ALASKA LEGISLATURE COMMITTEE FILES, 1989-1990 8672 414
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Table 4.—Selected Bureau of Mines reports on cobalt, the platinum-group metals, and chromite

Summary of information	References
Statewide review of mineral terranes, mapped at 1:1,000,000 scale	1
Analyses of 1,000 mineral samples collected in 1978	17
Analyses of 2,000 mineral samples collected in 1979	18
Delineation of areas with high potential for nickel-copper, cobalt, platinum-group metals, and chromite in Glacier Bay National Monument	2
Evaluations of the Bohemia Basin and Mirror Harbor nickel, cobalt, and copper deposits	(1)
Baseline information on chromite potential in select areas of the western Brooks Range	9-10
Initial delineation of the trend of chromite deposits in the Kanuti River region	6
Additional investigation of the trend of chromite deposits in the Kanuti River region	(2)

[1]Johnson, B. R. (U.S. Geological Survey); A. L. Kimball, and J. Still (U.S. Bureau of Mines). Mineral Resource Potential of the Western Chicagof-Yakobi Islands Wilderness Study Area, Southeastern Alaska. U.S. Geol. Survey Bull. in press; for information, contact A. L. Kimball, Bureau of Mines, Juneau, Alaska.

[2]Foley, J. Y., M. McDermott, D.C. Dahlin, L. L. Brown, and J. J. Kinney. Podiform Chromite Deposits in Central Alaska. Unpublished BuMines report; for information, contact J. Y. Foley, Bureau of Mines, Fairbanks, Alaska.

Table 5.—Minerals Availability System evaluations of deposits of cobalt, the platinum-group metals, and chromite

Commodity	Deposit evaluated	Sequence No.
Cobalt	Yakobi Island (Bohemia Basin).	0021140017
	Mirror Harbor	0021140068
	Funter Bay	0021120072
Platinum-group metals.	Salt Chuck Mine	0021190135
	Salmon River (Goodnews Bay area).	0021230004
Chromite	Red Mountain	0021040001
	Claim Point (Seldovia).	0021040002
	Red Bluff Bay	0021160001

deposits can begin in 1982. These will include engineering and economic studies to update the Bureau's Minerals Availability System, if the estimated grade and tonnage of a deposit warrant.

In the reconnaissance phase, priority will be given to occurrences reported by the U.S. Geological Survey in quadrangles completed under the Alaska Mineral Resource Assessment Program.[14] Priority for the more detailed investigations will be given to occurrences in areas closed to mineral entry. To avoid duplication of effort, low priority will be given to deposits or areas where industry is currently exploring or likely to explore. However, a subprogram will be initiated to review industrial exploration and analyze gold placer concentrate samples or other selected mineral samples that may be donated by mine operators.

[14]A continuing program to map geology and mineral information on 1:250,000-scale quadrangle maps.

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US and the world mineral positions, 1985 to the year 2000

John D. Morgan

Introduction

The US Bureau of Mines' (USBM) world reserve/consumption ratios (Table 1) indicate that, if the world is relatively peaceful in the next two decades, there should be ample world supplies of minerals to permit rising standards of living for increasing world population. But it must be remembered that most mineral reserve estimates are conservative and that normal mining practice is to develop a ton of ore reserve for every ton mined. It should be noted that "reserve," as used in this paper follows the definition given in US Geological Survey (USGS) Circular 831, 1980; "that part of the reserve base which could be economically extracted or produced at the time of the determination."

In addition to accurately determining the geologic parameters of mineral deposits, a judgment as to whether that deposit is a "reserve" per se involves consideration of many other factors. These factors were recognized nearly a century ago by a well-known mining engineer and later President, Herbert Hoover. In "Principles of Mining," 1909, Hoover wrote:

"Unfortunately for the mining engineer, not only has he to weigh the amount of risk inherent in calculations involved in the mine itself, but also that due to fluctuations in the value of metals. If the ore is shipped to custom works he has to contemplate also variations in freights and smelting charges ...In a free market, the law of supply and demand governs the values of metals as it does that of all other commodities. So far, except for tariff walls and smelting rings, there is a free market in the metals under discussion. The demand for metals varies with the unequal fluctuations of the industrial tides. The sea of commercial activity is subject to heavy storms, and the mine valuer is compelled to serve as weather prophet on this ocean of trouble. High prices, which are the result of industrial booms, bring about overproduction, and the collapse of these begets a shrinkage of demand, wherein consequently the tide of price turns back."

Current supplies and use

There have been ample supplies of most mineral materials to permit several-fold increases of world production of common major mineral based minerals (steel, aluminum, copper, and cement) over the past three decades.

Motor vehicle production is a major consumer of mineral materials. However, in the last decade, down-sizing to facilitate improved fuel efficiency and reduce harmful emissions has reduced the weight of the average US-made automobile 15%, to 1.5 t (3200 lbs).

Also in the US, there are 92 million dwelling units, or on average, fewer than three persons per dwelling unit. Construction is another major consumer of materials in the industrialized developed countries. It will also be a major consumer of materials worldwide as less developed nations seek to improve their infrastructures by adding roads, bridges, railroads, airfields, ports, and housing.

Fortunately, a large number of traditional common materials, many of mineral origin and also many of agricultural origin, are readily available for construction. Traditional construction materials such as steel, aluminum, copper, and cement, are being replaced in many applications by engineered plastic and ceramic

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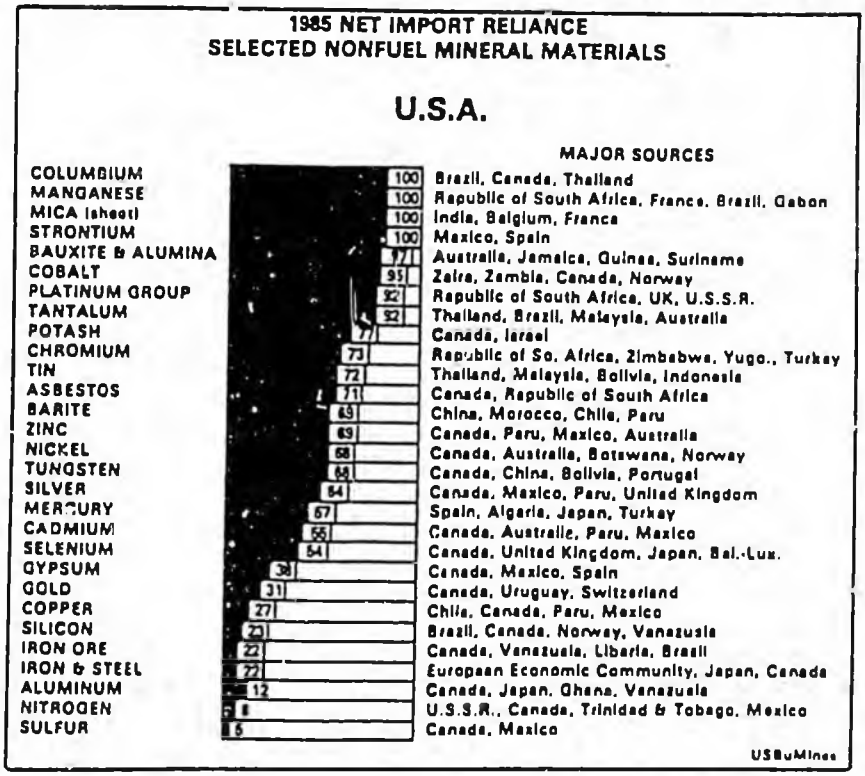


Table 1 — US and World Reserve/Cumulative Demand to 2000 Ratios. (All data rounded to 2 significant figures)

Reserves as of 1983 and cumulative demand 1983-2000

	US Reserve US Cumulative Demand	World Reserve World Cumulative Demand
Antimony	90,000 st 440,000 st	4 million st 1 million st
Arsenic	50 kt 310 kt	1 million Mt 590 kt
Asbestos	4 Mt 5.6 Mt	110 Mt 110 Mt
Barite	11 million st 60 million st	160 million st 150 million st
Bauxite (contained Al)	8 Mt 100 Mt	4.4 Gt 400 Mt
Beryllium	28,000 st 6900 st	420,000 st 12,000 st
Bismuth	20 million lb 43 million lb	200 million lb 170 million lb
Boron (BO)	120 million st 7.6 million st	360 million st 22 million st
Bromine	25 billion lb 5.9 billion lb	adequate 15 billion lb
Cadmium	90 kt 75 kt	560kt 350 kt
Cesium	0 300 st	110,000 st 520 st
Chromium	0 7.9 million st	360 million st 74 million st
Cobalt	0 390 million lb	8 billion lb 1.2 billion lb
Columbium	0 200 million lb	9 billion lb 870 million lb
Copper	57 Mt 31 Mt	340Mt 170 Mt
Corundum	0 17,000 st	7 million st 540,000 st
Diamonds, industrial stones	0 60 million ct	600 million ct 460 million ct
Diatomite	250 million st 10 million st	800 million st 29 million st
Feldspar	adequate 13 million st	adequate 72 million st
Fluorspar	36 million st 12 million st	850 million st 110 million st
Gallium	2 million kg 290 kg	110 million kg 740,000 kg
Garnet	5 million st 550,000 st	8.1 million st 860,000 st
Germanium	450 kg 990 kg	adequate 2.8 million kg
Gold	60 million tr oz 52 million tr oz	1.3 billion tr oz 870 million tr oz
Graphite crystalline flake	0 400,000 st	15 million st 7.8 million st
Gypsum	800 million st 480 million st	2.8 billion st 1.9 billion st
Hafnium	80,000 st 1400 st	460,000 st 2700 st
Helium	240 billion cu ft 29 billion cu ft	240 billion cu ft 41 billion cu ft
Indium	7 million tr oz 14 million tr oz	54 million tr oz 40 million tr oz
Iodine	550 million lb 150 million lb	3.9 billion lb 660 million lb
Iron Ore (contained Fe)	3.7 billion st 900 million st	72 billion st 9.9 billion st
Kyanite	adequate 2.1 million st	adequate 11 million st
Lead	21 Mt 12 Mt	95 Mt 61 Mt
Lithium	400,000 st 64,000 st	2.1 million st 180,000 st
Magnesite (contained Mg)	10 million st 14 million st	2.8 billion st 110 million st
Manganese	0 14 million st	1 billion st 170 million st
Mercury	140,000 fl 700,000 fl	4 million fl 3.7 million fl
Mica (sheet)	0 29 million lb	adequate 190 million lb
Molybdenum	6 billion lb 1.1 billion lb	12 billion lb 3.6 billion lb
Nickel	300,000 st 3.8 million st	58 million st 18 million st
Peat	700 million st 27 million st	adequate 8.5 billion st
Perlite	50 million st 11 million st	700 million st 35 million st
Phosphate	1.4 billion Gt 700 Mt	14 Gt 3.2 Gt
Platinum Group Metals	1 million tr oz 34 million tr oz	1 billion tr oz 130 million tr oz
Potash (K_2O equivalent)	95 Mt 110 Mt	9.1 Gt 590 Mt
Pumice	adequate 13 million st	adequate 260 million st
Rare Earths (REO) and Yttrium (Y_2O_3)	4.8 Mt 460 kt	45 Mt 810 kt
Rhenium	2 million lb 190,000 lb	6.4 million lb 340,000 lb
Rubidium	0 49,000 lb	4.4 million lb 91,000 lb
Salt	adequate 633 million st	adequate 4.2 billion st
Sand and Gravel	adequate 14 billion st	adequate adequate
Scandium	230 t 770 kg	770 t 1.4 t
Selenium	12 kt 10 kt	80 kt 28 kt
Silicon alloys	adequate 10 million st	adequate 61 million st
Silver	920 million tr oz 1.9 billion tr oz	7.9 billion tr oz 5.4 billion tr oz
Soda Ash	26 billion st 130 million st	26 billion st 720 million st
Stone	adequate 16 billion st	adequate adequate
Strontium	0 450,000 st	7.5 million st 1.2 million st

Sulfur	160 Mt 250 Mt	1.3 Gt 1.3 Gt	Titanium	8.1 million st 11 million st	190 million st 42 million st
Talc	150 million st 28 million st	350 million st 210 million st	Tungsten	150 kt 230 kt	2.8 Mt 270 kt
Tantalum	0 27 million lb	60 million lb 63 million lb	Vanadium	190,000 st 130,000 st	4.8 million st 870,000 st
Tellurium	3.? kt 2.5 kt	22 kt 4.5 kt	Vermiculite	25 million st 8.3 million st	50 million st 11 million st
Thallium	70,000 lb 48,000 lb	830,000 lb 450,000 lb	Zinc	22 Mt 19 Mt	170 Mt 130 Mt
Thorium	220 kt 770 t	1.1 Mt 6.5 kt	Zirconium	4 million st 1.3 million	23 million st 5.2 million st
Tin	20 kt 700 kt	3.1 Mt 3.9 Mt			

materials. In the past three decades, annual US production of plastics has risen from about 900 kt (1 million st) in 1950 to more than 20 Mt (22 million st) at the present time.

The volume of plastics produced annually in the US is now more than double the volume of the traditional metals. Platics are currently almost wholly based on the mineral fuels — petroleum and natural gas. But only a relatively small percentage of petrochemicals goes directly to their manufacturer. Carbon, hydrogen, oxygen, nitrogen, and chlorine are the building blocks for plastics. And there are virtually unlimited supplies of these materials in organic substances and in the waters and the atmosphere of the planet earth.

Today, there already is wide use of common ceramics. Extensive use of carefully engineered ceramic materials looms as a real possibility in such demanding applications as motor vehicle and aircraft engines. Silicon, a major ingredient of ceramics, is the second most abundant element in the earth's crust.

As the speed of aircraft increased over the years, wood, bamboo, and silk were replaced by aluminum. Aluminum, in turn, was replaced by stainless steel. And today, supersonic radar-detection-defying aircraft are being built of carbon fibers. Carbon, too, is an abundant element in the rocks and agricultural materials of this planet.

Forecast to 2000

A broad overview of the mineral position of a relatively peaceful world to the year 2000 indicates an overall adequacy of mineral materials supplies. However, industrialized nations must assure themselves of adequate and continuing supplies of materials at reasonable prices. This is necessary, not only to maintain employment levels and productivity in peacetime, but also to provide a defense industrial base adequate to deter the threat of war or if that proves impossible, to survive one.

US preparedness

US preparation for emergencies embraces a broad spectrum ranging from natural disasters, such as earthquakes, volcanoes, tsunamis, fires, floods, avalanches, and unprecedented snowfalls, through terrorists' actions, boycotts, embargoes, minor wars, major conventional wars, chemical/biological warfare, limited nuclear wars, and nuclear holocausts. Major conventional wars would impose the greatest strains on materials supplies.

Pursuant to Executive Orders 10480 and 11490 under the Defense Production Act as amplified by Federal Register 49FR 30437 and Executive Order 12155 under the Stock Piling Act, the Interior Department is responsible for emergency readiness plans and programs for all nonfuel minerals. Interior is generally responsible for mines, concentrating plants, smelters, and refineries, and for the ores, concentrates, and other materials treated in such facilities.

The Department of Commerce is responsible for facilities and materials that are further along in the chain of processing and use. Commerce maintains the "Defense Priorities and Allocations System" to channel essential materials to defense and related production. Steel, copper, aluminum, and nickel have long been designated as "controlled materials," and they are the basis for the priorities and allocations through which the Commerce Department channels materials to defense rated orders.

The Department of the Interior has charted the Emergency Minerals Administration (EMA) to carry out actual operations in the event of a major emergency. The EMA is based on the USBM, with support as needed from the (USGS), Minerals Management Service, Office of Surface Mining (OSM), and other Interior units.

The research work of the USGS is essential to extending our knowledge of mineral resources worldwide. Additionally, the mining and metallurgical research of the USBM extends our ability to use lower grade deposits and enhances improved performance of materials, conservation in their use, and recycling.

USBM's role

USBM continuously monitors domestic production, imports, exports, stocks, and consumption of all major nonfuel minerals. Detailed reports are received monthly, quarterly, or annually from domestic mines, smelters, refineries, recyclers, and major users. Monthly import and export data are obtained from the US Customs Service by way of the Bureau of the Census and the Department of Commerce.

USBM experts continuously monitor developments in foreign supply areas. Every month USBM publishes for the guidance of government and industry its "Mineral Industry Surveys," that give current detailed statistics.

A detailed review of US and world production for more than 100 commodities is provided in the annual "Mineral Commodity Summaries." Also, special mineral commodity profiles that give details of world production, tech-

nology, reserves, resources, and outlook to the year 2000 are published every five years in "Mineral Facts and Problems." Individual studies are published more often, as appropriate.

As a result of its continual monitoring of mineral supply and demand and its own technological competence, USBM has the framework needed to discharge priorities, allocations, and supply expansion responsiblities under the legislation cited earlier. The Bureau would also act as the claimant agency for the mineral sector of the economy to assure needed fuel, power, transportation, personnel, supplies, and equipment.

To facilitate coordinated government action in the event of an emergency, USBM in 1975 organized nearly 100 interagency mineral commodity committees. These committees include experts from USBM, USGS, and one or more areas of State, Commerce, Defense, CIA, GAS, Energy, Treasury, US trade representative, Council of Economic Advisers, International Trade Commission, Commodity Futures Trading Commission, Federal Emergency Management Agency (FEMA), and for certain commodities, Agriculture and Transportation. These committees would be promptly called on in the event of any emergency.

During a supply disruption, the first action to be taken would be to monitor exports and, if necessary, to control them.

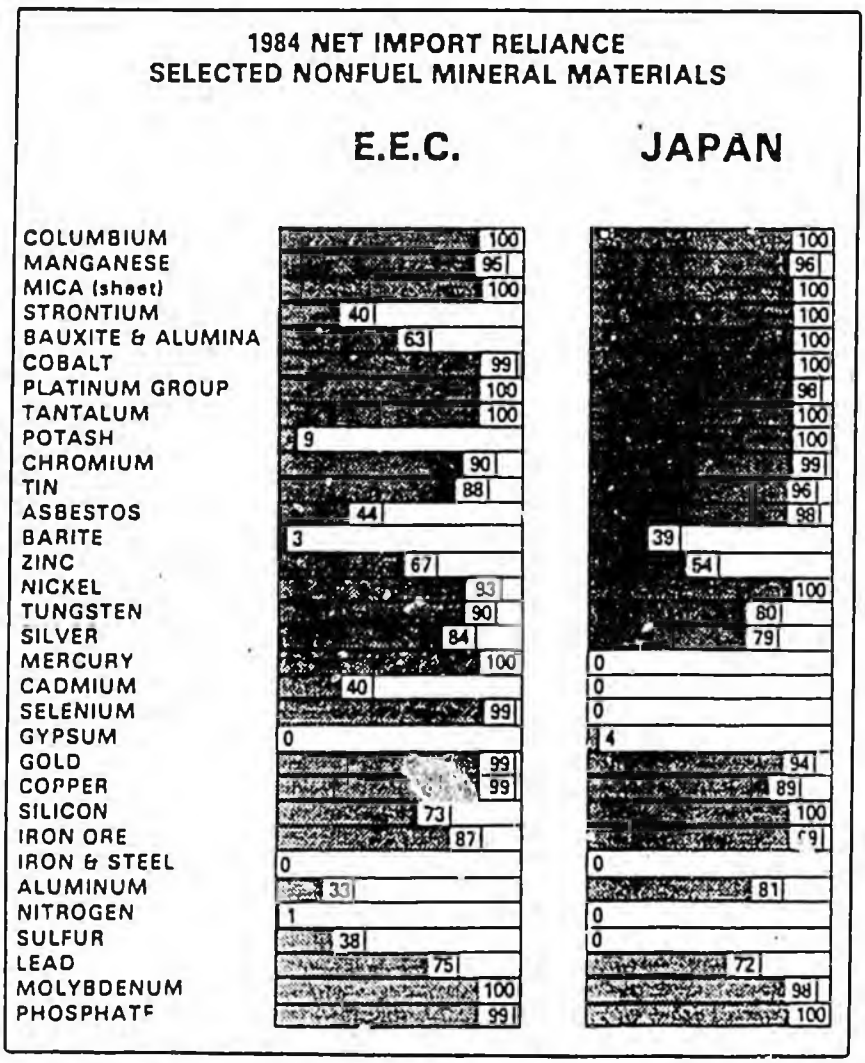
During a supply disruption, the first action to be taken would be to monitor exports and, if necessary, to control them. A worsening supply situation would require imposition of a system of priority under Title I of the Defense Production Act, whereby rated orders would have to be filled first. If priorities proved to be inadequate, they would be followed by a system of allocations, also authorized under Title I. USBM and Department of Commerce would implement priorities and allocations in their respective areas of responsiblity.

At some point in a serious shortage situation, recourse to the strategic stockpile might be required. The Stock Piling Act provides for release "on the order of the President, at any time the President determines the release of such materials is required for purposes of the national defense; and in time of war declared by the Congress or during a national emergency, on the order of any officer or employee of the United States designated by the President to have authority to issue disposal orders . . . if . . . required for purposes of the national defense."

To release stockpiled materials, FEMA, in consultation with other agencies including USBM, would prepare a justification and recommendation for the President's signature. On receipt of the President's authorization, the Office of Stockpile Disposal of GSA would release the material to specified recipients.

Export controls, priorities and allocations, and stockpile releases, however, are only temporary measures of limited effectiveness. Any long lasting supply disruption would call for supply expansion programs under Title III of the Defense Production Act. These would cover not only domestic deposits but also deposits in reliable foreign sources. USBM would develop mineral supply expansion programs in consultation with industry, including active participation of persons with specialized knowledge of the worldwide mineral deposits.

In the meantime, the Bureau is continuing to develop its computerized inventory of mineral deposits known as the Minerals Availability System (MAS). For example, in the case of chromium, a material considered highly strategic since World War I, the MAS inventory of domestic chromium properties includes more than 700 past producers, 150 developed deposits, 350 explored prospects, 250 raw prospects, and 750 other domestic chromium occurrences. The MAS also catalogs many other deposits located throughout the world. In addition to cataloging such deposits, USBM develops current cost estimates for producing from major mineral locations, based on modern mining, concentrating, smelting, and refining processes. ■



A REVIEW OF FAVORABLE OFFSHORE AND COASTAL DEPOSITIONAL SITES FOR PLATINUM-GROUP METALS IN THE GOODNEWS BAY MINING DISTRICT, ALASKA

By Brian R. Zelenka
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********** Open File Report 11-88

UNITED STATES DEPARTMENT OF THE INTERIOR

Donald P. Hodel, Secretary

BUREAU OF MINES

T S Ary, Director

CONTENTS

ILLUSTRATIONS

UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

cm	centimeter
cm/yr	centimeter per year
g/m^3	gram per cubic meter
gr	gram
kg	kilogram
km	kilometer
m	meter
m^3	cubic meter
ppb	part per billion
ppm	part per million
pct	percent
sp gr	specific gravity
um	micron
yd^3	cubic yard
yr	year

A REVIEW OF FAVORABLE OFFSHORE AND COASTAL DEPOSITIONAL SITES FOR PLATINUM-GROUP METALS IN THE GOODNEWS BAY MINING DISTRICT, ALASKA

By Brian R. Zelenka[1/]

ABSTRACT

The Bureau of Mines (Bureau) reviewed all available information regarding geologic and depositional processes contributing to potential coastal and offshore platinum group metal (PGM) placer deposits around the Goodnews Bay Mining District. The Bureau found that favorable environments for PGM along with gold and chromite enrichment include: (1) buried paleofluvial channels; (2) recent paleofluvial channels with little marine sediment overburden, (3) beach deposits, particularly in the upper swash zone and near back beach environments; (4) paleostrand lines; (5) shoal lag deposits inside the mouths of Goodnews and Chagvan bays; and (6) bases of far offshore tidal ridges which may represent reworked glacial deposits.

