrology, Glaciology, *Alaska.
Identifiers: Proglacial lakes, *Juneau Icefield (Alas).

Small 'moat lakes', sometimes empty, sometimes filled with water, are encountered on the edges of glacial firn areas of the Juneau Icefield in southeastern Alaska. The lake basins are primarily blowouts formed as a result of wind erosion. On the Juneau Icefield strong winds blow from the southern sector, principally from the southeast, and cause drifting. The lake basin develops in such a way that meltwater from the surface of the glacier and the slopes of the nunatak collects in the depression originally made by the wind. (Knapp-USGS)
W74-01379 February 1, 1974

THE TUNDRA MICROCLIMATE DURING SNOW-MELT AT BARROW, ALASKA,
Alaska Univ., College, Geophysical Inst.
G. Weller, S. Cubley, S. Parker, D. Trabant, and C. Benson.
Arctic. Vol 25, No 4, p 291-300. 1972.
Identifiers: *Alaska (Barrow), Climates, *Microclimate, *Tundra, Snow-melt, Heat balance, Evaporation.

The microclimate of the tundra during spring of 1971 (29 May to 17 June) at Barrow, Alaska, is described and analyzed in terms of the heat balance at the terrestrial surface and the effects of terrain parameters on the heat balance components. Changes through the snow melting period are large. Within 2 wk 35 cm. of snow are removed, soil interface temperatures increase by 15 degrees C, and the dry snow environment is replaced by a saturated water-soaked tundra surface. As a result, evaporation rates are high; up to 6 mm day -1 occurs immediately after the snow melt. The latent heat required for this is 40 times higher than during the pre-melting period.

W74-02095 February 15, 1974

ECOLOGICAL EFFECTS ON RIVER FLOODING AND FOREST FIRES ON PERMAFROST IN THE TAIGA OF ALASKA,
Forest Service (USDA), College, Alaska. Inst. of Northern Forestry.
L.A. Viereck.
In: International Conference on Permafrost, 2nd, Yakutsk, USSR, 1973, p 60-67, 1973. 7 fig, 1 tab, 26 ref.

Descriptors: *Permafrost, *Freezing, *Thawing, Floods, Forest fires, Ice, Frozen ground, Vegetation effects, Silting, Ecology, *Alaska.
Identifiers: *Taiga(Alaska).

In the taiga of Alaska, permafrost and vegetation are closely related. In areas underlain by permafrost, the nature of the vegetation is important in determining the thickness of the active layer. In a black spruce stand, the active layer is normally 30-60 cm thick. Flooding has several effects on the vegetation-permafrost relationship on floodplain forest stand. Flooding and water table rise by warm water can quickly thaw existing permafrost or cause higher soil temperatures over at least the upper 150 cm of the substrate. Siltation during flooding results in the compaction and death of the moss layers, thus reducing their insulating value in summer which results in higher soil temperatures and an increase in thickness of the active layer. The results of thawing of frozen layers heavily laden with ice can be surface subsidence, tipping of trees, and eventually the formation of thaw ponds. In some cases, flooding over permafrost results in a separation of the organic layer at the permafrost boundary and a compression and rolling of the organic layer into peat mounds. Fire in forest types underlain by permafrost results in a temporary thickening of the active layer. For the first 15 years after fire, thaw is more than 1 m; return to preburn thaw levels takes about 50 years. (See also W74-04346)(Knapp-USGS)
W74-04352 May 1, 1974

THE OCCURRENCE AND CHARACTERISTICS OF NEARSHORE PERMAFROST, NORTHERN ALASKA,
R.I. Lewellen.
In: International Conference on Permafrost, 2nd, Yakutsk, USSR, 1973,
p 131-136, 1973. 3 fig, 2 tab, 7 ref.

Descriptors: *Permafrost, *Beaches, *Alaska, *Beach erosion, Water temperature, Frozen ground, Barrier islands, Sedimentation.
Identifiers: Undersea permafrost.

Permafrost is known is occur under the coastal waters of the Chukchi and Beaufort seas north of Alaska. Sea level, at or near the present level for the past years, can simulate eustatic change by the thermal erosion of the coastline. Rates of erosion ranging from 10 to 30 m per year, although operational only for the brief open-water period, can account for shoreline changes of 5-15 km in just 500 years in the Beaufort Sea region. With mean annual bottom water temperatures below -1.0 deg C, there are expected to be considerable expanses of offshore permafrost. As the sea-waters transgress the coast, the bottom elevations move farther below sea level with distance away from the shoreline. This transgression by thermal erosion or truncation without a tectonic or eustatic change. The change in bottom elevation is due, in part, to thaw subsidence and consolidation. On parts of these thermally truncated or thermal planation benches, storm waves and weak currents and tides winnow and scour fine material. As the sea thermally truncates the land, modifications to the existing permafrost, at or below the level of truncation, are in the form of mean annual surface temperature change and the possible circulation of seawater in the new seasonal thaw layer. In general, a warmer but still negative mean annual temperature prevails after the shoreline passes. If the sea level has been oscillating only 1-3 m around the present level for the past 3,000 or 4,000 years, and if allowances are made for changes in coastal erosion rates, extensive areas of truncated permafrost must still exist under the Beaufort Sea floor. (See also W74-04346)(Knapp-USGS)
W74-04359 May 1, 1974

GEOCHEMISTRY OF PERMAFROST AND QUATERNARY STRATIGRAPHY,
Arizona State Univ., Tempe.
T.L. Pewe, and P.V. Sellmann.
In: International Conference on Permafrost 2nd, Yakutsk, USSR, 1973. p. 166-170, 1973. 2 fig, 1 tab, 27 ref.

Descriptors: *Permafrost, *Geochemistry, *Stratigraphy, Glacial drift, Quaternary epoch, Soils, Frozen soils, Frozen ground, Resistivity, Salinity, *Alaska.
Identifiers: *Fairbanks (Alas).

A new approach to the study of permafrost is the chemical investigation of its ice and sediments. The existing ionic concentration gradients and their lateral dimensions can be indicative of cold regions environments and provide a measure of conditions prior to the formation of the perennially frozen ground. The distribution of soluble and exchangeable ions in soils, perennially frozen ground, and sediments underlying water bodies is influenced by both the materials and the present and past depositional and leaching environments. For the same material and environments, low concentrations indicate considerable leaching or freshening and high concentrations indicate lack of these active processes or enrichment by ground or surface waters. Silts and clays retain more soluble and exchangeable ions than do sand and gravels. Ionic concentration generally increases with depth, particularly in uplifted marine sediments. In the Fairbanka area, an abrupt change in chemical concentrations of extractable cations in permafrost shows a stratigraphic unconformity in retransported sediments of Wisconsinan age. Preliminary interpretations suggest thawing and refreezing above the unconformity. (See also W74-04346)(Knapp-USGS)
W74-04364 May 1, 1974

STRATIGRAPHY AND DIAGENESIS OF PERENNIALLY FROZEN SEDIMENTS IN THE BARROW, ALASKA, REGION,
Cold Regions Research and Engineering Lab., Hanover, N.H.
P.V. Sellman, and J. Brown.
In: International Conference on Permafrost 2nd, Yukutsk, USSR, 1973, p 171-181, 1973, 5 fig, 5 tab, 36 ref.

Descriptors: *Stratigraphy, *Permafrost, *Alaska, Soil formation, Diagenesis, Sedimentation, Sedimentology, Intertidal areas.
Identifiers: *Barrow(Alaska).

The late Quaternary history of the northern Alaskan Arctic Coastal Plain is discussed. The last major marine transgression deposited the Barrow unit in mid-Wisconsinan time. Recession, uplift, and formation of near-surface permafrost followed. The last 10,000 years is characterized by a gradual warning, active thaw-lake formation and degradation, and burial of surface peats through cryopedologic processes. (See also W74-04346)(Knapp-USGS)
W74-04365 May 1, 1974

THE NATURE OF THE SEAWATER-FRESH-WATER INTERFACE DURING BREAKUP IN THE COLVILLE RIVER DELTA, ALASKA,
Louisiana State Univ., Baton Rouge.
H.J. Walker.
In: International Conference on Permafrost 2nd, Yakutsk, USSR, 1973, p 473-476, 1973. 3 fig, 1 tab, 12 ref. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Permafrost, *Ice breakup, *Saline water-freshwater interfaces, *Saline water intrusion, *Arctic, *Alaska, Deltas, Ice jams, Rivers, Streams.
Identifiers: Colville River(Alaska).

Permafrost in combination with the seasonal freezing of the upper layers of all surface water results in the virtual cessation of flow in many arctic rivers and the replacement of the freshwater beneath the ice by seawater in their lower reaches. During the period of flooding in spring, seawater is replaced by floodwater that progresses seaward as a wedge beneath the sea ice. The freshwater-seawater interface that develops remains sharp as the floodwater advances. In 1971, the position and nature of the interface that developed off the Colville Delta in Alaska was established with a salinometer, and the volume of displaced seawater was calculated for the period of breakup flooding. Through the first 14 days of river flow, the discharge was 4640 million cu m. During the last 5 days of the flood season, discharge totaled 1060 million cu m. Thus, the total for the flood period was 5700 million cu m. This amount was 58% of the total discharge for 1971. (See also W74-04346)(Knapp-USGS)
W74-04397 May 1, 1974

SOME PASSIVE METHODS OF CONTROLLING GEOCRYOLOGICAL CONDITIONS IN ROADWAY CONSTRUCTION,
Cold Regions Research and Engineering Lab., Hanover, N.H.
R.L. Berg, and G.W. Aitken.
In: International Conference on Permafrost 2nd, Yakutsk, USSR 1973. p 581-586, 1973. 5 fig, 2 tab, 10 ref.

Descriptors: (Permafrost, *Subsidence, *Frost heaving, *Road construction, Arctic, *Alaska, Thawing, Freezing, Insulation, Cryology.

The most effective technique for controlling permafrost degradation under roads was that of painting the pavement surface white. Performance of a baled peat heat sink was not satisfactory and this approach should probably not be considered in an area having a thermal regime similar to that at Fairbanks. Two different heat transfer computational techniques applicable in evaluating thermal designs in permafrost areas. The finite difference technique should have more widespread application because of the flexibility it provides with regard to specification of boundary and initial conditions. (See also W74-04346)(Knapp-USGS)
W74-04406 May 1, 1974

PERMAFROST PROTECTION FOR PIPELINES,
Esso Production Research Co., Houston, Tex.
H.O. Jahns, T.W. Miller, L.D. Power, W.P. Rickey, and T.P. Taylor.
In: International Conference on Permafrost 2nd, Yakutsk, USSR 1973. p 673-684, 1973. 13 fig, 3 tab, 23 ref.

Descriptors: *Permafrost, *Oil fields, *Pipelines, *Thawing, Insulation, Frozen ground, Frozen soils, Arctic, *Alaska.
Identifiers: *Heated pipelines.

Pipeline operations in permafrost regions are faced with unique problems that arise from disturbances of the thermal regime in the ground. The thawing of ice-rich soil can result in a loss of adequate pipeline support. The conventional buried pipeline mode may be inadequate in these soils, particularly if the pipeline is to be operated at temperatures above the freezing point. Insulation placed around a warm buried pipeline is an efficient means of reducing heat transfer to the ground and, consequently reducing the rate of thaw. In cold permafrost, insulation alone can prevent the formation of a permanent thaw plug around the pipeline. Insulation and other passive protection systems for a warm buried pipeline tend to become very bulky in warm permafrost if no thawing is to be allowed below the line. Mechanical refrigeration can provide complete permafrost protection below an insulated buried pipeline under all climatic conditions of interest. Refrigeration rates required in such a system are not excessive. Thermal piles equipped with natural convection devices for heat removal during winter can be designed to prevent permafrost degradation around pile supports for an elevated pipeline. Both single-phase and two-phase closed systems are available for this purpose. In large-diameter piles, an open air convection system can also be used. Temperatures at the pile-soil interface may rise to near the freezing point during the summer when the thermal pile is inactive. White paint and insulation can offer permafrost protection for gravel berms. (See also W74-04346)(Knapp-USGS)
W74-04415 May 1, 1974

STABILITY OF AN UNDERGROUND ROOM IN FROZEN GRAVEL,
Bureau of Mines, Spokane, Wash.
H.C. Pettibone.
In: International Conference on Permafrost 2nd, Pakutsk, USSR 1973. p 699-706, 1973. 6 fig, 1 tab, 7 ref.

Descriptors: *Mining, *Permafrost, *Gravels, *Frozen ground, *Alaska, Thawing, Subsidence, Freezing, Soil mechanics.

The economic and technological practicability of mining gold from buried frozen gravel placers in Alaska was investigated. In Fairbanks, Alaska, the normal maximum temperature are below freezing from November through March and, therefore, above freezing during April through October. For 5 months of the year (November through March), an underground room in permafrost gravel at a depth of 15-30 m, 3 m high by 9 m wide by any length (21.3-m length in test), remained open without artificial support. Most rock falls occur within a few days after the opening is excavated,

and occasional slabs develop, particularly around silt lenses. Rock falls can be minimized by excavating a smooth roof such as that produced with a continuous miner or with smooth-wall blasting. A possible method of portal support for operation during the winter months only (November through March) would be continuous support (such as corrugated metal pipe through the active layer). then sealing off of the portal from April through October. This system would rely on the natural permafrost temperature for mine support during the summer months assuming no work during this period, and super-cooling the mine during the winter months with natural cold air. For year round operations, the most satisfactory method of ground support would be to keep the ground frozen by maintaining the air temperature in all working areas at -3.9 deg C or lower. Circulation of such cold, dry air would aggravate the sublimation problem and increase the frequency of gravel falling from the roof. To attempt operations during the warm months without refrigeration (using warm air ventilation), continuous support throughout the working and access areas is imperative. (See also W74-04346)(Knapp-USGS)
W74-04418 May 1, 1974

THE AIDJEX LEAD EXPERIMENT,
Oregon State Univ., Corvallis, Dept. of Oceanography,
C.A. Paulson, and J.D. Smith
AIDJEX Bulletin No. 23, Washington University Division of Marine Resources, p. 1-8, January 1974, 1 fig, 5 ref.

Descriptors: *Sea ice, *Movement, Currents(Water), Winds, Navigation, Heat transfer, Freezing, Convection, Heat flow, *Alaska.
Identifiers: Leads(Icepacks).

To study the sea-ice movement, an open-lead experiment is planned. Atmospheric and oceanic observations are made at a newly created lead offshore from Barrow, Alaska. The atmospheric observations attempt to measure the vertical flux of heat and determine its relation to air-sea temperature difference, fetch, height, and wind speed. The oceanic observations seek to determine the characteristics of the density-driven convection in the vicinity of a lead by measuring the oceanic velocity and density fields. (Knapp-USGS)
W74-05158 May 15, 1974

NEW INSIGHTS INTO THE INFLUENCE OF ICE ON THE COASTAL MARINE ENVIRONMENT OF THE BEAUFORT SEA, ALASKA,
Geological Survey, Menlo Park, Calif. Office of Marine Geology and Hydrology.
P.W. Barnes, and E. Reimnitz.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect B, Goddard Space Flight Center, New Carrollton, Md, March 5-9, 1973: National Aeronautics and Space Admin Rept NASA SP-327, p 1307-1314, 1973. 5 fig. 11 ref.

Descriptors: *Remote sensing, Satellites(Artificial), *Sea ice, *Alaska, *Geomorphology, Surveys, Data collections, Water circulation, Sedimentation, Sediment transport.
Identifiers: *ERTS.

Areal patterns from field data and ERTS-1 imagery show a close relationship between geomorphic processes and the influence of sea ice along Alaska's northern coast, perhaps the nation's least known continental margin. Ice acts as (1) a bottom-gouging agent, (2) an influence on water circulation, (3) a carrier of sediments, and (4) an influence on water types. (See also W74-06619)(Knapp-USGS)
W74-06669 July 1, 1974

SNOW COVER SURVEYS IN ALASKA FROM ERTS-1 DATA,
Alaska Univ., College.
C.S. Benson.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect B, Goddard Space Flight Center, New Carrollton, Md, March 5-9, 1973: National Aeronautics and Space Admin Rept NASA SP-327, p 1593-1595, 1973.

Descriptors: *Remote sensing, Satellites(Artificial), *Snow cover, *Ice, *Glaciers, Snowpacks, *Alaska, Surveys, Melting, Mapping, Data collections.
Identifiers: *ERTS.

September and October, 1972, ERTS data were analyzed to delineate snow cover patterns in northern Alaska's Brooks Range and on Mt. Wrangell, an active volcano in south central Alaska. Snow on the northern foothills of the Brooks Range is significantly more affected by katabatic wind action than on the southern foothills. Aufeis deposits along arctic rivers also can be identified in late summer. A survey of such aufeis deposits could identify additional summertime sources of freshwater supplies. Images of Mt. Wrangell monitor the interaction between volcanic heat and the mass balance of glaciers. Significant melting of new snow from an extensive storm on August 18 was seen. Digital analysis of data from subsequent passes over the summit on September 7, 23 and 24 reveal considerable bare rock exposed by melting, which is virtually impossible from solar heating at this altitude and date. (See also W74-06619)(Knapp-USGS)
W74-06697

SURVEY OF THE SEASONAL SNOW COVER IN ALASKA,
Alaska Univ., College, Geophysical Inst.
B. Holmgren, C. Benson, and G. Weller.
Available from NTIS, Springfield, Va. 22151 as N73-29269. Price $3.50 printed copy: $1.45 microfiche. ERTS-1 Project Semi-annual Report for National Aeronautics and Space Administration, July 31, 1973. 15 p. 9 fig. 3 ref, 4 Append/ NASA Contract NAS5-21833.

Descriptors: *Alaska, *Remote sensing, *Ice breakup, *Snowmelt, Satellites (Artificial), Snow, Ice, *Snow cover, Ice cover.
Identifiers: *ERTS.

Freezeup and breakup patterns of the seasonal snow and ice covers in Alaska were studied by collection of ground-based data in a north-south transect across Alaska, and by using ERTS data together with observations from air and ground to describe the snow cover characteristics on the Arctic Slope. The ERTS data provide information on breakup patterns including development of runoff over extensive watersheds. Areas of low albedo and early snows retreat before the start of the main ablation period. and large snow drifts

and aufeis remains after the main ablation period. The ERTS data can also be used to monitor manmade effects on the breakup in the Prudhoe Bay oil exploration area. (Knapp-USGS)
W74-08179 August 15, 1974

MODELING SNOWMELT RUNOFF IN AN ARCTIC COASTAL PLAIN,
Alaska Univ., College Inst. of Water Resources.
R.F. Carlson, W. Norton, and J. McDougall.
Available from the National Technical Information Service as PB-232 431 $3.75 in paper copy, $1.45 in microfiche. Report No. IWR-43, January 1974, 72 p, 16 fig, 4 ref. 3 append. OWRR A-031-ALAS(5).

Descriptors: *Snowmelt, *Arctic, *Alaska, *Runoff, *Coastal plains, *Mathematical models, Simulation analysis, Hydrograph analysis, Heat Budget, Temperature, Melt water.

