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332

HOUSE COMMITTEE REPORT

2/14

(9)
Date Referred: January 24, 1990 FURTHER REFERRALS: FINANCE

Date of Committee Action: 2/13/90

The RESOURCES Committee considered: SSHB 332

SS HOUSE BILL NO. 332 GOODNEWS BAY CRITICAL HABITAT AREA

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

RECOMMENDATIONS:
[ ] be replaced with _____ [ ] the same title [ ] a new title
[ ] have attached amendment(s)
[ ] do pass
[ ] do not pass
[X] no recommendation
[ ] individual recommendations
[ ] additional referral to the _____ Committee

ADOPTS: _____ letter of intent

ATTACHES NEW FISCAL NOTE(s): (Dept)
[ ] fiscal impact _____
(2) [x] zero fiscal note ADFG DNR
[ ] zero with analysis _____

APPROVES PREVIOUS: (Date/Dept)
[ ] fiscal note(s) _____
[ ] zero fiscal note(s) _____
[ ] zero fn/analysis _____

SIGNING DO PASS:

Cliff Davidson DAVIDSON
Mike Davis M.DAVIS

SIGNING: (Check approp column)

	Do Not Pass	No Rec	Amend
MENARD		X	
		X	
HUDSON		✓	
FURNACE	X		
NAVARRE		✓	

Cliff Davidson
CO- Chairman's Signature

FISCAL NOTE

REQUEST:

Revision Date: 6-Feb-90
Agency Affected: Natural Resources
Title: An Act establishing the Goodnews Bay Critical Habitat Area.
BRU: Mining Management
Land & Water Management
Sponsor: Hoffman and Davidson
Components: Mininge Management
Requestor: House Resources
Land & Water Management

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND&STRUCTURES						
GRANTS,CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0
CAPITAL						
REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND						
FEDERAL FUNDS						
OTHER						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary)

Prepared by: Larry Ostrovsky
Phone: 465-2400
Division: Commissioner's Office
Date: 6-Feb-90

Approved by Commissioner: Lennie Gorsuch
Date: 6-Feb-90
Agency: Department of Natural Resources

Distribution (by preparer) :
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

STATE OF ALASKA
1990 LEGISLATIVE SESSION

BILL VERSION: HB 332
PUBLISH DATE:

FISCAL NOTE

REQUEST:

Revision Date:
Title: Goodnews Bay Critical Habitat Area
Sponsor: Hoffman
Requestor:

Agency Affected: Fish and Game
BRU: Habitat
Components:

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES	0					
TRAVEL	0					
CONTRACTUAL	0					
SUPPLIES	0					
EQUIPMENT	0					
LAND & STRUCTURES	0					
GRANTS, CLAIMS	0					
MISCELLANEOUS	0					
TOTAL OPERATING	0					
CAPITAL	0					
REVENUE	0					

FUNDING: (Thousands of Dollars)

GENERAL FUND	0					
FEDERAL FUNDS	0					
OTHER	0					
TOTAL	0					

POSITIONS:

FULL-TIME	0					
PART-TIME	0					
TEMPORARY	0					

ANALYSIS: (Attach a separate page if necessary)

No FY 90 impact.

Prepared by: Frank Rue, Director
Phone: 465-4105
Division: Habitat
Date: 2/6/90

Approved by Commissioner:
Date: 2/6/90
Agency: Department of Fish and Game

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

STATE OF ALASKA

OFFICE OF THE GOVERNOR

BILL ANALYSIS

DEPARTMENT	DIVISION	BILL NUMBER	SPONSOR
Fish and Game	Habitat	CSHB332	Resources Committee

SHORT TITLE OF BILL: Goodnews Bay Critical Habitat Area and Goodnews Bay Management Plan

DEPARTMENT POSITION: Recommend amendments

PREPARED BY	DATE	COMMISSIONER'S SIGNATURE	DATE
Frank Rue	4.18.90	[signature]	4/18/90

SUMMARY

OTHER AGENCIES AFFECTED BY BILL	CONSTITUENT GROUP(S) AFFECTED BY BILL
Department of Natural Resources	Goodnews Bay Residents, Commercial Fishermen, Platinum Miners
ORGANIZATIONAL SUPPORT FOR BILL	**ORGANIZATIONAL OPPOSITION TO BILL**

FISCAL IMPACT: ☐ NONE ☒ FISCAL NOTE ATTACHED

BACKGROUND/LEGISLATIVE INTENT

The purpose of the bill is to establish the Goodnews Bay Critical Habitat Area, direct the preparation of a Goodnews Bay Management Plan and provide for the issuance of offshore prospecting permits and leases.