Limited geologic and compositional (assay) data prevent determination of deposit size and grade of PGM mineralization for each deposit class. Future geologic sampling requirements for demonstration of identifiable offshore and beach PGM-bearing placers are discussed. Beach and offshore sampling programs conducted by the Bureau in 1986 will contribute additional information providing verification of specific deposit classes.

INTRODUCTION

The Bureau is currently investigating known and potential nearshore and offshore placer deposits in Alaska. The offshore region adjacent to the Goodnews Bay Mining District is recognized as having a high potential for PGM, gold, and chromium placers. Reliable quantitative analyses of beach and offshore sands around the Goodnews Bay Mining District are limited and the potential for economically extracting marine placers remains largely unknown. This study was undertaken as an attempt to compile available literature and evaluate the offshore and coastal placer potential near the Goodnews Bay Mining District. Specific depositional environments with possible economic concentrations of PGM, gold, and chromium are hypothesized.

Fluvial PGM placers were discovered in a small region south of Goodnews Bay, southwestern Alaska, during 1926 (23-25)[2/]. From 1927 to 1934, the placers were worked by small-scale hand mining methods. Dragline excavators were employed in 1935, and in 1937 the Goodnews Bay Mining Company built a bucket-line dredge which was seasonally used until 1975. The dredge has been used intermittently since then.

1/Mining Engineer, Alaska Field Operations Center (AFOC), Anchorage, Alaska (deceased).

2/ Underlined numbers in parentheses refer to items in the list of references at the end of this report.

Although PGM extraction has been restricted to gravels in the creeks which drain Red Mountain, the ultramafic source for the PGM (25, 35,), numerous researchers have reported trace to possibly economic concentrations of platinum in beach and offshore sands around Goodnews Bay, Chagvan Bay, and the adjacent coastal waters of Kuskokwim Bay (5, 7, 11, 28, 42). The presence of PGM-bearing sediments offshore was verified by the Bureau in 1985.

Significant concentrations of chromite, with lesser amounts of gold, are locally associated with the PGM placers and may represent economically recoverable co-products or by-products of PGM production. During the summer of 1986, the Bureau's Mineral Land Assessment (MLA) section and the Critical and Strategic Minerals sampling program continued to systematically collect bulk samples for PGM and heavy mineral analysis in the offshore and intertidal regions between Goodnews and Chagvan Bay.

This paper, which integrates the work of previous researchers, summarizes those characteristics which together suggest favorable marine placer environments in the Goodnews Bay Mining District. These include: (1) coastal and offshore geology; (2) Holocene geomorphology and its relationship to placer depositional environments; (3) Quaternary geology; (4) primary PGM sources; (5) secondary depositional environments; (6) PGM transport models; and (7) the results of marine sediment analyses. Depositional environments with possible PGM resources are identified using available data. Analysis of samples collected by the Bureau in 1985 and 1986 is incomplete, nor have assay data suggesting specific PGM placers in various offsho › depositional environments been completely evaluated. However, l ited compositional data from beach samples collected during 1986 by ..e Bureau's MLA program is presented.

ACKNOWLEDGMENTS

Peter Barnes, Geologist for the U.S. Geological Survey, is gratefully acknowledged for providing invaluable unpublished data from his offshore investigations in 1969 of the Goodnews Bay district. The author also wishes to acknowledge his colleagues at the Bureau of Mines, Alaska Field Operations Center, who provided both data and interpretive reviews.

STRATEGIC IMPORTANCE

Approximately 92% of the PGM consumed by the United States is imported from South Africa and the U.S.S.R., and is therefore considered strategic and critical for the U.S. (10, 27)). Platinum is used for two principal functions; (1) as a catalyst in automotive, petroleum refining, and other industries, and (2) as a corrosion-resistant material for industries such as chemical, electrical, and dental-medical (21). The Goodnews Bay Mining District is the only district in the U.S. which has produced PGM as a primary commodity. Significant resources and limited reserves of this commodity exist in the Salmon River valley, adjacent tributaries, and nearby coastal zones in the Goodnews Bay Mining District; however, the reserve base has been only partially evaluated (13, 29).

LOCATION

The Goodnews Bay Mining District is located north of Bristol Bay in southwestern Alaska (fig. 1). The district encompasses approximately 1.1 million acres, and is bounded by the Indian River on the north, Cape Newenham on the south, and Ungluayagat Mountain to the east (fig. 2, 31). This study investigates the nearshore and offshore region between the north spit at Goodnews Bay and the southern side of Chagvan Bay along the Bering Sea coast.

PRODUCTION AND RESERVE BASE

Total production of PGM from the entire Goodnews Bay District between 1927-81 is approximately 20,031 kg (2). The bucket-line dredge at Goodnews Bay, operated by the Goodnews Bay Mining Company from 1937-75, produced at least 16,949 kg of PGM (13). Presently, the platinum dredge, owned by the R. A. Hanson Company, is being operated on a limited basis, hence current PGM production from Goodnews Bay is negligible (12).

Measured recoverable reserves for PGM contained onshore in fluvial placers near Goodnews Bay are in excess of 9,330 kg (12). Hypothetical resources of subeconomic grade include 40,430 kg recoverable from lode occurrences at Red Mountain, 15,550 kg from beach deposits, and 155,500 kg from offshore placers according to Page and others (29). The U.S. Geological Survey (USGS) estimate of 171,050 kg of PGM for coastal placers should be recognized as an estimate of order of magnitude precision only (29), because they rely heavily on analyses of a limited number of grab samples (5, 11). Data obtained by the Bureau during 1986 suggests that a significantly smaller resource base is present on the beaches and probably offshore.

REGIONAL GEOLOGY

The geology of the Goodnews Bay Mining District has been studied by numerous investigators. The most significant contributions are discussed below. Reed (32, 33), in 1931 and 1933, described the early placer mining at Goodnews Bay and the ultramafic rocks comprising Red Mountain. In 1940, Mertie (23) reported on the regional geology and the character of the placers which included detailed petrographic investigations of the PGM. Mertie (24-25) went on, in 1969 and 1976, to summarize the mining history and composition of the PGM placers and also described the regional geology, Quaternary depositional environment, and economic significance. The heavy mineral potential of beach deposits along the coast of Bristol Bay was first reported by Berryhill (5) in 1963. Porter (30) described the Quaternary glacial history of the Chagvan Bay area in 1967. A comprehensive investigation of the Goodnews Bay District was released in 1978 by the USGS as part of the Alaska Mineral Resource Appraisal Project (AMRAP) (11, 16, 18-19). Bond (7) and Ulrich (42) reported on the distribution and processes involving the formation of beach placers in the Goodnews Bay district in 1982 and 1984 respectively. Wakeland (37), Welkie (40), and Walish (39) investigated the sedimentological processes active in Goodnews Bay, Chagvan Bay, and in nearshore environments in 1973, 1976, and 1977 respectively. The most recent

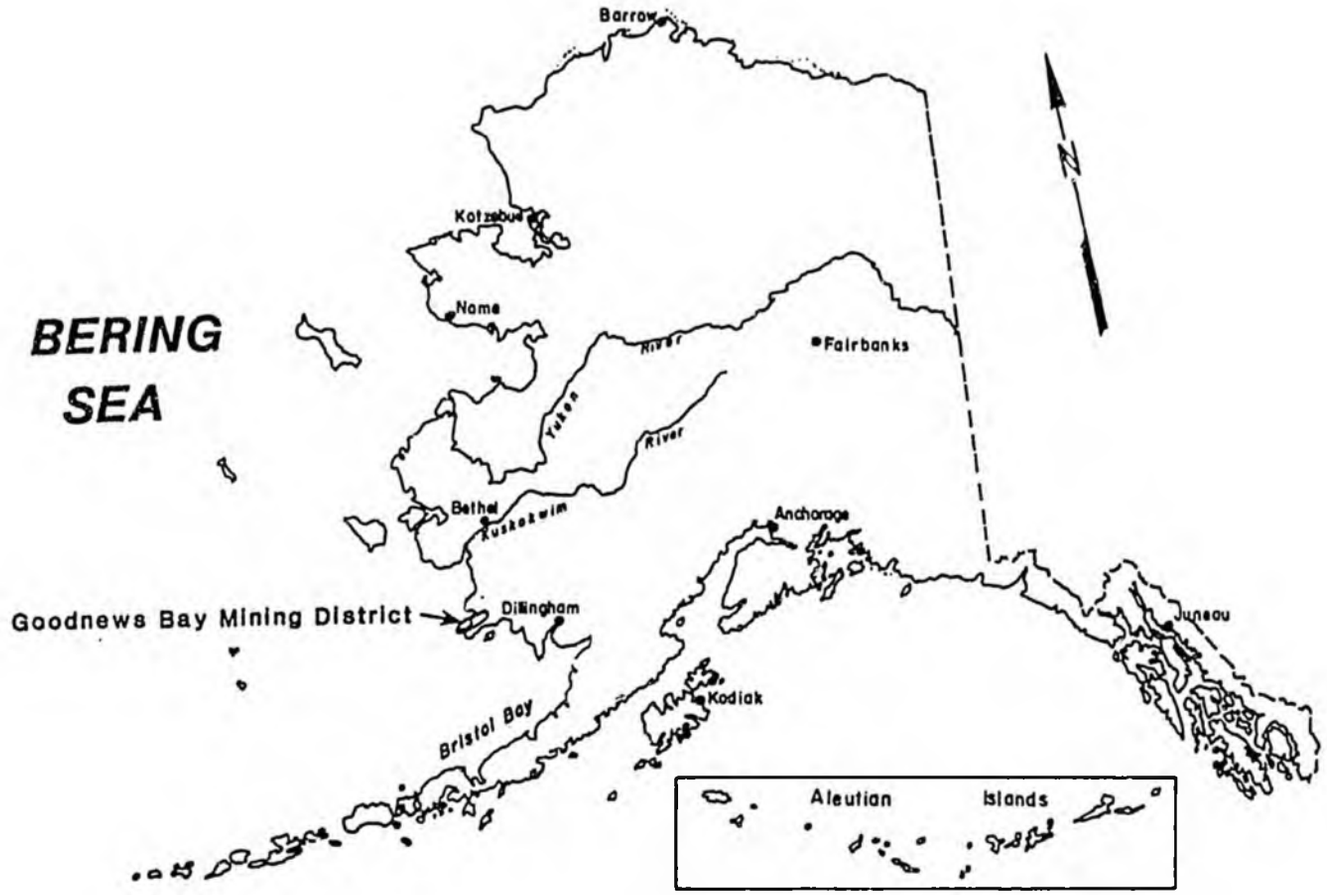

FIGURE 1. Location map of the Goodnews Bay Mining District, Alaska.

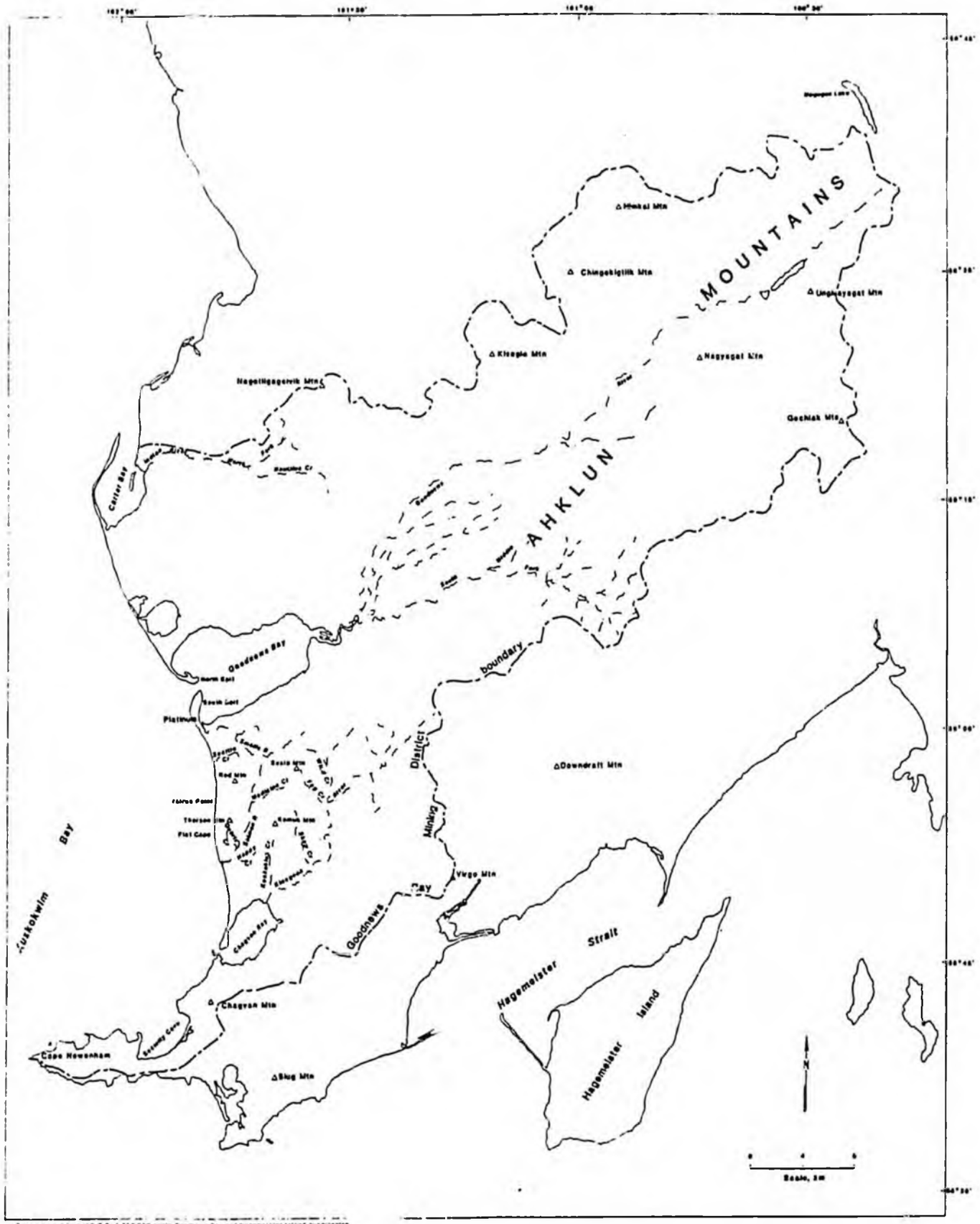

Figure 2. – Detailed Location Map showing boundaries of the Goodnews Bay Mining District and main topographic features

geologic map of the Goodnews Bay area was compiled by Hoare and Coonrad (19) for the Goodnews-Hagemeister Island quadrangles region in 1978. The tectonic setting of southwestern Alaska was recently investigated by Box (8-9), in 1982 and 1985, for the USGS. Southworth and Foley (36), and Southworth (35) published detailed descriptions of the ultramafic source rocks for PGM mineralization at Red Mountain. In 1982 and 1984, Box (8-9) subdivided the Goodnews Bay district into terranes which are overlain by unconsolidated glaciofluvial Quaternary deposits.

The tectonic setting of the Goodnews Bay complex is best described using the tectonostratigraphic terrane framework developed by Jones and others (20) and Box (8). The Goodnews Bay region consists of the Goodnews and Togiak Terranes. The following discussion is adapted from Box (8-9).

TOGIAK TERRANE

The Togiak Terrane consists of Mesozoic volcanic and volcaniclastic sedimentary rocks which may be subdivided into the Hagemeister and Kulukak subterranes (fig. 3). The Hagemeister subterrane is a northeast striking belt which includes Chagvan Bay and Chagvan Mountain. The Hagemeister subterrane is comprised of Upper Triassic through Lower Cretaceous mafic igneous rocks, shallow marine volcaniclastic sedimentary rocks, and intercalated cherts. The subterrane may be further divided into three units with unconformable contacts.

The Kulukak subterrane consists of Jurassic volcaniclastic turbidites, and is exposed as a northeast trending belt south of the Goodnews Bay District (fig. 3). A northeast striking linear fault separates the Hagemeister and Platinum subterranes from the Nukluk subterrane to the northwest.

GOODNEWS TERRANE

The Goodnews terrane is subdivided into the lithologically distinct Nukluk, Platinum, and Cape Peirce subterranes (fig. 3). The Nukluk subterrane strikes northeast with its western margin extending from Goodnews Bay to Carter Bay (fig. 3). The Nukluk subterrane consists of Triassic limestone and volcaniclastic sedimentary rocks, radiolarian cherts, and polymictic clastic rocks in a matrix-poor melange package. Locally, the subterrane is overprinted by greenschist to blueschist facies metamorphism along the northwestern margin. The Nukluk subterrane is separated from the Platinum and Hagemeister subterranes by a northeast trending linear fault. The Platinum subterrane is exposed around Goodnews Bay and the Upper Goodnews River, and consists of an unfoliated package of basalts, limestones, and volcanic conglomerates of Permian age. The Cape Peirce subterrane outcrops between Goodnews Bay and Chagvan Bay, around Security Cove, and on the northern shore of Hagemeister Strait (fig. 3). The Cape Peirce subterrane consists of foliated greenschist to blueschist facies metamorphic rocks of late Triassic or early Jurassic age, which have been thrust over the Platinum subterrane to the northwest. The Cape Peirce subterrane is exposed through a window under a low-angle fault overlain by the Hagemeister subterrane.

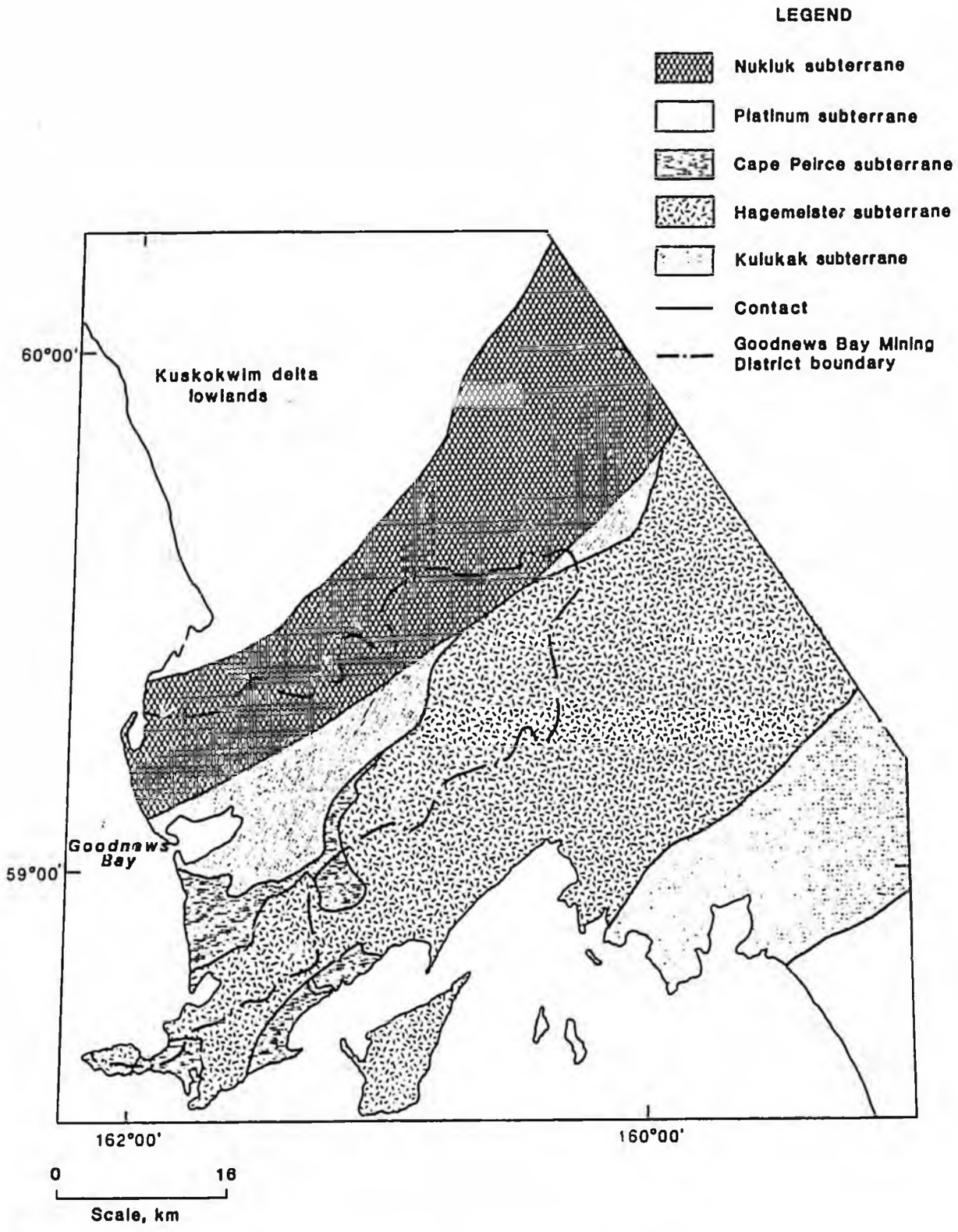

FIGURE 3. Teconostratigraphic terrane map of the Goodnews Bay Mining District

ULTRAMAFIC ROCKS

Red Mountain and Suzie Mountain are two exposures of ultramafic rock within the Goodnews Bay Mining District and probably represent the same complex (35, 36). The ultramafic intrusives consist of dunite, pyroxenite, hornblendite, and gabbro which form a discontinuous belt of sill-like bodies which intruded the Cape Peirce subterrane during Late Cretaceous to Early Tertiary time (35). These intrusives represent the source of PGM, chromite, and minor gold (25, 35). Hoare and Coonrad (19) report potassium-argon ages of 176.4 ± 5.3 and 186.9 ± 5.6 million years for secondary amphibole located along the Red Mountain contact zone.

QUATERNARY GEOLOGY AND DEPOSITS

Unconsolidated Quaternary deposits in the Goodnews Bay Mining District are derived from glacial, fluvial, and marine origins. A discussion of each is presented below.

GLACIAL HISTORY AND DEPOSITS

Porter's (30) description of the glacial history of the Chagvan area may be applied to the Goodnews Bay area. Mertie (25) summarized many of Porter's conclusions and provided additional interpretations based on his observations of the placer mining operations.

Glaciers originating in the Ahklun Mountains, northeast of the Goodnews Bay Mining District, spread over the coastal lowlands at least four times as broad piedmont lobes. From oldest to youngest, the four ice sheets have been named Kemuk, Clara Creek, Chagvan, and Unaluk, which correspond to the Nebraskan, Kansan, Illinoian, and Wisconsinian Glaciations, respectively (25). The Kemuk drift sheet is deeply buried beneath younger drift and is indicated only from a single drill hole located half a mile north of Happy Creek. The sediments are characterized as strongly weathered and oxidized and directly overlie weathered bedrock. The Kemuk Glaciation did not erode bedrock at lower elevations in the Salmon River Valley, as evidenced by preservation of the bench placer on the east wall of the valley which was buried by the earliest ice advance. This early advance may have covered the entire upland as suggested by the distribution of placer gold presumably carried in by ice sheets from source rocks to the east.