Snowmelt runoff models simulate the spring runoff, an important part of the hydrologic system of Alaska's arctic coastal plain. The snowmelt model produces a snowmelt hydrograph which is converted by the runoff model into a runoff hydrograph. The snowmelt model subdivides the snowpack into two layers. Daily climatological parameters govern the heat transfer between snowpack and atmosphere. Once the heat flux received or emitted by the snowpack has been computed, the melting processes within the snowpack are considered. Computed parameters of the snowpack are density, depth, water equivalent, water content, temperature, and thermal quality. The runoff model uses a three-parameter linear storage model to transform the snowmelt hydrograph into a runoff hydrograph. The parameters represent the amount of storage, the rate of runoff, and the lag between snowmelt and runoff. Using Prudhoe Bay weather data as input, and comparing the output to runoff data from the Kuparuk, Putuligayuk, and Sagavanirktok Rivers for the years 1970 and 1971, results indicate that the models perform satisfactorily. (Knapp-USGS)
W74-08233 August 15, 1974

SEA ICE CONDITIONS IN THE COOK INLET, ALASKA DURING THE 1971-72 WINTER,
National Weather Service, Anchorage, Alaska.
R.J. Hutcheon.
Available from NTIS, Springfield, Va. 22161 as COM-73-10773, Price $3.00 printed copy; $4.25 microfiche. Technical Memorandum NWS AR-8, April 1973. 17 p, 2 fig, 3 tab.

Descriptors: *Sea ice, *Estuaries, *Fjords, *Alaska, Ice cover, Freezing, Weather, Temperature.
Identifiers: *Cook Inlet(Alaska).

In Cook Inlet, Alaska, the development of ice began slowly during the late fall of 1971, but persistent below-normal temperatures during January, February, and March of 1972 resulted in a long and rough ice year. By the end of March, accumulation of ice was almost as great as the seasonal ice accumulation of a winter in the coldest 10% of winters of record. Below-normal temperatures throughout April and during the first part of May resulted in a slow decrease in the ice during the spring. (Knapp-USGS)
W74-10428 October 15, 1974

HYDRAULIC INFLUENCES ON AUFEIS GROWTH,
R.F. Carlson, and D.L. Kane.
In: Proceedings of Canadian Society for Civil Engineering 1st Canadian Hydraulics Conference, Alberta University, Edmonton, May 10-11, 1973: Alberta University Water Resources Center Publication No 4, p 165-175, 1973. 5 fig, 5 ref.

Descriptors: *Ice, *Alluvial channels, Freezing, *Alaska, Roads, Highways, Design, Surface-groundwater relationships, Groundwater movement.
Identifiers: *Icings, *Aufeis growth, *Naleds.

The hydraulic mechanism of aufeis growth is the result of a complex interaction of open channel, closed conduit, and groundwater flow. Results of a field measurement program on a small stream near Fairbanks, Alaska illustrate rapid and complicated fluctuation of hydrostatic head in the stream and the adjacent groundwater aquifer in conjunction with aufeis growth. A very important role is played by the adjacent groundwater aquifer as a storage reservoir. An understanding of the interaction of groundwater and streamflow is necessary for the development of design criteria where various transportation facilities intersect streams that have a potential for aufeis accumulation. (See also W74-12087)(Knapp-USGS)
W74-12095 December 1, 1974

2E. Streamflow and Runoff

SMALL-STREAM FLOOD INVESTIGATIONS IN ALASKA, A COMPILATION OF PEAK DATA, MAY 1963 TO SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
S.H. Jones
Basic-data report, 1973, 55 p, 8 fig, 3 tab, 5 ref.

Descriptors: *Peak, discharges, *Small watersheds, *Alaska, Stage-discharge relations, Floods, Stream gages, Data collections, Hydrologic data.

A small-stream flood investigation program for Alaska was initiated in September 1962. This program was designed to provide flood data on streams with drainage areas generally less than 100 square miles, placing particular emphasis on those with areas of less than 50 square miles. The objective was to obtain sufficient flood data to define the magnitude and frequency of floods on a regional basis for the entire State and provide information for detailed hydrologic studies. Hydrologic data obtained under this program consist primarily of the annual maximum instantaneous stages and discharges. (Knapp-USGS)
W74-09218 September 1, 1974

FLOOD SURVEYS ALONG TAPS ROUTE ALASKA,
Geological Survey, Anchorage, Alaska.
J.M. Childers.
Basic-Data Report, 1974. 16 p, 1 fig, 1 tab, 24 ref.

Descriptors: *Floods, *Alaska, *Pipelines, Peak discharge, Arctic, Stage-discharge relations, Flood data, Hydrologic data.
Identifiers: Trans-Alaska Pipeline.

Flood data and a description of flood surveys are presented for 24 sites along the Trans-Alaska Pipeline System(TAPS) route from Prudhoe Bay to Valdez. Twenty-four channel sites at or near the TAPS centerline were surveyed during 1971-73. Sites selected were reasonably straight, uniform, alluvial channel reaches of larger streams where the pipeline design was considered to be sensitive to flood magnitude. Driftwood and other flood-deposited vegetal debris upon the overbank floodways were used as floodmarks to determine elevations of Maximum Evident Flood surfaces at the channel sites. (Knapp-USGS)
W74-13198 December 15, 1974

2F. Groundwater

RECHARGE OF A CENTRAL ALASKA LAKE BY SUBPERMAFROST GROUNDWATER,
Alaska Univ., College.
D.L. Kane, and C.W. Slaughter.
In: International Conference on Permafrost 2nd Yakutsk, USSR, 1973, p 458-462, 1973. 3 fig, 11 ref.

Descriptors: *Permafrost, *Lakes, *Alaska, *Surface-groundwater relationships, Discharge(Water), Hydrogeology, Temperature, Groundwater movement.

The existence of an unfrozen zone beneath a lake surrounded by permafrost and recharge of the lake from subpermafrost aquifers through the thawed zone were shown both by piezometer and temperature data. In the zone of discontinuous permafrost, including the lowlands of central Alaska, it is likely that many lakes indicate hydrologic connections between subpermafrost aquifers and the surface. While the bog lake studied is a point of discharge for groundwater, other small lakes might be either recharge or discharge points for subpermafrost aquifers. (See also W74-04346)(Knapp-USGS)
W74-04394 May 1, 1974

RISK OF UNCONTROLLED FLOW FROM WELLS THROUGH PERMAFROST,
Cold Regions Research and Engineering Lab., Hanover, N.H.
K.A. Linell.
In: International Conference on Permafrost 2nd, Yakutsk, USSR, 1973, p 462-468, 1973. 6 fig, 2 tab, 4 ref.

Descriptors: *Water wells, *Permafrost, Wells, Frozen ground, Artesian wells, Well casing, Water temperature, Freezing, Thawing, Subsidence, *Alaska.

Where groundwater below permafrost is under artesian pressure, risk exists that piping, erosion, uncontrolled flow, settlement of wellhead facilities, and damage to the well casing may occur when a water well, oil well, or subsurface exploration boring is drilled through the permafrost. Possible consequences attending uncontrolled flow include formation of a constantly enlarging thaw and erosion pit at the well, permafrost degradation and terrain damage in the area exposed to surface and subsurface discharge from the well, ice fog and ground icing in winter, development of frost mounds, and waste of expensively developed water. Reestablishment of control may be

difficult and expensive. Reliable, effective resistance to piping, erosion, and blowout under artesian pressure and flow conditions of significant magnitude in a well drilled through permafrost requires proper initial installation of the well casing, based on accurate knowledge and evaluation of the permafrost conditions. If the permafrost is thaw-stable, without excess ice, the casing should be tightly installed through the full permafrost zone, except that in thaw-stable bedrock casing is not needed unless for other reasons than thaw instability. If the permafrost is high-ice-content, thaw-unstable soil or rock, not only must the casing be tightly installed in the permafrost but the maintenance of a permanently frozen contact and seal between the casing and the permafrost may also be necessary. (See also W74-04346)(Knapp-USGS)
W74-04395 May 1, 1974

A GROUNDWATER SUPPLY FOR AN OIL CAMP NEAR PRUDHOE BAY, ARCTIC ALASKA,
Metcalf and Eddy, Inc., Boston, Mass.
R.G. Sherman.
In: International Conference on Permafrost 2nd, Yakutsk, USSR, 1973, p 469-472, 1973. 2 fig, 12 ref.

Descriptors: (Groundwater, *Permafrost, *Arctic, *Alluvial channels, Alluvium, Frozen ground, Water supply, *Alaska, Ice, Water quality, Potable water.
Identifiers: *Sagavanirktok River(Alaska).

In designing an oil camp on the west bank of the Sagavanirktok River 11 km south of Prudhoe Bay, the first step was to locate a year-round supply of potable water. Permafrost thickness of as much as 610 m in the campsite area eliminated consideration of deep aquifers, Potential sources in lakes and in the nearby Sagavanirktok River and in aquifers beneath the lakes and the river were explored. A year-round supply of good quality water exists in an alluvial aquifer beneath the Sagavanirktok River. At sites near the coastline the aquifer may be subject to saltwater encroachment, induced either by heavy pumping during periods of zero river flow or by natural upstream migration of the saltwater as flushing action of the freshwater underflow supported by streamflow ceases. (See also W74-04346)(Knapp-USGS)
W74-04396 May 1, 1974

2H. Lakes

TRACE METALS IN A TUNDRA POND: VARIATIONS IN CONCENTRATION AND THEIR EFFECT ON PHYTOPLANKTON POPULATIONS,
Alaska Univ., College. Inst. of Marine Science.
R.J. Barsdate.
In: Pathways of Trace Elements in Arctic Lake Ecosystems: Progress Report 8 to Atomic Energy Commission, p 3-19, 1972. 4 fig, 4 tab, 9 ref.

Descriptors: *Water analysis, *Trace elements, *Phytoplankton, *Ponds, *Alaska, Arctic, Tundra, Correlation analysis, Chemical analysis, Heavy metals, Analytical techniques, Data collections, Evaluation, Chemical reactions, Ecosystems.
Identifiers: *Barrow(Alaska).

During an investigation of trace metal complexation in arctic waters, high concentrations of copper and lead were found in a small tundra pond occupying a low-centered polygon near Barrow, Alaska. These metal levels appeared anomolous when compared with trace metal data previously compiled for high latitude lakes and ponds. Investigations of the phytoplankton sensitivity to trace metal additions in the pond suggested that the trace metal concentrations observed might affect the pond's phytoplankton population. Trace metal results are presented along with primary productivity, algal biomass, and species composition data. Analytical techniques are described. (See also W74-01401)(Woodard-USGS)
W74-02726 March 15, 1974

THE INFLUENCE OF DISSOLVED HUMIC SUBSTANCES ON TRACE METAL PHOTOTOXICITY,
Alaska Univ. College, Inst. of Marine Science.
R.J. Barsdate.
In: Pathways of Trace Elements in Arctic Lakes Ecosystems: Progress Report to Atomic Energy Commission, p 20-36, 1972. 1 fig, 4 tab, 13 ref.

Descriptors: *Water analysis, *Trace elements, *Organic compounds, *Lakes, *Alaska, Dissolved solids, Correlation analysis, Chemical analysis, Heavy metals, Sampling, Data collections, Evaluation, Arctic, Tundra, Phytoplankton, Chemical reactions, Ecosystems.

Work on the interrelationships between trace metals and biota in high latitude aquatic systems has provided information on rates of metal assimilation, possible changes in metal speciation resulting from biochemical interactions, and the effects of metals on primary producers. Dissolved organic compounds (humic materials) which can complex metals have been found in abundance in some Alaskan lakes, and it is likely that in these lakes the effects of trace metals on plankton algae may be altered substantially by complexation. Water samples were taken from three Alaskan lakes, for which general limnology, trace metal concentration, and organic complexation data previously had been obtained. In lakes with high natural concentrations of humic complexing agents the suppression of phytoplankton production by the addition of trace metals was more pronounced than in a lake with a very low dissolved organic content. The experimental additions of a metal-free humic preparation to lake water naturally low in organics also resulted in an increased sensitivity to metals. These observations suggest that metals complexed by dissolved humic substances are available physiologically to the phytoplankton. (See also W74-01401)(Woodard-USGS)
W74-02727 March 15, 1974

SOME ARCTIC LIMNOLOGY AND THE HIBERNATION OF INVERTEBRATES AND SOME FISHES IN SUB-ZERO TEMPERATURES,
Naturhistoriska Riksmuseet, Stockholm (Sweden), Section for Invertebrate Zoology.
C. Holmquist.
Archiv fur Hydrogiologie, Vol 72, No 1, p 49-70, June 1973, 1 fig, 87 ref.

Descriptors: *Overwintering sites, *Cold resistance, Aquatic plants, *Oligochaetes, *Mollusks, *Diatoms, *Chlorophyta, *Cyanophyta, Sampling, Water temperature, Aquatic habitats, *Alaska, Lakes, Freezing, Permafrost, Benthic fauna, Crustaceans, Aquatic insects, Nematodes, Diptera, Snails,

Claims, Rotifers, Waterfleas, Caddisflies, Nostoc, Chara, Daphnia.
Identifiers: Survival, Hydrozoans, Turbellaria, Tardigrades, Gastrotrichd, Polychaetes, Leeches, Hydrachnids, Bryozoa, Porifera, Macroinvertebrates, Coelenterates, Water bears, Nitella, Potamogeton, Lemma trisulca, Ceratophyllum demersum, Hydra, Macrostomum, Castrada spinulosa, Mesostoma lingua, Manayunkia speciosa, Alexandrovia, Trichodrilus, Rhynchelmis, Lumbriculus variegatus, Glossiphonia complanata, Eurycercus, Sphaerium, Lymnaea, Physa, Gyraulus, Valvata, Rhizoclonium, Oedogonium.

Five shallow (less than 2 m depth) lakes in permafrost areas of northern Alaska were investigated to determine whether bottom-living animals occur and survive in frozen environments. Samples were collected in the summer of 1970. A number of macroscopic plants, algae, and animals were identified. The animals included Hydrozoa, Turbellaria, Tardigarda, Gastrotricha, Polychaeta, Oligochaeta, Hirudinea, Crustacea, Insecta, Hydrachnida, Mollusca, Bryozoa, Porifera, Nematoda, and fish. The results of the survey are discussed with respect to the possible winter temperatures of the bottom habitats for invertebrates of such areas, the frost resistance of invertebrates, the oxygen supply, the mode of hibernating in invertebrates, and the actual lakes with their animals. The available literature on low temperature survival of invertebrates is also reviewed. Since the area concerned is compound and varied topographically, geologically and climatically, and the invertebrates live in microclimatic and microecological conditions as compared with the larger, more mobile vertebrates, it is impossible to deduce anything as regarding the winter conditions of the actual lakes or the frost-resistance of animals existing there from what is known from the better-investigated temperate areas or from laboratory conditions. (little-Battelle)
W74-03275 April 1, 1974

WATER BALANCE OF A SMALL LAKE IN A PERMAFROST REGION
Alaska Univ., College Inst. of Water Resources.
C.W. Hartman, and R.F. Carlson.
Availability from NTIS as PB-227 241 $3.00 in paper copy, $1.45 in microfiche.
Report No. IWR-42, September 1973, 23 p, 7 fig, 2 tab. OWRR A-031-ALAS(4).
14-01-0001-3002.

Descriptors: Climates, *Alaska, Cold regions, *Groundwater, *Lakes, Hydrologic budget, *Drawdown, *Permafrost, *Water balance, Peat, Arctic.
Identifiers: *Fairbanks(Alas), Sub-permafrost, Pumped drawdown.

Lakes form an important water resource in arctic permafrost areas. Although normal groundwater flow in permafrost areas is confined to the active layer, potential interconnections exist between lakes and the underlying sub-permafrost groundwater aquifer. The existence of these interconnections was examined by pumping water from a small thaw lake near Fairbanks, Alaska. The induced drawdown allowed study of the dynamics of the active layer surrounding the lake and determination of the amount of groundwater recharge into the lake. The drawdown tests indicated that there is little hydraulic connection between the lake and the sub-permafrost groundwater system. The lake probably routinely fills with water during the spring runoff and is controlled throughout the summer season by rainfall, evaporation and from a small amount of recharge from the shallow peat layer surrounding the lake after intense rainstorms.
W74-03758 April 15, 1974

2I. Water in Plants

THE FEEDING ECOLOGY OF THE ROCK GREENLING, HEXAGRAMMOS LAGOCEPHALUS, IN THE INSHORE WATERS OF AMCHITKA ISLAND, ALASKA,
Washington Univ., Seattle, Coll. of Fisheries.
C.A. Simenstad.
Available from the National Technical Information Service as TID-26129 $3.00 in paper copy, $1.45 in microfiche, M Sc Thesis, 1971. 131 p, 14 fig, 16 tab, 60 ref, 3 append. AEC Contract AT(26-1)-171.

Descriptors: *Fish food organisms, *Ecosystems, *Aquatic life, *Alaska, Surveys, Food habits, Aquatic algae, Aquatic animals, Aquatic environment, Growth stages, Fish diets, Analytical techniques, Biomass.
Identifiers: *Rock greenling, Hexagrammos lagocephalus, Amchitka Island (Alaska).

Analysis of the stomach contents of 596 rock greenling, Hexagrammos lagocephalus, collected from the inshore waters of Amchitka Island, Alaska, indicated the fish to be a benthophage ingesting a diverse spectrum of macroinvertebrates, fish, and algae. Prey organisms represented exclusively from both intertidal or subtidal habitats suggest movement onto the intertidal bench during high tide for the purpose of feeding. Diet composition of indetifiable food organisms by biomass consisted of amphipods (43.2%), miscellaneous organisms and identifiable nonfood matter (31.9%), mysids (10.2%), molluscs (6.4%), fish, (4.5%), decapoda (2.8%), and copepods (1.0%). Rank by percentage occurrence was similar except for reversal of the mollusc and mysid categories. Greenling appear to feed continuously with a slight diurnal emphasis and to have a relatively high proportion of digested food in the stomach. While no differences in the annual composition of the diet was noted in 1968-1970, the yearly total biomass ingested per fish was significantly different. (Woodard-USGS)
W74-03505 April 1, 1974

AQUATIC ORGANISMS FROM SELECTED SITES ALONG THE PROPOSED TRANS-ALASKA PIPELINE CORRIDOR, SEPTEMBER 1970 TO SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
J.W. Nauman, and D.R. Kernodle.
Basic-Data Report, 1974. 23 p, 1 fig, 3 tab, 12 ref.

Descriptors: *Aquatic animals, *Aquatic life, *Alaska, Sampling, Monitoring, Water pollution effects, Pipelines, Data collections, Water quality.
Identifiers: *Trans-Alaska pipeline, Aquatic organisms.

Biological data were collected along the proposed trans-Alaska pipeline corridor from Prudhoe Bay to Valdez including the terminal site at Port Valdez. Benthic invertebrates and other miscellaneous aquatic organisms were collected in 314 samples including artificial substrate, Surber, Ekman dredge, dip net, and 10-rock samples from 62 sites (33 streams, 3 lakes, and 1 fjord-type estuary). The data provide a basis for evaluating naturally occurring and man-induced changes of water quality along the proposed trans-Alaska pipeline corridor. The alteration of normal faunal composition and abundance of benthic invertebrates can provide an indicator of adverse environmental change. (Knapp-USGS)
W74-08369 August 15, 1974

2J. Erosion and Sedimentation

SEA-SURFACE CIRCULATION, SEDIMENT TRANSPORT, AND MARINE MAMMAL DISTRIBUTION, ALASKA CONTINENTAL SHELF,
Alaska Univ., College. Inst. of Marine Science.
G.D. Sharma, F.F. Wright, and J.J. Burns.
Available from NTIS, Springfield, Va., 22151 as E73-10370 Price $3.00 printed copy; $1.45 microfiche. Contract Report for NASA Goddard Space Flight Center, February 20, 1973. 33 p. 13 fig. 3 ref, 2 append.