ANALYSIS OF BILL/PROGRAM EFFECTS

1. The bill establishes Goodnews Bay Critical Habitat Area and provides for management of the area under the State Critical Habitat Area Program. It establishes the purpose for which the area is to be managed and closes the area to mineral entry and mineral leasing.

2. The bill directs the Commissioner of the Department of Natural Resources to establish and revise a Goodnews Bay Management Plan for tide and submerged lands and waters south of Goodnews Bay to Salmon River.

3. The bill directs the Commissioner of the Department of Natural Resources to issue offshore prospecting permits and finds no further administrative action is required.

4. The bill establishes the March 9, 1989 Preliminary Best Interest Finding of the Department of Natural Resources as the interim management plan for the area covered by the Goodnews Bay Management Plan.

AMENDMENTS PROPOSED

(see attached sheet)

PLEASE ATTACH A SEPARATE SHEET FOR ADDITIONAL COMMENTS OR ANALYSIS.

Continuation sheet for Amendments for Bill Analysis CSHB 332

Amendments

Amend Section 1 to read as follows:

* Section 1. [LEGISLATIVE FINDINGS]. This Act establishes the Goodnews Bay Critical Habitat Area and directs the preparation of a Goodnews Bay management plan and the issuance of offshore prospecting permits and leases. In providing for the management of the Goodnews Bay ESTABLISHING THIS area, the legislature finds that

(1) Goodnews Bay is an area of high biological productivity that supports valuable commercial and sport fisheries and a rich and varied subsistence economy;

(2) [IMPORTANT] platinum prospects have been identified near Goodnews Bay; platinum is a strategic mineral that the Untied States now imports from other countries; [THE UNITED STATES BUREAU OF MINES HAS IDENTIFIED THESE COASTAL AREAS AS HAVING FAVORABLE POTENTIAL FOR THE DEVELOPMENT OF IMPORTANT ADDITIONAL PLATINUM RESERVES];

(3) in 1982, applications for offshore prospecting permits were properly filed under applicable state laws and regulations for land in the Goodnews Bay area;

(4) the Department of Natural Resources has properly processed these applications under applicable laws and has issued its Preliminary Best Interest Finding, dated March 9, 1989;

(5) the processing of the applications has resulted in the responsible agencies identifying the various opportunities, interests, and risks involved in the exploration and development of the platinum prospects in the Goodnews Bay area;

(6) in preparing the Preliminary Best Interest Finding dated March 9, 1989, the commissioner of natural resources has held hearings, solicited testimony, considered the applicable issues, and taken all steps required by applicable law to allow the offshore prospecting permits to be issued and exploration to take place;

(7) preservation of the fish and wildlife habitat in and around Goodnews Bay is crucial to perpetuation of the existing commercial and sport fisheries and the local subsistence economy; [MINERAL EXPLORATION AND DEVELOPMENT CAN BE CONDUCTED IN THE OFFSHORE COASTAL AREA OUTSIDE THE GOODNEWS BAY CRITICAL HABITAT AREA IN A MANNER CONSISTENT WITH STATE LAW AND RESOURCE MANAGEMENT POLICIES AND WITHOUT ENDANGERING THE HABITAT AND RESOURCES IN AND AROUND GOODNEWS BAY];

(8) certain areas within Goodnews Bay and the territorial water should be designated as critical habitat areas and other areas are more appropriately administered under general law;

(9) [RESPONSIBLE DEVELOPMENT OF THE PLATINUM PROSPECTS IN THE OFFSHORE AREA SOUTH OF TOWNSHIP 13 SOUTH, SEWARD MERIDIAN IS IN THE STATE'S BEST INTEREST UNDER AS 38.05.035(e) AND CAN BE CONDUCTED IN A MANNER CONSISTENT WITH APPLICABLE COASTAL ZONE MANAGEMENT PROGRAMS].

These amendments are recommended for accuracy and to omit findings of fact and findings of law not supported by any information provided in the bill or known to be available at this time.

Amend AS 16.20.630(a) to read as follows:

Sec. 16.20.630. [GOODNEWS BAY CRITICAL HABITAT AREA ESTABLISHED]. (a) The following described areas are established as the Goodnews Bay Critical Habitat Area: the state tideland below the mean high tide line, submerged land, and water of the state [ALONG KUSKOKWIM BAY FROM THE NORTHWESTERLY POINT OF SECTION 33, TOWNSHIP 12 SOUTH, RANGE 75 WEST, SEWARD MERIDIAN ALONG KUSKOKWIM BAY TO THE SOUTHEASTERLY POINT OF SECTION 32], TOWNSHIP 13 SOUTH, RANGE 75 WEST, SEWARD MERIDIAN, AND WITHIN GOODNEWS BAY] within:

Township 12 South, Range 73 West, Seward Meridian

Sections 17 - 36

Township 12 South, Range 74 West, Seward Meridian

Section 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 9 - 16

Sections 21 - 27

Sections 34 - 36

This amendment will make the legal description less confusing and eliminate redundant language.