The Clara Creek (Kansan) Glaciation was the most extensive of the four ice advances and produced massive morainal material which has been remobilized by erosion and mass-wasting. The preglacial course (bench placer) of the Salmon River was probably abandoned during the Kemuk or Clara Creek Glaciation because the younger, valley-bottom placer was truncated by ice advancing into the lower Salmon Valley from Chagvan Bay during the third glaciation.

The third ice advance, represented by the Chagvan (Illinoian) Glaciation, has been radiocarbon dated to have occurred at least 45,000 years before present (30, p. 13). The deeper (Clara Creek) bench placer was not eroded by this ice advance. This glaciation did, however, destroy PGM placers that presumably existed on the northeastern side of Red Mountain, as evidenced by erratic boulders

found at elevations as high as 267 m (25, p. 13). The Chagvan Glaciation produced a less modified constructional topography than previous glaciations. Kettle lakes and arcuate ridges are the most characteristic features. Porter (30) mapped moraines of the three youngest glaciations on the north and west flanks of Red Mountain. Extensive drilling programs have found no significant placers there. However, the same source rocks (i.e. Red Mountain) provided glacial debris which were later reworked by fluvial processes to provide important paystreaks east and south of Red Mountain. Most of the unconsolidated deposits removed from the northern and western flanks of Red Mountain prior to glacial deposition were probably transported offshore as morainal and outwash material during marine regressions associated with continental glacial advances. Porter (30, p. 238) and Ulrich (42) estimate that glacial material was deposited at least 1.5 km offshore from the present coast. Reevaluation of data provided by Ulrich (42), however, suggests morainal material may have been deposited up to 5 km offshore.

The Unakluk Drift has been dated to be at least 8,910 ± 110 years old, representing the last glacial event near Goodnews Bay. The moraines of the Unaluk Glaciation have been altered little by erosion or mass-wasting. Terminal moraines are found four miles east of Chagvan Bay, and hence had little effect on the Goodnews Bay District except for glaciofluvial deposition from runoff.

Poorly sorted glacial deposits do not contain economic placers according the Mertie (25). Fluvial or marine reworking of the unsorted deposits is a necessary requisite in order to hydraulically concentrate the PGM and other heavy minerals.

FLUVIAL DEPOSITS

Unconsolidated fluvial gravel deposits have yielded nearly all of the PGM recovered from the Goodnews Bay Mining District. The Salmon River is the only major PGM-bearing drainage in the district. Placer deposits of the Salmon River and its paleochannels (bench placers) range from 5 m to approximately 80 m in depth, with the highest grades directly above bedrock (25, 30). Two PGM-bearing paystreaks are recognized. The most recent deposit, located in the Salmon River valley, is shallow and approximately follows the modern drainage (24-25). The older, deep bench placer on the east wall of the valley was abandoned by the Salmon River and buried with glacial debris during the Clara Creek Glaciation (30). Extensive drilling programs have failed to locate additional PGM-bearing paleochannels. Most PGM recovered from these placers occurs within structural traps in the upper meter of bedrock, if unweathered, or as much as 1.3 m into broken or highly altered bedrock (25).

Smaller drainages and tributary streams contain shallow fluvial deposits overlain by 2 to 7 m of overburden. Although these shallow deposits proved to be easily accessible by hand and dragline placer mining techniques, their limited minable volume, and difficult accessibility has restricted dredge recovery except where the drainages feed into the Salmon River Valley.

Tributaries draining from the north and west side of Red Mountain lack economically significant concentrations of PGM, gold and chromite (23-25). The Chagvan glacial advance scoured the northwestern flanks

of Red Mountain presumably removing the richer placer accumulations of these metals (30). Tributaries have had insufficient time to rework the glacial deposits and reconcentrate the heavy minerals in this area. In the lower Salmon River Valley, south of Red Mountain, glacial erosion removed most of the placer deposits present in stream channels. PGM and gold deposits recovered from the lower Salmon River are the result of glaciofluvial reconcentration from highly disseminated heavy mineral-bearing glacial deposits.

MARINE DEPOSITS

Marine deposits occurring in Kuskokwim Bay are derived from: detritus transported offshore during ice advances; the coastal erosion of alluvial (mostly morainal) bluffs along the western side of Red Mountain; direct weathering of ultramafic bedrock exposed at Walrus Point which probably extends offshore (fig. 2); and fluvial sediment discharged from coastal rivers and tributaries. Economically significant concentrations of PGM have not been reported in offshore or beach deposits between Goodnews Bay and Chagvan Bay. However, selected pan concentrates and grab samples collected by Berryhill (5, p. 13) contained heavy mineral accumulations with up to 12.1 pct chromite and trace amounts of platinum, gold, and silver. During the Bureau's 1986 beach sampling program one sample obtained exceeded 10.5 g/m^3 PGM and 4.1 g/m^3 gold (14).

Beach deposits occurring in the foreshore and backshore are composed of unconsolidated, poorly sorted deposits predominantly of glacial origin (7, 42). The beach is characterized as a thin wedge of coarse-grained sediments overlying "false bedrock", and range in thickness from several centimeters near the base of the bluff to approximately 1 m in the mid-beach zone (7, p. 20). The beaches average 30 m wide and extend to an unknown depth along the shoreface zone. Heavy mineral concentrations occur in the swash zone (foreshore), behind berms in the backshore, and along the "false" bedrock horizon below the beach sands. The "false" bedrock consists of glacially derived clay and sediments (morainal) which are ferricreted in some areas. Black sands are concentrated on the "false" bedrock surface up to 30 m from the bluffs (15). Erosion of the bluff face of approximately 50 cm or more a year provides a continual source of PGM-bearing glacial debris to the beach and nearshore heavy mineral concentrating corridor (42).

Glacial sediments extending 5 km (or more?) offshore were deposited during marine regressive events correlated to ice sheet advances during the Pleistocene and Holocene Epochs. Porter (30) cites evidence which suggests that the sea level may have been 80 m lower than the present elevation. Upon the retreat of the glaciers, the sea level rose towards its present elevation during which time low to high energy waves and littoral currents reworked morainal and glaciofluvial debris deposited on the sea floor. There have been at least four transgressive-regressive cycles associated with Quaternary glacial events.

Fluvial channels were developed during regressive marine events and may be present as buried channels extending offshore. Evidence for such channels is suggested from contours of bathymetric and acoustic "basement" data obtained during an offshore sampling program by the

USGS (4). Sediments overlying the paleochannels range in thickness from 25 to 50 m.

GEOMORPHOLOGY

The past glacial history and present periglacial climate have strongly influenced the geomorphology of the Goodnews Bay region. It is the geomorphology which ultimately determines the transportation and depositional potential of placer-bearing sediments.

Red Mountain is an elongate ultramafic body 11.3 km long, approximately 1.5 km wide, and 574 m in elevation. The northwestern flank is steeper than the southeastern side, with the asymmetry apparently resulting from the effects of glacial erosion and/or variable insolation (42). The northwestern side of Red Mountain is covered with colluvium and morainal material at lower elevations. The unsorted material ranges from clay sized particles to boulders many meters in diameter. Red Mountain is flanked by soliflual lobes which result from the gravity sliding of water-saturated sediments. Vegetation around Red Mountain is sparse, lichens are found at higher elevations, with moss and other tundral growth becoming denser near the base of the mountain.

The relative rates of chemical versus physical weathering processes occurring on Red Mountain have not been investigated. Ulrich (42) noted that although chemical processes are subdued at higher latitudes, field observations suggest that chemical weathering has contributed significantly to the disaggregation of Red Mountain. She noted that fractures in ultramafic rocks have a thin coating of serpentine and all exposed surfaces were buff-colored and powdery.

The Bering Sea coastline is characterized by a broad low-angle gravel beach backed by bluffs of exposed glacial outwash and morainal debris, except where Red Mountain encroaches on the Bering Sea, locally referred to as Walrus Point (7, p. 9). The bluffs range in height from approximately 1 m, where drainage erosion has occurred, to 15 m at Walrus Point.

The seasonal beach morphology has been observed to change significantly from a storm profile to a swell profile during late May or early June (42). Glacial bluffs were observed by Ulrich (42) to retreat approximately 25 cm during a 5 week field season. Assuming an erosional rate of 50 cm/yr, the shoreline has retreated at least 4,450 m since the last glaciation 8,900 years ago. This estimation is considerably larger than Porter's (30) estimate of 1,609 m which he calculated by extrapolating the slope of the Unaluk till sheet offshore.

Major stream drainages in the Goodnews Bay Mining District include the Salmon River which flows southward between Red and Suzie Mountains and eventually drains into Bristol Bay. The Smalls River, which drains into Goodnews Bay, and Seattle Creek originate from basins on the north flank of Red Mountain. Goodnews Bay receives most of its fluvial material from the Goodnews River which drains from the Ahklun Mountains northeast of the Goodnews Bay District. The Kinegnak River is the major tributary feeding sediments to Chagvan Bay. The four glacial episodes have significantly modified drainage basins in the Goodnews Bay region. Most notably, the Salmon River flowed southeasterly into Chagvan Bay until the Kansan Glaciation modified the drainage system (25).

Goodnews Bay and Chagvan Bay are intertidal lagoons with sandy spits protecting the entrances. The formation of the spits suggests the presence of northerly and southerly littoral currents transporting material from the receding coastal bluffs and stream drainages including the Salmon River (28, 37).

Seasonally flowing tributaries originate in cirques and cirque-like basins around Red Mountain (42). The streams have deeply incised straight, narrow valleys in the glacial morainal material. The streams change gradient at the base of the mountain allowing sediments to settle out and form small alluvial fans in some drainages. Eventually, the streams empty into the Bering Sea where the remaining sediment load comes under the influence of marine processes.

SEDIMENT TRANSPORT MECHANISMS

Understanding heavy mineral-bearing sediment transport mechanisms is critical in developing depositional environment models. Longshore transport from littoral currents is probably the most important agent concentrating heavy minerals offshore. The rate of transport has not been determined in the Goodnews Bay region, although the directions of sediment movement were cited by Bond (7). Data provided by the U.S. Air Force installation at Cape Newenham indicate that the dominant weather pattern, particularly the storm approach angle, is from the south to southwest during ice-free months (7). Evidence for this northward movement of sediments is observed in the accretion of the recurving spits forming the entrance to Goodnews Bay. Additionally, refraction of the wave train at the Flat Cape - Walrus Point headland produces longshore currents in a southward direction toward Chagvan Bay (7). Formation of the spit along the north side of the entrance of Chagvan Bay demonstrates the southern transport of sediments along the coast from Walrus Point (7). Direct input of sediments to coastal environments is derived from: 1) transport from the Salmon River; 2) erosion of glacial morainal and outwash material; and 3) erosion of the Red Mountain ultramafic body where it encroaches the coast and apparently extends offshore.

Sediment transport from far offshore (2-15 km) probably requires high energy, storm generated waves. Water depths do not exceed 20 m in this region of Kuskokwim Bay, hence high energy waves are probably capable of reworking offshore sediments. Sediment transport along the nearshore conduit, including beaches, is provided by storm events, and to a lesser degree, by wave and tidal activity.

Shoaling waves occur in the mouths of Goodnews and Chagvan Bays. Shoaling waves decrease in energy and dump their sediment load upon entering the bays. Tidal changes of 1 to 3 m in the Kuskokwim Bay region increase in energy towards the mouths of the bays scouring bottom sediments and winnowing out lighter sediments.

PRIMARY PGM SOURCES

Mertie (23-25) described the ultramafic rocks comprising Red and Suzie Mountains and went on to demonstrate that the PGM are derived from the Red Mountain ultramafic complex. Based on Mertie's (25, p. 41) calculations, the Red Mountain dunite contains 0.016 to 0.023 g/m^3 PGM. He concluded that large low-grade PGM deposits of commercial value were not likely to be discovered.

Southworth (35) recently completed a comprehensive petrologic investigation of the Goodnews Bay ultramafic complex and concluded that the intrusive is an Alaskan-type zoned ultramafic complex, similar to those found in southeastern Alaska, British Columbia, and the Ural Mountains in the U.S.S.R. Platinum within the Goodnews Bay ultramafic complex (Red Mountain) is associated with chromite concentrated in the dunite core. Anomalous values of iridium and palladium are apparently associated with sulfides, and/or magnetite in the outer zone of the complex. The central core of dunite is rimmed successively by wehrlite, magnetite clinopyroxenite, hornblende clinopyroxenite, and hornblendite.

All economic PGM placers in the Goodnews Bay Mining District are derived from erosion of the Red Mountain ultramafic complex. Furthermore, Southworth (35) and Fechner (15) have demonstrated that at least some of the gold associated with the PGM placers was derived from Red Mountain. Most of the chromium is weathered from Red Mountain, with minor quantities contributed from Suzie Mountain (35). Although Suzie Mountain consists of a dunite-wehrlite core rimmed by clinopyroxenite (35), it is not a major source of PGM in the valley of the Salmon River (25). The apparent extension of the Goodnews Bay ultramafic complex offshore along a southwestern trend is suggested by bathymetric (4) and limited aeromagnetic data (16).

There is strong evidence which suggests PGM are preferentially associated with chromite at Goodnews Bay (23-24, 35, 42). Additionally, Southworth (35) has noted a strong PGM-magnetite association which is consistent with observations from Mertie (24), and Rosenblum and others (34). Geochemical observations such as the PGM-chromium association should be cautiously extended to secondary placer environments, since the hydraulic behavior of the minerals differ. This was noted by Ulrich (42) who failed to find a correlation between PGM and Fe, presumably the result of ultrafine PGM being lost from the hydraulically concentrated samples.

SECONDARY PGM SOURCES

As stated, PGM placers of fluvial origin are the only deposits which have been economically developed by industry at Goodnews Bay. The high average density of PGM (sp gr 14 to 19) together with other heavy minerals allows hydraulically concentrated deposits to form in environments with energies high enough to separate the heavy minerals from other sediments. Glacial transport of alluvium generally disperses rather than concentrates heavy minerals. Thus morainal deposits in the Goodnews Bay district, although PGM-bearing and geochemically interesting, do not contain economically important PGM, gold, or chromium accumulations. Glaciofluvial deposits, such as those in the lower Salmon River drainage may have been locally reworked sufficiently to develop significant placer accumulations.

Marine deposits, of interest in this study, occur in offshore, nearshore, and beach environments. Descriptions of possible depositional sites for heavy mineral accumulations have been published by Berryhill (5), Owen (28), Welkie (40), Coonrad and Others (11), Bond (7), and Ulrich (42). The Bureau has been conducting investigations on the beach and marine placer potential at Goodnews Bay since 1981.

POTENTIAL OFFSHORE, NEAR-SHORE, AND BEACH PLACER DEPOSITS

Available quantitative and qualitative geochemical data, Quaternary geologic history, studies of active marine processes, and inferences concerning depositional environments, suggest favorable environments for offshore and coastal deposits of platinum-group and other heavy minerals. Six deposit classes containing potential heavy mineral accumulations of economic significance are hypothesized: buried paleofluvial channels, recent paleofluvial channels, beach deposits, paleostrand lines, tidal ridges, and shoal deposits. The approximate hypothetical areal distribution and classification of each deposit is shown on figure 4.

Buried Paleofluvial Channels

Buried paleofluvial channels were identified using limited "acoustic basement" data collected by Barnes in 1969 for the USGS and provided to the author (4). Figure 4 identifies the locations of three possible buried channels recognized as depressions in the "acoustic basement" from seismic data.

The buried channels are presumed to originate from the coastal area between the Salmon River and the northern spit of Chagvan Bay and may represent extensions of the Salmon River drainage which were cut during one or more marine regressive events. These channel locations are very approximate and high resolution data is required to verify and define their locations. Buried channels do not correlate to submarine topographic relief, and are not recognizable from bathymetric data.

The buried channels are apparently covered with 30 to 50 m of alluvium, presumably of glacial and fluvial origin. Since the channels are defined by negative relief in bedrock or possibly ferricreted-gravel "false" bedrock, it is believed that the channels originated during the Kemuk or Clara Creek Glaciation and were later covered with glaciofluvial debris from the Unaluk or Chagvan Glaciation and other marine (e.g. littoral) processes. Heavy mineral accumulations, including PGM may be present in these paleochannels at the "false bedrock" contact. This hypothesis is supported by limited magnetic data collected along the buried channels (4). PGM concentrations may approximate those found in lower Salmon River if the sediments were derived from Red Mountain.

Recent Paleofluvial Channels

Recent paleofluvial channels, shown in figure 4, are suggested from detailed bathymetric data (1.52 m contours) provided by Barnes (4). These channels also represent fluvial offshore extensions formed during marine regressive events. The channels are younger than the buried channels and are presumably correlated to the Unaluk and/or Chagvan glaciation. The channels are southwest trending but are not all extensions of the Salmon River Valley (fig. 4). The channels are presently covered with an unknown thickness of recent sediments, and 5 to 20 m of water. The channels do not rest on acoustic "bedrock", therefore it is not clear where heavy mineral concentrations, if any, may have accumulated. The channels are identified as gentle

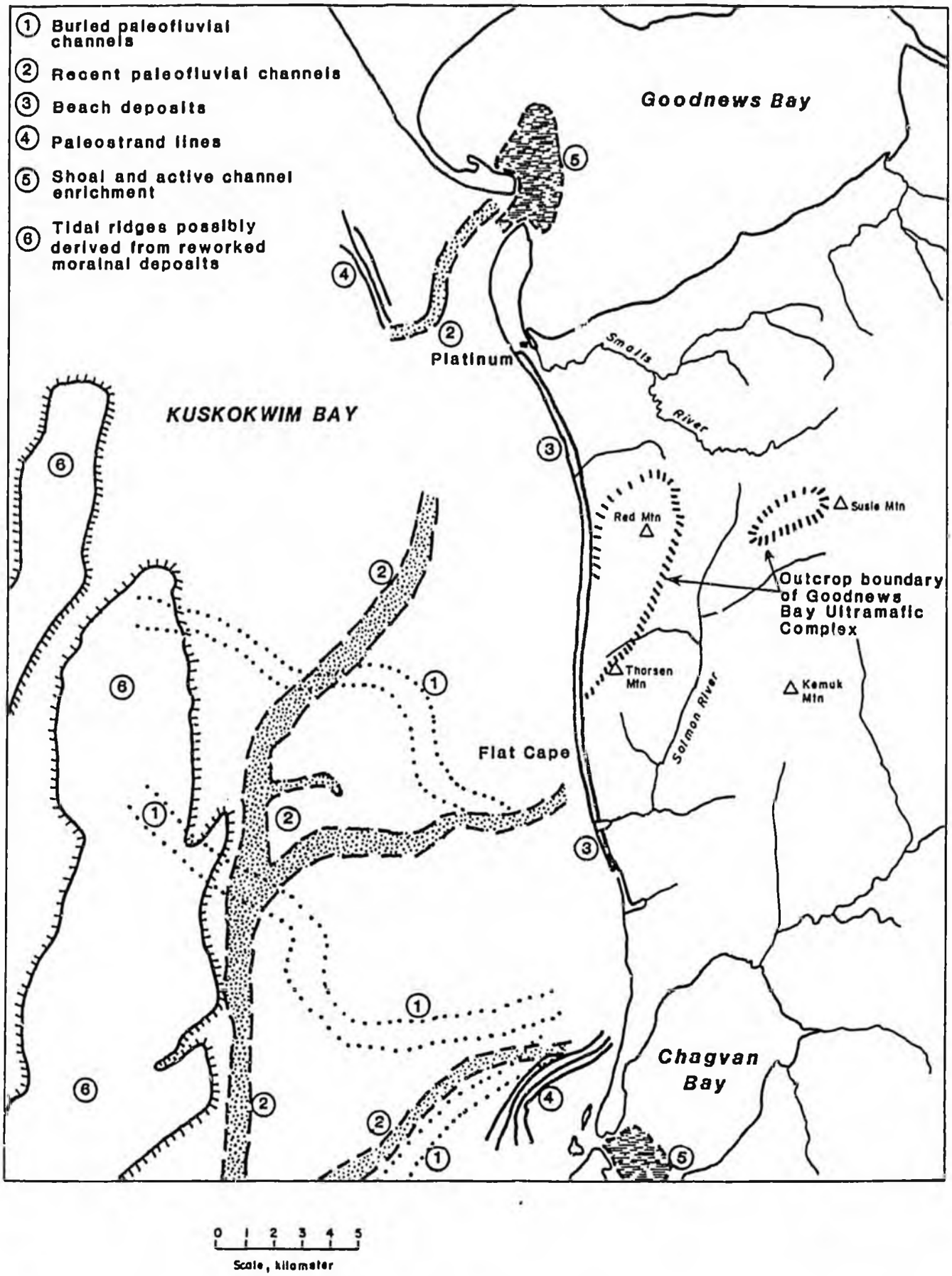

FIGURE 4. Favorable offshore and coastal platinum-bearing depositional environments.

bathymetric depressions up to 1.5 km wide with 5 m or less negative relief, and are traceable from approximately 3 km to 10 km offshore. Channels in the near shore environment extending from the Salmon River Valley are most favorable for PGM mineralization. Welkie (40) originally proposed the offshore channel model based on U.S. Coastal & Geodetic Service bathymetry map 9103. Her evaluation of 88 offshore samples, however, did not suggest selective platinum enrichment in the channels. Barker (1) also has suggested the presence of southwest-trending paleofluvial channels west of Red Mountain. His field investigations identified channels in the sea bluffs at Flat Cape.

Beach Deposits

Berryhill (5) collected 47 auger and shovel samples of beach sands between the north shore of Goodnews Bay and Chagvan Bay. Although h found trace to minor quantities of PGM and gold in the sands, potentially economic concentrations were not recognized. Selective sampling of specific beach environments was not accomplished.

Welkie (40) found platinum, chromium, and gold concentrations in beach samples which have been enriched up to an order of magnitude above concentrations obtained in offshore samples. Beach deposits containing the greatest PGM and heavy mineral values occurred over a 2 km distance immediately south of the Salmon River (fig. 4).

Bond (7) continued beach placer investigations in the area and found the most significant PGM concentrations between Walrus Point and Platinum (figs. 2, 4). He concluded that the PGM was being derived from two principal sources: (1) direct weathering of Red Mountain where it crops out along the coast at Walrus Point and (2) reworking of morainal material deposited on the western flanks of Red Mountain which is rapidly eroding from coastal processes. Importantly, Bond (7) recognized specific shoreface environments where PGM, chromite, and gold are being selectively concentrated. The highest PGM concentrations are contained in thin layers of heavy mineral accumulations on the back beach near the base of the morainal bluffs, and in storm washover deposits at the mouths of creeks that erode the bluff. Additionally, Bond noted that beach and nearshore wave energy concentrates only fine platinum (less that 250 um). Heavy mineral concentration by wave sorting along the upper swash zone and far back-beach apparently results from swash wave action, storm, and high tide events. Ulrich (42) also concluded that PGM was being concentrated between the upper swash zone and back-beach as a result of daily high-tide spillover events, and in the far back-beach as a result of storm processes. The greatest concentration of PGM was found in the less-than 125 um range.

New data collected by the Bureau in 1986 (15) suggests a hypothetical reserve base of 1,420,000 m^3 for beach sands between the bluff at Red Mountain and the south spit at Goodnews Bay with the average tenor of PGM and gold to be 0.0325 g/m^3 and 0.0039 g/m^3 respectively.