Descriptors: *Sediment transport, *Water circulation, *Remote sensing, *Aerial photography, *Satellites (Artificial), *Alaska, Oceans, On-site investigations, Correlation analysis, Currents (Water), Data collections, *Continental shelf.
Identifiers: *Cook Inlet area (Alaska), *Bering Sea, Chukchi Sea.

Water and sediment movement and factors controlling sea mammal distribution were observed from ERTS multi-spectral scanner imagery. Emphasis during the first half year was upon data from the Cook Inlet area of southern Alaska and from the Bering Sea and Chukchi Sea of the northwest. Relatively, both these areas are accessible for ground truth observations, and the weather permitted the collection of useful ERTS imagery. The Bristol Bay area has also provided satisfactory imagery and it is anticipated that information from the extreme eastern end of this area will be available in useful quantities. The major effort was to obtain synchronous ground truth and satellite imagery. This is pertinent to the total understanding of the ERTS-1 imagery. Undoubtedly the sediments in the water column as observed from the ERTS imagery reflect the sources and movement of sediments and thereby elucidate the coastal sea surface circulation pattern. Detailed interpretation of sediment distribution and water circulation on the entire shelf, however, requires a more cautious approach. The turbid water as observed in the ERTS-1 imagery could be a result of biological material as well as sedimentary material. (Woodard-USGS)
W74-00298 January 1, 1974

EFFECTS OF THE ALASKA EARTHQUAKE AND TSUNAMI ON RECENT DELTAIC SEDIMENTS,
Scripps Institution of Oceanography, La Jolla, Calif.
E. Reimnitz, and N.F. Marshall.
Journal of Geophysical Research, Vol 70, No 10, p 2363-2376, May 15, 1965. 12 fig, 9 ref. Nonr 2216(23).

Descriptors: *Coasts, *Tsunamis, *Alaska, Sediments, *Deltas, Erosion, *Sedimentation, Seiches, *Earthquakes, Ecology.
Identifiers: Tidal flats, Salt marshes, Barrier islands.

The Alaska Good Friday earthquake (its epicenter about 80 mi from the Copper River delta) and the events associated with the quake left indelible marks on the recent sediments of the delta. A relatively dense pattern of earthquake shock structures is found in the upper part of the section. These include sand dikes, sand pipes, slumps, faults, and joints. The structures increase in abundance toward the central part of the delta, where sediments are thickest, and become rare along its fringes, where sediments are thinnest. The 6-ft uplift of the region was responsible for some erosion and other immediate changes. But the establishment of a new equilibrium, biologically as well as geologically, for barrier islands, tidal flats, and marshes,

will advance only gradually over the next few years. Seiches, brought about by the earthquake, with current velocities of up to 20 or 30 knots, regionally planed off the upper 2 or 3 ft of the tidal flats. These areas often are marked by accumulations of clam shells. The eroded materials were dumped into deep channels and troughs. (Sinha-OEIS)
W74-00524 January 1, 1974

LATE QUATERNARY SEDIMENTATION IN THE ACTIVE EASTERN ALEUTIAN TRENCH,
Dalhousie Univ., Halifax (Nova Scotia), Dept. of Geology.
D.J.W. Piper, R. von Huene, and J.R. Duncan.
Geology, Vol 1, No 1, p 19-22, September 1973. 7 fig, 8 ref.

Descriptors: *Sedimentation rates, *Sedimentation, *Pleistocene epoch, *Alaska, *Glaciation, Turbidity currents, Bottom sediments, Stratigraphy.
Identifiers: Aleutian trench.

Sediments originally deposited on the Alaskan Abyssal Plain have been depressed to form the eastern Aleutian Trench. Simultaneously, a wedge of horizontally bedded sediments, about 1 km thick at its axis, has been deposited in the trench. The time-transgressive facies change between this wedge of sediment and the abyssal-plain sediment sequence shows up as a discontinuity on seismic records. Sediment is being deposited up to 10 times faster in the trench than on the abyssal plain. Ninety percent of the sediment in the trench arrived there by moving down the trench wall as slumps or in turbidity currents, and has been partly redistributed by turbidity currents flowing in a channel along the trench axis; 7% has come from the Survey or Channel distribution system on the abyssal plain; and 3% is pelagic (mainly ice rafted). Sediments pass from a sandy facies near the trench wall to a silt-mud facies on the abyssal plain. Sediment fill in the Aleutian Trench is abnormally thick as a result of Pleistocene glaciation; Neogene trench-fill sediments would be less than 800 m thick. (Knapp-USGS)
W74-05720 June 1, 1974

REGIONAL SEDIMENT YIELD ANALYSIS OF ALASKA STREAMS,
Alaska Univ., College. Inst. of Water Resources.
G.L. Guymon.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No FY1, Paper 10255, p 41-51, January 1974, 3 fig, 2 tab, 4 ref, append. OWRR A-042-ALAS(2).

Descriptors: *Sediment yield, *Alaska, *Sediment load, Equations, *Regression analysis, Sedimentation, Suspended load, Statistical methods, Sampling, *Glaciohydrology.

Sparse suspended sediment data for Alaska were evaluated to verify regional sediment yield relationships and to test alternative regression correlations using readily obtained watershed parameters. Glacier-fed streams in the south-central region of Alaska were emphasized, although one nonglacial stream in the interior region of Alaska was included for comparison. Plausible, simple relationships can be developed for stream reaches well downstream from the glacier which delivers a high fraction of the total suspended

sediment load. A great deal of uncertainty is associated with correlation attempts for short stream reaches near the glacier delivery source. (Knapp-USGS)
W74-06440 June 15, 1974

SEDIMENTATION ON GRAVEL OUTWASH FANS, MALASPINA GLACIER FORELAND, ALASKA,
Massachusetts Univ., Amherst Dept. of Geology and Geography.
T. Gustavson.
Journal of Sedimentary Petrology, Vol 44, No 2, p 374-389, June 1974, 20 fig, 2 tab, 19 ref. ONR-GP Contract N00014-67-A-0230-0001

Descriptors: *Sedimentation, *Glacial drift, *Alluvium, Gravels, Glaciers, *Alaska, Sediment transport, Deposition(Sediments). Sedimentary structures, Stratigraphy, Braiding, Sand Bars.
Identifiers: *Malaspina Glacier(AK), Outwash.

Three depositional facies occur on the outwash fans of Fountain Stream and Alder Stream, which drain portions of the Malaspina Glacier along the northeastern Gulf of Alaska. Longitudinal bars are deposited during high-flow stage; they consist of plane-bedded, imbricate, very poorly sorted pebble and cobble gravels. The sediment of the bars decreases in mean size downstream. Some bars determinate in avalanche slip faces of poorly sorted, silty, medium to coarse sand. Paleoccurrent directions suggest that stream flow diverges acros bar surfaces. Deposition in channels occurs in two morphologically distinct areas, riffles and pools. Sediment deposited in pools consists primarily of ripple cross-laminated, poorly sorted, silty, medium to coarse sand, commonly capped by draped lamination. Ripple crests vary from straight to cuspate. Sediment in riffles consists of gravel laid down under upper flow regime conditions as transverse ribs and stone cells. Both apparently are relict antidune bedforms. During late-stage flow, thin patches of horizontally bedded sand are deposited between transverse ribs and adjacent stone-cell borders. The longitudinal bar facies and channel pool facies are common in cutbank sections. The channel riffle facies was not recognized in cutbank sections. Scour pits, commonly observed on some bar surfaces, are produced by currents scouring around grounded ice blocks. Ice-block trails are produced by ice blocks dragged through soft sediment. (Knapp-USGS)
W74-10375 October 15, 1974

2L. Estuaries

SHORELINE PROCESSES NEAR BARROW, ALASKA: A COMPARISON OF THE NORMAL AND THE CATASTROPHIC,
Tufts Univ., Medford Mass, Dept. of Geology.
J.D. Hume, and M. Schalk.
Arctic, Vol 20, No 2, p 86-103, June 1967, 9 fig, 25 ref.

Descriptors: *Alaska, *Coasts, *Sediment transport, *Storms, Floods, Climates, Waves (Water), Beaches.
Identifiers: *Point Barrow (Alaska).

Studies of sediment movement between 1948 and 1962 along the Alaska coast west of Point Barrow indicate a normal average yearly net transport to the northeast of 10,000 cubic yards. Net transport east of Point Barrow, based on surveys begun in 1958, indicate a normal annual southeastward movement there of 9,500 cubic yards. On 3 October 1963, a storm with gusts of up to 75 miles per hour blew over an ice-free ocean and attacked the coast. Wave heights, estimated at 10 feet, combined with a storm surge of 11 to 12 feet, caused coastal flooding and over $3 million damage. The 1963 storm, probably a 'two-hundred year storm,' moved over 200,000 cubic yards of sediments, which is equivalent to 20 years' normal transport. If the climate is becoming warmer, such storms can be expected more frequently. Construction adjoining the shore should be planned accordingly. (Sinha-OEIS)
S74-01193 February 1, 1974

A REVIEW OF THE OCEANOGRAPHY AND RENEWABLE RESOURCES OF THE NORTHERN GULF OF ALASKA,
Alaska Univ., College, Inst. of Marine Science.
IMS Report R72-23 (Sea Grant Report 73-3), February 1972, 690 p. NOAA Grant 04-3-158-41.

Descriptors: *Oceanography, *Reviews, *Pacific Ocean, *Alaska, *Continental shelf, Water circulation, Ocean currents, Fisheries, Water chemistry, Sedimentation, Hydrology, Glaciology, Water pollution, Oil pollution.
Identifiers: *Gulf of Alaska.

The first oceanographic observation in the northern Gulf of Alaska were made by Captain Cook in 1778. Although many cruises of exploration and commercial exploitation took place in the years that followed, it was not until the late 1920's that full-scale oceanographic observations. Routine sampling of the Gulf of Alaska did not start again until after the end of the Second World War. Even with the increased emphasis on oceanography in the late 1950's, observation in the northern Gulf of Alaska can at best be described as spotted. This lack of information can be ascribed to unfavorable weather conditions and distance from the major oceanographic centers. The coastal area of the northeastern Gulf of Alaska is characterized topographically by a relatively straight coastline and by extensive coastal lowlands. This is in contrast to elsewhere in the Gulf of Alaska where the coastline is extremely irregular and the mountains rise abruptly from the shore. The coastal lowlands extend inland 2 to 40 miles to the southern front of the Chugach and St. Elias Mountains. Despite the relatively mild climate at sea level in this region, about one-fifth of the coastal land is covered by glaciers or by permanent ice and snow fields. The continental shelf varies in width from a maximum of 60 miles off Prince William Sound to a minimum of 7 miles off Cape Suckling just east of Kayak Island. In general, the shelf is marked by irregular topography resulting from its past glacial history. This is a broad review of the present state of knowledge of the oceanography and renewable marine resources of the Gulf of Alaska. It is the most complete collection of Gulf of Alaska environmental and renewable source data which has been assembled to date. (See W74-06427 thru W74-06434)
W74-06426 June 15, 1974

PHYSICAL OCEANOGRAPHY OF THE NORTHERN GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
T.C. Royer.
In: A Review of the Oceanography and Renewable Resources of the Northern Gulf of Alaska: Alaska University Institute of Marine Science Report R72-23 (Sea Grant Report 73-3), Section 1. p 5-22, February 1972. 7 fig, 1 tab, 33 ref. NOAA Grant 04-3-158-41.

Descriptors: *Oceanography, *Alaska, *Continental shelf, *Reviews, Currents (Water), Mixing, Water circulation, Ocean currents, Water temperature.
Identifiers: *Gulf of Alaska.

Research in the field of physical oceanography in the Gulf of Alaska is reviewed. It covers a time span of about 45 years. However, the duration is deceptive since the number of oceanographic expeditions tend to be grouped in the summer months to take advantage of favorable climatic conditions. Most investigations were undertaken with the purpose of providing data to assist in the evaluation of the fisheries of the region. Recent studies are generally more concerned with providing data for the understanding of the entire air-sea system. Description of the physical oceanographic parameters in the North Pacific yields little insight into the short-term variation of conditions on the shelf region in the Gulf of Alaska. The air-sea interaction on the shelf apparently modifies the oceanographic parameters to a large extent making it necessary to have data on the local effects before a complete understanding of the local dynamics can be accomplished. Winter convective mixing extends to the ocean bottom on the continental shelf. The minimum water temperature in the region is about 1C colder than the previously reported low of 2.78C. It appears that the bottom of the halocline extends partially onto the shelf region, which indicates that the outer part of the shelf does not have season water-mass fluctuations as a result of convective cooling. (See also W74-06426)(Knapp-USGS)
W74-06427 June 15, 1974

CHEMICAL OCEANOGRAPHY OF THE GULF OF ALASKA,
Alaska Univ., College. Inst. of Marine Science.
L. Longerich, and D.W. Hood.
In: A Review of the Oceanography and Renewable Resources of the Northern Gulf of Alaska: Alaska University Institute of Marine Science Report R72-23(Sea Grant Report 73-3). Section 2, p 23-55, February 1972. 18 fig. 3 tab, 37 ref. NOAA Grant 04-3-158-41.

Descriptors: *Water chemistry, *Alaska, *Continental shelf, *Reviews, *Oceanography, Trace elements, Nutrients.
Identifiers: *Gulf of Alaska.

The chemical data available for the Gulf of Alaska, particularly the near-coastal area, are limited and very sporadic. These consist largely of short-term observations of the concentration of some of the chemical parameters in the area with no information on the seasonal effects or on the dynamic processes which control these concentrations. In the northern Gulf of Alaska in the area inside the 200-meter depth profile and between Cross Sound and Kodiak Island, only limited chemical information is available. Inorganic nutrients have been the only chemical parameters measured in this region except for a brief study near Kodiak Island in June 1967. Although there has been a considerable number of measurements of hydrography and nutrients in the Gulf of Alaska and the North Pacific Ocean area, few actual stations were occupied on the continental shelf. (See also W74-06426) (Knapp-USGS)
W74-06428 June 15, 1974

THE LAND HYDROLOGY OF THE SOUTH-CENTRAL COASTAL ZONE,
Alaska Univ., College Inst. of Water Resources.
R.F. Carlson.
In: A Review of the Oceanography and Renewable Resources of the Northern Gulf of Alaska: Alaska University Institute of Marine Science Report R72-23 (Sea Grant Report 73-3), Section 7, p 149-152, February 1972. 3 ref. NOAA Grant 04-3-158-41.

Descriptors: *Hydrology. *Runoff, *Sediment yield. *Alaska, *Reviews, Streamflow, Hydrologic data, Glaciers.
Identifiers: *Gulf of Alaska.

The most significant aspect of the hydrologic system of Alaska's south-central region, an area of some 100,000 sq mi. is the tremendous variety which occurs within this zone. There are few places in the United States which represent a greater variety of temperature, streamflow, and precipitation extremes within an area of this size. The region is characterized by a brief summer runoff season, a great number and volume of glaciers, a large volume of silt discharge in the streams during the summertime, and large elevation differences. Only limited hydrological studies have been made in this area. There exist only some eighty climatological stations in this region (IATCA, 1970). These stations are confined primarily to lower elevations along the sea coast and the river valleys. (See also W74-06426) (Knapp-USGS)
W74-06433 June 15, 1974

GEOLOGY AND GEOMORPHOLOGY OF THE CENTRAL GULF OF ALASKA CONTINENTAL SHELF,
Alaska Univ., College. Inst. of Marine Science.
F.F. Wright.
In: A Review of the Oceanography and Renewable Resources of the Northern Gulf of Alaska: Alaska University Institute of Marine Science Report R72-23 (Sea Grant Report 73-3), Section 8, p 153-160, February 1972. 1 fig. 35 ref. NOAA Grant 04-3-158-41.

Descriptors: *Geology, *Geomorphology, *Sedimentation, *Glaciation, *Alaska, Reviews.
Identifiers: *Gulf of Alaska.

The continental margin of the Gulf of Alaska reflects the complex recent orogenic and climatic history of the northernmost Pacific area. The region of particular interest lies between Kodiak Island and Yakutat Bay, an area which actually represents the seaward expression of a bight, where the entire North American cordillera has been deflected at least 90 deg close to the eastern end of the Aleutian arc and trench system. Tectonic mechanisms in the general area remain to be defined, but proponents of crustal-plate tectonic hypotheses have suggested that the current cycle of orogenic activity may be related to the opening of the Gulf of California and the resulting strong relative movement between the Pacific and American plates. There has been significant glaciation in the hinterland of the Gulf of Alaska for at least the past three million years. The combination of tectonism and intense glaciation has resulted in a very complex recent geologic history for the central Gulf of Alaska continental shelf region. (Knapp-USGS)
W74-06434 June 15, 1974

ERTS-1 OBSERVATIONS OF SEA SURFACE CIRCULATION AND SEDIMENT TRANSPORT, COOK INLET, ALASKA,
Alaska Univ., College. Inst. of Marine Science.
F.F. Wright, G.D. Sharma, and D.C. Burbank.
in: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol--Technical Presentation, Sect B, Goddard Space Flight Center, New Carrollton, Md. March 5-9, 1973: National Aeronautics and Space Admin Rept NASA SP-327, p 1315-1322, 1973, 3 fig, 4 ref.

Descriptors: *Remote sensing, Satellites(Artificial), *Estuaries, *Alaska, Water circulation, Path of pollutants, *Sediment transport, Mixing, Data collections, Glacial drift, Tides, Sedimentation, Erosion, Currents(Water).
Identifiers: *ERTS, *Cook Inlet(ALAS).

Cook Inlet is a large tide-dominated estuary in southern Alaska. Highly turbid streams enter the upper inlet, providing an excellent tracer for circulation in the lower inlet. ERTS MSS 4 and 5 images can be used in this area to plot sediment and pollutant trajectories, areas of probable commercial fish concentration, and the circulation regime. (See also W74-06619)(Knapp-USGS)
W74-06670 July 1, 1974

SEDIMENT DISTRIBUTION AND COASTAL PROCESSES IN COOK INLET, ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H.
D.M. Anderson, L.W. Gatto, H.L. McKim, and A. Petrone.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-I: Vol I--Technical Presentations, Sect B, Goddard Space Flight Center, New Carrollton, Md, March 5-9, 1973: National Aeronautics and Space Admin Rept NASA SP-327, p 1323-1339, 1973. 7 fig. 13 ref.

Descriptors: *Remote sensing, Satellites(Artificial), *Estuaries, *Alaska, Water circulation, Path of pollutants, *Sediment transport, Mixing, Data collections, Glacial drift, Tides, Sedimentation, Erosion, Currents(Water).
Identifiers: *ERTS, *Cook Inlet(Alas).

Regional hydrologic and oceanographic relationships in Cook Inlet, Alaska, were recognized from sequential ERTS-1 MSS imagery. Coastline configuration is well defined on bands 6 and 7. Current patterns are visible in the inlet because of differential concentrations of suspended sediment. These patterns are most evident on bands 4 and 5. The circulation patterns are controlled primarily by the interaction between the semidiurnal tides and the counter-clockwise Alaska current. Tongues of clear oceanic water enter the inlet through Kennedy Channel along the east shoreline in the vicinity of Cape Elizabeth. A counterclockwise circulation pattern around Kalgin Island results from the interplay of the northerly moving water along the east shore end the southerly moving water along the west side of the inlet. Freshwater plumes heavily laden with sediment are visible at the mouths of all major rivers. Relect plumes from as many as three tidal stages have been recognized. Tidal flats and a number of unmapped cultural features appear prominently in bands 5 and 6. (See also W74-06619)(Knapp-USGS)
W74-06671 July 1, 1974

4A. Control of Water on the Surface

VEGETATIVE AND GEOLOGIC MAPPING OF THE WESTERN SEWARD PENINSULA, ALASKA, BASED ON ERTS-1 IMAGERY,
Alaska Univ., College.
J.H. Anderson, L. Shapiro, and A.E. Belon.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: VolI--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 67-75, 1973. 3 fig, 10 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Terrain analysis, *Geological mapping, *Vegetation, Mapping, Aerial photography, Ecology, Geology, *Alaska, Data collections, Forests.
Identifiers: ERTS, *Vegetation identification.