Amend AS 16.20.630(d) to read as follows:

(d) The commissioner shall permit the reasonable construction, maintenance, and [THE REASONABLE] use of docking facilities within the Goodnews Bay Critical Habitat Area in a manner consistent with (b) of this section.

This amendment is necessary to clarify that land uses and activities in the critical habitat area will be managed in a manner compatible with the purpose for which the critical habitat area was established.

Amend AS 41.23.700(b) to read as follows:

(b) The commissioner may allow [SHALL PERMIT] mining under AS 38.05.185 - 38.05.275 within the area described in (c) of this section under terms established in the management plan that prevent the material interference from mining with fish migration and spawning within the area described in (c) of this section.

This amendment is necessary to allow the management plan process to determine under what conditions, if any, offshore exploration and development can occur in the Goodnews Bay Management Plan area so as to be compatible with protection of fish populations and their habitats. The Department of Fish and Game has objected to opening this area to offshore prospecting in the past.

Amend Section 4 Subsection (a) as follows:

* Sec. 4. [GOODNEWS BAY AREA OFFSHORE PROSPECTING PERMITS]. (a) The commissioner of natural resources shall, within 90 days [FROM THE EFFECTIVE DATE OF THIS ACT], after implementation of the Goodnews Bay Management Plan issue offshore prospecting permits in accordance with direction provided in the Goodnews Bay Management Plan [THE PRELIMINARY BEST INTERESTS FINDING OF THE DEPARTMENT OF NATURAL RESOURCES DATED MARCH 9, 1989, RELATING TO THE GOODNEWS BAY AREA, FOR ALL LAND LOCATED OUTSIDE THE GOODNEWS BAY CRITICAL HABITAT AREA AS

ESTABLISHED IN AS 16.20.630, ENACTED BY SEC. 2 OF THIS ACT.]

This amendment is necessary to establish the appropriate and logical decision making sequence. Because the primary issue in development of the Goodnews Bay Management Plan will be offshore mining activity, the issuance of offshore prospecting permits and leases needs to occur after, not before, the management plan is developed so that the management plan can provide guidance on this issue.

Amend Section 4 subsection (b) as follows:

> (b) A person holding a mineral lease, offshore prospecting permit, or offshore prospecting permit application within the Goodnews Bay Critical Habitat Area on the effective date of this Act shall be allowed, within 90 says after the effective date of the Goodnews Bay Management Plan [THIS ACT,] to exchange the lease, permit, or permit application for equivalent acreage outside the Goodnews Bay Critical Habitat Area on acreage not already subject to a lease, permit, or permit application. The land to be exchanged under this section is limited to acreage that is described in the March 9, 1989 Preliminary Best Interests Finding of the Department of Natural Resources and available for offshore prospecting as provided in the Goodnews Bay Management Plan and that is not already subject to a lease, permit, or permit application.

Exchange of applications should occur after decisions regarding where offshore prospecting activity will be, allowed have been made in the Goodnews Bay Management Plan. This will ensure that applicants choose from appropriate acreage.

Omit Subsection (c) of Section 4. Subsection (c) would require that offshore prospecting exploration and development occur before development of the Goodnews Bay Management Plan. This does not make logical sense since the primary decisions to be addressed in the Goodnews Bay Management Plan focus on offshore prospecting activity.

Omit Subsection (d) of Section 4. Subsection (d) makes findings regarding compliance with other statutes and regulations and the need for further administrative action. Assuming the issuance of offshore prospecting permits occurs as a result of decisions made in the Goodnews Bay Management Plan as recommended, compliance with other statutes and regulations will be assured. Furthermore, management of offshore prospecting permits and leases will require additional administrative actions on the part of the Division of Mining.

Omit Section 5. Section 5 states that the Preliminary Best Interest Finding of the Department of Natural Resources dated March 9, 1989 constitutes the interim Goodnews Bay Management Plan. A Preliminary Best Interest Finding is not a management plan and cannot effectively be used as one. Furthermore, the Department of Fish and Game has objections to portions of the Preliminary Best Interest Finding. The objections need to be worked out with the Division of Mining before the Best Interest Finding becomes final and can be implemented.