Between Walrus Point and the Salmon River, the areal extent of the beach is limited, with a hypothetical reserve base of 251,800 m^3. PGM grades average around 0.2968 g/m^3, and gold values average 0.1342 g/m^3. Average grades are based on sixty-four 0.0765 m^3

(0.1 yd^3) samples collected from representative beach facies. PGM and gold grades were determined by weighting the average value of sample site assays against the cross-sectional area of the beach profile between sample sites as described by Wells (41, pp. 55, 58-59). Total available hypothetical resources are limited to approximately 121 kg of PGM. Volume estimates of beaches are hypothetical and assume a 23 m wide beach south of the Red Mountain bluff, and 46 m wide beach north to the South Spit of Goodnews Bay. The thickness of the beach deposits to bedrock was extrapolated from limited test pit sampling data (15). Hypothetical reserves may be significantly increased if nearshore sediments, below the average low tide, are included with the beach deposits.

Paleostrand Lines

Potential for heavy mineral concentration exists in submerged strand lines (terraces) offshore and subparallel to the present coast line. Submerged paleostrand lines may have formed along ancient coastal areas during marine regressions/transgressions associated with glacial events. This type of deposit is an important offshore concentrator of gold in the Nome district (12). Available bathymetric data suggest the possibility of paleostrand lines 1 km to 6 km west of Goodnews and Chagvan Bays (fig. 4). The strand lines are defined by approximately 5 m of vertical relief over regions as narrow as 1,000 m. PGM and gold may have accumulated as lag deposits along the strands while lighter sediments were winnowed out by wave and current energy during transgressive and regressive marine cycles.

Shoal Deposits

Littoral sediments originating from eroded morainal bluffs, fluvial discharge, and sediments eroded from seaward extensions of the Red Mountain ultramafic complex at Flat Cape could be deposited as shoals at the mouths of Goodnews Bay and Chagvan Bay due to decreasing wave transport energy (fig. 4). Owen (28) presented evidence that bluff derived sediments including heavy minerals were being concentrated at the mouth of Chagvan Bay. Heavy minerals and coarse-grained sediment accumulations are concentrated in Chagvan Bay as lag deposits by winnowing out lighter sediments. Concentrations exceeding 100 ppm chromium were identified just past the spit in the mouth of Chagvan Bay, however, analyses for PGM were not obtained (28).
Bond (7) suggests the possibility of the Goodnews Bay shoal acting as the final "sink" for ultra-fine (-125 um) PGM. Ultrafine-grained PGM probably would be transported by northerly littoral currents along a low energy near shore corridor (7). The higher energy beach corridor apparently transports slightly coarser platinum towards the Goodnews Bay spits.

The Bureau (1) confirmed the presence of large scale winnowing features offshore. Reconnaissance samples confirmed PGM accumulations in the Goodnews Bay channelway. These observations are consistent with Wakeland's (37) sediment distribution observations which indicate that up to 80 pct of the sediments in the mouth of Goodnews Bay are gravels. PGM tend to associate with coarser sands and gravels (lag deposits) in coastal environments near Goodnews Bay (40, 42).

Sampling by Fechner (14) along the Goodnews Bay spits, however, suggests that PGM concentrations are less than 0.0012 g/m^3 and of little economic importance.

Tidal Ridges

Offshore topographic features which possibly act as corridors for selective heavy mineral concentrating are elongate, topographically high, north-south trending tidal ridges. If the ridges are comprised of reworked offshore morainal deposits, disseminated heavy minerals might be available for selective concentrating. The origin of the ridges is probably due to strong tidal action (6, 38). They are characterized by 3 m to 20 m of relief and are separated by narrow channels (fig. 4). Littoral currents and storm wave energy would be the major forces acting to concentrate PGM and other heavy minerals as lag deposits. Because the floor of Kuskokwim Bay in this region is shallow, most bottom features are within the zone of wave disturbance, and thus capable of producing heavy mineral enriched lag gravels.

Concentration Along "False" Bedrock Horizon

Placer production from fluvial channels onshore encountered the highest PGM grades directly above bedrock, and within the upper meter of weathered or "false" bedrock (24-25). Clay-rich glacial till and ferricreted gravel horizons were discovered underlying the beach front during Bureau sampling efforts in 1986 (15). Continuous clay-rich or ferricreted gravel stratum over large offshore areas may represent favorable "false" bedrock contacts for platinum-bearing heavy mineral accumulations in some of the other deposit classes.

RESULTS OF MARINE SEDIMENT ANALYSES NEAR GOODNEWS BAY

Results from geochemical and textural analyses have been reported for marine sediments from the Goodnews Bay Mining District. Unfortunately, significant differences in sampling and chemical analytical techniques prevent comparative evaluation of samples collected by different researchers. Further, low sampling densities and inadequate methods of sample collection and preparation have prevented determination of offshore resources.

PGM placers from high energy beach deposits are very-fine-grained. Ulrich (42) found that most of the PGM occurs in the less-than 125 um range. The PGM mineralization is associated with fine-to medium-grained sand (1.5-2.5 phi range). Bond (7) observed that all of the PGM recovered from beach deposits was less-than 250 um in length. Textural analyses of nearshore and far offshore placer PGM concentrates have not been determined. The presence of very fine grained PGM in high energy beach deposits leaves questions about the distribution of coarser-grained PGM. PGM coarser-than 250 um would be substantially easier to recover using currently available technologies. The location of coarser-grained PGM is unclear. It is possible that coarse PGM grains remain dispersed or have been selectively concentrated offshore in reworked glaciofluvial sediments. Storm wave energy and littoral currents may not be strong enough transport agents to remobilize coarser-than 250 um platinum

grains to the nearshore or beach environment. Therefore, depositional environments for fine-grained or coarser PGM may be dependent upon winnowing out of the other hydraulically lighter sediments.

GEOCHEMICAL ASSOCIATION

The association of PGM with elements exhibiting geochemically and hydraulically similar behavior is useful for delineating regions with potential platinum mineralization based on the abundance of the other elements. Further, since platinum is a noble metal and occurs in trace to very minor concentrations, assays usually have a high degree of analytical uncertainty.

Ideally, detection limits of 50 ppb platinum are obtainable by preconcentrating the prepared sample using a fire assay followed by an atomic absorption analysis (3). However, results obtained using this technique may only represent an order-of-magnitude approximation of the actual PGM abundance if sample collection and concentration were not carefully performed. If the ratio between the elements associated with PGM are determined, coevaluation of those elements will provide a higher degree of certainty regarding the actual concentration of PGM. Anomalous or unexpected PGM assays will be recognized and the sample analysis can be reevaluated if desired.

Unfortunately, fire assay and atomic absorption analysis will not provide information indicating how much PGM is available for placer recovery; the analysis will be positively biased. A more useful analytical technique which determines the abundance of recoverable PGM and gold is obtained by bulk sampling a known volume of sediment, concentrating heavy minerals with a jig or sluice plant, and physically separating PGM and gold from other heavy minerals recovered. A 0.0765 m^3 (0.1 yd^3) sample should be sufficient to reduce the nugget effect of PGM which are generally very fine grained. Partitioning of PGM and gold from other heavy minerals is accomplished with magnetic separation, gold amalgamation, and most likely a binocular microscope and tweezers. PGM and gold may then be weighed and the grade back calculated knowing the original volume of the sample. This procedure allows the determination of concentrations below 1 ppb, providing data which may be directly applied to economic evaluation of the placer deposit . Analytical certainty is limited only by the efficiency of the concentrating plant and precision of the scale used to weigh out recovered values. Fire assay of residual heavy mineral concentrates will indicate the abundance of commercially nonrecoverable PGM and gold.

Because the compositional analysis of other geochemically similar elements (e.g. Cr, Fe) is not as sensitive to analytical and sampling errors, geochemical data available from previous researchers might be useful in determining the extent of PGM concentration and distribution. High concentrations of PGM were found to be associated with analyses containing greater than 10 pct iron, 5,500 ppm chromite, and 35 ppm cobalt according to Ulrich (42). Bond (7) found platinum concentrations relate to the relative abundance of chromite, nickel, and cobalt. Although the USGS AMRAP program has provided abundant geochemical data onshore in the Goodnews Bay Mining District, there is relatively little semiquantitative offshore and beach data available (11, 17-18).

Wakeland (37) and Owen (28) published reports concerning geochemical investigations of Goodnews and Chagvan Bays, respectively. Concentrations exceeding 18 ppm cobalt and 22 ppm nickel are distributed just inside the mouth of Goodnews Bay (37). Additionally, the mouth of Goodnews Bay is characterized by sediments containing 30 to 80 pct gravel, suggesting a high energy environment favorable for concentration of PGM and other heavy minerals.

The inlet to Chagvan Bay contains 6 to 10 pct heavy minerals with individual samples containing over 400 ppm cobalt, 250 ppm chromite, 45 ppm nickel, 500 ppm manganese, and 5 to 6 pct iron (28). This information suggests the shoal and channels just inside the mouth of Chagvan Bay may contain geochemically significant, and perhaps economically viable concentrations of PGM. Offshore geochemical surveys include 78 semiquantitative sample analyses provided by Barnes for the AMRAP program (4).

Hessin and Others (18) list semiquantitative data for chromium, and Coonrad and Others (11) compiled offshore data for platinum and gold. These data however, are inadequate for identifying regions with favorable PGM concentrations.

The only other offshore geochemical data available was obtained by Welkie (40). Evaluation of her contoured data from 88 sample sites is incomplete, but suggests that anomalously high concentrations of cobalt, chromium, gold, and platinum are found in offshore regions corresponding to paleofluvial channels. Offshore grab samples contained up to 0.8 ppm platinum, 0.06 ppm gold, 30 ppm cobalt, and 180 ppm chromium. All determinations were made using atomic absorption spectrometry, leaving some uncertainty regarding analytical accuracy and actual values of recoverable PGM and gold.

CONCLUSIONS AND RECOMMENDATIONS

The primary source for platiniferous coastal and offshore sediments in the Goodnews Bay Mining District is the Red Mountain ultramafic complex . Principal secondary sources supplying PGM-bearing sediments to beach and offshore deposits include glacial morainal and outwash deposits and discharge from the Salmon River. Six potential placer deposit classes are recognized: (1) buried paleofluvial channels, (2) recent paleofluvial channels, (3) beach deposits, particularly along the upper swash zone, (4) paleostrand lines, (5) shoal deposits at the mouths of Goodnews and Chagvan Bays, and (6) lag deposits comprised of reworked glacial morainal material along the base of tidal ridges.

Limited assay data prevents direct calculation of the distribution and concentration of PGM and gold in potential offshore placers. The USGS has estimated hypothetical resources of subeconomic grade to be 155,500 kg from offshore placers (29). Limited beach and offshore sampling results suggest this value to be very optimistic. Fechner, in 1986, completed bulk sampling of the beach front between the north spit of Goodnews Bay and the north spit of Chagvan Bay (14). Based on 64 bulk samples, data suggests that 121 kg of PGM is recoverable from a hypothetical resource base of 1,672,000 m^3 along the beach between the southern end of the south spit at Goodnews Bay and the Salmon River. The highest average grade of PGM was found between the bluff at Red Mountain and the Salmon River which ranged around 0.2968 g/m^3.

The first step required to delineate minable offshore and coastal placer deposits around the Goodnews Bay Mining District involves sufficient reconnaissance sampling to suggest potential economic PGM concentrations. This step is being accomplished and specific depositional environments with potentially economic PGM and heavy mineral accumulations have been recognized. Additional Bureau reports which are currently in preparation will specifically address PGM and gold distributions offshore and along the coast.

The second stage of offshore and beach placer evaluation requires a high sample site density around favorable targets. Reliable evaluations are dependent upon correct bulk sampling techniques and reproducible compositional analysis. Given the approximate size of the various potential deposits around Goodnews Bay, 100 to 150 m sample spacing is probably sufficient to determine if economically minable grades and volumes are present (26). Since some of the PGM placer deposits are stratified and buried to unknown depths (e.g. under marine or reworked glacial debris), stratigraphic control of sampling is critical for representative deposit evaluation.

Mining costs estimated for offshore dredging establishes a subeconomic cut off grade of approximately $\$1.3/m^3$ ($\$1/yd^3$) contained PGM and gold for economically recoverable placers (12). As assays from sampling programs are evaluated, deposits with potentially economic PGM placer mineralization will be located and minable volumes, if any, estimated using geometrics or proper geostatistical techniques (22).

Bottom grab or suction dredge sampling for offshore placers provides useful information identifying favorable PGM mineralization for some deposit classes. However, since these techniques only sample the upper sediment horizons they are inadequate for determining the volume or grade of potentially minable offshore deposits in the third dimension. An offshore drilling program capable of yielding large uncontaminated samples is necessary to gain stratigraphic control of PGM and gold distributions which will allow the calculation of minable reserves or subeconomic resources.

PGM grains in the Goodnews Bay Mining District, and presumably offshore, are very fine-grained. Therefore, the efficiency of gravity concentrating systems should be considered when evaluating the recoverable value of the reserve base. Historically, micron sized PGM grains have been lost during on-shore dredging operations (12).

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PLATINUM MINING AT GOODNEWS BAY, ALASKA

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The Goodnews Bay Mine is located at Platinum, Alaska. It is 450 miles west and 150 miles south of Anchorage. It is also 150 miles directly south of Bethel. Summers are quite pleasant and winters are not too cold. The area receives only a few feet of snow, which is extensively drifted by the wind.

The discovery of platinum in the Goodnews Bay area was made in 1926 when Walter Smith, an Eskimo from a small village on Chaguan Bay led Henry Wuya and Charlie Thorsen to a place on Platinum Creek. Smith had earlier panned some of the heavy metal, which he termed "Black Gold". Thorsen, who was a prospector, persuaded Joe Jean, a French Canadian Trader at Mumtrak, Alaska, to send a sample of the metal to the College of Mines at Fairbanks for assay. In the winter of 1927 a confirmation was received that the heavy gray metal was platinum.

Hand-mining operations began in the summer of 1927 in Clara Creek, Squirrel Creek, Fox Gulch and Platinum Creek. All of these streams are right-limit tributaries of the Salmon River and all cut the eastern flank of Red Mountain. Red Mountain, a rust colored ridge of rock, rises 2,000 feet from the Bering Sea.

From 1927 until 1933, hand-mining produced a scant 3,000 ounces of crude platinum (less than 500 ounces a year) with 8 to 10 individual miners involved in this project, it became clear that little profit or progress could be made in developing this deposit.

In 1933, an Anchorage prospector, Walter Culver, obtained leases and options on most of the mining claims in the area. In the fall of that year, Culver turned these claims and leases over to a group of successful pioneer goldminers headed by Andrew Olson. Olson, together with his partners, operated the Northland Development Company and Olson & Company in the Flat-Iditarod section of Interior Alaska.

By 1934, the Northland Development Company had shipped a dragline excavator, trestle sluice box, caterpillar tractor and other equipment and supplies into Goodnews Bay, thus setting up a complete and self-sufficient modern mining camp. The boat carrying this equipment arrived at Goodnews Bay on July 10th and the shipment was hauled twenty-five miles around the western flank of Red Mountain and up the Salmon River to Squirrel Creek, the mining campsite. Equipment was then assembled, buildings constructed and on August 11, 1934, mining operations began. Mining continued without interruption, except for seasonal shutdowns until the fall of 1975.

Early in 1935, the Goodnews Bay Mining Company, was incorporated in the territory of Alaska to consolidate the holdings of the predecessor company in the Goodnews area. The first two years of mining were limited to the dragline operations. Extensive exploration and drilling indicated a substantial yardage of deeper ground on the Salmon River, which provided the basis of a $600,000 loan for the purchase of a bucketline dredge. In 1937, a Yuba diesel electric dredge with 8 cubic foot buckets were purchased and transported to the Salmon River. The Yuba Dredge 129 started digging on November 10, 1937, perilously close to the freeze-up weather. A benign providence provided mild weather making it not only possible to complete the 30-day trial run, but as an added and most welcome bonus, allowed dredging to continue until December 22nd.

The total cubic yards dredged from 1938 to 1975 were 42,115,518. The total number of ounces dredged from 38 to 75 was 519,844,142. In the first year of operation, the mine produced approximately 2,575 troy ounces of crude platinum; increasing in 1935 to almost 8,000 ounces. The following two years showed a production decline, which was partially attributable to the preparation and erection of the dredge. 1938, the first full season of operation for both the dredge and the dragline, increased production to 37,000. In subsequent years, the operating methods did not change materially, although a number of mining problems were encountered and solved. Through the years, ingenious modifications and additions to the equipment have been introduced. The successful solution of mining and mechanical problems is largely contributed to the inventive minds of the two Olson brothers, Andrew and Edward.

One of the first tasks each season is the removal of ice from the dredge pond. The ice, which averages about 3 feet in thickness, is first cut into blocks with a power chain saw. These blocks are approximately 5 feet wide and 10 feet long and are hoisted from the pond by the dragline and piled on the shore. With an average dredge pond surface area of 2 to 2-1/2 acres, the weight of ice to be removed is formidable -- running from 8,000 to 10,000 tons.

The dragline operations utilized two Bucyrus-Erie machines with 1-1/4 yard bucket capacity, bulldozers and hydraulic water. Sometimes an elevated trestle was used for the sluice boxes and other times, the boxes were placed on bedrock. The dragline season was shorter than the dredge season, running from May 15 to October 15, involving the handling of about 200,000 cubic yards of gravel and bedrock. Dragline operations were discontinued in 1957 when the shallow gravels suitable for this method of mining were exhausted.

The Yuba Dredge was capable of digging 50 feet below pond water level and in 1961 an additional 10 feet was added to the digging ladder. The depth of the placer ground varies from 15 to 60 feet. The actual thickness of the pay gravel lying on a bedrock of altered dunite, serpentine and some extremely hard sedimentary rock, ranges from 2 to 6 feet.

The Yuba Dredge originally weighed about 1,400 tons and now totals nearly 2,000 tons as a result of added equipment. The added weight required the addition of 4 more pontoons to the original 33 that constitute the steel hull.

The digging ladder of the original dredge carried a line of 94 buckets, each of 8 cubic foot capacity, running at a speed of 31 buckets a minute. Working 24 hours a day, the dredge has averaged a little over one million cubic yards each mining season.

A Bucyrus Erie walking dragline (200W) with a 6 cubic yard bucket was used in the later years to strip up to 40 feet of overburden so that the dredge could reach bedrock.

The mining season extends from about May 1st to November 15th each year. The first crew, however, starts work around the 1st of April overhauling equipment and preparing for the season. The ground has little permafrost, although occasional lenses of frozen ground do occur. Transportation to the area is good. Air freight arrives almost daily, and Wien has three scheduled flights per week. Barge service is also available since the mine is located on the ocean.

Our company acquired this property in January of 1980 from the Goodnews Bay Mining Company. After refurbishing the dredge, the first operation season was completed in 1980. Once underway, the plan was to move the dredge from the bench where the former owners had it parked, down to the Salmon River Paystreak. The dredge operated until August of 1980 when it was shut down for the season. During the period between June and August, 1980, we dredged a total of 127,573 cubic yards. Digging mainly for flotation, the area dredged was not an area of indicated values for any platinum or gold. Some of the problems involved with the first season were almost a complete replacement of the water pipes on the dredge, electrical problems, a lower tumbler bearing change and the use of many untrained bucketline dredge personnel. We had the good fortune of having many of the former owners and workers act as consultants which somewhat eased our problems.

The 1981 season started in May with the dredge still proceeding off the bench toward the Salmon River. The season ran from May through October 8th, 1981, during which we dredged 322,396.166 cubic yards.

Our primary thrust is to remine the tailings. There are many examples of gold dredges running through old tailings and recovering as much the second and third time as the first. We hope to produce atleast half as much as the previous owners.

Fine platinum, we believe, is easier to recover than fine gold. Platinum is not malleable like gold. Fine grains of platinum retain their shape, unlike flat, flaky gold. I have placed fine platinum (-200 mesh) and fine gold together in a vial of water. When the vial is turned over the platinum drops instantly to the bottom. The gold comes down like a leaf falling off a tree, by comparison. Although the platinum is 5% heavier than gold, its particle shape makes it easier to recover. Of course, this means that the first dredging may have recovered most of the platinum, but our testing is still favorable at this time.

The records kept by the previous owners are one of the property's most valuable assets. We can review these records and determine how much they recovered at any place on the property. They recorded all of their cable tool drilling and compared the drill results with their dredge recoveries. Every drill hole is related to the subsequent dredging and both are located on a map. They calculated and recorded the yardage dredged, area of bedrock mined, and screened and classified each recovery. The cleanup data is important because they recovered two-thirds of their metal from one-third of the ground. I do not want to spend the next 40 years going over the property again. We will cover the third of the ground where they had their best recoveries in about 15 years.

The overall values are not fantastic, totaling about $250 million at $500 an ounce. This value, divided by the 50 million yards of dredged tailings yields an average value of $5 per cubic yard. The best areas produced $20 to $30 per cubic yard. Our recoveries to date are approximating those of the original owners, in $2 per cubic yard ground.

The dredge has a capacity of 6,000 yards per day, averaging just over one million cubic yards per year. Material dumped by the dredge buckets into the main hopper feeds through a 7-1/2 foot diameter revolving trommel screen 36 feet long with perforations ranging from 3/8 to 5/8 inch in diameter. The trommel is powered by a 75 horsepower motor. Undersize material passing through the screen flows onto a bank of tables fitted with rubber covered wooden riffles, from which the major part of the platinum concentrates are recovered. Overflow from the tables goes through a series of Yuba jigs, the concentrates from which are collected on expanded metal and coconut matting in cleanup sluices. Oversize material from the trommel screen discharges on to a 140 foot long stacker belt at the stern end of the dredge.

The on board recovery system includes a closed loop that recycles the tails from the finishing jig back across the first rough jig. The system is however, quite labor intensive to clean up because half or more of the metal remains in the sluices ahead of the jigs. About a ton of material, mostly rock, is removed from the sluices with each cleanup, and must be worked down in the shore lab.

Dredge concentrates, consisting of crude platinum and some gold with considerable quantities of black sands of magnetite, chromite, ilmenite, chromiferous spinel, etc. are processed further in a cleanup house on shore where they are passed over a 4 x 8 foot wilfley table. Further concentration is affected after drying by screening and magnetic separation. Finally, air is blown through the concentrates as they drop from a vibrating hopper, the heavier platinum metals falling through the air into a sectionalized box, while the lighter impurities are blown away into different sections. This method successfully yields a 90% concentrate. Concentrates from our last season were processed by elutriation tubes of our own design. The elutriation yields a much cleaner concentrate in far less time than blowing and hand plucking the platinum.

When we upgraded the dredge, high pressure pumps were added inside the trommel substantially increasing the amount of water. A retaining ring keeps the clay balls in the trommel longer. Lifters are also present in the trommel. However, there is still a significant amount of clay leaving the trommel and going out the stacker. It may take major design changes to break up the clay.

Breaking up clay balls is perhaps the biggest problem on the property. Many of the recoverable values are trapped in the clays. In the upper bench the values are almost entirely in the top clay. We will probably not dredge this area at all, but will develop some other type of machinery that can selectively mine only the top 10 or 15 feet of material rather than the entire 60 foot section. There is also a lot of clay in the upper channel. We are presently mining in the lower channel where there is less clay.

We have tested many of the tailings, and determined that the values are in the top 10-15 feet. This indicates that the platinum did in fact go out via the clay. The tailings look clean on the surface, but one finds quite a bit of clay and fine material when you dig into them. We hope there are significant values remaining in this material.