ERTS-1 scene 1009-22095 (Western Seward Peninsula, Alaska) was studied to evaluate whether direct visual examination of indiviaual and composite color prints can provide new information of the vegetation and geology of this relatively well known area of Alaska. The vegetation analysis reveals seven major vegetation types, only four of which are described on existing vegetation maps. In addition, the ERTS analysis provides greater detail than the existing maps on the areal distribution of vegetation types. Most of the major rock units and geomorphic boundaries shown on the available geologic maps could also be identified on the ERTS data. Several major high-angle

faults which dominate the structure of the area are much less obvious. All of the previously mapped granitic instrusive rocks in the area were identifiable on the images; however, a radial drainage pattern about 7 km in diameter, probably indicative of a buried intrusive, was recognized for the first time on the ERTS images. (See also W74-01663)(Knapp-USGS)
W74-01672 February 15, 1974

FLOOD PLAIN INFORMATION, KENAI RIVER, PHASE I, KENAI PENINSULA BOROUGH, ALASKA, Army Engineer District, Anchorage, Alaska.

Prepared for the Kenai Peninsula Borough Report, June 1973, 26 p, 12 fig, 20 plate, 2 tab.

Descriptors: *Flood data, *Flood plains, *Alaska, *Flood forecasting, Flood profiles, Aerial photography, Topography, Floods, Streamflow, Flow rates, Peak discharge, Flood damage, Ice jams, Ice breakup, Snowmelt.
Identifiers: *Kenai Peninsula Borough (Alaska Intermediate Regional Flood, Standard Project Flood.

The portion of the Kenai Peninsula Borough, Alaska, covered by this report is subject to flooding from the Kenai River. The properties along this stream are primarily residential and recrational and were moderately damaged by the floods of 1964 and 1969. The areas in the flood plain which are now under pressure for future development are extensive. Although large floods have occurred in the past, studies indicate that even larger floods are possible. During the Intermediate Regional and Standard Project Floods, average velocities of main-channel flow is about 7.5 and 9 feet per second, respectively. Velocities of this magnitude are sufficient to cause severe erosion to banks, move structures off their foundations, transport vehicles, and cause similar damages. Overbank flow would average 1 fps. In the case of an ice jam flood, flood waters will generally rise rapidly and recede rapidly when the ice jam breaks. The levels that the Intermediate Regional Flood and Standard Project Flood are expected to reach at various locations in the area are indicated on the photographs. (Woodard-USGS)
W74-01952 February 15, 1974

NORTH SLOPE CONSTRUCTION CRITERIA FOR ROADS AND FACILITIES,
Atlantic Richfield Co., Dallas, Tex.
W.P. Stokes.
Journal of Petroleum Technology, Vol 23, No 10, p 1209-1214, October 1971.
4 fig, 3 tab, 8 ref.

Descriptors: *Arctic, *Cold regions, Construction, *Road construction, *Alaska, Permafrost, Foundations, Drainage, Thawing, Snow, Wind pressure, Gravels, Piles (Foundation), Buildings, Ice.
Identifiers: *North Slope (Alas), Prudhoe Bay (Alas), Sag River (Alas).

The North Slope of Alaska is located in a continuous permafrost zone where the subsurface soils are permanently frozen to depths as great as 2000 feet. The top foot or so of soil - called the active layer - thaws in summer and refreezes in winter. Permafrost road construction requires that the road be built in such manner that the insulating tundra cover is preserved intact

and undamaged. Consequently, surface grading and side ditching are ruled out. Culverts are installed above the tundra surface. Adequate quantities of gravel are available in the vicinity of Prudhoe Bay. The gravel should be fairly well graded with sufficient fines to act as a binder; yet it must contain less than 3 percent of material finer than 0.02 mm. A 5-ft.-thick gravel fill usually is adequate, although a somewhat thicker layer may be needed to prevent the thaw from extending into the active zone. Buildings, structures, and other facilities must be designed to meet government regulations and operational requirements. Local conditions of wind velocity and snowfall must be considered. Permanent, heated structures are supported on pile foundations with several feet of free air space under the building. Drill sites are covered with a 5-foot layer of gravel. Skid-mounted rigs are used and the skid rails are supported on timbers to allow circulation of air under the drilling rig. All utility lines are subject to freezing are protected by insulation, heat tracing, or are placed in heated utilidors. (Gray-NWWA)
W74-05104 May 15, 1974

A MULTIDISCIPLINARY SURVEY FOR THE MANAGEMENT OF ALASKAN RESOURCES UTILIZING ERTS IMAGERY,
Alaska Univ., College.
J.M. Miller, and A.E. Belon.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect b, Goddard Space Flight Center, New Carrollton, Md, March 5-9, 1973: National Aeronautics and Space Admin Rept NASA SP-327, p 999-1005, 1973, 5 fig.

Descriptors: *Remote sensing, Satellites (Artificial), *Alaska, *Mapping, *Land management, Land use, Forests, Transportation, Mining Surveys, Data collections, Fisheries, Ecology, Tundra.
Identifiers:*ERTS

ERTS-1 data were applied to a coordinated multidisciplinary survey of Alaska to provide updated resource inventory data to land use planning groups and government agencies concerned with resource management. Of particular emphasis in this survey are vegetative, hydrological, and geological analyses of the proposed trans-Alaska transportation corridor, and lands to be selected by the State of Alaska, the native corporations, and the Department of Interior. ERTS data are satisfying these objectives on a regional scale. (See also W74-06619)(Knapp-USGS)
W74-06633 July 1, 1974

ROAD LOG AND GUIDE--GEOLOGY AND HYDROLOGY FOR PLANNING, ANCHORAGE AREA.
Geological Survey, Anchorage, Alaska.
Alaska Geological Society Symposium Report, September 1973. 34 p, 22 fig, 16 ref.

Descriptors: *Hydrogeology, *Alaska, *Landslides, *Earthquakes, Artificial recharge, Water pollution control, Erosion, Conferences.
Identifiers: *Anchorage (Alaska).

Following the destructive 1964 earthquake, the need for a better understanding of the physical setting of the Anchorage area of Alaska became apparent. Increased geological and hydrological studies were initiated to provide base-line data so that development of the area might minimize environmental

damage. This field trip guidebook highlights some of the problem areas and provides general background information of the geologic and hydrologic setting of the Anchorage area. (Knapp-USGS)
W74-08180 August 15, 1974

FLOOD PLAIN INFORMATION-PETERS CREEK, BIRCHWOOD, ALASKA,
Corps of Engineers, Anchorage, Alaska.
Army Corps of Engineers Flood Plain Report, May 1974, 12 fig, 14 plate, 2 tab.

Descriptors: (Floods, *Alaska, *Flood plains, Flood control, Flood protection, *Data collections, Flood plain zoning, Hydrologic data.
Identifiers: Birchwood (Alaska). Peter Creek (Alas).

A portion of the community of Birchwood, Alaska, is subject to flooding from Peters Creek. The properties along this stream are primarily residential and were moderately damaged by the flood of August 1971. The open spaces in the flood plains which are now under pressure for future development are extensive. A history of flooding along Peters Creek identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles, and cross sections. A suitable basis is given for the adoption of land use controls to guide flood plain development. Other flood damage reduction techniques such as works to modify flooding and adjustments, including flood profiling, might be embodied in an overall flood plain management program. (Knapp-USGS)
W74-10684 October 15, 1974

FLOOD PLAIN INFORMATION, HOADLEY CREEK, KETCHIKAN, ALASKA.
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 23 p, 7 fig, 7 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Hoadley Creek (AK), *Ketchikan (AK).

Flooding from Hoadley Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and, for the most part, have been developed only in recent years. There are still open spaces adjacent to the stream which are available for future development. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. The study includes a history of flooding along Hoadley Creek and identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11427 November 1, 1974

FLOOD PLAIN INFORMATION, WHIPPLE CREEK, KETCHIKAN, ALASKA,
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974, 23 p. 7 fig, 9 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Whipple Creek (AK), *Ketchikan (AK).

Flooding from Whipple Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and have not been damaged by past floods. Although large floods have occurred in the past, studies indicate that even larger floods are possible. The open spaces along the stream which are available for future development are extensive. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to these floods sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11428 November 1, 1974

FLOOD PLAIN INFORMATION, CARLANNA CREEK, KETCHIKAN, ALASKA,
Corps of Engineers, Anchorage, Alaska.
Flood Plain Report, June 1974. 27 p, 8 fig, 6 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Carlanna Creek (AK), *Ketchikan (AK).

Flooding from Carlanna Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and industrial and were severely damaged by the October 1973 flood. The open spaces adjacent to the stream in the study area are limited and are not presently under pressure for development. Large floods have occurred in the past and will occur in the future. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to these floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11429 November 1, 1974

FLOOD PLAIN INFORMATION, KETCHIKAN CREEK, KETCHIKAN, ALASKA,
Corps of Engineers, Anchorage, Alaska.
Army Corps of Engineers Flood Plain Report, June 1974, 31 p, 13 fig, 9 plate, 2 tab.

Descriptors: *Floods, *Alaska, Flood control, *Flood plain zoning, Flood protection, Flood data.
Identifiers: *Ketchikan Creek (AK).

Flooding from Ketchikan Creek, Ketchikan, AK, is described. The properties along this stream are primarily residential and have been moderately damaged by past floods. The open spaces in the flood plain are limited and are not

now under pressure for future development. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain use. Special emphasis is given to floods through maps, photographs, profiles and cross sections. A suitable basis is provided for the adoption of land use controls to guide flood plain development and thereby prevent intensification of loss and damage. (Knapp-USGS)
W74-11430 November 1, 1974

METHODS OF FLOOD FLOW DETERMINATION IN SPARSE DATA REGIONS,
Alaska Univ., College, Inst. of Water Resources.
R.F. Carlson, P.M. Fox, and S.D. Shrader.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 261: $3.25 in paper copy, $2.25 in microfiche. Partial Completion Report No IWR-52, June, 1974, 37p, 2 fig, 40 ref, append. OWRTB-021-ALAS(1).

Descriptors: *Alaska, *Design flood, History, *Hydrologic data, Statistical methods, Rational formula, Reliability, *Flood frequency, Peak discharge, *Flood forecasting, Graphical analysis.
Identifiers: Physiographic regions, Emperical formulae, Graphical analysis.

Three issues must be understood when embarking on a flood frequency design task: the fundamental basis of the design method, actual execution of the task, and the data environment. A survey of the history and background of the many methods of flood frequency determination is included, followed by a description of the methods currently used by design agencies in Alaska. The physical environment of Alaska is described including identification of four homogenous physiographic regions. The data conditions are also described for these regions. With this information three methods were chosen for further evaluation: log Pearson type III, graphical and regional multiple regression. These methods were chosen primarily on the basis of applicability to sparse data regions; ease of calculation; superficial satisfaction of underlying assumptions; and general acceptance and/or previous use in Alaska.
W74-11458 November 15, 1974

FLOOD FREQUENCY ESTIMATION IN NORTHERN SPARSE DATA REGIONS,
Alaska Univ., College, Inst. of Water Resources.
R.F. Carlson, and P.M. Fox.
Available from the National Technical Information Service, Springfield, Va. 22161 as PB-235 262; $3.00 in paper copy, $2.25 in microfiche, Completion Report No. IWR-55, July, 1974. 15 p. 1 fig, 3 ref. OWRTB-021-ALAS(2).

Descriptors: *Flood frequency, Snowmelt, Energy budget, Probability, Evaluation, Design flood, *Alaska, Model studies, *Flood forecasting, Hydrologic data.
Identifiers: *Snowmelt models, *Kinematic waves, Log Pearson type III.

With the increased emphasis placed on resource extraction in Northern regions, consideration of the effects of sparse data on flood frequency estimation required for design decision is needed. Results are summarized of a project designed to deal with those needs. Following a survey of existing methods

and current physiographic and data conditions three methods were chosen to be compared using data from eleven diverse basin in Alaska. These three methods were compared on the basis of efficiency, consistency, and power as well as record length requirements, and satisfaction of underlying assumptions. A heat budget type snowmelt model was modified for use on the Chena River basin, and checked with snow survey data for accuracy. The output from the model was then used for flood predictions with a hybrid flood frequency model which combined stochastic input and kinematic wave theory. This fourth approach was also evaluated. Criteria were developed to determine which method is applicable for a given situation. Due to the variability of the physical and data environment of northern regions, no one method should be strictly adhered to for flood frequency determination.
W74-11459 November 15, 1974

UNITED STATES GEOLOGICAL SURVEY ALASKA PROGRAM, 1974.
Geological Survey, Washington, D.C.
Circular 700, 1974. 63 p, 15 fig, 51 ref.

Descriptors: *Alaska, *Geology, *Water resources, *Research facilities, *Projects, Investigations, Geologic investigations, Data collections, Surveys.

This report on the Alaskan activities of the U.S. Geological Survey contains up-to-date accounts of recent results and summaries of plans for the summer of 1974. It is organized in six parts: (1) responsibilities and services of the Geological Survey; (2) organization of the U.S. Geological Survey; (3) Alaskan field activities for 1974; (4) cooperative programs with state and federal agencies; (5) summary of important results of geological and geophysical research in 1973, and (6) reports published by Survey authors in 1973. (Knapp-USGS)
W74-12012 December 1, 1974

4B. Groundwater Management

GEOLOGY AND WATER RESOURCES OF THE GIRDWOOD-ALYESKA AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
C. Zenone.
Geological Survey open-file report, 1974, 22 p, 5 fig, 5 tab, append.

Descriptors: *Hydrogeology, *Alaska, *Glacial drift, Water pollution, Septic tanks, Alluvial channels, Gravels, Urbanization, Recreation, Skiing.
Identifiers: *Girdwood (Alaska).

The unconsolidated sediments which overlie the bedrock of Glacier Creek valley, Alaska, are composed of materials originally transported to the valley by large Pleistocene glaciers. The material has been reworked by glacier ice, melt-water streams, and marine waters. Groundwater supplies adequate for single-family dwellings are generally available within 100 feet of the ground surface throughout the valley, except on the steep mountain slopes near the valley margins. The most favorable sites for development of larger-yield, public-supply wells are along Glacier Creek in the central part of the valley. Abundant surface water is available from Glacier Creek and its tributaries. The flow regimen of these streams is to some extent regulated by the storage of water in the basin's glaciers and snowfields and the subsequent release of melt water. The inorganic chemical quality

of the valley's groundwater and surface water is acceptable for domestic use; suspended sediment in the larger streams may at times preclude their use as potable supplies prior to removal of the glacial silt. Damaging floods have occurred in historic times and are probably in the future. The low flood-plain along Glacier and California Creeks is the most flood prone area. A high-water table and poor infiltration characteristics of the clayey and silty deposits in some parts of the valley create conditions unsuitable for septic-tank sewage disposal. Instances of pollution by sewage have already occurred in the Alyeska village area. (Knapp-USGS)
W74-08595 August 15, 1974

GEOLOGY AND GROUNDWATER FOR LAND-USE PLANNING IN THE EAGLE RIVER-CHUGIAK AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
C. Zenone, H.R. Schmoll, and E. Dobrovolny.
Open-file Report 74-57, 1974. 25 p, 9 fig, 1 plate, 4 tab, 15 ref, append.

Descriptors: *Hydrogeology, *Water resources, *Alaska, Groundwater, Alluvium, Aquifers, Water yield, Data collections, Hydrologic data, Geologic mapping, Water demand.
Identifiers: *Anchorage (AK).

The geology and groundwater resources of the Eagle River-Chugiak area, Alaska, are described. The study area lies mostly within the Cook Inlet-Susitna Lowland and consists of low hills and intervening channels, hummocky ridges, sloping alluvial fans, and low-lying tidal flats that border Knik Arm. The eastern part of the area lies on the steep slopes of the Chugach Mountains. Drainage is generally to the west and northwest, except that locally the slopes drain southwesterly to the Eagle River, the major stream of the area. Limited amounts of groundwater can be recovered from the bedrock in the Eagle River-Chugiak area, particularly where the rock is fractured and weathered. Greater success in locating larger amounts of groundwater can be expected in the more permeable and more porous unconsolidated surficial deposits. The types of geologic materials from which groundwater can be recovered in adequate quantities for even single-family use are limited in number and areal extent. However, two alluvial-fan areas-at Meadow Creek and at Peters Creek-are potential sources for larger, communitywide water supplies. A yield of 326 gpm was reported for one well on the Meadow Creek fan. The chemical quality of groundwater in the Eagle River-Chugiak area is acceptable for domestic use. A potential for bacteriological pollution of the water exists, however, in relatively high-density residential area of Eagle River, where individual shallow wells and septic tanks are used. Part of the community is now served by a sewage-collection system and treatment facility. (Knapp-USGS)
W74-11982 November 15, 1974

4C. Effects on Water of Man's Non-Water Activities

EFFECTS ON HIGHWAY BRIDGE CONSTRUCTION ON A SUBARCTIC STREAM,
L.A. Peterson, and D. Nyquist.
The Northern Engineer, Vol 4, No 2, p 18-20, Winter 1972. 2 fig, 1 tab, 10 ref. OWRR B-017-ALAS(5).

Descriptors: *Environmental effects, *Water quality, *Ecosystem, *Bridge construction, *Alaska, Streambeds, Baseline studies, Correlation analysis, Chemical analysis, Aquatic animals, Aquatic plants, Data collections, Evaluation, Water quality control.
Identifiers: *Goldstream Creek (Alaska).

Effects of construction of roads and highways along and over flowing waters and the subsequent reduction in water quality and disturbance of the associated flora and fauna have been the focal point of much heated debate in the United States. The effects of construction of a highway bridge over Goldstream Creek in the past has been subjected to extreme environmental damage, both aquatic and terrestrial, due to past gold dredging and placer mining operations. The stream has been rerouted to facilitate the mining operations. The terrestrial vegetation has never recovered; however, the aquatic ecosystem seems to have fared batter. Young grayling were observed in Goldstream Creek in 1971. Presently, Goldstream Creek does not contain a viable sports fishery. The changes in water quality and bottom organisms between August 1970 and October 1971 are described, (Woodard-USGS)
W74-02295 March 1, 1974

CONTROL OF PERMAFROST DEGRADATION BENEATH A ROADWAY BY SUBGRADE INSULATION,
Alaska State Dept. of Highways, College.
D.C. Esch.
In: International Conference on Permafrost 2nd, Yakutsk, USSR 1973, p 608-622, 1973. 10 fig, 1 tab, 8 ref.

Descriptors: *Permafrost, *Subsidence, *Road construction, *Insulation, *Alaska, Thawing, Consolidation, Peat, Frozen soils, Frozen ground, *Degradation (Slope).