Some of our recent ideas have included putting in rubber screen plates instead of the steel punch plate. We have purchased some spirals to install in the concentration circuit, hopefully to reduce the labor of cleanup. We believe we can automate and upgrade the machinery

to cut down on labor by a third. At present it takes half a day to clean up -- this is half a day that the dredge is down.

Energy is a major expense. Since there is a lot of wind, we are going to consider the possibilities of using wind power to generate electricity. There is a natural wind tunnel in the saddle between Red Mountain and the mountain next to it.

Instead of pumping muddy water out of the pond for the washing plant, we would like to pipe in fresh water. Water could be piped in under pressure with about one mile of steel pipe. This would also save us the cost of the three or four 100 h.p. pumps now in use. We would not recover the cost of the pipe in fuel savings, but we believe we could significantly improve our recovery by washing with clean water.

General Geology

Both bedded and intrusive rocks are present in the area. Outcrops are rare. The bedrock in creek bottoms is the best source of geological information.

The Sedimentary Rocks have been highly indurated. These rocks are gray to light tan and yellow to greenish in color. They are dense, very fine grained, hard rocks with some epidote. They are thought to be mainly siliceous argillites and some quartzites. The strike and dip of these bedded rocks vary considerably. Highly altered and weathered tuffs are located at the north end of the east upper bench. These thin bedded strata are tan to brownish black in color, broken and quite soft. The dredge could dig 6 feet of this strata before it became too hard to dig.

Intrusive Rock. An ultrabasic mass of dunite forms the Red Mountain Ridge west of the Salmon River. The dunite weathers to a yellowish brown in color with small black crystals of magnetite and chromite exposed on the surface. The weathered zone varies, but is generally about 1/4 to 1/2 inch thick. The unweathered dunite is very fine grained and is black in color. The dunite appears to have been cracked and shattered at some time in the past, for these fine lines are now rehealed. Pyroxenite filled fractures cut the dunite.

Perknite is found to the east of Red Mountain dunite. Hornblendite with coarse black crystals of hornblende is found on upper Squirrel Creek.

Peridotite. Dark colored, medium grained, equigranular, with some mica is found in Fox Gulch and on Dowry Creek.

A one foot dike of dark, equigranular, fine grained diorite can be found cutting the meta sediments and the bleached serpentine zone at the head of Fox Gulch. There is only one place where the perknite border rocks can be seen in contact with the main dunite mass of Red Mountain. This contact is at the end of the upper placer workings in Fox Gulch. Here a major fault striking north 70° east separates black dunite from the bleached light green serpentine zone, 110 feet in width, that contains blackish clots of magnetic rock that is considered to be a breccia. Coarse and medium grained peridotite is found southeast of the light green serpentine zone. On Dry Gulch a black pyroxenite is found in contact with metasediment breccia.

On Squirrel Creek, the perknite rocks appear to be an island surrounded on all sides by meta sediments. On Dowry Creek, medium grained equigranular, unaltered peridotite is found surrounded by highly faulted, serpentinized black dunite.

On the crest of the hill above McCann Creek, 1/2 to 3 inch wide pyroxenite filled fractures cut the dunite.

Two complete chemical analyses of the dunite of Red Mountain were made by E.T. Erickson of the U.S. Geological Survey: one (A) of a composite sample of fresh unaltered dunite with a representative content of marginal perknitic rocks and one (B) of the oxidized shell that forms a veneer on these ultrabasic rocks.

Ultrabasic Rocks. Chemical Analysis in weight percent

	(A)	(B)
$Si\ O_2$	39.20	28.54
Al_2O_3	1.50	.78
Fe_2O_3	3.10	5.29
Mg O	37.79	42.29
Ca O	5.66	.34
Na_2O	N.D.	N.D.
K_2O	N.D..	N.D.
H_2O +	5.81	5.53
TiO_2	.05	.14
Cr_2O_3	.27	.13
MmO	.01	.01
NiO	.077	.053
CuO	.007	.004

The presence of chromite (Cr_2O_3) shown by the chemical analysis is significant, as the placers contain platinum nuggets that are intergrown with or have adhering chromite. Chromite constitutes a small but significant part of the accessory minerals recovered with the platinum metals. In an analysis of pebbles of chromite recovered from these placer concentrates made by E.T. Erickson, the tenor in platinum metals was found to be 0.05 troy ounces per ton of chromite. An interesting characteristic of the Goodnews Platinum deposit is the wide variation in the percentage of iridium. Clara Creek, which is the northernmost of the creeks cutting Red Mountain, yielded a crude that contained 4% iridium. The iridium percentage increases progressively in each creek to the south, reaching a high of 33% in Fox Gulch, the southernmost of the creeks cutting the mineralized section of Red Mountain. The Salmon River deposit, which is a mixture of mineral from its north right limit tributaries, has averaged an iridium content of 10% over the years.

Platinum is 50 times as rare as gold. All the platinum mined in the world would fit into a 13 foot cube. There are 50 million cubic yards of tailings at Goodnews Bay, from which 1 1/4 cubic yards of platinum have been extracted in 40 years of mining. At the time we purchased the property, platinum was selling for $800 an ounce. Since then it has gone up to $1,100 and down to $300 an ounce. We converted all of our cost data to a price of $500 an ounce, even though platinum is now worth $350.

We received a little bad news recently. Our watchman called and said that the dredge was sinking. What he meant was that it was already on the bottom of the pond. Fortunately the pond is not too deep. We hope to be able to pump enough water out of the pond to get to the pontoons. We will then pump out the pontoons and refloat the dredge. If we are unable to lower the pond level it will be a big job for underwater divers. There are now five or six feet of ice on the pond and three or four feet of ice inside the dredge. We may be delayed a month this year.

Engelhard and Johnson-Mathey purchased last season's platinum. Engelhard's new office in Anchorage will be a big help to us as they buy gold and all precious metals.

Q How much did you recover?

A The last two years we have been digging to obtain flotation. We have mined only one corner of a known pay area. We recovered about $2 per cubic yard, which is roughly what the Goodnews Bay Company produced. We also recovered approximately the same graduation of platinum from fine to coarse in size. This is encouraging, but we do not pretend that we will also have the same recovery in an area where the previous owners produced $20 to $30 of platinum per cubic yard.

We sold about $200,000 of platinum, which is not much considering that we spent about a million and a half getting it. We are not very skilled yet. We are also desperately in need of experienced winchmen. We have built and trained an excellent crew that is good at everything except winching.

Q How do you break up the clay?

A Inside the trommel are high pressure pumps and water jets. There are also retainers and lifters, but it's really hard to break up one of those clay balls once it's formed. It reminds me of plowing on the farm, when a crust formed on the soil we'd harrow to break it up. If we just went out there with a tillage tool the crust ripped into clods. We could then harrow it ten times over and never get rid of the clods. I think the same things apply here. The best way to solve the clay ball problem is to not make one. I haven't figured out how to do that yet, but it's the end I'm going to work on.

Q How will you utilize the spirals?

A They are part of the effort to reduce the labor involved in cleanup. If we can we're going to put them in a circuit in such a way as to clean the concentrate a lot better before we take it ashore. Exactly how we're going to do that, I don't know. I'm going to ask Tom Feree while I'm here and he's going to give me all the answers, I'm sure.

Q Do you use your trommel to physically break up the clay?

A Well, I think it's physical, but I also think that there's got to be some help chemically. The magnitude of the problem is determining how much water is needed to dissolve the amount of fine clay present. There is a physical limitation. Even if solved mechanically, the ability to dissolve more clay, or to settle out the clay in the pond, might be enhanced chemically, producing cleaner water to work with.

Q. Is the greenstone bedrock hard on your machinery?

A No, most of the tailings are less than a foot in diameter. Scraping bedrock is, of course, hard on it. Where the bedrock is deteriorated, we dig into it as far as we can, between two to five feet. This is where the values are. That's the only time it's very hard on the equipment. In the upper channel, which was there 10,000 years ago, before the glaciation of the area, the bedrock is more deeply decomposed. It is yellowish material that looks like clay. The values may be from the weathered bedrock and all mixed up with the clay. Some clay balls assay up to $1,000 a cubic yard. On the other hand the next 100 clay balls may have nothing in them.

Q Have you tried methods that cut down the amount of water needed to break up the clay, such as a scrubber or trommel arrangement with fewer holes? This might save some washing water.

A We haven't tried that, but it might be a good approach. Major changes like that are not easy to accomplish in an existing machine.

Q Have you tried retaining the clay longer?

A There is a retaining ring in the trommel and we could add more. This approach would work best, if the washing section were larger and revolved at an r.p.m. suitable for scrubbing and if the screen was a separate trommel that revolved at the right speed for screening. I think that's a good idea that would work much better than what we presently have, and it

would be much more energy efficient. Using high pressure pumps is not an energy efficient way to break up the clay. If we could also retain, rather permanently, a few of the rocks in the scrubbing section it would help. I think that's a good idea and I thank you.

Q What about physically breaking the clay?

A We've thought about it, but haven't really figured out how we could make that clay into a slurry. The former owners tried a special sort of impact device, appropriately called a 'mudhog'. It worked like a traditional hammer mill but the anvil parts were continuously moving large bars mounted on a chain revolving very slowly to prevent it from plugging up, no matter how much mud went through it. The hammers beat up the clay balls. Of course, the rocks went through also, and it turned out to have a high maintenance cost. But, I guess it worked quite well. I thought more about mashing those clay balls with something like the old wringer washing machine. If we had some huge rollers that we could run everything through, the rocks would pass through without harming the machine, but the clay balls would be squeezed into flat pancakes which would break up in the trommel. The worst thing about the clay is that it often comes out of the bucket line in a ball the size of the bucket. If you start out with a ball, it's pretty hard to not have a ball come out the back end.

Q Joe Vogler: Have you considered using a revolving cutter wheel like that developed by the Germans?

A Yes, that goes back to my story about the farmer. The best way to not have a clod is to not make one. If we could dig clay so that it was cut in to little shavings it would be a help. I don't think little balls will grow into big balls. I make that kind of machinery, by the way, so I certainly have thought of it. That kind of machinery would also work well above water level where clay occurs. I'm not sure I believe the story that a clay ball rolling through the trommel and the sluice boxes is picking up the values. I think that, if we find a clay ball with values in it, the values were always inside of it. Perhaps we could not recover the clay shavings from deep underwater. But there are suction dredges being made now that have a little wheel on them, very much like a German wheel, that pick up the material and dump it in to the suction of the dredge. That might also be an answer.

STATE OF ALASKA

LYMAN F. HOFFMAN
CO-CHAIRMAN
HOUSE FINANCE COMMITTEE

P.O. BOX V
JUNEAU, ALASKA 99811
(907) 465-3706

HOUSE OF REPRESENTATIVES

DISTRICT 25
AKIACHAK
AKIAK
ATMAUTLUAK
BETHEL
CHEFORNAK
EEK
GOODNEWS BAY
KASIGLUK
KIPNUK
KONGIGANAK
KWETHLUK
KWIGILLINGOK
MEKORYUK
NAPAKIAK
NAPASKIAK
NEWTOK
NIGHTMUTE
NUNAPITCHUK
OSCARVILLE
PLATINUM
QUINHAGAK
TOKSOOK BAY
TUNTUTULIAK
TUNUNAK

M E M O R A N D U M

TO: Representative Cliff Davidson
Representative Curt Menard
Co-Chairmen, House Resources Committee

FROM: Representative Lyman Hoffman *Lyman*
Co-Chairman, House Finance Committee

DATE: January 21, 1990

SUBJ: House Bill 332

Please find attached the backup information for House Bill 332, an act establishing the Goodnews Bay Critical Habitat Area.

My staff aide, Bob Herron, will assist your offices for the upcoming Resources Committee hearing. I respectfully request the scheduling of a teleconference to Vernon Bavilla in Goodnews Bay for the hearing date. His primary number is 967-8428, secondary is 967-8520. Also, a teleconference to John Oscar of the Cenaliulriit Coastal Management Program and Greg Roczicka of Nunam Kitlutsisti, both who will be at 543-2856.

If there are any questions or concerns concerning this legislation, please do not hesitate to contact my office at your convenience.

Thank you.

P. O. Box 763 Bethel, Alaska 99559 (907) 543-3543

INDEX

* Not included in packet due to bulk
Available on request of Committee staff

(1)

IN THE HOUSE

SPONSOR SUBSTITUTE FOR HOUSE BILL NO. 332

IN THE LEGISLATURE OF THE STATE OF ALASKA

SIXTEENTH LEGISLATURE - SECOND SESSION

A BILL

For an Act entitled: "An Act establishing the Goodnews Bay Critical Habitat Area; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. AS 16.20 is amended by adding a new section to read:

Sec. 16.20.630. GOODNEWS BAY CRITICAL HABITAT AREA ESTABLISHED. (a) The following described areas are established as the Goodnews Bay Critical Habitat Area:

(1) the state tideland below the mean high tide line, submerged land, and water of the state along Kuskokwim Bay from the South Spit of Goodnews Bay in Section 17, Township 13 South, Range 75 West, Seward Meridian along Kuskokwim Bay to the north shore of the Salmon River where it empties into Kuskokwim Bay; and

(2) the state tideland below the mean high tide line, submerged land, and water of the state within Goodnews Bay within

Township 12 South, Range 73 West, Seward Meridian
Sections 17 - 36
Township 12 South, Range 74 West, Seward Meridian
Sections 19 - 20
Sections 23 - 36
Township 12 South, Range 75 West, Seward Meridian
Sections 24 - 26
Sections 33 - 36
Township 13 South, Range 74 West, Seward Meridian
Sections 1 - 10

Sections 16 - 19

Township 13 South, Range 75 West, Seward Meridian

Sections 1 - 24

Sections 26 - 32

Township 13 South, Range 76 West, Seward Meridian

Sections 1 - 3

Sections 10 - 14

Sections 23 - 25

Section 36

Township 14 South, Range 75 West, Seward Meridian

Sections 4 - 9

Sections 16 - 21

Sections 28 - 33

Township 14 South, Range 76 West, Seward Meridian

Section 1

Sections 12 - 13

Sections 24 - 25

Section 36

Township 15 South, Range 75 West, Seward Meridian

Sections 4 - 9

Sections 16 - 22

Township 15 South, Range 76 West, Seward Meridian

Section 1

Sections 12 - 13

Section 24

(b) The Goodnews Bay Critical Habitat Area is established to protect and maintain fish and wildlife habitat and populations and aquatic plant resources, especially eelgrass beds, and to ensure the continued productivity of the area's fisheries and fish and wildlife

harvest.

(c) The area is closed to mineral entry and mineral leasing under AS 38.05.185 - 38.05.275.

* Sec. 2. This Act takes effect immediately under AS 01.10.070(c).

Introduced: 5/4/89
Referred: Resources

IN THE HOUSE BY HOFFMAN AND DAVIDSON

HOUSE BILL NO. 332

IN THE LEGISLATURE OF THE STATE OF ALASKA

SIXTEENTH LEGISLATURE - FIRST SESSION

A BILL

For an Act entitled: "An Act establishing the Goodnews Bay Critical Habitat Area; and providing for an effective date."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* Section 1. AS 16.20 is amended by adding a new section to read:

Sec. 16.20.620. GOODNEWS BAY CRITICAL HABITAT AREA ESTABLISHED. (a) The following described areas are established as the Goodnews Bay Critical Habitat Area:

(1) the state tideland below the mean high tide line, submerged land, and water of the state along Kuskokwim Bay from the South Spit of Goodnews Bay in Section 17, Township 13 South, Range 75 West, Seward Meridian along Kuskokwim Bay to the north shore of the Salmon River where it empties into Kuskokwim Bay; and

(2) the state tideland below the mean high tide line, submerged land, and water of the state within Goodnews Bay within

(A) Township 12 South, Range 73 West, Seward Meridian
Sections 17 - 36

(B) Township 12 South, Range 74 West, Seward Meridian
Sections 19 - 20
Sections 23 - 36

(C) Township 12 South, Range 75 West, Seward Meridian
Sections 24 - 26
Sections 33 - 36

(D) Township 13 South, Range 74 West, Seward Meridian
Sections 1 - 10

Sections 16 - 19

(E) Township 13 South, Range 75 West, Seward Meridian

Sections 1 - 24

Sections 26 - 32

(F) Township 13 South, Range 76 West, Seward Meridian

Sections 1 - 3

Sections 10 - 14

Sections 23 - 25

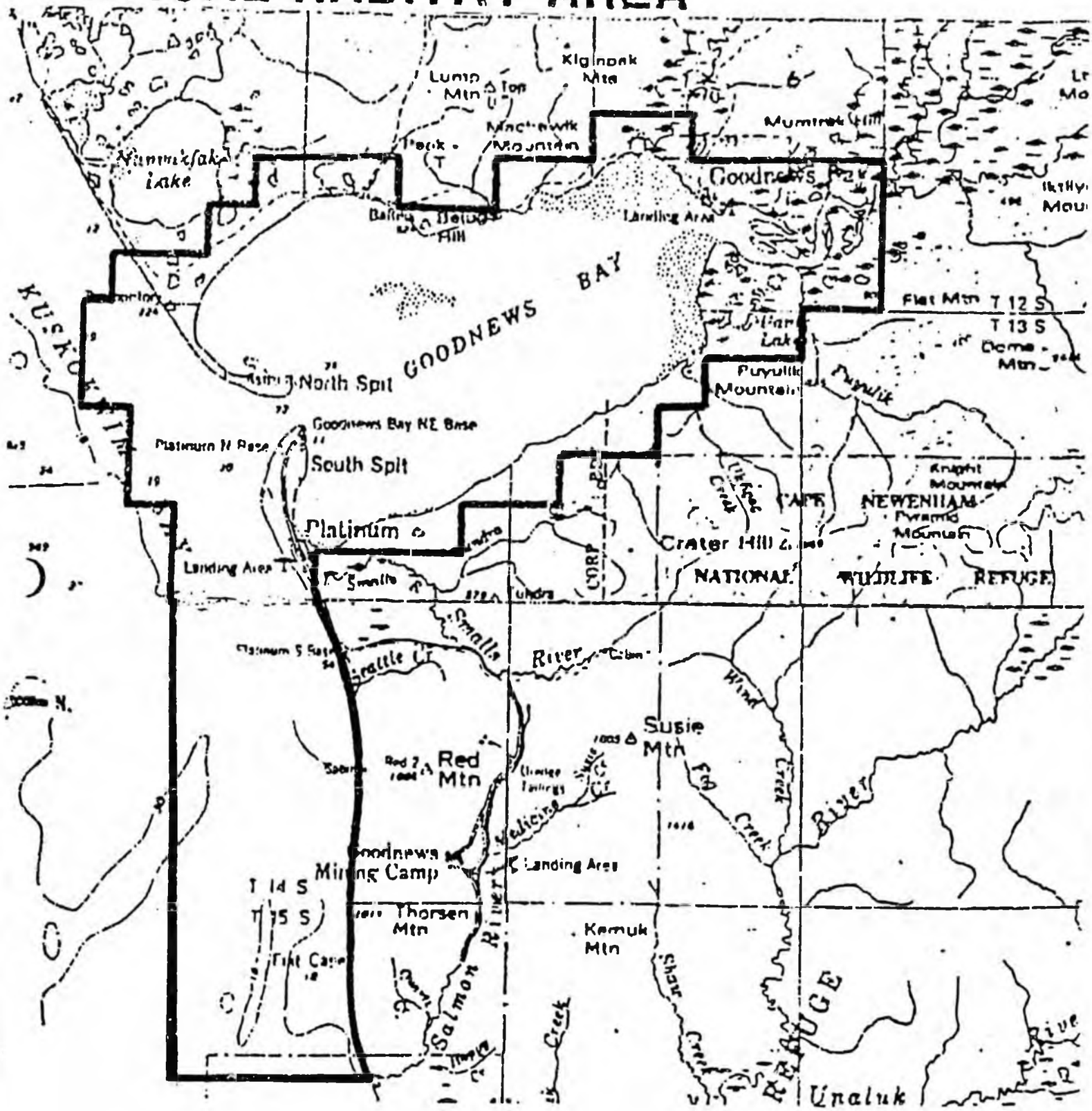
Section 36

(b) The Goodnews Bay Critical Habitat Area is established to protect and maintain fish and wildlife habitat and populations and aquatic plant resources, especially eelgrass beds, and to ensure the continued productivity of the area's fisheries and fish and wildlife harvest.

(c) The area is closed to mineral entry and mineral leasing under AS 38.05.185 - 38.05.275.

* Sec. 2. This Act takes effect immediately under AS 01.10.070(c).

PROPOSED GOODNEWS BAY CRITICAL HABITAT AREA



(2) (3)

STEVE COWPER, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINING

☐ P.O. BOX 107016
ANCHORAGE, ALASKA 99510-7016
PHONE: (907) 561-2020

☐ 3700 AIRPORT WAY
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PHONE: (907) 451-2790

☐ 400 WILLOUGHBY #400
JUNEAU, ALASKA 99801-1000
PHONE: (907) 465-3400

March 9, 1989

Dear Alaskan:

Enclosed for your review is a Preliminary Best Interest Finding and Proposed Consistency Determination prepared by the Alaska Department of Natural Resources, Division of Mining, regarding the issuance of offshore prospecting permits in and near Goodnews Bay, Alaska. Public comments on this document must be received by April 20, 1989 to be considered. A series of public hearings have been scheduled in Bethel, Platinum and Goodnews Bay. The enclosed Notice gives the specific dates, time and location of each public hearing and the address where written comments should be sent.

In order that all Alaskans understand this proposal, the Department has prepared a VHS video tape that explains in general terms the proposed action and the public process for comment. This video tape is in both the English language and the Yupik language. This video tape is not intended to replace the written preliminary finding, but only serve as a tool to help understand the preliminary finding. Arrangements may be made to view this video tape by contacting either Mr. Kerwin Krause at DNR's Division of Mining office in Anchorage (telephone 762-2162), or Ms. Anna Phillip at the Cenaliulriit Coastal Management Program Office in Bethel (telephone 543-2243).

We look forward to your comments on this document.