Newly constructed roadways crossing permafrost terrain originally covered with vegetation have the effect of increasing the amplitude of the seasonal surface and subsurface temperature variations and also of altering the mean annual surface temperature. Readjusting of the permafrost table to the new thermal conditions occurs over a period of years. Readjustment is accompanied by roadway surface settlement in areas where permafrost degradation occurs in soils having high frozen moisture contents or segregated ice formations or deposits. The Alaska Department of Highways, in 1969, installed two different thicknesses of extruded polystyrene foam insulation boards beneath a newly constructed roadway in a region of relatively warm permafrost. Roadway fill sections constructed over a frozen peat subgrade, with both 5.1- and 10.2-cm-thick insulation layers, performed very well during the first 3 years after construction, as evidenced by the fact that surface settlement has been very small and very uniform. Adjacent normally constructed fill sections showed the average settlement to be 8 times greater than the 5-cm insulation section and 11 times greater than the 10-cm section, with severe variations in settlement magnitude. (See also W74-04346)(Knapp-USGS)
W74-04409 May 1, 1974

LONG-TERM EFFECTS OF VEGETATIVE COVER ON PERMAFROST STABILITY IN AN AREA OF DISCONTINUOUS PERMAFROST,
Cold Regions Research and Engineering Lab., Hanover, N.H.
K.A. Linell.
In: International Conference on Permafrost 2nd, Yakutsk, USSR 1973. p 688-693, 1973, 4 fig, 2 tab, 10 ref.

Descriptors: *Permafrost, *Subsidence, *Thawing, *Vegetation effects, Forests, Tundra, *Alaska, Arctic, Frozen soils, Frozen ground, Soil physical properties, Soil mechanics.

The relationship between vegetative cover and permafrost degradation was studied at Fairbanks, Alaska. The data extend through 1972, 26 years after the start of the experiment. The terrain at the station has a comparatively smooth, gentle slope to the west, providing good surface drainage except at the lowest elevations where swampy conditions exist. The ground under the station is permanently frozen, with the depth of permafrost approaching 60 m. Only the original densely tree covered section has remained free from permafrost degradation. In both the cleared and stripped sections, permafrost degradation is still continuing, though at a distinctly slower rate than in the area that was only cleared. In an environment like that at Fairbanks the maintenance or reestablishment of a random, mixed-type low vegetative cover cannot be counted on to stop or prevent permafrost degradation in an area subject to surface disturbance. (See also W74-04346) (Knapp-USGS)
W74-04417 May 1, 1974

ENCOUNTERING MASSIVE GROUND ICE DURING ROAD CONSTRUCTION IN CENTRAL ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H.
N. Smith, and R. Berg.
In: International Conference in Permafrost 2nd, Yakutsk, USSR 1973, p 730-736, 1973. 17 fig, 4 ref.

Descriptors: *Permafrost, *Road construction, Excavation, *Alaska, Arctic, Thawing, Revegetation.

Several cuts along a new roadway in Central Alaska had exposed massive ice inclusions and wedges. Eight relatively deep cuts were made in high ice content soils. Guidelines are given for making cuts through ice-rich soils: avoid north-facing slopes when possible; make vertical backslopes on cuts; provide a wide ditch at the base of the cut to allow removal of material if necessary to allow deposition of some overlying material during the stabilization process; and clear trees and brush from the top of the slope to a distance about equal to the height of the slope. (See also W74-04346) (Knapp-USGS)
W74-04420 May 1, 1974

RELATIONSHIP BETWEEN LOGGING ACTIVITIES AND SALMON PRODUCTION,
Alaska Dept. of Fish and Game, Juneau.
A.P. Kingsbury.
Available from the National Technical Information Service as COM-73-11630; $5.00 in paper copy, $1.45 microfiche. National Marine Fisheries Service Report No. NOAA 73090605, April 1973. 59 p, 13 fig, 1 tab, 33 ref, 10 append. 52-4-R.

Descriptors: *Sedimentation, *Lumbering, *Salmon, *Productivity, Bottom sediments, Pink salmon, Fry, Stream, *Alaska, Spawning, Dissolved oxygen, Seasonal, Gravels, Fish eggs, Road construction, Streamflow.

Effects of logging and road building on stream flow, water temperature and debris on salmon egg and fry production were assessed quantitatively and additional data obtained on sediment content of spawning gravel, intra-gravel, dissolved oxygen and salmon abundance. Studies were conducted at 108 Creek and Kadashan Creek in southeastern Alaska. Spawning bed sediment and dissolved oxygen and pink salmon survival data were assembled and are discussed in relation to logging and road building. Fine sediment in three 108 Creek study areas increased somewhat irregularly over the first six years of the study and did not change appreciably in the following three years. Analysis of the relationship between amount of fine sediment and dissolved oxygen content within the gravel in the streams was inconclusive. Decreases in fine sediments were usually associated with high stream flow and high spawner density. Estimates of overwinter survival of pink salmon were too imprecise and are affected by too many factors for use as a measure of land use effectson pink salmon production. Intra-gravel sediment and dissolved oxygen data were highly variable within and between Kadashan Creek study areas. Effects of logging and roading on the pink salmon production were difficult to demonstrate. (Jones-Wisconsin)
W74-07468 July 15, 1974

FLOOD SURVEY AT PROPOSED TAPS CROSSING OF YUKON RIVER NEAR STEVENS VILLAGE, ALASKA,
Geological Survey, Anchorage, Alaska.
J.M. Childers, and R.D. Lamke.
Open-file report, 1973. 12 p, 4 fig, 1 tab, 7 ref.

Descriptors: *Floods, *Alaska, *Pipelines, Scour, Stage-discharge relations, Design flood, Historic floods, Erosion, Surveys.
Identifiers: *Trans-Alaska Pipeline, *Yukon River (Alas).

A flood survey and a hydraulic analysis were made at the proposed pipeline and highway bridge crossing of the Yukon River, Alaska. The Maximum Evident Flood at the proposed crossing, section 6, was 890,000 cu ft per sec at an elevation of 301 feet. The Standard Project Flood (or design flood), at 1,600,000 cu ft per sec, will reach an elevation of 322 feet at the proposed crossing. No ice-jam evidence was found. No significant scour or fill occurs at high flow. (Knapp-USGS)
W74-09405 September 15, 1974

THE EFFECTS OF LAND USE ON SALMON PRODUCTION,
Alaska State Dept. of Fish and Game, Juneau.
S.C. Smedley, K.E. Durley, and C.C. Larson.
Available from NTIS, Springfield, Va 22151 as COM-72-10895 Price $3.00 printed copy; $1.45 microfiche. Completion Report to National Marine Fisheries Service, July 1972, 82 p.

Descriptors: *Salmon, *Lumbering, *Water pollution effects, *Land use, Land management, *Alaska, Fisheries, Forestry, Forest management.

To assess the effects of land use (primarily logging) in Alaska on the salmon spawning environment, a monitoring program was initiated in 1963. Three major salmon streams, capable of handling escapements of 100,000 or more pink salmon per year, were chosen. These are Staney Creek and 108 Creek (also known as Big Creek) on the Kasaan District of the South Tongass National Forest and Kadashan Creek, Sitka District, 1968, North Tongass National Forest. Seven years of monitoring in 108 Creek of (1) adult pink salmon escapement, (2) streambed composition, (3) streambed stability, and (4) production of pink salmon fry, show a drop in adult escapements, marked increase of fine materials in the spawning grounds, a relatively stable streambed, a drop in pink salmon fry production, and a rise in percentage fry survival between eyes eggs and pre-emergency when adult spawners are relatively sparse. Equally important, these affects have been noted in a stable, lake-fed stream where logging and road building have been conducted under careful supervision. No careless practices have been tolerated. Land use was apparently unrelated to the initial drop in odd-year adult pink salmon runs and fry production. The drought year 1965 seems the primary cause of depression. High salmon egg deposition plus a high percentage of fine materials in 1964 and particularly in 1966 presumably created a BOD too high to be met, resulting in low fry survival and eventually a low 1968 adult return. Contributions of sediment to 108 Creek through small tributary streams were identified as coming from the road system and from logs skidding over and breaking tributary streambanks. Slumps in unlogged areas from the banks of 108 Creek also contributed significant suspended sediment load. A significant (1.3 to 1.4 deg F) increase in water temperature was found in the summer of 1966 and 1967 when compared with water temperatures of summers, 1964 and 1965. This increase might be ascribed to logging. (Knapp-USGS)
W74-09411 September 15, 1974

5A. Identification of Pollutants

COMPOSITIONAL STUDIES OF A HIGH-BOILING 370-535 C DISTILLATE FROM PRUDHOE BAY, ALASKA, CRUDE OIL,
Bureau of Mines, Bartlesville, Okla. Bartlesville Energy Research Center.
H.J. Coleman, J.E. Dooley, D.E. Hirsch, and C. J. Thompson.
Analytical Chemistry, Vol 45, No 9, p 1724-1737, August 1973, 10 fig, 7 tab, 18 ref.

Descriptors: *Chemical analysis, Methodology, Pollutant identification, *Distillation, Organic compounds, *Alaska, Nuclear magnetic resonance, Aromatic compounds, Chemical degradation, Sulfur, Nitrogen, Separation techniques, Physical properties.
Identifiers: Chemical composition, *Crude oil, *Petroleum distillates, Boiling point, *Prudhoe Bay (Alas), *Oil characterization, Aromatic hydrocarbons, Gel permeation chromatography, Silica gel adsorption chromatography, Alumina gel adsorption chromatography, NMR spectra, Sample preparation, Petroleum residues, Light gasoline, Naphtha, Gas oil, Kerosene, Paraffins, Naphthenes.

In addition to providing some of the general characteristics of the Prudhoe Bay, Alaska, crude oil as determined by the Bureau of Mines routine method of analysis, this paper presents a comprehensive analytical characterization of a high-boiling 370y535C distillate. Following distillate preparation by several distillation steps in special distillation equipment, careful procedures with ion-exchange resins, coordination-complex formation of neutral nitrogen compounds with ferric chloride, and dual silica-alumina gel adsorption

provided suitable concentrate fractions for further study. Subdivision of aromatics into three major aromatic types-monoaromatics, diaromatics, and polyaromatics-polar greatly simplified subsequent separation and characterization studies. Monoaromatic, diaromatic and polyaromatic-polar concentrates combined represent a large portion (45.5 percent) of the 370-535C boiling range distillate of the Prudhoe Bay, Alaska, crude oil, the importance of which justified detailed determinations of the number of rings involved, the relative aromaticity, and the degree of condensation of aromatic, naphthene, or heterocyclic rings. Further analytical separtions by GPC, followed by determination of mass and NMR spectral data on the resulting GPC subfractions provided a basis for determining a much more intelligible and reasonable understanding of compound type distributions for this specific high-boiling 370-535C Prudhoe Bay, Alaska, crude oil distillate. The end result is a scheme of sample preparation, analysis, and characterization that should be applicable to similar high-boiling distillates from other crude oils and of value to the petroleum industry in studies related to the origin of petroleum as well as its production, processing, storage, and usability. (Holoman-Battelle)
W74-00258 January 1, 1974

FIELD WATER-QUALITY INFORMATION ALONG THE PROPOSED TRANS-ALASKA PIPELINE CORRIDOR, SEPTEMBER 1970 THROUGH SEPTEMBER 1972,
Geological Survey, Anchorage, Alaska.
J.W. Nauman, and D.R. Kernodle.
Basic-Data Report, 1973. 22 p, 1 fig, 3 tab, 9 ref.

Descriptors: *Water quality, *Surface waters, *Baseline studies, *Alaska, *Pipelines, Oil industry, Water analysis, Chemical analysis, Basic data collections, Streams, Rivers, Lakes, Ice, Temperature, On-site investigations.
Identifiers: *Trans-Alaska pipeline corridor.

Field water quality information was collected during parts of 1970, 1971, and 1972 among the proposed trans-Alaska pipeline corridor. The data include measurements of water and air temperature, specific conductance, alkalinity, pH, dissolved oxygen, chlorophyll 'a' stream discharge, and ice conditions for 69 sites. At 11 stream sites 24-hour studies were conducted, and additional data on barometric pressure, light intensity, percent cloud cover, and wind conditions are presented for these studies. Seasonal turbidity data are presented also. (Woodard-USGS)
W74-04054 April 15, 1974

5B. Sources of Pollution

PROTEIN ADSORPTION BY SUSPENDED SEDIMENTS: EFFECTS OF PH, TEMPERATURE, AND CONCENTRATION,
Alaska, Univ., College, Inst. of Water Resources.
A.P. Murray.
Environmental Pollution, Vol 4, No 4, p 301-312, June 1973, 6 fig, 2 tab, 9 ref. OWRR A-030-ALAS(3).

Descriptors: *Proteins, *Adsorption, Aquatic environment, *Suspended solids, *Sediments, *Environmental effects, Water temperature, Hydrogen ion concentration, Variability, Soil analysis, Water analysis, Bottom sediments, Bottom sampling, Water sampling, Chemical analysis, Aquatic soils Colorimetry, *Alaska, Kaolinite, Illite, Montmorillonite, Particle size, Clay minerals, Path of Pollutants.

Identifiers: Natural waters, Chemical concentration, Characterization, Fate of pollutants, Sample preparation, Tanana River, Lowe River, Knik Arm, Bovine serum albumin.

The affinities of sediment materials from various natural, silt-laden waters in Alaska, and their variation with pH, temperature and protein concentration, were determined for the protein bovine serum albumin. Water and bottom soil samples were collected from Alaskan river systems in summer and autumn. The water samples were characterized in terms of the particle size distributions of their suspended matter and the soil samples were characterized before their use in adsorption experiments. The sediment sample or reference sample for the adsorption experiments was placed in an Erlenmeyer flask to which was added a temperature-equilibrated solution of the protein in distilled water or buffer solution. The flask was capped, contents mixed, set in an incubator-shaker and shaken at 300 rpm on a rotary motion shaker at a known temperature for at least 24 h. To determine the amount of protein remaining in solution at equilibrium, an aliquot of the suspension was centrifuged and the supernatant was analyzed for protein by the Folin-Ciocalteu colorimetric method. As expected, the pH of the water system plays an important role in the amount of the protein bovine serum albumin adsorbed by suspended sediments. For the soil materials studies, maximum adsorption was observed at pH 3; minimum at pH 6.5. The behavior of the Alaskan sediments in this respect was similar to that of kaolinite and montmorillonite but unlike that of illite. From experiments in which the adsorptive capacities of the sediments were measured as a function of the initial amount of protein, it was found that the equilibrium concentration of protein remaining in solution could be related to the initial protein: sediment ratio by the equation: c equals k times the quantity P sub o divided by m raised to the n power. Variations in temperature from 5C to 25C had no detectable effect on the amount of protein adsorbed. The amount of protein adsorbed (at the pH of the natural water systems) on to suspended sediments would have a negligible effect on the rate at which the protein would be decomposed in the aqueous environment. (Holoman-Battelle)
W74-00293 January 1, 1974

SUMMARY OF CHEMICAL AND RADIOCHEMICAL MONITORING OF WATER FOR THE CANNIKIN EVENT, AMCHITKA ISLAND, ALASKA, FISCAL YEAR 1972,
Geological Survey, Lakewood, Colo.
L.J. Schroder, and W.C. Ballance.
Available from NTIS, Springfield, Va. 22151 USGS-474-167 Price $4.00 printed copy; $1.45 microfiche, Contract Report USGS-474-167, 1973. 39 p, 5 fig, 6 tab, 8 ref. AEC Contract AT (49-16)-3002.

Descriptors: *Nuclear explosion, *Underground, *Alaska, *Water analysis, *Pollutant identification, Chemical analysis, Tritium, Nuclear meters, Radioactivity, Dissolved solids, Sampling, Correlation analysis, Data collectionsn, Radiochemical analysis.
Identifiers: *Amchitka Island (Alaska), Cannikin event, Gross beta/gamma activity.

Amchitka Island, was the site for three underground nuclear detonations. The Long Shot event was conducted on October 29, 1965, the Milrow event on October 2, 1965, and the Cannikin event on November 6, 1971. This report is concerned with the Cannikin event. An increased dissolved-solids content was found immediately after water-sampling network established in 1967 and revised in September 1971. The observed dissolved-solids content increase was within the seasonal range that has been observed at these locations. No measureable increase in radioactivity was detected as a result of the Cannikin event at the 72 locations monitored during fiscal year 1972. A measureable increase in gross beta/gamma activity was found in January 1972 which was correlated to a surface test of a nuclear device by a foreign nation. (Woodard-USGS)
W74-00547 January 1, 1974

SEASONAL VARIATION OF CHEMICAL PARAMETERS IN ALASKAN TUNDRA LAKES,
Skidmore Coll., Saratoga Springs, N.Y. Dept. of Biology.
H.H.Howard, and G.W. Prescott.
American Midland Naturalist, Vol 90, No 1, p 154-164, July 1973, 2 fig, 3 tab, 37 ref.

Descriptors: Tundra, *Water chemistry, *Alaska, Water sampling, Chemical analysis, Supersaturation, Chemical properties, Water properties, Shallow water, Lakes, Alkalinity, Dissolved oxygen, Bicarbonates, Hydrogen ion concentration, Chlorides, Hardness (Water), Calcium, Magnesium, Sulfates, Calcium carbonate, Methodology, *Ice cover, Thawing, Water analysis, Water quality.
Identifiers: Imikpuk Lake (Alas), Ikroavik Lake (Alas), *Seasonal variation, *Tundra lakes.

Chemical parameters were monitored for 20 months in two shallow lakes near Barrow, Alaska. After formation of an ice cover, all parameters, except dissolved oxygen and pH, increased to a maximum at time of maximum ice depth. The pH values were essentially the inverse of other parameters after an ice cover was formed. Dissolved oxygen increased to supersaturation values in January and then gradually decreased until photosynthetic rates became significant. The lakes did not become anaerobic at any time. During and immediately after thawing, dissolved oxygen was near saturation and all other solutes (except pH) fell to minimum values. After this low point, concentrations began to increase toward another maximum in the following year. Solutes may be concentrated up to about 30 times by the thick ice cover. Ratios of solutes deviated widely from mean world values, probably because of the close proximity of the lakes to the ocean. Imikpuk, nearer to the ocean, had most ratios closer to ocean values. Seasonally, except at the time of the thaw, ratios were essentially constant except for Cl/HCO3, Cl/HCO3 decreased after ice formation and until photosynthetic rates became significant. During ice melt, ratios differed from values at other times, possibly because of differential occlusion of solutes in ice. (Holoman-Battelle)
W74-01347 February 1, 1974

PATHWAYS OF TRACE ELEMENTS IN ARCTIC LAKE ECOSYSTEMS,
Alaska Univ., College. Inst of Marine Science.
R.J. Barsdate.
Available from NTIS Springfield Va., 22151, as RLO-2229-T2-1 for $3.00 paper copy $1.45 microfiche. Progress Report No. RLO-2220-T2-1, 1972. 87 p, 19 fig, 15 tab, 57 ref. Contract No. AT(45-1)-2229 No. 2.

Descriptors: *Trace elements, *Phytoplankton, Tundra, Ponds, Lakes, Ecosystems, *Path of pollutants, *Water pollution effects, Humic acids, Phytotoxicity, Heavy metals, Lake sediments, Pollutant identification, Biomass, Primary productivity, Bioassay, Alkaline earth metals, Water analysis, Chemical analysis, Cycling nutrients, Plant tissues, Zinc, Lead, *Alaska, Aquatic algae, Food webs, Food chains, Copper, Silica, Chrysophyta, Cobalt, Manganese, Chlorophyta, Pyrrophyta, Cyanophyta, Calcium, Magnesium, Strontium, Surface waters, Eutrophication, Methodology, Electrochemistry, Sediments, Dinoflagellates, Color, Diatoms, Euglenophyta, Laboratory tests, Absorption, Lagoons, Standing crops, Limiting factors.
Identifiers: *Metals complexes, Natural organics, Chemical composition, Phosphorus cycle, Bioaccumulation, Fate of pollutants, Dissolved carbon, Dissolved nitrogen, Dissolved copper, Dissolved silica, Phodomonas minuta, Dissolved organic carbon, Zostera marinus, Sensitivity.