Sincerely,

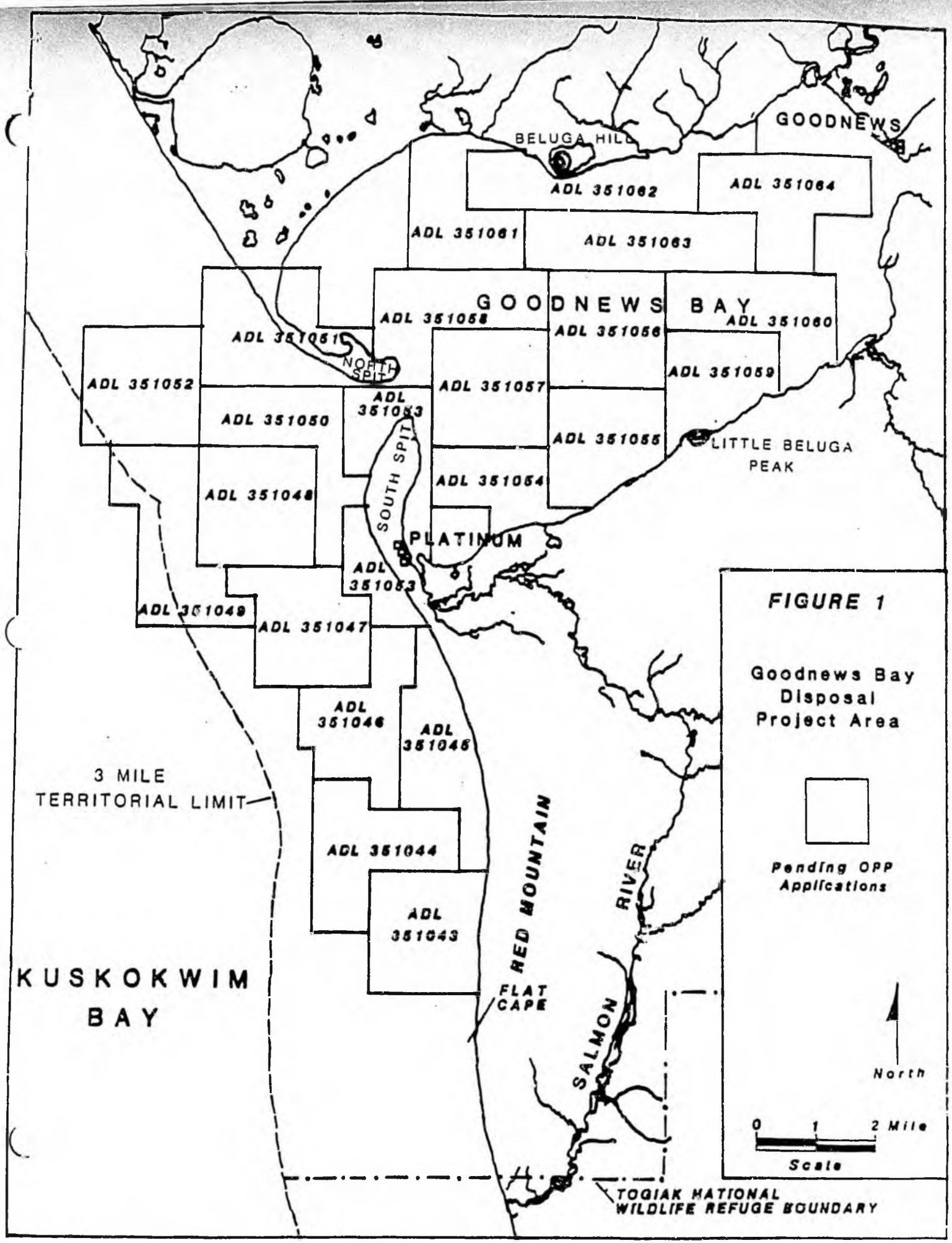
G Gallagher

Gerald Gallagher
Director

PRELIMINARY FINDING OF THE DIRECTOR AND COASTAL CONSISTENCY DETERMINATION REGARDING ISSUANCE OF OFFSHORE PROSPECTING PERMITS IN AND NEAR GOODNEWS BAY, ALASKA

State of Alaska
Department of Natural Resources
Division of Mining
Anchorage, Alaska

March 9, 1989


GOODNEWS
BELUGA HILL
ADL 351062
ADL 351064
ADL 351061
ADL 351063
GOODNEWS BAY
ADL 351058
ADL 351056
ADL 351060
ADL 351051
NORTH SPIT
ADL 351059
ADL 351052
ADL 351057
ADL 351053
ADL 351050
ADL 351055
LITTLE BELUGA PEAK
SOUTH SPIT
ADL 351054
ADL 351048
PLATINUM
ADL 351053
ADL 351049
ADL 351047
ADL 351046
ADL 351045
3 MILE TERRITORIAL LIMIT
ADL 351044
ADL 351043
RED MOUNTAIN
SALMON RIVER
KUSKOKWIM BAY
FLAT CAPE
FIGURE 1
Goodnews Bay Disposal Project Area
Pending OPP Applications
North
0 1 2 Mile
Scale
TOGIAK NATIONAL WILDLIFE REFUGE BOUNDARY

Objectives of The State Offshore Mining Program

By issuing offshore prospecting permits and leases for offshore exploration and eventual development, the State of Alaska seeks to diversify its economic base and employment opportunities and to make mineral exploration and development possible on tide and submerged land. Administration of the State's offshore program is guided by the following objectives:

1. To offer the state's promising offshore areas for exploration and development by private industry.

2. To develop an offshore mining industry that could provide stable and diverse job opportunities for Alaska's local communities.

3. To develop offshore resources that would contribute to the industrial needs and strategic mineral base of Alaska and the United States.

4. To increase the knowledge of Alaska's offshore resources by the collection of geologic, geochemical, and geophysical data.

5. To minimize negative effects upon the environment through permit and lease stipulations, plans of operations, and comprehensive monitoring of operations.

6. To consider and incorporate the views of the general public, government agencies, the mining industry, local residents, and other resource users when selecting and refining particular areas for offshore prospecting permits and when designing the terms of the disposal.

7. To establish and broaden the stable long-term economic and revenue base of the state and local government.

8. To stimulate the growth of other industries through the use of shared infrastructure.

Policy and Statutory Background of the State Offshore Program

The primary policies governing Alaska's offshore mining program are found in the Constitution of the State of Alaska, which became operative with the formal proclamation of statehood on January 3, 1959. Article VIII of the constitution is devoted exclusively to natural resources and signifies the importance of minerals, fish and wildlife to the state. Section 8 authorizes exploration permits and leases for any of the resources within the public domain. Sections 11 and 12 specifically address mineral rights, leases and permits. In 1959 the Alaska legislature passed the Alaska Lands Act and established the framework for state mining law. The Act stated that, in the case of tide and submerged lands, "the right to mine and remove such (locatable) minerals may be acquired only by lease". Basic provisions of the current law were set out in statute AS 38.05.250.

Under 11 AAC 86.500, the state intended to open all tide and submerged land for offshore prospecting permit applications on June 30, 1984, unless the state finds that: (1) the land contains known mineral deposits that will be offered by competitive leasing; (2) mining would be incompatible with significant surface use; or (3) adequate funding has not been appropriated for disposal of these minerals under the procedures provided by law. At this time, adequate funding has not been provided for this program and the state's tide and submerged lands are closed to the filing of new OPP applications. This finding proposes to open a small, discreet portion of tide and submerged lands, and is not intended to open the remainder of state tide and submerged lands to the filing of OPP applications.

The key authority relating to offshore mining is found in Alaska law, AS 38.05.250. The state owns the mineral rights in almost all land covered by tidal waters along the coast, regardless of the ownership of adjoining upland (43 U.S.C. secs. 1301 et seq., the Submerged Lands Act). The Alaska offshore mining program applies to mineral resources on the State's submerged lands which are lands covered by tidal waters between the line of mean high water and seaward to a distance of three geographical miles or further as may hereafter be properly claimed by the state.

> 38.05.250. Prospecting permits and leases on tide and submerged land. (a) The exclusive right to prospect for deposits of minerals subject to AS 38.05.185 - 38.05.275 in or on tide and submerged state land may be granted by a permit issued by the director. Permits shall be granted to the first qualified applicant. A permit may not include an area larger than 2,560 acres, subject to the rule of approximation. Lands subject to a prospecting permit shall be as compact in form as possible taking into consideration the area involved. The term of the permit shall be 10 years. Prospecting permits shall be conditioned upon payment of rental against which credit shall be given for useful expenditures on land covered by the permit or group of contiguous permits under common ownership or assignment. Excess expenditures may be applied against rentals due for the following four years. The rental shall be $3 per acre for the first two-year period of the permit, payable on the second anniversary of the permit and $3 per acre each following year, payable annually on the anniversary date of the permit. Minerals from land under a prospecting permit may not be mined and marketed or used, except for limited amounts necessary for sampling or testing. A person may not take or hold prospecting permits for minerals on state land under this section exceeding in the aggregate 300,000 acres. A person may not take or hold leases for minerals on state land under this section exceeding in the aggregate 100,000 acres.

A summary of the statutory and regulatory terms for offshore prospecting permits and leases is contained in Table 1. Before issuing a permit or lease, the Division of Mining (DOM) must comply with laws applicable to the "disposal of an interest in state land" (transferring state-owned property rights). One of those laws is AS 38.05.035(e), which requires that I prepare a written finding that the state's interests will best be served by issuance

Best Interest Finding

Determining whether the proposed disposal will best serve the state's interests is only possible after considering the potentially positive and negative aspects of the disposal. Offshore lands are subject to multiple and sometimes conflicting uses as described in the Resource Assessment Report (Appendix A). Extreme adverse effects created by a disposal will be avoided by deletion of certain areas from that disposal. Less adverse effects can be lessened or eliminated through mitigation, permit stipulation, and monitoring requirements.

The Resource Assessment Report (RAR) provides a detailed description of the biologic, oceanographic, physical, social and economic resources of the project area. That description is not repeated here, but is incorporated in its entirety as Appendix A. The reader is encouraged to review this information. Section A of the RAR describes the physiography, coastal processes, geology and mineral potential of the project area. In addition, it describes possible mining technologies that could be utilized. It also includes estimates of activity, drilling, geophysical assessments, and production scenarios. Section B of the RAR describes the biological resources present in the disposal area. This section also identifies potential impacts that mining exploration and mining production may have upon these biological resources, and mitigation alternatives that can be implemented to reduce these impacts so that they do not endanger the resources. The mitigation measures described may be incorporated through stipulation requirements into the OPP, a mining lease or any exploration and/or mining permits issued.

Section C of the RAR describes community, subsistence, commercial fishing and land use issues. This section of the report emphasizes several important issues, the subsistence lifestyle, and how it relates to the communities social and economic activities, and the concern local residents have for mining impacts on subsistence and commercial fishing. Chapter 4 specifically addresses exploration and mining impacts to community life, subsistence activities, commercial fishing and general land use. The chapter indicates how subsistence activities would be impacted if mining exploration or production are allowed in Goodnews Bay. Chapter 6 of Section C deals with mitigation alternatives. The chapter specifically recommends mitigation applicable to scheduling mining exploration and production activities, limitations on areas explored or mined, and how exploration and mining might benefit the communities.

The RAR and information obtained from several informal public meetings held in Platinum and Goodnews Bay indicate the importance of the subsistence life style and the delicate marine ecosystem that must be protected during offshore exploration and mining operations. The biological resources are the mainstay of life in the Platinum and Goodnews Bay communities, and the resources will be protected under the mitigation measures identified.

On the other hand, there is good potential for a valuable platinum resource to be present in the offshore areas of the project area. Exploration and

gradually increasing in size due to sedimentation from the Goodnews and Tunulik Rivers. The shallow muddy substrate in the bay is host to extensive eelgrass growth. The eelgrass beds are where the herring spawn. OPP tracts covering portions of the bay which contain significant eelgrass beds will not be issued. Exploration activities in portions of the bay containing eelgrass would have very little impact upon the biological productivity associated with the eelgrass, however future dredging would most likely destroy the eelgrass, and for this reason those pending OPP's will be rejected. In addition, OPP applications that include the North and South Spit tidal areas will be rejected. These areas are also the site of important subsistence and commercial fisheries. Rejected OPP applications by ADL number are 351051, 351053, 351054, 351055, 351057, 351058, 351059, 351061, 351062 and 351064. Three tracts in the bay do not contain significant eelgrass beds. The 3 tracts identified by ADL number are 351056, 351060 and 351063 (see fig. 1). These 3 tracts overlie the sand bars in the central portion of the bay. The Department proposes to issue these OPP's subject to the following discussion.

The attached Resource Assessment Report concludes that Goodnews Bay is an area of high biological productivity during the spring, summer and early fall. The bay's importance for subsistence and commercial fishing during this time period is also very evident. The level of biological activity and fishing drops off in late September, after the late salmon runs enter the rivers and juvenile fish species move out of the bay to offshore overwintering areas. The period of time that exploration activities could occur on the 3 tracts in the middle of the bay (ADL's 351056, 351060, 351063) would be for 3 months only, from September 15 through December 15 each year. Limiting exploration activities to this 3 month period will be the primary mitigation measure to minimize adverse impacts. Restricting exploration to this time period will also avoid area conflicts with winter tomcod fishing areas and lessen conflicts with winter seal and sealion hunting which occurs within the bay and near the bay entrance from October though April. Since exploration would be limited to the period of September 15 to December 15, some of it would be conducted during open water and some would be done through the ice. The geophysical exploration and drilling of sand bars would not damage the environment or leave permanent traces. The exploration activities would conflict with 2 1/2 months of the 7 month long marine mammal hunting period, but potential user conflicts would be minimized in the site specific permitting process.

Exploration on these above 3 tracts would likely take the full 10 years to complete due to the short 3 month working period. If workable placer deposits were discovered, then a dredging technique would have to be considered that addressed the shallow depths of this area. Because the bay is gradually infilling from river sediment discharge, and since boat navigation is sometimes hazardous in the bay during low tide, dredging the sediments on the sand bars in the middle of the bay and discharging the sediments on-shore could open up navigational channels that might be beneficial to future boat navigation and fish migration. Turbidity plumes created by dredging and discharge would be reduced through the use of silt curtains or other physical barriers, thus the threat of discharged sedimentation covering eelgrass beds could be minimized. Another concern within the bay is noise and disturbance created by low flying aircraft and boat traffic supporting exploration activities near bird nesting colonies at

stipulation requiring an analysis of the area and timing of fish migration along the coast line prior to conversion to lease. Within 500 feet of shore, bulk sampling (in excess of 10 cubic yards) will be prohibited between April 15 and September 15 each year. During the spring each year, capelin and surf smelt are known to spawn along the beaches at high tide from Platinum to south of the Salmon River. According to ADF&G, the annual movement of salmon and other forage fish through this part of Kuskokwim Bay begins in May and continues into September. It is thought that most fish mitigation occurs near shore. Also present in the nearshore zone between Goodnews Bay and the Salmon River are surf clams and a blue mussel bed at flat cape. With proper timing, exploration activities will have negligible effects on fish migrations, fish spawning, marine mammals, clam beds, or blue mussel beds.

The Department also proposes to lease 5 tracts not now under OPP application. These 5 tracts are shown on figure 1a, and labeled as Tract 1 through Tract 5. Because the tracts are all at least 1320 from shore, no timing or bulk sampling restrictions are proposed.

These tracts will be leased non-competitively under the process defined by 11 AAC 82.500 - .540. Under the time frames put forth in the final Best Interest Finding, the Department will accept applications for each tract from qualified applicants (see 11 AAC 82.200 - .205) during a 30 day filing period. At the close of this period, a public drawing will be held to determine the priorities among these applications. The filing period, date of the drawing, and location of the drawing will be provided in the final Best Interest Finding and accompanying notice.

Proposed Stipulations for ADL's 351043, 351045, 351048, 351050

1. On OPP's ADL 351048 and 351050, exploration and mining during periods of mammal haul out are prohibited.

2. On OPP's ADL 351043 and 351045, a sonar analysis to determine both the area and timing of fish migration along the coast must be provided to DNR prior to lease conversion. The Department reserves the right to prohibit or restrict mining within 500 feet of the shoreline based upon this information.

3. On OPP's 315043 and 315045, bulk sampling in excess of 10 cubic yards within 500 feet of the shore line will be prohibited during the period April 15 to September 15 each year, until the sonar analysis in stipulation 2 is provided. Based upon that information, the Department reserves the right to maintain the prohibition, modify this prohibition, or eliminate this prohibition.

Figure 1a shows those areas on which the Department intends to issue OPP's. Those include both existing OPP application by ADL number, and new tracts labeled as Tract 1 through Tract 5. Figure 1b shows those existing OPP applications that will be rejected in whole or part. Table 3 lists the acreage proposed for issuance and rejection.

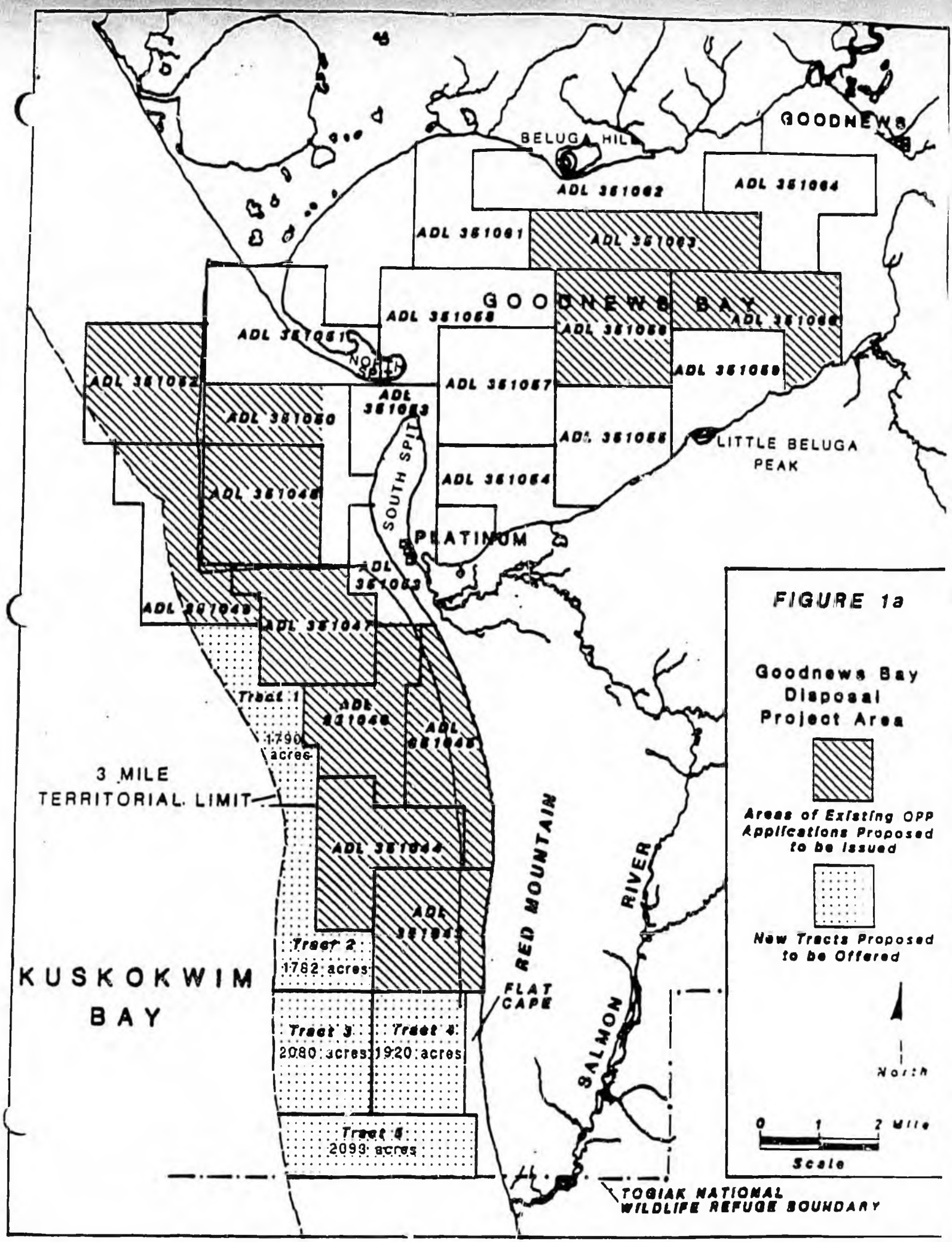

GOODNEWS
BELUGA HILL
ADL 351062
ADL 351064
ADL 351061
ADL 351063
GOODNEWS BAY
ADL 351058
ADL 351059
ADL 351060
ADL 351057
ADL 351056
LITTLE BELUGA PEAK
ADL 351054
NORTH SPIT
SOUTH SPIT
PLATINUM
ADL 351053
ADL 351048
ADL 351047
Tract 1
1790 acres
ADL 351046
ADL 351045
3 MILE TERRITORIAL LIMIT
ADL 351044
ADL 351043
Tract 2
1782 acres
Tract 3
2080 acres
Tract 4
1920 acres
Tract 5
2093 acres
KUSKOKWIM BAY
RED MOUNTAIN
FLAT CAPE
SALMON RIVER
TOGIAK NATIONAL WILDLIFE REFUGE BOUNDARY
FIGURE 1a
Goodnews Bay Disposal Project Area
Areas of Existing OPP Applications Proposed to be Issued
New Tracts Proposed to be Offered
North
0 1 2 Mile
Scale

Table 3

Summary of Proposed Actions by Acreage

		Acres
Proposed Issuance of OPP's within Goodnews Bay	-	7,488
Proposed Rejection of OPP's within Goodnews Bay	-	17,556
Proposed Issuance of OPP's Outside Goodnews Bay	-	19,665
Proposed Rejection of OPP's Outside Goodnews Bay	-	8,169
Proposed Tracts Outside of Bay Open to New Application	-	9,665

and Yupik life style was a priority in determining which OPP tracts to issue and which OPP tracts not to issue. Within Goodnews Bay, over 17,556 acres will be rejected and less than 7,500 acres are proposed for issuance. Outside of the bay, 8,169 acres will be rejected, while 19,665 acres are proposed for issuance.

Issue 2. Government Coordination (CCMP Standard 2.1): This standard requires sensitivity to the Yupik way of life and a requirement to gather information about the culture, economy and ecosystem. The attached Resource Assessment Report and information received during the public meetings have all been used in determining what tracts to issue and what stipulation measures to include in order to preserve the Yupik culture and life style.

Issue 3. Indigenous Culture (CCMP Standards 3.1, 3.2): These standards require that cultural disruption be minimized and the proposed action not destroy or interfere with cultural resources. Elimination of tracts used for subsistence and commercial fishing and general stipulation 2 (historical or cultural areas) address this standard.

Issue 4. History and Archaeology (CCMP Standards 4.1, 4.4): These standards provide for the protection of cultural and historic sites. General stipulation 2 addresses this concern.

Issue 5. Subsistence (CCMP Standards 5.1, 5.6): These 6 standards protect the subsistence resources and subsistence lifestyles of the local people. OPP applications overlapping critical subsistence use areas inside Goodnews Bay and outside of the bay entrance were all rejected due primarily to subsistence use. Only 3 tracts out of 11 pending OPP applications are being selected for issuance in the bay. Exploration on these 3 tracts will be prohibited during all periods of subsistence activity. In addition, site specific activities will be evaluated during the permitting process.

Issue 6. Environmental Management (CCMP Standards 6.1, 6.3): The 3 standards related to environmental protection rated very important in making the decision as to which OPP's to issue and which to reject. Deletion of 11 of the 22 tracts maximized this protection in compliance with these standards. Timing and monitoring stipulations attached to the proposed OPP's will further protect the environment. The timing restriction inside Goodnews Bay and nearshore outside of the bay will protect migratory fish. Finally, the permit process will provide continued site specific protection measures.

Issue 7. Development in General (CCMP Standards 7.1 - 7.8): These standards guide industrial development and two standards, 7.5 and 7.6, are particularly applicable. The activities must be consistent with the standards of the ACMP and processing must be conducted in compliance with state and federal water quality standards. The states permitting process will assure compliance with these standards.

Issue 8. Fish and Wildlife Habitats (CCMP Standards 8.1 - 8.10): Compliance with the 10 standards listed to protect fish and wildlife resulted in the exclusion of 11 of the 22 tracts in the disposal area. The standards included under this issue were established to protect the marine and onshore

Upon review of resource information, and with certain tract deletions and proposed stipulations, I find the proposed offshore prospecting permit disposal in the Goodnews bay area to be in the best interest of the State of Alaska and consistent with the ACMP and CCMP standards. The disposal will be modified based on this comment period.

Call For Public Comments

This document is a preliminary finding and no conclusions have been reached at this time. Public comments regarding this document must be received by April 15, 1989. Comments must be mailed to:

Mr. Kerwin Krause
Department of Natural Resources
Division of Mining
P.O. Box 107016
Anchorage, Alaska 99510

Comments will be considered in the final decision and finding, which will contain my determination as to whether this disposal best serves the interests of the state.

3/9/89
Date

Gerald Gallagher, Director
Division of Mining

NOTICE

Preliminary Best Interest Finding and Proposed Consistency Determination Regarding Issuance of Offshore Prospecting Permits in and Near Goodnews Bay, Alaska

Call for Comments and Notice of Public Hearings

The Alaska Department of Natural Resources, Division of Mining, hereby gives notice under AS 38.05.945(a)(3) of the publication of a Preliminary Best Interest Finding and Consistency Determination regarding the proposed issuance of offshore prospecting permits near Goodnews Bay and Platinum, Alaska. This document is issued pursuant to AS 38.05.035(e), and is intended to allow the public to comment on the proposed action and to assist the Director of the Division of Mining in making a final written finding and decision whether granting the offshore prospecting permits is in the best interests of the state and is consistent with the Alaska Coastal Management Program. A copy of this document may be requested from the Division of Mining at the address shown below.

The state's authority for the proposed action is found in AS 38.05.250. An offshore prospecting permit is an exclusive right to explore for locatable minerals (platinum, gold, etc.) on state owned tide and submerged land for a non-renewable period of 10 years. If the permittee discovers workable mineral deposits, he or she is entitled to a noncompetitive mining lease.

The state proposes to grant offshore prospecting permits in and near Goodnews Bay, Alaska, on part or all of the tide and submerged lands located in the Seward Meridian within:

Township 12 South, Range 75 West, Secs 34-36;
Township 13 South, Range 75 West, Secs. 1,2,11,12;
Township 13 South, Range 74 West, Secs. 4,5,6,9;
Township 13 South, Range 76 West, Secs. 9,10,15,16,22,27,34;
Township 14 South, Range 76 West, Secs. 1,2,12,13,24,25,36;
Township 14 South, Range 75 West, Secs. 5-9,16-21,28-33;
Township 15 South, Range 75 West, Secs. 4-9,16-18;
Township 15 South, Range 76 West, Secs. 1,12,13.

The preliminary finding describes areas where the Director proposes to issue offshore prospecting permits, discusses excluded areas where the Director does not consider it in the best interest of the state to grant permits, and sets out the terms and conditions thought to be necessary to serve the state's interest or to be consistent with the Alaska Coastal Management Program. Included are 27,153 acres that would be granted to an existing applicant and 9,665 acres that would be opened to new applications.

The public is invited to comment on the preliminary best interest finding and the proposed consistency determination. Written comments must be received by April 20, 1989 in order to be considered. Public hearings will be held to accept verbal comments about the proposed action as outlined below:

Date:	Apr 17, 1989	Date:	Apr 18, 1989	Date:	Apr 19, 1989
Location:	Bethel, AK Bethel Regional High School	Location:	Platinum, AK Arviq Store	Location:	Goodnews Bay, AK Town Meeting Hall
Time:	7:00 p.m.		2:00 p.m.	Time:	2:00 p.m.

After an analysis of public and agency comment, a decision will be made on this disposal. Should the division proceed with the Goodnews Bay disposal, a final best interest finding and consistency determination should be available about May 15, 1989. The final finding and determination will be based on information and analyses presented here and on comments received about this document. Please send written comments to:

Department of Natural Resources
Division of Mining
ATTN: Kerwin Krause
P.O. Box 107016
Anchorage, AK 99510
Phone: 762-2162

0195K

Attachment

(4)

STATE OF ALASKA

LYMAN F. HOFFMAN
REPRESENTATIVE

P.O. BOX V
JUNEAU, ALASKA 99811
(907) 465-4530, 465-4453

HOUSE OF REPRESENTATIVES

DISTRICT 25
AKIACHAK
AKIAK
ATMAUTLUAK
BETHEL
CHEFORNAK
EEK
GOODNEWS BAY
KASIGLUK
KIPNUK
KONGIGANAK
KWETHLUK
KWIGILLINGOK
MEKORYUK
NAPAKIAK
NAPASKIAK
NEWTOK
NIGHTMUTE
NUNAPITCHUK
OSCARVILLE
PLATINUM
QUINHAGAK
TOKSOOK BAY
TUNTUTLIAK
TUNUNAK

April 24, 1989

Commissioner Lennie Boston-Gorsuch
Department of Natural Resources
400 Willoughby Avenue
Juneau, Alaska 99811

Dear Commissioner Gorsuch:

This is a letter requesting the Department of Natural Resources and the Division of Mining to stop the proposed issuing of Offshore Prospecting Permits in the coastal areas near Platinum and within Goodnews Bay. There are a number of sound reasons for not continuing this course of action.

First of all, the residents of Goodnews Bay and Platinum are nearly unanimous in their opposition to such a permitting proposal. These mostly Native people are dependent on the subsistence and commercial harvesting of herring, salmon, clams, marine mammals and birds in this area. It has been determined by the Alaska Department of Fish & Game that dredging, especially within Goodnews Bay itself, will have a detrimental and devastating effect on marine life.

In the Resource Assessment Report from the Preliminary Finding which was issued by your department, several facts are extremely disturbing. It states that the proposed offshore tracts in this area contain no known mineable placer reserves, yet the Division of Mining apparently believes that it is worth risking a valuable, renewable herring and salmon fishery for an unknown, non-renewable mineral resource.

The report further admits to the risk of possible fuel spills and that noise and vessel traffic are likely to disturb the natural environment. Your findings also admit that biological productivity will be lost in the short term on all sea floor areas that are excavated by dredging, and that long-term biological impacts may result if critical species of plant life such as eel grass fail to recolonize.

P.O. Box 763 BETHEL, ALASKA 99559 (907) 543-3543

Your Preliminary Finding report has failed to include accurate and complete subsistence information. This was pointed out during the recent hearings in Bethel, Platinum and Goodnews Bay by the local residents and previously by the Department of Fish & Game - Subsistence Division. Furthermore, I concur with the Cenaliulriit Coastal Management Program in strongly opposing all offshore mining activity in this area due to the danger and uncertainty it poses for the natural environment and to the users of the area.

I would appreciate an explanation of logic for wanting to proceed with issuing offshore prospecting permits in the Platinum and Goodnews Bay area. It is obvious that any offshore mining will adversely affect the environment and the people in the area. I question that this is a good public policy decision. I expect the Department to reevaluate the cost/benefit of this issue. It is apparent that the social and economic costs far outweigh any profit that such speculation may produce.

I request that you respond to my concerns in writing within five working days.

Sincerely:

Lyman F. Hoffman
Alaska State Representative

cc: Governor Steve Cowper
Senator Johne Binkley
Cenaliuriit, Inc.
Nunam Kitlutsisti
Kuitsarak, Inc.
Arviq, Inc.
Tundra Drums
Grant Fairbanks

Senator Johne Binkley

Senate Finance Committee
P.O. Box V • Juneau, Alaska 99811 • (907) 465-4985

Finance Committee
Co-Chairman

May 2, 1989

Commissioner Lennie Gorsuch
Department of Natural Resources
400 Willoughby Avenue
Juneau, Alaska 99811

TO BE HAND DELIVERED

Dear Commissioner Gorsuch:

I am formally requesting that the Department of Natural Resources postpone any action on proposed offshore mining permits in and near Goodnews Bay until there have been further studies conducted on the impacts of offshore mining on fish and wildlife resources in the area, and until there is support for offshore mining from a majority of the residents of both Goodnews Bay and Platinum.

Currently, there is near unanimous opposition of this project by all of the local residents who would be most impacted by it. In a series of public meetings and hearings and through resolutions from city and traditional councils, the nearby communities have expressed their serious concern with how mining activities could affect their own subsistence, commercial and recreational activities. Goodnews Bay and the area outside the Bay are intensively used by local residents for the harvesting of herring, salmon, clams, marine mammals and birds.

The Alaska Department of Fish and Game has stated that dredging within Goodnews Bay itself would have serious, and perhaps devastating, impacts on the valuable fisheries and wildlife resources. There should be absolutely no mining activity within the Bay. I believe the impacts of mining activity within the project area offshore of Goodnews Bay however, have not been adequately addressed within the Resource Assessment Report from the Preliminary Finding. The report does not address the turbidity issue resulting from local tides flushing sediments from dredging activities outside the bay directly into the bay. Local residents and the Cenaliulriit Coastal Resource Service Board are very concerned that such sediments would destroy the highly sensitive eelgrass beds in the bay used by spawning herring.

In addition, the toxicity question has not been adequately addressed in your preliminary finding. Already Norton Sound has increased levels of mercury contamination. Any elevation of those levels as a result of even minor

amounts of dredging could result in making all marine mammals inedible for human consumption.

Testimony at recent public meetings in Platinum and Goodnews Bay indicated that the Resource Assessment Report's evaluation of subsistence usage of the proposed project area is not accurate, particularly concerning the usage of marine mammals.

With this proposal, I believe the Department of Natural Resources is attempting to circumvent the intent of state law 11 AAC 86.500 in two respects. First, there is significant surface use of the area, and mining would be incompatible with such use. And second, no new offshore prospecting permit applications are to be allowed unless the Legislature has provided adequate funding for this program. Your own preliminary finding admits that such funding has not been provided and that is why this project proposes opening only a "small, discreet portion of tide and submerged lands." I believe this directly violates state law.

For these reasons, I believe the Department should immediately cancel this proposal, conduct further research and analysis of the areas of concern mentioned by myself and others, and work further with the residents of Platinum and Goodnews Bay. Since there are no known mineral deposits in the area, the state would have little to gain by proceeding with this proposal, yet the residents of the area would have everything to lose.

Sincerely,

Senator Johne Binkley
Yukon-Kuskokwim and
Interior Rivers

mem

cc: Governor Steve Cowper
Tundra Drums

STATE OF ALASKA

STEVE COWPER, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF THE COMMISSIONER

400 WILLOUGHBY AVE.
JUNEAU, ALASKA 99801-1796
PHONE: (907) 465-2400

May 1, 1989

The Honorable Johne Binkley
Alaska State Senator
P.O. Box V
Juneau, AK 99811

The Honorable Lyman Hoffman
Alaska State Representative
P.O. Box V
Juneau, AK 99811

Dear Senator Binkley and Representative Hoffman:

This letter responds to your inquiry concerning the timing of the decision making process for the proposed Goodnews Bay offshore prospecting permit best interest finding. As you know, the preliminary best interest finding was released for public comment on March 9, 1989. Public hearings were held in Bethel, Platinum, and Goodnews Bay on April 17, 18, and 19, respectively.

The original notice indicated the comment period would close on April 20. However, at the request of the village of Goodnews Bay, the comment period was extended to May 1. Last Friday, the Alaska Department of Fish and Game and the Cenaliurlriit Coastal Management representative requested another extension until Monday, May 8. The village of Goodnews made a similar request this morning. That extension has been granted.

At the close of the comment period, the department must carefully consider all comments, correct the preliminary report as necessary, and continue discussions with the Departments of Fish and Game and Environmental Conservation and the local coastal district. Because any decision to issue or reject OPP's must be done with the concurrence of the three state resource departments, each must agree with the final decision.

There is no formal timeframe for the agencies to reach consensus during this process. However, past experience indicates that at least 30 days will

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be required to reach this point. Under these timeframes, I believe a final decision will be reached on this proposal in mid to late June.

If you have any further questions, please feel free to contact me.

Sincerely,

Lennie Gorsuch

Lennie Gorsuch
Commissioner

CENTRAL REGION
DEPARTMENT OF TRANSPORTATION and PUBLIC FACILITIES

MEMORANDUM State of Alaska

TO: Gerald Gallagher, Director
Division of Mining
Department of Natural Resources

DATE: April 6, 1989

FILE NO:

TELEPHONE NO: Ext. 470

FROM: L. Kay Schmidt
Regional Planning Manger

SUBJECT: Goodnews Bay
Preliminary BIF

The Department of Transportation and Public Facilities (DOT&PF), Central Region Planning Section has completed its review of the Preliminary Best Interest Finding and Proposed Consistency Determination prepared by the DNR Division of Mining regarding the issuance of offshore prospecting permits in the Goodnews Bay area.

We have the following comments regarding runway and navigational aids improvements recommended at Platinum Airport or Goodnews Bay Airport to handle transport aircraft supplying the proposed mining activity. The department presently has no capital improvements planned for either of these two state-owned airports in our FY'90-95 Capital Improvements Program because of the priority needs of other state airports and declining state revenue dollars.

Thank you for the opportunity to comment on this Preliminary Best Interest Finding regarding proposed mining in Goodnews Bay. Please contact Roger Maggard, DOT&PF Area Planner, at 266-1653 if you have any questions.

JHH:kc

(5)

HEARING ON

Preliminary Best Interest Finding and Proposed Consistencey Determination Regarding Issuance of Offshore Prospecting Permits in and Near Goodnews Bay, Alaska

TESTIMONY ON BEHALF OF

KUITSARAK, INC.

APRIL 19, 1989

KUITSARAK, INC. IS THE ANCSA VILLAGE CORPORATION FOR GOODNEWS BAY, ALASKA. WE HAVE 224 SHAREHOLDERS, NEARLY THE ENTIRE ADULT POPULATION OF GOODNEWS BAY. WE APPRECIATE THE OPPORTUNITY TO TESTIFY ON THE PRELIMINARY BEST INTEREST FINDING ("PBIF") OF THE ALASKA DEPARTMENT OF NATURAL RESOURCES ("DNR") ON THE PROPOSED DISPOSAL OF STATE LANDS FOR OFFSHORE MINING IN AND NEAR GOODNEWS BAY. WE ALSO PLAN TO SUPPLEMENT THIS ORAL PRESENTATION WITH MORE DETAILED WRITTEN COMMENTS IN SUPPORT OF OUR POSITION.

THE PLACE YOU KNOW AS GOODNEWS BAY, WE CALL "MUMTRAK", ITS ORIGINAL YUPIK NAME. IT HAS BEEN HOME TO US AND OUR ANCESTORS FOR THOUSANDS OF YEARS, AND THAT IS ONE OF THE THOUGHTS WE WANT TO BE SURE DNR HAS IN MIND WHEN YOU DECIDE WHETHER IT IS IN THE "BEST INTEREST" OF THE STATE TO PERMIT THE DREDGE MINING OF THE BAY AND THE SURROUNDING WATERS. MANY PEOPLE COME TO GOODNEWS BAY IN THE SUMMER TO MAKE MONEY FROM OUR RICH HERRING AND SALMON FISHERIES AND OTHERS COME FOR RECREATION FISHING IN THE RIVERS WHICH EMPTY INTO THE BAY. WE TOO USE THESE RESOURCES TO EARN MONEY TO SUPPORT OUR FAMILIES IN THE CASH ECONOMY, BUT WE ALSO USE THESE AND THE OTHER RICH MARINE RESOURCES (LIKE MARINE MAMMALS, CLAMS, CRABS, BIRDS AND BIRD EGGS) DIRECTLY AS WHAT YOU CALL "SUBSISTENCE" RESOURCES. AND THAT TELLS YOU ONE OF THE BIG DIFFERENCES BETWEEN US WHO LIVE HERE AND THE PEOPLE WHO ONLY VISIT.

IF SOMETHING WERE TO HARM THE RESOURCES OF GOODNEWS BAY AND THE SURROUNDING WATERS, THE PEOPLE WHO COME HERE TO FISH WOULD LOSE A SOURCE OF PLEASURE OR EVEN THEIR LIVLIHOOD. WE WOULD LOSE OUR ENTIRE WAY OF LIFE, AND WE COULD NO LONGER EVEN LIVE IN OUR HOME! WE HAVE CAREFULLY REVIEWED THE PBIF AND THE ATTACHED RESOURCE ASSESSMENT REPORT ("RAR") AND CONSULTED WITH EXPERTS TO BE ABLE TO BETTER UNDERSTAND IT. THE PROPOSED DISPOSAL THREATENS US WITH THE RISK OF LOSING EVERYTHING WE HAVE, AND THAT CANNOT POSSIBLY BE IN THE STATE'S "BEST INTEREST".

THE PBIF IS AS DEFECTIVE FOR WHAT IT DOES NOT SAY AS FOR WHAT IT DOES SAY. NOT ONLY DOES IT LEAVE OUT INFORMATION ABOUT THE RENEWABLE RESOURCES WE DO HARVEST, IT EITHER IGNORES OR BRUSHES OVER MAJOR QUESTIONS SUCH AS MERCURY CONTAMINATION, FUEL SPILLS AND TURBIDITY, ANY ONE OF WHICH HAS THE POTENTIAL TO DESTROY OUR MARINE RESOURCES OR OUR ABILITY TO USE THEM. BECAUSE SO MUCH HAS BEEN LEFT OUT OF THE PBIF, WE QUESTION WHETHER SUFFICIENT TIME AND RESOURCES WENT INTO THE PREPARATION OF THE RAR ON WHICH THE PBIF IS BASED. IT WAS A MISTAKE TO PERMIT THE OFFSHORE PROSPECTING PERMIT ("OPP") HOLDERS TO HIRE THEIR OWN CONSULTANTS TO DO THE RAR. NOT ONLY DOES THIS CALL INTO QUESTION THE BIAS OF THE RAR, BUT IT ALSO DEPRIVES THE STATE OF OVERSIGHT AND CONTROL OF THE PREPARATION OF THE BASIC REPORT ON WHICH THE PBIF IS BASED. AS STATED AT PAGE 7 OF THE PBIF, UNDER 11 AAC 85.500 OF THE STATE REGULATIONS, STATE TIDE AND SUBMERGED LANDS ARE NOT TO BE OPENED TO OPPS IF "ADEQUATE FUNDING HAS NOT BEEN APPROPRIATED FOR DISPOSAL OF . . . MINERALS UNDER THE PROCEDURES PROVIDED BY LAW."

THE PBIF GOES ON TO NOTE THAT "ADEQUATE FUNDING HAS NOT BEEN PROVIDED", SO WE ARE AT A LOSS TO UNDERSTAND HOW THE STATE WAS ABLE TO PROCEED WITH THIS DISPOSAL. APPARENTLY IT IS UNDER THE RATIONALE THAT THIS DISPOSAL ONLY AFFECTS A "SMALL, DISCREET PORTION" OF THE STATE'S SUBMERGED LANDS. THE PROBLEM IS THAT THE PBIF DOESN'T SAY T H A T THIS IS ONE OF THE EXCEPTIONS TO THE LIMITS ON NEW OPPS. EVEN IF IT WERE A VALID EXCEPTION, THAT DOESN'T EXPLAIN HOW DNR CAN ALLOW NEW OPPS ON FIVE NEW TRACTS WHEN STATE REGULATIONS PROHIBIT DOING SO UNLESS THERE IS ADEQUATE FUNDING AND DNR HAS SPECIFICALLY FOUND THAT "ADEQUATE FUNDING HAS NOT BEEN PROVIDED". WE HAVE CONCLUDED THAT THE PROPOSED DISPOSAL AND NEW OPP OFFERING ARE THEREFORE ILLEGAL AS CONTRARY TO EXISTING STATE LAW. ENEN IF THAT WERE NOT THE CASE, THERE ARE MANY OTHER REASONS WHY THIS DISPOSAL IS NOT IN THE STATE'S BEST INTEREST AND WHY IT CANNOT GO FORWARD ON THE STRENGTH OF THIS PBIF.

FIRST, THE PBIF TOTALLY IGNORES RECENT FINDINGS CONNECTING MERCURY POISONING TO SUBMERGED LAND DREDGING. THE DRAFT ENVIRONMENTAL IMPACT STATEMENT ("EIS") PREPARED FOR THE PROPOSED NORTON SOUND SUBMERGED LAND MINING LEASES IN NOVEMBER 1988 SPECIFICALLY DISCUSSES THE RISKS OF MERCURY POISONING FROM OCEAN BOTTOM DREDGING. AMONG OTHER THINGS, THE DEIS SAYS: "MERCURY IS THE MOST TOXIC TRACE METAL

REGULATED BY THE EPA [THE FEDERAL ENVIRONMENTAL PROTECTION AGENCY]. ITS TOXICITY IS OF THE SAME ORDER OF MAGNITUDE AS THAT OF SEVERAL PESTICIDES, AND A HUNDREDF] MORE TOXIC THAN THE OTHER TRACE METALS OF CONCERN." THE DEIS GOES ON TO SAY AT PAGE IV-B-12 THAT, UNLIKE OTHER TOXIC METALS, THE TOXIC EFFECTS OF MERCURY ARE ACTUALLY INCREASED IN THE AQUATIC FOOD CHAIN. THAT MEANS THAT THE CREATURES AT THE END OF THE FOOD CHAIN (LIKE NATIVES WHO EAT MARINE MAMMALS) ARE GOING TO GET THE HIGHEST CONCENTRATIONS OF MERCURY. THAT IS ESPECIALLY TRUE SINCE SEALS AND OTEHR MARINE MAMMALS HAVE THE ABILITY TO CONCENTRATE MERCURY IN THEIR MEAT AND ORGANS, AND MARINE MAMMALS ARE ONE OF THE MAIN PARTS OF OUR DIET.

ACCORDING TO THE DEIS, THE LEVEL AT WHICH MERCURY POSES A RISK OF CONCENTRATION TO THE ANIMALS AND HUMANS IN THE MARINE FOOD CHAIN IS ONLY 0.025 PARTS PER BILLION ("PPB") OF SEA WATER. TABLE IV-8 OF THE SAME DEIS SAYS TAHT THE MERCURY LEVELS IN THE CENTRAL BERING SEA (THE AREA NEAREST GOODNEWS BAY) HAS MEASURED HISTROCIALLY BETWEEN 0.05 TO 0.58 PPB WITH A MEAN OF 0.22 PPB. WE ARE ALREADY AT SOME RISK BECAUSE OF THE LEVELS OF MERCURY IN THE SEA, AND THE PBIF DOESN'T GIVE ANY CONSIDERATION TO THE VERY REAL POSSIBILITY THAT THIS HEALTH RISK COULD BE INCREASED BY THE PROPOSED DISPOSAL. AT THE VERY LEAST THE PBIF SHOULD FULLY ASSESS THIS RISK AND REQUIRE THAT THERE BE NO MINING ANYWHERE INSIDE OR OUTSIDE OF THE BAY UNTIL IT IS PROVEN THAT THE LEVELS OF MERCURY IN THE SEDIMENT TO BE MINED WILL NOT ELEVATE THE LEVELS OF MERCURY IN OUR DIET TO UNHEALTHY LEVELS. YOU SHOULD BEGIN BY PROPERLY SAMPLING THE LEVELS OF MERCURY IN SEAL LIVER AND CLAMS, BECAUSE WE EAT A LOT OF THESE A N D ARE ARE ADVISED THAT THIS IS ALSO WHERE THE MERCURY CONCENTRATIONS ARE LIKELY TO BE THE HIGHEST.