The primary emphasis of this report is the interactions between planktonic algae and trace metals (principally zinc) in solution as related to lake ecosystems in the Arctic. Distinctions were made, where possible, between pathways and effects of metals in simple ionic forms and those bound to naturally occurring organic ligands. The results from studies of tundra pond waters indicate that increases in metal concentrations may be responsible for the absence of fall phytoplankton blooms and a dramatic shift in phytoplankton population from Rhodomonas minuta to Chrysophyta. In lakes with high natural concentrations of humic complexing agents there was a pronounced suppression of phytoplankton production by the addition of trace metals. This suggested that such complexed metals are available physiologically to phytoplankton. The shallow marine or estuarine lagoons bordering the Bering Sea have vast eel-grass meadows which are responsible for exporting substantial quantities of dissolved C, N, P, Cu, and silica; Pb is also removed but in smaller quantities. The somewhat detailed study of zinc showed that in organic-rich lakes, a large fraction of the total Zn is in the form of dissolved complexes or colloidal complexes, and a smaller fraction is in simple inorganic forms. Precision in the determination of complexed zinc is considered to be extremely important. (Holoman-Battelle)
W74-01401 February 1, 1974

WATER QUALITY IN ALASKA CAMPGROUNDS,
Alaska Univ., College, Inst. of Water Resources,
R.S. Murphy.
Available from the National Technical Information Service as PB-228 851, $9.00 in paper copy, $1.45 in microfiche, Report No. IWR-38, 1973, 108 p, 1 fig, 22 tab, 52 ref, 2 append. OWRR B-009-ALAS(1).

Descriptors: *Camping, *Recreational facilities, *Recreational wastes, *Water supply systems, Water quality, Water sources, Waste disposal, Water pollution sources, *Alaska, Potable water.
Identifiers: *Campgrounds.

An evaluation is presented of water quality in Alaskan Campgrounds using laboratory determinations and on-site evaluations. In general, ground water quality was excellent and surface water quality unacceptable for human consumption and total body contact recreation. The most pressing need was the provision of an approved drinking water supply for each campground. The environmental health aspects of campgrounds were found to be largely neglected. Many of the sewage systems are inadequate, resulting in pollution of the ground and surface water. Solid waste was stored and disposed of by unacceptable methods. Finally, many campgrounds are located in swampy areas or in areas subject to annual flooding. (Hartman-Alaska)
W74-04974 May 15, 1974

GAMMA-EMITTING RADIONUCLIDES IN ALASKAN ENVIRONMENTS 1967-1970,
California Univ., Livermore, Lawrence Livermore Lab.
J.J. Koranda, and J.R. Martin.
In: CONF-710501-P1 -- Proceedings of the Third National Symposium on Radioecology, May 10-12, 1971, Oak Ridge, Tenn. p 81-107, (1971) 5 fig, 19 tab, 23 ref.

Descriptors: *Environment, *Sampling, *Radioactivity, *Assay, *Measurement, Evaluation, Safety, Air pollution, Water pollution, Soil contamination, Vegetation, Lichen, Fallout, Cesium, Nuclear explosions, Radioisotopes, *Alaska.
Identifiers: China, *Amchitka Island (Alas).

Environmental samples were collected at several sites in Alaska to determine the present status of radionuclides in Alaskan environments, with special emphasis on Amchitka Island. Samples were obtained on Amchitka Island, the coastal Alaska near Anchorage, and in central Alaska in the Fairbanks area. Lichens, grasses, herbs, and shrubs were collected along the Amchitka Island to Fairbanks transect of Alaskan environments. Radionuclide concentrations were determined by scintillation crystal and solid-state gamma spectroscopy. Cesium-137 was the most abundant radionuclide found in the northern environments, with low but detectable concentrations of Eu-155, Sb-125, Ce-144, and Mn-54 also being present. Fallout from recent Chinese tests produced increased levels of Zr-95/Nb-95 in the 1970 samples. Lichens have the highest concentrations of Cs-137, but evergreen vascular plants also had Cs-137 concentrations in the same range as those found in lichens. Plants with an annual topgrowth, such as grasses, had low to nondetectable concentrations of radionuclides. These data describe radiometric base lines pertinent to current testing programs being conducted in the Aleutian Islands and relate those base lines to those occurring elsewhere in the high latitudes. (See also W74-05181)(Houser-ORNL)
W74-05187 May 15, 1974

RECENT MEASUREMENTS OF CESIUM-137 IN RESIDENCE TIME IN ALASKAN VEGETATION,
California Univ., LIvermore. Lawrence Livermore Lab.
J.R. Martin, and J.J. Koranda.
In: CONF-710501-P1, Proceedings of the Third National Symposium on Radioecology, May 10-12, 1971, Oak Ridge, Tenn. p 108-115, (1971) 5 fig, 1 tab, 25 ref.

Descriptors: *Monitoring, *Measurement, *Cesium, *Vegetation, *Lichens, Ecology, Ecosystems, Water pollution, Fallout, Sampling, Assay, Data collections, Radioecology, Absorption, Cycles, Food chains, Public health, Radioisotopes, *Alaska, *Path of pollutants.
Identifiers: Residence half-time, Aleutian Islands(Alas), Anchorage(Alas).

Radionuclide concentrations in Alaskan plant species were measured in the period 1967-1970 when incoming fallout was a small fraction of the accumulated inventory present in the vegetation. Samples were collected in five geographic areas from the western Aleutians to the interior of Alaska. Radionuclide concentrations in 150-g aliquots of dried, ground, and compressed samples were measured by scintillation gamma spectrometry. The residence half-time for Cs-137 in Cladonia sp. lichens was approximately three years on Amchitka Island and the coastal area near Anchorage, Alaska. In central Alaska near Fairbanks and in the mountains near Anchorage, the residence half-time for Cs-137 in lichens was about eight years. Evergreen vascular plants from these higher elevation sites had residence half-times of only one to three years. (See also W74-05181)(Houser-ORNL)
W74-05188 May 15, 1974

GROUND WATER QUALITY EFFECTS ON DOMESTIC WATER UTILIZATION,
Univ. of Alaska College, Inst. of Water Resources.
D.W. Smith, and L.A. Casper.
Available from the National Technical Information Service as PB-232 535, $4.75 in paper copy; $1.45 in microfiche. Office of Water Resources Research, USDI Report IWR-48, March, 1974, 139 p, 63 fig, 10 tab, 48 ref. OWRR A-040-ALAS(1).

Descriptors: Groundwater, *Water costs, Water quality, *Water wells, Water supply, *Wells, Groundwater management, Water utilization, *Alaska, *Cold regions, *Subarctic, Domestic water.
Identifiers: Water hauling, *Groundwater quality.

The areal distribution of ground water quality characteristics were examined through the rural domestic water users appraisal of the water and a selected number of chemical analyses. Survey forms were distributed to 6015 rural residents with data form and by maps indicating well depths, iron, color, taste and odor problems, and the locations where softeners and filter were reported in use. Chemical analysis for alkalinity, electrical conductivity, Ca, Mg, Fe, Mn, NO-2 + NO=3, and color were run on 83 ground water samples in a selected area. Information was collected on an additional 23 wells. The chemical information had a good correlation with the quality problems indicated by the users. A significant inverse correlation was noted between iron content and nitrate-nitrite concentration in the well waters. Cost considerations indicate that considerably more attention to ground water supplies is warranted in the interior of Alaska.
W74-08287 August 15, 1974

HYDROCARBON BIODEGRADATION IN ALASKAN WATERS,
Alaska Univ., College. Inst. of Marine Sciences.
B. Robertson, S. Arhelger, P.J. Kinney, and D.K. Button.
Proceedings of a Workshop held at Georgia State University, December 4-6, 1972. Published by Louisiana State University, Sea Grant Publication No. LSU-SG-73-01, p 171-184, 1973, 4 fig, 5 tab, 14 ref.

Descriptors: *Oil pollution, *Oil spills, *Biodegradation, *Microbial degradation, *Estuaries, Sea water, Salinity, Bacteria, Yeast, Microorganisms, Algae, Mixing, Silts, *Alaska.
Identifiers: Cook Inlet(Alas). Port Valdez(Alas), Marine microorganisms, Crude oils, Oil slicks, Inoculation, Chemotaxis, Hydrocarbon oxidation, Microbial oxidation, Oil toxicity, Selanastrum capricornutum, Flushing, Solubilization, Incubation temperature. Inoculation frequency, Kerosene.

Populations of hydrocarbon-oxidizing organisms were of the order of 1/cc in Alaska's Cook Inlet and Port Valdez, less in the Arctic Ocean. Distribution decreased with salinity in Cook Inlet and with dodecane (91 microgram C/liter) started within hours and proceeded at a rate of 1 microgram/liter-day. Storage of Cook Inlet crude oil for four years in sea water at 10 C effected removal of most visible components. Mixing had a major effect on oil slick stability. The solubilization process was little affected by added silt, a major component of many Alaskan estuaries. Isolated organisms had unique preferences for various components of kerosene, emulsified crude oil and responded in a 14.5 to 16 Kcal/mole. Some effects of crude oil inhibition are discussed. Calculations show that motility, particularly in combination with chemotaxis, is necessary for rapid slick inoculation. In this communication we report observations on the distribution of hydrocarbon-oxidizing organisms, some characteristics of several organisms isolated, rates of hydrocarbons oxidation observed and some estimates of inoculation frequency. (See also W74-08609)(Sinha-OEIS)
W74-08627 August 15, 1974

TRITIUM BURDENS IN TWO ARCTIC VILLAGES,
National Environmental Research Center, Las Vegas, Nev.
J.A. Eckert, and R.B. Evans.
Journal available from Supt. of Documents, U.S. Govt. Printing Office, Washington, D.C., $1.00 per copy. Radiation Data and Reports, Vol 14, No 5, p 273-275, May 1973, 3 fig, 2 tab, 6 ref.

Descriptors: *Environment, *Monitoring, *Radioactivity, *Cesium, *Tritium, *Alaska, Arctic, Domestic water, Public health, Water pollution, Urine, Analytical techniques, Data collections.
Identifiers: Body burden.

During a routine visit to measure cesium-137 body burdens in residents of two Alaskan villages, drinking water and urine samples were collected and analyzed for tritium. The mean concentrations at Noatak, Alaska, were 1200 pCi/liter and 1500 pCi/liter for tritium in drinking water and urine, respectively. At Kiana, the mean tritium concentration in drinking water was less than 400 pCi/liter, and the mean tritium concentration in urine was 1000 pCi/liter. (Houser-ORNL)
W74-08649 August 15, 1974

LOW WINTER DISSOLVED OXYGEN IN SOME ALASKAN RIVERS,
Environmental Protection Agency, College, Alaska, Arctic Environmental Research Lab.
E.W. Shallock, and F.B. Lotspeich.
Copy Available from GPO Sup Doc as EP1.23:660/3-74-008, $0.85; microfiche from NTIS, Springfield, Va 22161 as PB-234 443, $2.25. Ecological Research Series Report EPA-660/3-74-008, April 1974, 33 p, 11 fig, e tab, 36 ref. EPA Project 21ARX, Program Element IBA021.

Descriptors: *Dissolved oxygen, *Alaska, Rivers. Winter, Seasonal, *Conductivity, Alkalinity, *Hydrogen ion concentration, *Water temperature, Water quality standards, Arctic, Subarctic.
Identifiers: Yukon River (Alas). Chena River (Alask), Sagavanirktok River (Alas).

Water samples collected during the years 1969 through 1972, from 36 selected Alaskan rivers were analyzed for dissolved oxygen, pH, conductivity and alkalinity. Dissolved oxygen (D.O.) ranged from 0.0 to 15.3 ml/l (106 percent saturation); pH from 6.2 to 8.4; conductivity varied from 105 to 3000 (umho/cm); and alkalinity from 28 to 410 (mg/l). Severe D.O. depletion during winter was found in many river systems large and small, and located in a range of latitudes (70 deg N to 61 deg N). Sufficient data were collected on the Chena, Chatanika, and Salcha Rivers to reveal annual D.O. trends: near saturation during spring 'breakup' and fall 'freezeup' when water temperatures are near 0 deg C; somewhat lower D.O. concentrations during warm water summer periods; and yearly minimum concentrations during the winter (January-March) interval. Data indicate that D.O. degression begins in October and continues into February. D.O. from stations near the mouth of a river were generally depressed more than at upper stations. The latter trend was observed in the Yukon River which contained 10.5 mg/l (73 percent) saturation) at the Canadian Border but only 1.9 mg/l (13 percent) near the mouth. pH gradually decreased in some rivers although alkalinity and conductivity increased. The depressed winter D.O. concentrations and low winter discharge in many Alaskan rivers are more severe and widespread than present literature indicates. Winter conditions may already limit aquatic organisms in some systems. (EPA)
W74-10546 October 15, 1974

FATE AND EFFECTS OF OIL POLLUTANTS IN EXTREMELY COLD MARINE ENVIRONMENTS,
California Inst. of Tech., Pasadena. Jet Propulsion Lab.
R.M. Atlas.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-769 895, Price $3.00 printed copy; $2.25 microfiche. Final Report to Office of Naval Research, October 1973. 34 p, 6 fig, 5 tab, 16 ref. ONR Contract NAS 7-100.

Descriptors: *Oil spills, *Oily water, *Arctic, *Alaska, *Biodegradation, Water pollution effects, Water pollution treatment, Nutrients, Bacteria, Fungi, Algae, *Path of pollutants.

The interactions of microorganisms and Prudhoe crude oil were studies in Alaskan coastal waters. The main study site was located at Prudhoe Bay in Arctic Alaska. Some work was also done at Valdez, the proposed southern terminus for the trans-Alaskan pipeline. Other experiments were conducted at Umiat and Cape Simpson where there are large natural oil seepages. The rates of crude oil mineralization were higher for Prudhoe Bay water samples than for water samples collected at Valdez. Nitrogen and phosphate levels were about 0.5 ppm and 0.05 ppm respectively, which are lower than those levels required for extensive petroleum biodegradation. Total microbial populations were about 100/ml at Valdez and 1000/ml at Prudhoe Bay. Oil degrading microorganisms were about 0.1/ml at Valdez and 0.7/ml at Prudhoe Bay. When Prudhoe crude oil was incubated with water from coastal ponds along Prudhoe Bay, the bacterial populations increased in numbers by several orders of magnitude. There was a qualitative change in the algal population with a disappearance of coccoid green algae, but the remaining algae did not appear to be inhibited. Miniature contained oil slicks were floated in Prudhoe Bay. After 5 weeks of exposure, the nonbiological losses were 31%, the natural losses, including biodegradation (unfertilized), were 60% and the stimulated losses (fertilized) were 80% of the added oil by weight. (Knapp-USGS)
W74-11725 November 15, 1974

5C. Effects of Pollution

THERMAL TOLERANCES OF INTERIOR ALASKAN ARCTIC GRAYLING (THYMALLUS ARCTICUS),
Alaska Univ., College. Inst. of Water Resources.
J.D. LaPerriere, and R.F. Carlson.
Availability from NTIS as PB-227 239 $3.25 in paper copy, $1.45 in microfiche.
Report No. IWR-46, December, 1973. 36 p, 2 fig, 10 tab, 13 ref. OWRR A-031-ALAS(3).

Descriptors: *Bioassay, Fish, *Thermal pollution, *Alaska, Subarctic, Heat resistance, Water pollution effects, Water temperature.
Identifiers: *Arctic grayling, Thymallus arcticus, *Thermal tolerance, Chena River (Alas).

Arctic grayling, Thymallus arcticus, captured from the Chena River in Interior Alaska or artificially propogated from the sex products of fish from this population were tested for tolerance to elevated water temperatures. Most tests were conducted in recirculating temperature-controlled tanks with a few conducted as standard static bioassays. Median tolerance limit ranges were delineated for sac fry, young-of-the-year, fish larger than 10 cm, and fish larger than 20 cm. There is some evidence that the least sensitive life cycle stage is the young-of-the-year which had a median tolerance limit above 24.5C after acclimatization of 8.5C plus or minus 1C. Equipment limitations did not allow acclimatization of all fish at the same temperature, however. Therefore, some changes in tolerance due to life cycle changes were somewhat masked by the effect of different acclimatization temperatures.
W74-03759 April 15, 1974

STUDIES ON ORGANISMS FOUND IN ARCTIC SEA ICE,
Alaska Univ., College. Inst. of Marine Science.
R.A. Horner

Available from the National Technical Information Service as AD-768 399, $4.75 in paper copy, $1.45 in microfiche. Final Report to Arctic Institute of North America, Washington, D.C., March 1973. 150 p, 9 fig, 3 tab, 31 ref, append, NR 307-105. N00014-70-A-0219-0001.

Descriptors: *Aquatic microorganisms, *Arctic, *Ice, Nutrients, Salinity, Chlorophyll, Kelps, Diatoms, Dinoflagellates, *Alaska, Sea water, Algae, Zooplankton, Systematics, Invertebrates.
Identifiers: Flagellates, Ciliates, *Barrow(Alaska).

Studies of ice organisms near Barrow, Alaska showed that the shore-fast ice is a habitat for a relatively complex assemblage including diatoms, pigmented and non-pigmented dinoflagellates and flagellates, and ciliates. Samples were collected, field measurements made and laboratory studies performed. Species from each station in five locations were investigated and are listed. The deep-water stations were sampled to see if the spring phytoplankton bloom was occurring in the sea-water under the ice and to try to determine the areal extent of the organism layer in the bottom few centimeters of ice. The sampling technique had posed a problem as pieces of ice would break from the core and be lost. When ice cores are brought to the surface, cells are exposed to extremes of temperature and light whose effect is not known. Melting the ice at room temperature may also affect the cells. Small flagellates seem to be the most abundant organisms found in new ice in the fall. Perhaps many of the ice organisms, especially the diatoms, are benthic species which may be brought into the water column during the fall storms and remain long enough to become trapped as the ice forms. A recently discovered kelp bed is described. (Jones-Wisconsin)
W74-07487 July 15, 1974

AN ECOSYSTEM STUDY IN THE INSIDE PASSAGE OF SOUTHEASTERN ALASKA,
Oregon State Univ., Corvallis. Dept. of Oceanography
H.C. Curl.
In: Proceedings 2nd Annual Technical Conference on Estuaries of the Pacific Northwest, March 16-17, 1972. Oregon State Univ., Corvallis (Engineering Experiment Station Circular No. 44), p 42-49 (1972), 5 fig, 1 tab, 10 ref.

Descriptors: *Bays, *Alaska. *Productivity, Estuaries, Nutrients, Plankton. Enzymes, Zooplankton, Nitrogen, Amino acids, Nitrates, Ammonia, Eutrophication, Phytoplankton, Light intensity, Model studies, Mixing.
Identifiers: *Auke Bay(Alaska). Alaska Inside Passage.

In Auke Bay near Juneau and the Alaskan Inside Passage there is a strong, two-layered circulation in summer, upwelling is frequent, seasonal cycles are similar from year to year, zooplankton usually occur as a single, mid-summer pulse, and most chemical and biological properties, except zooplankton, are homogeneously distributed in the horizontal plane. A study was made of the differences in the activity of the enzyme nitrate reductase between Thalassiosira and Skeletonema. Effect of light intensity on nitrate assimilation and nitrate supported growth of the two organisms was studied. The sequence of events is now thought to be that the initial spring bloom is initiated by the onset of stability, increasing solar radiation, and high levels of initial nutrients. Species composition at this time is controlled by temperature acting on anzymatic processes and by nutrient availability. Subsequent blooms and their composition are controlled by periodic wind mixing, replenishing nutrients from beneath

the pycnocline, in situ nutrient regenerations by grazing zooplankton, or possibly, directly from phytoplankton, advection and stream flow, rainfall, and grazing by zooplankton. The biological response varies according to the interactions of the forcing functions. (See also W74-07491) (Jones-Wisconsin)
W74-07495 July 15, 1974

EFFECTS OF CRUDE OIL AND SOME OF ITS COMPONENTS ON YOUNG COHO AND SOCKEYE SALMON,
Alaska Univ., College, Dept of Biological Sciences.
J.E. Morrow.
Copy Available from GPO Sup Doc as EP1.23:660/3-73-018, $0.85; microfiche from NTIS as PB-232 094 $1.45. Environmental Protection Agency, Ecological Research Series Report EPA-660/3-73-018, January 1974, 37 p, 20 tab, 10 ref. EPA Project R 801039 (formerly 1610FWQ).

Descriptors: *Oil pollution, *Alaska, *Sockeye salmon, *Organic compounds, Oil wastes, *Toxicity, Aromatic compounds, Lethal limit, *Mortality, Fish, Water pollution effects.
Identifiers: *Crude oil, *Coho salmon, Aliphatic hydrocarbons, Aromatic hydrocarbons, Monovalent blood ions, Cell membranes(Fish).

Young coho and sockeye salmon, acclimated to 30 o/oo salinity, were exposed to various ways to different amounts of crude oil from the Prudhoe Bay field. Oil poured on the surface of the water in 95 liter (25 gallon) aquaria produced significant mortalities when the oil concentration was 500 ppm or greater. Fish dipped into a crude oil film, or with a drop of oil placed directly on each gill, showed no significant mortalities. The same was true of fish force-fed crude oil at 1 g per 100 g body weight. Oil that had been exposed to air for 30 days produced no significant mortalities. Among oil components tested for toxicity on coho salmon, aliphatic compounds were not lethal. Mono-cyclic aromatics were generally toxic, the degree of toxicity increasing with the degree of unsaturation. It is suggested that the toxicity of these substances is brought about through alteration of cell membrane permeability, especially in the gills. This results in a rapid increase of mono-valent ions in the blood and probably also interferes with CO2-HCO3 regulation. (EPA)
W74-07613 August 1, 1974

55FE CONCENTRATION AND SPECIFIC ACTIVITIES IN NORTH PACIFIC MARINE ORGANISMS,
Battelle-Pacific-Northwest Lab., Richland, Wash.
C.E. Jenkins, and J.C. Langford.
IEEE Transactions on Nuclear Science, Vol NS-21, No 1, p 517-521, February, 1974, 8 fig, 16 ref.

Descriptors: Iron, *Salmon, Marine fish, Sea water, *Pacific Ocean, *Alaska, Food chains, *Radionuclides, Investigations, Aquatic environment, Environmental effects.
Identifiers: *Iron-55.

Marine organisms have been shown to have up to 1000-fold higher specific activities of iron-55 than that in seawater; also iron-55 specific activities increase 10 to 30-fold in salmon between mid and northern latitudes. These observations are currently explained on the basis of a different chemical form for iron-55 in seawater and greater dilution of the iron-55 by stable iron at mid-latitudes than at the northern latitudes. The half-time for iron-55 concebtrations in mature harvested salmon at all latitudes is approximately 10 months, which is comparable to the half-time for movement of stratospheric debris to the earth's surface. (Sandoski-FIRL)
W74-09733 September 15, 1974

THE DISTRIBUTION AND SUCCESSION OF AQUATIC VASCULAR PLANT COMMUNITIES IN RELATION TO PHYSICAL-CHEMICAL CHARACTERISTICS OF VARIOUS LAKES AND PONDS OF THE TANANA VALLEY, CENTRAL ALASKA,
Alaska Univ., College. Inst. of Water Resources; and Alaska Univ., College. Inst. of Marine Science.
J.D. LaPerriere, and B.R. Robertson.
Termination Report, September 1973. 17 p. 1 fig, 9 tab. OWRR A-011-ALAS(1).

Descriptors: *Alaska, *Aquatic plants, *Distribution, *Succession, Physical properties, Chemical properties, Lakes, Ponds, Bottom sediments, Algae, Soil analysis, Water quality, Temperature, Oxygen, Carbon dioxide, Alkalinity, Nitrites, Sulfates, Turbidity, Hydrogen ion concentration, Phosphates, Weather,Organic matter.
Identifiers: *Tanana Valley (AK), Harding Lake(AK), Little Lake(AK).

This report consists of one figure showing the morphometry of Harding and Little Lakes in central Alaska with sampling station locations. The station characteristics are summarized in nine tables regarding the texture of bottom materials (percentage dry weight) according to depth and station. The species of aquatic vascular plants, algae, and liverwort, occurring in Harding Lake in the summer of 1966 are listed showing the number and dry weight of the plant collections, arranged by station. The occurrence of plant species in quadrat (1 sq m) samples are listed by number and dry weight. The soil analysis data are arranged by plant stand and by plant species. At one station the water quality parameters--temperature, oxygen, carbon dioxide, alkalinity, nitrites, sulfates, turbidity, pH, phosphates, and weather--are analyzed. (Jones-Wisconsin)
W74-11282 November 1, 1974

MELMINTHS OF SOCKEYE SALMON (ONCORHYNCHUS NERKA) FROM THE KVICHAK RIVER SYSTEM, BRISTOL BAY, ALASKA,
Battelle-Pacific Northwest Labs., Richland, Wash. Ecosystems Dept.
D.A. Pennell, C.D. Becker, and N.R. Scofield.
US Natl Mar Fish Serv Fish Bull. Vol 71, No 1, p 267-277, 1973. Illus.

Descriptors: *Salmon *Sockeye salmon, Juvenile fish, *Alaska, United States, Smolt, Freshwater fish, *Diseases.
Identifiers: Anisakis, Bolbosoma-caenoforme, Brachyphallus-crenatus, Contracaecum, Diphyllobothrium, Diplostomulum, Echinorhynchus-gadi, Eubothrium-salvelini, Gyrodactyloides-strelkowi, Helminths, Lecithaster-gibbosus, Neoechinorhynchus-rutili, Oncorhynchus-nerka, Philonema-oncorhynchi, Phyllobothrium-caudatum, Proteocephalus, Rhabdochona, Triaenophorus-crassus, Tubulovesicula-lindbergi, Kvichak River, *Bristol Bay (Alas).

A study of helminths infecting juvenile and adult sockeye salmon (O. nerka) leaving and entering the Kvichak River system, Bristol Bay, Alaska (USA) was conducted in 1969. Ten helminths acquired in fresh water were found in smolts; Diplostomulum sp.; an unidentified trematode; Diphyllobothrium spp.; Triaencophorus crassus Forel, 1868; Proteocephalus sp.; Eubothrium salvelini (Schrank, 1790); Neoechinorhynchus rutili (Mueller, 1789); Philonema oncorhynchi Kuitunen-Ekbaum, 1933; Rhabdochona sp.; and Contracaecum sp. In addition to surviving larval stages of freshwater parasites, adults were infected by 9 helminths acquired in the sea: Gyrodactyloides strelkowi Bykhovskaya and Polyanskaya, 1953; Lecithaster gibbosus (Rud., 1802); Brachyphallus crenatus (Rud., 1802); Tubulovesicula lindbergi (Layman, 1930); Phyllobothrium caudatum (Zschokke and Heitz, 1914); Echinorhynchus gadi Mueller, 1776; Bolbosoma caenoforme Heitz, 1920; Anisakis sp.; and Contracaecum sp. Infection incidences and intensities are tabulated where accurate data are available. Information on life histories is assembled from scattered sources, and some ecological aspects of helminths infecting Kvichak sockeye salmon are briefly discussed.--

W74-12719 December 1, 1974

5D. Waste Treatment Processes

AN EVALUATION OF WASTE DISPOSAL PRACTICES IN ALASKA VILLAGES,
Alaska State Dept. of Environmental Conservation, Fairbanks.
A.J. Alter.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 1-28, 1974. 12 tab.

Descriptors: *Water supply, *Waste disposal, *Cold regions, *Waste water treatment, Environmental control, Biological properties, Chemical properties, Physical properties, *Alaska.
Identifiers: *Cold climates, Environmental management.

Special problems associated with the provision of an adequate water supply and waste disposal in cold climates are discussed. Recommendations are made as to appropriate planning procedures for communities, research needs in the biological, chemical, and physical performance of existing waste treatment methods and of non-frost susceptible methods of environmental management, and the development of realistic, reasonable and equitable methods of finance for supply and treatment systems. (See also W74-10160) (Shaffer-FIRL)
W74-10161 October 1, 1974

DIFFUSION SYSTEM FOR COLD CLIMATE LAGOONS,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
C.D. Christianson, and D.W. Smith.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 170-206, 1974. 13 fig, 1 tab, 34 ref.

Descriptors: *Diffusion, *Cold regions, *Aerated lagoons, *Alaska, Dissolved oxygen, Efficiencies, Costs, Maintenance, Ice fog, *Waste water treatment.
Identifiers: Fine bubble diffuser, Coarse bubble diffuser, *Fort Greely (Alas).

Studies to compare coarse and fine bubble aerators were carried out at the Fort Greely lagoon. Dissolved oxygen levels were monitored in both water and sludge. Horsepower requirements of different systems were calculated. Conclusions reached were the fine bubble diffusers are more efficient in oxygen transfer than coarse bubble diffusers, but not necessarily more economical; power requirements in lb 02 per horsepower-hour may be higher for fine bubble diffusers; maintenance requirements are higher for fine bubble diffusers. Oxygenation efficiencies published in design but where ice fog is a problem, one must use a larger number of diffusers at increased spacing. (See also W74-10160)(Shaffer-FIRL)
W74-10169 October 1, 1974

BIO-PROCESSES OF THE OXIDATION DITCH IN A SUB-ARCTIC CLIMATE,
Dames and Moore, Fairbanks, Alaska.
R.S. Murphy, and K.R. Ranganathan
In: International Symposium on Wastewater Treatment In Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-WP-74-3, p 332-357, 1974. 7 fig, 6 tab, 12 ref.

Descriptors: *Biodegradation, Temperature, Cold regions, *Waste water treatment, *Alaska, Activated sludge, *Aeration, Costs, Biological oxygen demand, Suspended solids, Design criteria, Treatment facilities, *Oxidation lagoons.
Identifiers: *Extended aeration.

Waste treatment in Arctic areas shares the same problems as treatment needs world wide, that is: climate, economics, and low population. The extended aeration modification of the activated sludge process appears to be a highly suitable alternative for the treatment of small volumes of waste. This paper examines one form of the extended aeration process, the oxidation ditch. One such facility at College, Alaska was studied during 1967-1968 and showed a 90 percent BOD and suspended solids reduction at 50 percent loading. It was also found that biological processes operated at essentially the same rate at low temperatures as at higher temperatures in more moderate climates. Some design criteria are also included. (See also W74-10160)(Shaffer-FIRL)
W74-10177 October 1, 1974

CHLORINE DISINFECTION OF WASTEWATER,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
C.R. Gordon, C.V. Davenport, and B.H. Reid.
In: International Symposium on Wastewater Treatment in Cold Climates, Environment Canada Economic and Technical Review Report EPS-3-WP-74-3, p 438-481, 1974. 11 fig, 7 tab, 35 ref.

Descriptors: *Waste water treatment, *Disinfection, *Chlorination, Temperature, *Toxicity, Environmental sanitation, Cold regions, Performance, Efficiences, *Alaska, Hydraulic structures, Design flow.
Identifiers: Batch flow, Contact time, Plug flow.

A two-phase study was carried out to determine if chlorination could provide satisfactory disinfection of waste water at temperatures less than 1C. The first phase consisted of batch treatment with rapid chlorination and continuous stirring. Four effluents were tested (primary sedimentation system, a 15 day detention time aerated lagoon, and two extended aeration systems). The tests were run at less than 1C with controls run at 25C. Effective disinfection was achieved in all four effluents at less than 1C with a 60 minute contact time and no more than 1 mg/liter residual chlorine. The second phase of the study consisted of running primary sedimentation effluent through a well baffled flow-through chlorine contact chamber at less than 1C. Acceptable reduction of coliforms was not reached in the flow-through chambers at less than 1C until residual chlorine reached 2 mg/liter. Doubling contact time to 120 minutes allowed proper disinfection with only 0.5 to 0.6 mg/liter. Conclusions are drawn, the most important being that contact time appears to be as important as maintenance of a particular chlorine residual level. (See also W74-10160)(Shaffer-FIRL)
W74-10182 October 1, 1974

ALASKA VILLAGE DEMONSTRATION PROJECTS: FIRST GENERATION OF INTEGRATED UTILITIES FOR REMOTE COMMUNITIES,
Environmental Protection Agency, College, Alaska. Arctic Environmental Research Lab.
B.H. Reid.
In: International Symposium on Wastewater Treatments in Cold Climates, Environment Canada Economic and Technical Review Report EPS 3-Wp-74-3, p 549-569, 1974. 6 fig. 11 ref.

Descriptors: *Rural areas, * Community development, *Cold regions, *Waste water treatment, Facilities, Costs, Water conservation, Water demand, Water supply, Water distribution, Water utilization, Incineration, *Alaska.
Identifiers: *Community facilities. *Vacuum toilets.

Under Section 20, Public Law 91-224, April 3, 1970, Congress authorized the Secretary of Interior to carry out the Alaska Village demonstration Projects (AVDP). The projects were to include, 'provisions for community safe water supply systems, toilets, bathing and laundry facilities, sewage disposal facilities, and other similar facilities.' The projects were assigned to the Office of Research and Development and the Arctic Environmental Research Laboratory. In developing the project concept certain objectives were established, including: the provision of a system of facilities that would be simple, reliable, inexpensive, and yet a real improvement over existing conditions: provide water for domestic use that met Federal and State quality requirements; and treat and dispose of all wastes (air, water, solid) in such a manner as to meet future Federal and State regulations. In achieving these goals some of the following processes and equipment were used: vacuum toilets; separation of grey water from black water; physico-chemical treatment of waste water with reuse in laundering facilities; incineration of black water residue and

sludge from waste water treatment; utilization of incinerator heat for building heat; sauna heat, and clothes dryer heat. (See also W74-10160) (Shaffer-FIRL)
W74-10186 October 1, 1974

5E. Ultimate Disposal of Wastes

ACTIVATED SLUDGE DISPOSAL IN A SUB-ARCTIC ENVIRONMENT,
Hill, Ingman, Chase and Co., Seattle, Wash.
C. Patterson.
Deeds and Data (Water Pollution Control Federation), April 1974, p D6-D8, 3 tab, 3 fig, 2 ref. (Paper presented at 46th Annual Conference, WPCF, Cleveland, Ohio, Sept. 30-Oct 4, 1973).

Descriptors: *Subarctic, *Alaska, *Sludge disposal, *Activated sludge, *Cold regions, *Costs, *Operating costs, *Transportation, Climatology, Temperature, Heating, Ice fog, Fog, Weather, Weather patterns, Microorganisms, Pathogenic bacteria.
Identifiers: Trucks, Trucking.

Subarctic environments pose special problems which aggravate the already difficult tasks of sludge disposal. These problems include survival of pathogenic microorganisms, the generation of ice, fog, the prevalence of subzero temperatures, and the need for seasonal adjustments in operating procedures. A flexible solution to these problems has been attempted in Fairbanks, Alaska. It makes use of temperate-climate technologies plus appropriate adaptations, such as heated trucks. Costs of such an operating system are also indicated. (Brown-IPC)
W74-08443 August 15, 1974

5F. Water Treatment and Quality Alteration

OZONE TREATS ARCTIC WATERS,
Arctic Health Research Centre, College, Alaska.
Environmental Sciences Branch.
L.C. Reid, and H.S. Potworowski.
Water and Pollution Control, Vol 112, No 3, p 53-55, March 1974, 6 fig, 2 tab.

Descriptors: *Water purification, *Ozone, *Arctic, Iron, Manganese, Organic matter, Color, *Water treatment, Investigations, Filtration, Sedimentation, Tastes, Groundwater, *Alaska.

The application of ozone as a useful water conditioner for cold water sources was investigated for water supplies in Alaska. It is feasible to use ozone for iron, manganese, organics, and color removal in cold waters. From the results obtained, it would appear that ozone may be the answer to the need for better iron and manganese removal from arctic water suppliers. If the water is of acceptable hardness after removal of iron and manganese, the only treatment of the raw water would be for ozonation, sedimentation, and filtration. The resulting water would be free of odors and obnoxious tastes, and would be clear. Staining of clothes and fixtures would be eliminated. A side benefit of the ozonation process

would be the purification. It is recommended that an attempt be made to develop a pilot ozonation plant that would treat groundwater for removal of iron, manganese, color, and organics. (Merritt-FIRL)
W74-10556 October 15, 1974

5G. Water Quality Control

WATER POLLUTION CONTROL IN ALASKA,
L. Laska.
Water Air Soil Pollut. Vol 1, No 4, p 415-432, 1972.
Identifiers: *Alaska, *Oil pollution, *Water pollution control, Legal aspects, *Water law, Jurisdiction.

An analysis of Alaskan water pollution laws and problems, especially oil pollution, is presented. Particular attention is given to statute law, jurisdiction, and procedures for applying the law.--Copyright 1973, Biological Abstracts, Inc.
W74-05465 June 1, 1974

6B Evaluation Process

ALASKA WATER RESOURCES RESEARCH NEEDS FOR THE 70'S,
Alaska Univ., College. Inst. of Water Resources.
Availability from NIIS as PB-227 244 $4.75 in paper copy, $1.45 in microfiche. Report No. IWR-39, September, 1973, 155 p. (Edited by R.F. Carlson and J. Butler). OWRR A-038-ALAS(1).

Descriptors: Water policy, Water law, Lakes, *Alaska, Hydrology, Limnology, Groundwater, Management, Snow, Ice, *Water quality, Sanitary engineering, Cold regions, *Research and development, Applied research, Basic research, *Resources development, Administration, Research priorities, Planning.
Identifiers: *Research needs.

The Institute sponsored a seminar which examined the water resources research needs for the state during the next decade. The seminar brought together as speakers and participants: public and private users, state and federal regulatory bodies, consulting engineers, researchers and interested citizens. The seminar proceedings presents the remarks of 16 speakers who discussed topics in water quality, water resources control, resources development and resources administrations. Also included in the report are a keynote address, concluding remarks, a report of the Institute's advisory board meeting held the following day, and summary of the whole research examination effort. Research recommendations are given for the areas of water resource management aspect of fisheries management, recreational lakes, reservoir management, flood control, water resource management in cold climates, and urban water resource management.
W74-03757 April 15, 1974

6E. Water Law and Institutions

WATER RESOURCES DEVELOPMENTS AND NAVIGATIONAL INPROVEMENTS IN ALASKA, Hearings--Before the Subcommittee on Water Resources of the Committee on Public Works, U.S. Senate, 93d Cong., 1st Sess., August 1973. 537 p.

Descriptors: *Alaska, *Federal government, *Water resources development, * Harbors, Oil industry, Commercial fish, Navigation, Political aspects, Social aspects, Boating, Sport fishing, Aesthetics, Recreational facilities, Beach erosion, Engineering structures, Bridges, State governments, Funding, Project planning, Cost-benefit analysis, Feasibility studies, Cost sharing, Breakwaters, Coastal engineering.
Identifiers: *Congressional hearings.