AT PAGE IV-H-3 OF THE DEIS, IT SAYS THAT THE FEDERALLY APPROVED "SAFE" LEVEL FOR MERCURY IN HUMAN BLOOD IS 20 PPB AND THAT 200 PPB CAUSES NERVE DAMAGE. BUT THE TRUTH IS NOBODY KNOWS WHAT DAMAGE MERCURY MAY DO WHEN IT GETS ABOVE THE "SAFE" LEVEL, BUT BEFORE IT STARTS TO CAUSE NOTICIEABLE NERVE DAMAGE. THE DEIS DOES SAY (AT PAGE IV-H-7) THAT STUDIES SHOWED MOTHERS ALONG THE YUKON-

KUSKOKWIM COAST (JUST NORTH OF HERE) SHOWED MERCURY CONCENTRATIONS OF 22.7 TO 73.8 PPB IN THEIR BLOOD AND SUGGESTS THESE LEVELS COULD BE SUFFICIENT TO POSE A RISK TO UNBORN CHILDREN OF SUCH MOTHERS. THE NORTON SOUND DEIS CONCLUDES (AT PAGE IV-H-8) THAT IF THERE ARE ELEVATED LEVELS OF MERCURY IN SEA WATER, MARINE MAMMALS AND HUMANS, DREDGING THAT INCREASES THE LEVEL OF MERCURY IN WATER ONLY A LITTLE COULD REQUIRE PEOPLE TO STOP HUNTING AND EATING MARINE MAMMALS! IF THERE IS ANY RISK OF THAT AT ALL, IT IS NOT IN THE STATE'S BEST INTEREST TO PERMIT DREDGE MINING OFFSHORE (MUCH LESS INSIDE) OF GOODNEWS BAY.

FUEL SPILLS ARE ANOTHER POTENTIALLY DISASTROUS, BUT LARGELY IGNORED RISK OF THE PROPOSED DISPOSAL. THE RAR SAYS AT PAGE A-15 THAT ONE DREDGE WOULD USE ABOUT 500,000 GALLONS OF FUEL A SEASON. WE UNDERSTAND THAT A DREDGE THE SIZE TO BE USED HERE OFTEN HOLDS 250,000 GALLONS IN ITS OWN TANKS. THE REPORT ALSO ACKNOWLEDGES THAT THE WEATHER ALONG THE COAST WHERE THE DREDGE WOULD OPERATE IS EXTREMELY STORMY. IF THE DREDGE EVER RUNS AGROUND, CAPSIZES OR SINKS IN ONE OF THESE STORMS, THERE IS A CERTAINTY OF A CATASTROPHIC FUEL SPILL. THE SAME THING COULD HAPPEN WITH THE SUPPLY BARGE OR TANKER WHICH MIGHT HOLD UP TO 500,000 GALLONS OF FUEL. THE NEWSPAPER REPORTS COMING OUT OF VALDEZ SAID THAT PRIOR TO THE EXXON SPILL, THE OIL COMPANIES CONSIDERED EVEN A 250,000 GALLON SPILL TO BE "CATASTROPHIC". THAT IS EXACTLY THE RANGE OF THE RISK WE FACE HERE, BUT THE PBIF AND RAR HARDLY EVEN MENTION IT. FURTHERMORE, OUR EXPERTS ADVISE US THAT REFINED FUEL IS EVEN MORE TOXIC THAN CRUDE OIL, SO A LITTLE BIT WILL GO A LONG WAY.

WHAT WOULD A 250,000 GALLON FUEL SPILL, OR 125,000 GALLON ONE AS HAPPENED IN COOK INLET A YEAR OR TWO AGO, OR A 50,000 OR EVEN A 10,000 GALLON SPILL DO TO US? WE'RE AFRAID TO ASK AFTER SEEING WHAT HAPPENED IN PRINCE WILLIAM SOUND AND EARLIER IN COOK INLET, BUT YOU HAVE AN OBLIGATION TO AT LEAST ASK THESE QUESTIONS BEFORE YOU DETERMINE IT IS IN THE STATE'S "BEST INTEREST" TO TAKE SUCH A RISK HERE. WE HAVE A FULLY FUNCTIONING CASH AND SUBSISTENCE ECONOMY HERE RIGHT NOW. LAST YEAR, ACCORDING TO THE PBIF IT BROUGHT IN OVER $1.5 MILLION FROM COMMERCIAL FISHING ALONE. THAT'S AS MUCH AS THE PBIF SAYS WILL BE BROUGHT IN BY THE 50 JOBS THAT ARE SUPPOSED TO BE CREATED

BY THE MINING AND DOESN'T EVEN TAKE INTO ACCOUNT THE MONEY BROUGHT IN BY SPORTSMEN AND OTHERS WHO PURCHASE FUEL AND SUPPLIES FROM DISTRIBUTORS IN GOODNEWS BAY. FROM THE PBIF, IT LOOKS LIKE ALL OF THE ECONOMIC BENEFIT (SUCH AS IT IS) WILL BE CONCENTRATED IN PLATINUM. BUT WE WOULDN'T WANT THE PROJECT EVEN IF IT WERE THE OTHER WAY AROUND. ALL IT WILL DO IS SUBSTITUTE A BOOM AND BUST TYPE ECONOMY BASED ON THE RISKY DEVELOPMENT OF MINERAL RESOURCES FOR THE STABLE AND GROWING ECONOMY WE ALREADY HAVE BASED ON RENEWABLE RESOURCES.

THE PBIF IS ALSO RIDDLED WITH INCONSISTENCIES AND ITS UTLIMATE CONCLUSION TO PERMIT EXPLORATION AND MINING IS INCONSISTENT WITH BOTH THE CENALLULRIIT COASTAL RESOURCE AREA PLAN AND THE BRISTOL BAY AREA PLAN (BBAP). ONE EXAMPLE OF WHAT WE MEAN IS THE DETERMINATION AT PAGE 12 OF THE PBIF TO PERMIT EXPLORATION AND MINING ON THE SAND BARS JUST OUTSIDE THE BAY WHERE MARINE MAMMALS HAUL OUT AND WHERE WE HUNT THEM. EXPLORATION AND MINING IS TO BE PROHIBITED DURING THE TIME WE HUNT, THE ONLY PROBLEM IS WE HUNT THESE ANAMALS ALL YEAR LONG AS IS SPECIFICALLY MENTIONED AT PAGE B-14 OF THE RAR. THE WHOLE PROJECT OUGHT TO BE DROPPED, BUT IT IS INCONSISTENT WITH DNR'S OWN REPORT TO PERMIT EXPLORATION OR MINING NEAR THE AREAS WE USE TO HUNT MARINE MAMMALS.

CONTRARY TO THE ASSERTIONS AT PAGES 18 THROUGH 20 OF THE PBIF, THE PRELIMINARY FINDING IS NOT CONSISTENT WITH THE CENALLULRIIT PLAN. WE ARE SURE CENALLULRIIT WILL COMMENT ON THESE MATTERS, AND WE DO NOT PRETEND TO SPEAK FOR THEM. THE PBIF IS PARTICULARLY INCONSISTENT WITH THE CENALLULRIIT SUBSISTENCE STANDARDS (5.1 THROUGH 5.6). IN PARTICULAR THE PBIF DOES NOT ANALYZE THE "POSSIBLE ADVERSE IMPACTS OF THE ACTION ON SUBSISTENCE" WHEN IT COMES TO THE QUESTIONS OF MERCURY POISONING AND FUEL SPILLS, MUCH LESS PROVIDE SAFEGUARDS TO "ASSURE SUBSISTENCE USE." FINALLY, THE PBIF IS INCONSISTENT WITH ITS OWN DESCRIPTION OF THE BBAP AT PAGE C 3-4 OF THE RAR. THE STATED INTENT OF THE BBAP FOR THE AREA INCLUDING GOODNEWS BAY IS TO MANAGE IT "PRIMARILY FOR FISH AND WILDLIFE HABITAT (ESPECIALLY FOR COMMERCIAL FISHING AND FISH HARVESTING." DREDGE MINING IS PERMITTED ONLY WHEN "THE PROPOSED ACTIVITY WILL NOT HAVE A SIGNIFICANT ADVERSE IMPACT ON FISH OR FISH HABITAT OR THAT NO FEASIBLE OR PRUDENT ALTERNATIVE SITE EXISTS TO MEET THE PUBLIC NEED." THE PBIF SIMPLY DOESN'T ADDRESS EITHER OF THESE REQUIREMENTS.

WE DO NOT UNDERSTAND HOW DNR CAN POSSIBLY APPROVE THIS DISPOSAL OF STATE LANDS AS IN THE STATE'S "BEST INTEREST". IT APPEARS TO BE A PROPOSAL WHICH IS ONLY IN THE "SELF-INTEREST" OF A VERY FEW. WE CANNOT UNDERSTAND HOW THE STATE OF ALASKA COULD TAKE AN ACTION THAT HAS A SUBSTANTIAL RISK TO OUR LIVLIHOOD, OUR WAY OF LIFE AND PERHAPS EVEN OUR VERY OWN LIVES WITHOUT MUCH MORE THOUGHT. THE PROPOSED DISPOSAL THREATENS EVERYTHING WE VALUE AND HOLD DEAR, AND FOR WHAT? MAYBE 50 JOBS? SO A SPECULATOR CAN MAKE A KILLING ON THE POSSIBILITY THERE IS PLATINUM OFFSHORE OF GOODNEWS BAY? HOW CAN THIS POSSIBLY BE IN THE STATE'S BEST INTEREST WHEN IT IS MEASURED AGAINST THE STABLE AND EVEN GROWING SUBSISTENCE AND CASH ECONOMY WE ALREADY HAVE? THE PROPOSED DISPOSAL IS INCONSISTENT WITH AT LEAST TWO COMPREHENSIVE RESOURCE PLANS AND THE STATE'S OWN REGULATIONS. THE DISPOSAL IS NOT IN THE STATE'S BEST INTEREST AND SHOULD BE SHELVED UNTIL IT CAN BE MORE PROPERLY EXAMINED AND THOUGHT OUT.

QUYANAH

KUITSARAK, INC.

Vernon S. Bavilla

VERNON S. BAVILLA, PRESIDENT

STATE OF ALASKA

STEVE COWPER, GOVERNOR

DEPARTMENT OF FISH AND GAME

DIVISION OF SUBSISTENCE

P.O. BOX 1788
BETHEL, ALASKA 99559-1788
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April 24, 1989

Mr. Dean Rasmussen
Legislative Aid
Representative Lyman Hoffman
P.O. Box V
Juneau, AK 99811

Dear Dean,

Enclosed are my notes of the Goodnews Bay Offshore Mining Proposal meeting, held at Goodnews Bay on Wednesday April 19. These notes may provide you with a better idea of specific issues of concern to local residents. The Department of Natural Resources taped most of the meeting and may be able to provide you with more detailed information. These notes do not contain verbatim what happened at the meeting.

As my notes illustrate, Goodnews Bay residents informed DNR that the information in the Resource Assessment Report (including the maps) were incorrect. In December 1988, the Division of Subsistence identified several errors or lack of information when reviewing an agency Draft Resource Assessment. Our comments were incorporated into a Department of Fish and Game memo to DNR on December 15, 1988. It is unfortunate that information available from the ADF&G still did not find its way into the PBIF Resource Assessment despite our efforts point out the inadequacies to DNR and to inform the consultants who prepared the Resource Assessment that the information was available. There are some major problems with the resource use area information in the PBIF Report.

Sincerely,

Michael Coffing

Michael Coffing
Subsistence Resource Specialist

GOODNEWS BAY OFFSHORE PROSPECTING PERMIT
MEETING AT GOODNEWS BAY, APRIL 19, 1989

NOTES TAKEN BY MICHAEL COFFING
SUBSISTENCE DIVISION
ADF&G, BETHEL 99559

Following are comments made by residents of Goodnews Bay who testified at the public hearing held in Goodnews Bay on April 19, 1989. In attendance from agencies were Kerwin Krause, Division of Mining, DNR, Anchorage; Anna Phillips, CZM, Bethel; and myself. Attorney David S. Case, representing the community of Goodnews Bay, also attended, as did approximately 50 individuals (DNR has a roster signed by which those attending).

The meeting was scheduled to begin at 2pm. I arrived at approximately 2:30 and the meeting was in progress. DNR had prepared large (2-foot square) maps depicting subsistence and commercial use areas (figures in the Resource Assessment) and also large maps showing the tracts proposed for lease.

The main points brought out in the public testimony were that the mapped information appearing in the Resource Assessment Report were grossly incorrect and that, as they have said several times before, the people of Goodnews Bay do not want any mining in their area. People were visibly aggravated and were frustrated that they were at another meeting repeating what they had already told DNR.

Near the end of the meeting, Vernon Bavilla asked if I could add anything regarding the Department of Fish and Game and Subsistence Division position on the DNR proposed mining. I stated that ADF&G was opposed to any mining within Goodnews Bay and that we had concerns about mining in the offshore areas outside of Goodnews Bay. I briefly explained that ADF&G had reviewed the draft Resource Assessment Report and had provided comments to DNR explaining that there were several areas where the information was incomplete and needed considerable additions. I also stated that the Subsistence Division had reviewed the PBIF and had identified several areas in the Resource Assessment Report where information was lacking or incomplete. I explained that these comments were recently provided to Habitat Division (April 3 memo to Kim Sundberg) who would incorporate them into the Department's final PBIF comments to DNR.

I explained that ADF&G was concerned with mining in areas outside of Goodnews Bay and that ADF&G would make detailed recommendations to DNR about deleting tracts and permit stipulations. I said that: we could not be sure what (if any) the impacts would be; ADF&G is sensitive to the concerns of local people; the potential for impacts is real; there is information known by the local residents that has not been incorporated into the information provided to DNR, and that there remains to be some uncertainties. At this time I could not say specifically what ADF&G's statement to DNR would contain.

David Case asked me if there was any information describing subsistence uses outside of Goodnews Bay, which I was aware of, that had not been incorporated into the latest Resource Assessment Report. I briefly described the mapped information which the Subsistence Division had obtained in 1983 from Platinum residents and that this information included subsistence use areas for marine mammals, waterfowl, marine fish and salmon. I explained that we were concerned that this information was not in the Resource Assessment and that ADF&G would raise this issue in our comments to DNR.

Here are the comments from the public:

Wassillie Roberts

Pointed out that the maps resource use area maps are inaccurate. He wondered why the marine mammal haul out areas inside of Goodnews Bay are not shown on the maps.

Bavilla Merrit

The maps are incorrect, everyone of them.

David Walters

Where did the information on these maps come from anyway ? (answer from DNR, it came from consultants who were here last summer, also some of it came from ADF&G).

Bavilla Merrit

Bavilla showed an example of where the maps were incorrect: The area where tomcod fishing is supposed to occur is all mudflat. The salmon fishing area inside of the Bay shows almost all of the Bay. In fact, there is only a small channel in the Bay where salmon fishing occurs.

Christian Small

These maps are wrong. Since the maps are wrong, the information is wrong. This proposal process should not be continued.

Jessie Beaver

Maps are wrong. If oil or fuel is leaking from drilling activities or from the dredge itself, it is going to mess up our fishing. (Raising his voice to shouting) We don't want to hear any more about this, we have rejected this already (referring to several earlier meetings at Goodnews Bay where this offshore mining was discussed).

Charlie Chingliak

Maps are incorrect and they are also difficult for us to understand and follow.

Bavilla Merrit

Stated concerns about heavy metals. Mercury ---> poisoning-----> animals--------> people.
(Raising his voice), We have told you NO before but you keep asking us.

John James

In the old days we had no motors but instead we used dog teams. If there is drilling inside of the Bay, oil will seep out. Several years there was some drilling in the Bay and we later found some dead fish. White people have not helped us. The maps are not accurate. We want no offshore mining.

Vernon Bavilla

Vernon made an oral presentation of a written statement to DNR on behalf of Kuitsarak Incorporated. In summary, he said that this proposal to mining risks: their income from commercial fishing, income from recreational fishing and the value of the resources contributing to the subsistence of area residents. He questioned the timelines that DNR are following. He pointed out that there is a statement in the PBIF that the proposal will not go forward if there is not adequate funding available to address concerns. He further pointed out that the PBIF later states there is not adequate funding (?).

Concerns over mercury and fuel and spills risks to the resources and public health .

The maps are incorrect. Marine mammal haul-outs within Goodnews Bay are not shown.

The DNR PBIF is inconsistent with the CZM plan and the Bristol Bay plan.

The proposal risks everything that Goodnews Bay people value. The proposal is not in the State's best interest.

Moses Toniak

Who made these maps? Maps are inaccurate where tomcod and whitefish are shown. Concerning the marine mammal haul out areas, I have not seen any seals haul out in these areas because these areas are very close to where boats always travel.

Louis Smith

Maps are incorrect. I am opposed to any offshore mining. If someone asks me where I go to hunt and fish, I will not cooperate. Everyone here, men, women.. everyone, have said that they do not want mining. Mr Smith said that he found some dead smelt and silvers salmon a few years ago which was caused by the drilling activities there. He supports Vernon Bavilla's testimony. People living in other areas have also told him that they support the position of Goodnews Bay.

Elsie Ross

Ms. Ross pointed out that there are not enough jobs in the community and that this proposed mining could provide more jobs. She works a full time job and feels that, during the winter, some people make her life difficult because they think that she is rich because she works..... that they dislike her because she has one of the few jobs in the community. She feels that if people were working they would be happier and things would be better in the community.

William Walters ("crooked man")

Concerned about heavy metals such as arsenic. He referenced a publication (University of Alaska Magazine -- Winter 1984(?)) describing the effects of arsenic on fish, including skin diseases and bacterial infection.

Referring to the large maps, which illustrated the subsistence and commercial resource use areas in color, he said, "Eskimo have no color", making the point that people harvest in areas where they find the resources, not only in the areas indicated by the maps. He was also concerned that mining would affect eelgrass and herring inside of the Bay.

James Smith

Weather and other factors affect the distribution of resources and we have to move around to harvest fish and game. You can't put these areas on a map. If commercial fishing is lost, we will lose the economy of this community. Subsistence is our food, if it is lost, who is going to feed our people?

He then provided the following resolutions and comments in support of the position of Goodnews Bay residents:

Resolution by RARA, 89-05
Resolution by CZMP, 89-02-01

Resolution by Akiachak Native Community 89-03-02
Resolution by Quinhagak Native Community
Letter from Rep. Al Adams, Kotzebue
Statement by Rep. Lyman Hoffman, Bethel
Resolution by Goodnews Bay Trad. Council, 89- -01

David Walters

State of Alaska agencies need to understand that there needs to be cooperation between people here and the State. This can't be done overnight.....we can't become White. The State and the community must get together to resolve the differences before this proposal goes any further.

Martha Galila

We don't want mining here. She mentioned the oil spill in Prince William Sound, dead sea otters and marine mammals.

Joe Beaver

He was born in 1909 in Quinhagak and moved to Goodnews Bay in 1921. He doesn't like the maps he sees and he doesn't want any offshore mining.

He does not want to hear any more talk about this offshore mining any more in Goodnews Bay. He wants no more meetings to talk about it. They have already said "NO". He thought that ANCSA said something about not bothering Native people. Still everybody is trying to regulate them. All of these things are destroying the Yup'ik way of life and, ever though he is old, he must fight it.

Louis Smith

Mr. Smith asked DNR if the consultants that made the maps had the names of the Goodnews Bay people that provided them the information used on the maps. DNR felt that the consultants had the names of the people they interviewed. Mr. Smith added that the maps were untrue and they were useless for people of Goodnews Bay, although they may be useful to White people.

Christian Small

At this meeting, you have heard good information from Goodnews Bay people. He expressed hope that DNR would allow the resources and lives of residents to continue.

William Walters

In 1983 or 1984 Ron Hyde got permission to put his camp on Kuitsarak Inc. land (Hyde operates a sport fishing operation on a site leased from DOT atop a traditional use site and cemetery near the mouth of Goodnews River near the airport). First he came to the people of Goodnews Bay and asked us for permission; we said "no". He went to the State of Alaska and they told him "yes". The money from this

lease did not go to help our people but went to the State of Alaska. Why didn't the State of Alaska ask our people first before leasing our land to Hyde ?

Wassillie Roberts

After 1991 the government will take over the land. When that happens the people of Goodnews Bay will lose some of their power to influence decisions affecting the land. The Goodnews Bay people still have a chance to develop a fishing group that could lobby for the interests of Goodnews Bay residents. At the present time it appears that many people think that the Goodnews Bay area is open for anybody to do anything they want, including this mining. We have a chance to do something (implying that if there was a local fishermen's organization, it would strengthen the communitiy's position that the area is being used and that local residents are currently active in matters affecting their resources and livelihood).

Bavilla Merrit

We are not playing games. We do not want this operation inside or outside of Goodnews Bay area. We are not only protecting the fish but also the ducks, marine mammals and the clean water. We want this area to stay as it is now and we do not want the water to look like it does in other areas (dirty). If our fish remain clean and unspoiled we would also be helping people in foreign lands who buy our fish. Our fish are also food for hungry people in other parts of the world so lets keep Goodnews Bay area clean.

Maggi Sholtz

If the water is polluted a large land area will also be impacted. During times of high tide, much of the surrounding low land area, even tose areas far from the shore, get flooded. Some of our borries and plants, that we depend on, will be contaminated.

John James

Maps are inaccurate information. Will these inaccurate maps be used to make the final decision ? (DNR answered that all of the information, including the public testimony, will be used). Mr. James continued by saying that the offshore areas outside of Goodnews Bay are also important to other residents of the YK delta because of resources migrating through the area.

Joe Beaver

If there was an oil or fuel spill, a very large area including the Yukon and Kuskokwim rivers would be affected.

Jessie Beaver

Wants DNR people at meeting to tell "boss" that the message regarding any offshore mining in the area is "NO".

He said that he wants the position of the Goodnews Bay people to be made clear to those who DNR will report back to. He also wants the position of the Goodnews Bay people to be broadcast on TV, radio and in the papers.

Martha Galila

Asked for a show of hands of all people who are opposed to mining as proposed in DNR's PBIF. All hands were raised.

Before the meeting ended Anna Phillips (CZM) suggested to DNR that the proposed lease be postponed for 10 or 20 years. Someone in the audience stated that 10 or 20 years is not a very long time.

STEVE COWPER, GOVERNOR

DEPARTMENT OF FISH AND GAME

DIVISION OF HABITAT

BOX 3-2000
JUNEAU, ALASKA 99802
PHONE: (907) 465-4106

March 21, 1989

Ms. Anna Phillip
Coordinator
Cenaliulriit
P.O. Box 1169
Bethel, AK 99559

Dear Ms. ~~Phillip~~ Anna:

Thank you for the Resolution of the Cenaliulriit Board of Directors concerning the proposal by the Alaska Department of Natural Resources (ADNR) to open portions of Goodnews Bay and the adjacent offshore waters to mineral exploration and possible offshore mining.

The Department of Fish and Game (ADF&G) has carefully studied the ADNR, Division of Mining (DOM) proposal and the associated Resource Assessment Report. In addition, we have conducted a review of our own fish and wildlife resource and human use data for the area, and we have reviewed published and unpublished information concerning the potential impacts of offshore mineral exploration and seabed mining on fish and wildlife and human uses.

Our studies have shown that: 1) there are intensive fish and wildlife and human uses of portions of the project area, 2) it is very important to maintain productive marine habitats to support these uses, 3) there are potential impacts of seabed mining on important benthic habitats and water quality, and 4) there is a significant likelihood that the mitigation measures necessary to protect fish and wildlife resources, habitats, and human uses could not be fully complied with within Goodnews Bay.

The department concurs with the Cenaliulriit Board of Directors that Goodnews Bay should not be opened for offshore prospecting permits or mineral leasing at this time. The department has similar concerns for Chagvan Bay. However, you may be aware that Chagvan Bay is a State Game Refuge that is not within DOM's current project area. Moreover, offshore mineral exploration or mining cannot occur there without the concurrence of the ADF&G.

11-A25LH