Alaska is behind in the development of small boat harbor facilities, but is relatively advanced as to medium and deep water facilites. The need for federal funding is great if any meaningful improvement is to be accomplished. Very few of the projects necessary would qualify as a corps project because of their marginal benefit-to-cost ratios. Most of the small boat harbors in Alaska are for commercial fisheries and pleasure craft. Much of the testimony concerns itself with specific projected projects and their benefits and costs. (Sperling-Florida).
W74-05587 June 1, 1974

6F. Nonstructural Alternatives

FLOOD PLAIN INFORMATION, RABBIT CREEK, ANCHORAGE, ALASKA, Army Engineer District, Anchorage, Alaska.

Prepared for the Greater Anchorage Area Borough, May 1973, 27 p, 12 fig, 29 plate, 2 tab.

Descriptors: *Floods, *Flood plains, *Flood controls, *Flood data, *Alaska, Hydrologic data, Flood profiles, Flood forecasting, Historic floods, Streamflow, Flow characteristics, Data collections, Photography.
Identifiers: *Anchorage (Alaska), *Rabbit Creek (Alaska), Intermediate regional flood, Standard project flood.

The portion of the Greater Anchorage Area Borough, Alaska, covered by this report is subject to flooding from Rabbit Creek. The properties along this stream are primarily residential and were moderately damaged by the flood of June 1964. The areas in the flood plain which are now under pressure for development are extensive. Although large floods have occurred in the past, studies indicate that even larger floods are possible. A knowledge of flood potential and flood hazards is important in land use planning and for management decisions concerning flood plain utilization. This history of flooding in the Rabbit Creek area identifies those areas that are subject to possible future floods. Special emphasis is given to these floods through maps, photographs, profiles, and cross sections. Solutions to flood problems are not provided; however, a suitable basis for the adoption of land-use controls is furnished to guide flood-plain development and thereby prevent intensification of loss and damage. (Woodward-USGS)
W74-01873 February 15, 1974

6G. Ecologic Impact of Water Development

ENVIRONMENTAL IMPACT ANALYSIS: THE EXAMPLE OF THE PROPOSED TRANS-ALASKA PIPELINE,
Geological Survey, Washington, D.C.
D.A. Brew.
Circular 695, 1974, 16 p, 3 fig, 8 ref.

Descriptors: *Alaska, *Oil fields, *Pipelines, *Environment, Environmental engineering, Planning, Frail lands, Social aspects, Economics.
Identifiers: *Environmental impact analysis, *Trans-Alaska pipeline.

The environmental impact analysis made as required by the National Environmental Policy Act of 1969 for the proposed Trans-Alaska pipeline included consideration of the (1) technologically complex and geographically extensive proposed project, (2) extremely different physical environments across Alaska along the proposed route and elsewhere in Alaska and in Canada along the alternative routes, (3) socioeconomic environment of the State of Alaska, and (4) a wide variety of alternatives. The environment was divided into two general parts--natural physical systems and superposed socioeconomic systems--and those parts were further divided into discipline-oriented systems or components that were studied and analyzed by scientists of the appropriate discipline. Particular attention was given to potential feedback loops in the impact network and to linkages between the project's impacting effects and the environment. The principal unavoidable effects would be (1) disturbances of terrain, fish and wildlife habitat, and human environs, (2) the results of the discharge of effluent from the tanker-ballast-treatment facility into Port Valdez and of some indeterminate amount of oil released sea, and (3) the results associated with increased human pressures of all kinds on the environment. Comparison of alternative routes and transportation systems and of their environmental impacts provided information which indicates that one corridor containing both oil and gas pipelines would have less environmental impact than would separate corridors. (Knapp-USGS)
W74-12011 December 1, 1974

7C. Evaluation, Processing and Publication

PRELIMINARY GEOLOGIC APPLICATION OF ERTS-1 IMAGERY IN ALASKA,
Geological Survey, Menlo Park, Calif.
E.H. Lathram, I.L. Tailleur, W.W. Patton, Jr., and W.A. Fischer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-1: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 257-264, 1973. 4 fig, 7 ref.

Descriptors: *Remote sensing, *Satellites (Artificial), *Geologic mapping, *Alaska, Structural geology, Exploration, Mapping, Surveys.
Identifiers: ERTS

Linears and faults on ERTS-1 images corroborate the existence of possible deep-seated structures first noted on Nimbus IV images. These structures may have influenced location of mineralization. ERTS images also display

more comprehensively and explicitly than heretofore possible the thrust-faulted, complexly folded and open-folded terranes and strongly contrasting lithologies in northwestern Alaska, provide new data on faults in central Alaska, and display previously unknown lineations that suggest concealed folds in northern Alaska. The concealed folds are verifiable only by geophysical techniques and may be significant to petroleum exploration. (See also W74-01663)(Knapp-USGS)
W74-01693 February 15, 1974

SOME ASPECTS OF ACTIVE TECTONISM IN ALASKA AS SEEN ON ERTS-1 IMAGERY,
Alaska Univ., College. Geophysical Inst.
L.D. Gedney, and J.D. VanWormer.
In: Symposium on Significant Results Obtained from the Earth Resources Technology Satellite-I: Vol I--Technical Presentations, Sect A, National Aeronautics and Space Admin Rept NASA SP-327, p 451-457, 1973, 2 fig, 7 ref.

Descriptors: *Remote sensing, Satellites, (artificial), *Geologic mapping, *Structural geology, *Alaska, Earthquakes, Faults (GEOLOGIC), Surveys, Data collections, Hazards.
Identifiers: ERTS

ERTS-1 imagery is useful in delineating structural features in Alaska which have never been recognized on the ground. Previously unmapped features such as seismically active faults and major structural lineaments are especially evident. Among the more significant results of this investigation is the discovery of an active strang of the Denali fault. The new fault has a history of scattered seismicity and was the scene of a magnitude 4.8 earthquake on October 1, 1972. Perhaps of greater significance is the disclosure of a large scale conjugate fracture system north of the Alaska Range. This fracture system appears to result from compressive stress radiating outward from around the outside of the great bend of the Alaska Range at Mt. McKinley. One member of the fracture system was the scene of a magnitude 6.5 earthquake in 1968. The potential value of ERTS imagery to land use planning is reflected in the fact that the site of the proposed bridge and oil pipeline crossing of the Yukon River lies very near this fault. (See also W74-01663)(Knapp-USGS)
W74-01712 February 15, 1974

7B. Data Acquisition

AN ERTS VIEW OF ALASKA-REGIONAL ANALYSIS OF EARTH AND WATER RESOURCES BASED ON SATELLITE IMAGERY,
Cold Regions Research and Engineering Lab., Hanover, N.H.
D.M. Anderson, W.K. Crowder, L.W. Gatto, R.K. Haugen, and T.L. Marlar.
Available from NTIS Springfield, Va 22151 as AD-765 442 Price $4.25 printed copy; $1.45 microfiche Technical Report 241, June 1973, 48 p, 36 fig, 3 tab, 36 ref. NASA Contract S-70253-AG.

Descriptors: *Remote sensing, *Alaska *Satellites (Artificial), Water circulation, Glaciers, *Sedimentation, *Mapping, Geomorphology, Surveys, Data collections, Photogrammetry, Aerial photography, Water resources, Regional analysis, *Permafrost.
Identifiers: *Cook Inlet (Alas), *ERTS satellite.

Satellite imagery was used for synoptic surveys of the distribution and environmental interrelationships of permafrost terrain and of coastal sedimentation and related processes in Cook Inlet, Alaska. Earth Resources Technology Satellite multispectral scanner (MSS) imagery was the primary data source for investigation. Aerial underflight imagery and ground observations of selected sites were secondary data sources. Emphasis has been placed on evaluating the feasibility of mapping permafrost terrain from textural and tonal patterns related to surficial geology and vegetation. A mosaic of a 153,400-sq km area in north-central Alaska was prepared at a scale of 1:1 million. Seven surficial geology, 8 vegetative cover and 4 permafrost terrain units were defined and delineated. Many geomorphic features were also recognized: thaw lakes, stream drainage patterns, glacial moraines, cirques, abandoned glacial valleys and volcanic cones. The distribution of sediments and regional circulation patterns can be monitored using satellite imagery. (Knapp-USGS)
W74-10251 October 1, 1974

7C. Evaluation, Processing and Publication

WATER-TABLE CONTOUR MAP, ANCHORAGE AREA, ALASKA,
Geological Survey, Anchorage, Alaska.
L.L. Dearborn, and G.W. Freethey.
Open-file report, 1974. 1 sheet, 1 map.

Descriptors: *Water table, *Alaska, *Maps, Water levels, Groundwater.
Identifiers: *Anchorage (Alaska).

This map shows contours of the water table in the Anchorage area of Alaska. In the map area it generally lies within 30 feet of the land surface. The water-table contours shown are based on the altitude of the water level in wells that just penetrate the water body. Water-level measurements used to prepare this map were made from 1955 to 1973. Seasonal fluctuation of the water table normally ranges between 1 and 4 feet. (Knapp-USGS)
W74-10436 October 15, 1974

8D. Soil Mechanics

ANALYSIS OF THE PROPOSED LITTLE CHENA RIVER, EARTHFILLED NONRETENTION DAM, FAIRBANKS, ALASKA,
Corps of Engineers, Anchorage, Alaska.
W. George.
In: International Conference on Permafrost 2nd, Yakutsk, USSR 1973, p 638-648. 9 fig, 2 tab, 9 ref.

Descriptors: *Dams, *Dam design, *Permafrost, *Alaska, Dam construction, Thawing, Subsidence, Arctic, Flood control, Water storage, Water temperature, Earth dams.

A dam near Fairbanks, Alaska, will be located in an area in which the permafrost temperature is more marginal than that existing in the areas where such structures have been previously built with permafrost preservation in mind. The same requirements exist, however, to protect the permafrost and, in fact, these are even more a concern. Because of its use for temporary storage, a moderation and, in fact, control of heat absorption into the dam from these impounded waters will result. This controlled and limited heat input is an important factor in even considering the design and construction proposed. Conservative calculations show that there exists more than a margin of safety from the heat input from such temporary and infrequent impoundments when balanced against the loss. The more frequent floods will normally be of the spring snowmelt type with water temperature quite cold and the duration of the impoundment quite short. The less frequent flood, where water temperatures may be somewhat higher, will not be a problem. (See also W74-04346)(Knapp-USGS)
W74-04412 May 1, 1974

PERMAFROST-RELATED ENGINEERING GEOLOGY PROBLEMS POSED BY THE TRANS-ALASKA PIPELINE,
Geological Survey, Menlo Park, Calif.
R. Kachadoorian, and O.J. Ferrians, Jr.
In: International Conference on Permafrost 2nd, Yakutsk, USSR 1973, p 684-687, 1973. 1 fig, 11 ref.

Descriptors: *Permafrost, *Pipelines, *Alaska, *Arctic, *Oil fields, Frozen ground, Frozen soils, Subsidence, Frost heaving, Thawing, Freezing.

The design, construction, and maintenance of the proposed trans-Alaska pipeline system in the permafrost region of Alaska poses special engineering problems. The severity of problems resulting from soil instability, differential settlement, and erosion of thawed soil depends on the type and ice content of the soil and the slope and drainage conditions. Soil instability, differential settlement, erosion, and disrupted surface and subsurface drainage can result in loss of support and rupture of the pipe. Consequently, the effects of thawing permafrost and of erosion must first be determined and then minimized or controlled by proper design, proper arctic and subarctic construction procedures, and an adequate monitoring system. Some potential effects are so serious that contingency plans must be devised. These actions are necessary in order to maintain the mechanical integrity of the pipeline and to avoid degradation of the adjacent terrain. (See also W74-04346)(Knapp-USGS)
W74-04416 May 1, 1974

8G. Materials

THE USE OF POLYURETHANE FOAM PLASTICS IN THE CONSTRUCTION OF EXPEDIENT ROADS ON PERMAFROST IN CENTRAL, ALASKA,
Cold Regions Research and Engineering Lab., Hanover, N.H.
N. Smith, R. Berg, and L. Mueller.
In: International Conference on Permafrost, 2nd, Yakutsk, USSR, 1973, p 637-745, 1973. 10 fig, 4 tab, 1 ref.

Descriptors: *Permafrost, *Road construction, *Arctic, *Insulation, Thermal insulation, Frost heaving, Thawing, *Plastics, *Alaska.
Identifiers: Polyurethane foam.

In the cold regions of the world, seasonally and permanently frozen soils present severe road construction and maintenance problems during winter and the thawing period. The use of as much as 1.0-3.0 m of granular materials to minimize or prevent deleterious freezing and thawing actions is common practice. In general, for expedient roads designed for short lives, such as those required for lumbering, mining and oil explorations, and military operations, this method is too time consuming; also, many areas lack sufficient quantities of granular materials for this practice. Road test sections incorporating foamed in-place polyurethane insulation of two densities were tested over a sub-grade containing seasonally and permanently frozen high-moisture-content silt. On permafrost terrain similar to central Alaska, 10 cm of foam insulation is sufficient thickness to withstand 1,000 passes of a loaded dump truck having a maximum single wheel load of 2,415 kg. Additional use as an access road for lumbering, mining, and oil explorations, and military operations with wheel loads up to 5,000 kg could be handled for a minimum of one thaw season. Wood chips as a leveling course provided some insulation advantage over the gravel leveling course of approximately equal thickness. (See also W74-04346)(Knapp-USGS)
W74-04421 May 1, 1974

8I. Fisheries Engineering

FRAZER LAKE SOCKEYE INVESTIGATIONS, 1970,
Alaska Dept. of Fish and Game, Kodiak, Research Section.
P.A. Russell.
Available from the National Technical Information Service as COM-73-10238.
Alaska Department of Fish and Game Informational Leaflet No. 159, September 1972, 83 p, 32 fig, 15 tab, 11 ref, 11 append. 14-17-0005-222.

Descriptors: *Fish migration, *Spawning, *Alaska, Timing, Smolt, Age, Fish management, Productivity, Fish reproduction, Fish establishment, Fish passages, Life history studies.
Identifiers: *Frazer Lake (Alaska). Kodiak (Alaska).

Research to asses the sockeye run at Frazer Lake, Kodiak Island, Alaska, from 1965 to 1970 is described. Smolt age compositions in 1970 was 0.3% age 3.0, 31.6% age 2.0, 68.1% age 1.0 and 0.02% age 0.0. In 1970, age 0.0 smolt averaged149 mm and 31 grams; age 2.0 smolt 180 mm and 54 grams; age 3.0 smolt 193 mm and 64 grams. Sockeye freshwater survival from potential egg deposition to smolt indicates an overall median value for survival rate as about 0.70%. Smolt length frequency analysis provided a quantitative method of determining length distribution parameters usable in conjunction with scale reading to infer age composition of smolt outmigrations. Pilot echo sounding studies showed diurnal migration patterns of young sockeye. The number of sockeye entering Frazer Lake since 1956 has shown an increase in sockeye spawner survival occurred in 1970 resulting from improved fishpass efficiency due to medifications and temporary lead construction. Limnological investigations included outlet temperatures and lake temperature profiles, plankton analysis, and a profile map of Frazer Lake. (Jones-Wisconsin)
W74-00232 January 1, 1974

LABORATORY REARING EXPERIMENTS ON ARTIFICALLY PROPAGATED INCONNU (STENODUS LEUCICHTHYS),
Alaska Univ., College. Dept. of Biology.
J.D. LaPerriere.
Available from the National Technical Information Service as PB-232 141, $4.50 in paper copy, $1.45 in microfiche. Alaska Institute of Water Resources, Fairbanks, Report No. IWR-40, June, 1973, 25 p 7 fig, 4 ref. OWRR A-041-ALAS(2). 14-31-0001-3802.

Descriptors: *Fish hatcheries. Arctic, *Alaska, Photoperiodism, Daphnia, Shellfish, Algae, Brine shrimp, *Fish farming, Fish food organisms, *Fish diets.
Identifiers: *Inconnu, Oregon mash, Stenodus leucichthys, Selenastrum sp.

During the period of ice cover 1972-1973 the grayling thermal tolerance experiments in Interior Alaska were interrupted by the unavailability of these fish. In collaboration with the Alaska Department of Fish and Game it was decided to use the experimental set-up to attempt to rear Inconnu (Stenodus leucichthys) in controlled conditions. Two temperatures (5C and 8C) and four feeds (freeze dried Daphnia, freeze dried brine shrimp naupli, Oregon mash, and cultured algae, mainly Selenastrum sp.) were used as treatments. No significant difference was found between treatments due to heavy mortality. Papers by a Russian worker Karzinkin and Chilikov seemed to explain our heavy mortality. A photoperiod of 24 hours of light has been found necessary for successful rearing of Inconnu young.
W74-07725 August 1, 1974

OPTIMUM ESCAPEMENT STUDIES OF CHIGNIK SOCKEYE SALMON,
Washington Univ., Seattle, Fisheries Research Inst.
W.H. Parr, Jr., and R.L. Burgner.
Available from NTIS, Springfield, Va. 22151 as COM-73-11179, Price $3.00 printed copy, $1.45 microfiche. Completion Report for July 1969 to June 1970 to National Marine Fisheries Service, November 1970, 17 p, 4 fig, 6 tab, 10 ref.

Descriptors: *Salmon, *Alaska, *Fisheries, *Fish diets, Food chains, Juveniles, Fish populations, Fish hatcheries, Predation, *Sockeye salmon.
Identifiers: Coho salmon.

Studies were directed primarily toward gaining an understanding of the interactions affecting sockeye salmon production in the lake nursery area. Beach seining, surface trawling and echo sounding were conducted for determination of the growth, abundance, distribution, and mortality rate of juvenile sockeye salmon and resident fishes was continued for a third year so that competition between species under different population densities could be determined. Efforts were made to further understand the effects of predation by sockeye salmon. Assistance was given to the Alaska Department of Fish and Game in collections of statistics on the adult salmon runs. Methods used to forecast the magnitude and age composition of the 1970 run were evaluated. (Knapp-USGS)
W74-08176 August 15, 1974

COOK INLET SOCKEYE SALMON INVESTIGATIONS,
Alaska Dept. of Fish and Game, Juneau.
S. Pennoyer, R. Paulus, and A.S. Davis.
Available from NTIS, Springfield, VA 22151, COM-73-10823, Price $3.00 printed copy; $1.45 microfiche. Completion Report NOAA-73042713 for period July 1965-June 1971, March 1972. 166 p, 14 fig, 21 tab, 21 append.

Descriptors: *Alaska, *Salmon, *Fisheries, Data collections, Commercial fish, Commercial fishing, Fish management.
Identifiers: *Cook Inlet (Alaska).

The Sockeye Salmon Investigations project was initiated with an overall objective of collecting biological data from the Cook Inlet (Alaska) sockeye salmon run that would be useful in establishment of more scientific management of the run. These objectives included escapement estimation where visual methods were impractical, determination of smolt outmigration levels, optimum escapement goals, stock identification, revision of catch statistics, and other related projects. Sonar salmon counters, for adult enumerations, were developed and partially tested under this program. Downstream migrant sampling gear was developed that is suitable for use on glacial rivers with high water velocities and severe debris problems. Plans for future smolt programs are discussed. Stock identification studies utilized freshwater circuli counts as the distinguishing feature. Age and sex composition of the run were established. Catch statistics were compiled to reflect catch by period rather than by fishing week. (Knapp-USGS)
W74-10267 October 1, 1974