STATE OF ALASKA
1990 LEGISLATIVE SESSION

BILL VERSION: CSHB 332
PUBLISH DATE: 4/6/90

FISCAL NOTE

REQUEST:

Revision Date:
Title: Goodnews Bay Critical Habitat Area
Sponsor: Hoffman
Requestor:

Agency Affected: Dept. of Fish and Game
BRU: Habitat
Components:

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 91	FY 92	FY 93	FY 94	FY 95	FY 96
PERSONAL SERVICES	13.4					
TRAVEL	2.0					
CONTRACTUAL	1.0					
SUPPLIES	0.2					
EQUIPMENT	0					
LAND & STRUCTURES	0					
GRANTS, CLAIMS	0					
MISCELLANEOUS	0					
TOTAL OPERATING	16.6	0	0	0	0	0
CAPITAL	0	0	0	0	0	0
REVENUE	0	0	0	0	0	0

FUNDING: (Thousands of Dollars)

GENERAL FUND	16.6					
FEDERAL FUNDS	0					
OTHER	0					
TOTAL	16.6	0	0	0	0	0

POSITIONS:

FULL-TIME	1.0					
PART-TIME	0					
TEMPORARY	0	0	0	0	0	0

ANALYSIS: (Attach a separate page if necessary)

See attached

Prepared by: Frank Rue, Director
Division: Habitat
Phone: 465-4105
Date: 4/9/90

Approved by Commissioner:
Agency: Department of Fish and Game
Date: 4/9/90

Distribution (by preparer):
Legislative Finance
Legislative Sponsor
Requestor
Office of Management and Budget
Impacted Agency(ies)

Attachment to CSHB 332 Fiscal Note

ANALYSIS

Requirements in the bill that call for DNR's development if a management plan for the area beyond the Critical Habitat Area and the expedited issuance of offshore prospecting permits within 90 days would require ADF&G participation to ensure the protection of fish and wildlife habitats and the human use of fish and wildlife populations that utilize these habitats. The participation is presently unscheduled and unfunded and would require an FY 1991 fiscal note of 16.6 to cover the costs of 3 months of a Range 18 Habitat Biologist (Step 2), 2.0 of travel, and 0.5 in contractual expenses.

No fiscal impact in anticipated for FY 90, assuming the bill is signed into law at the end of the fiscal year.

PHIL R. HOLDSWORTH, P.E.
CONSULTING ENGINEER & LEGISLATIVE COUNSEL
MINING — GEOLOGY — LANDS

PHONE 907-586-1383

326 FOURTH STREET, No. 1009
JUNEAU, ALASKA 99801

January 30, 1990

Comments on SSHB 332 and SB 318
"An Act establishing the Goodnews Bay Critical Habitat Area; and providing for an effective date."

The following comments are presented on behalf of the Alaska Miners Association. The Goodnews Bay Mining District has provided the only platinum produced in the United States, beginning in 1916 with the annual production increasing to 37,000 ounces in a six-month's operation in 1938 - from a single operator. Production continued until 1975, and all production was from uplands.

Platinum is a critical/strategic metal and 93% of the nation's requirements are imported - from South Africa, the United Kingdom, and Russia. Renewed production from Alaska would certainly reduce the present imbalance of payments in international trade. The U.S. Bureau of Mines and the U.S. Geological Survey have conducted extensive surveys in this mining district in recent years indicating potential reserves, and have published their findings. These reserves are indicated both on-shore and off-shore lands. Renewed interest has been shown by the mining industry in this mining district.

An example of present-day mining technology practiced by the industry is best described by the Bima dredging operation of Westgold off-shore of Nome. Production has been on-going for the past three seasons and has had no adverse effects on the fishery. Environmental consequences of Westgold's Nome Offshore Placer Project after four years of study include:

1. After two to three years, substrate type. occur in the same proportion as surrounding areas.
2. No change in oxygen concentration in water column.
3. No change in trace metal concentrations of eight priority metals.
4. Within three years recolonization community structure is similar to control areas; community appears to be moving through successional maturation process.
5. No avoidance of mined areas by King Crab.
6. No trace metals being concentrated in king crab, fish or king crab food items.
7. Community recovery based on existing database is estimated at less than five years for sand substrate and seven years for cobble substrates.

It should be pointed out that platinum metal does not amalgamate with mercury. Its recovery is simply a gravity concentration process with the concentrates shipped to a refinery.

The Alaska Miners Association is opposed to this type of legislation which, by creating a "Critical Habitat Area" and "closed to mineral entry and mineral leasing", would prevent the production of a critical/strategic metal such as platinum. This is not in the best interest of the state and nation.

Respectfully submitted,

Phil R. Holdsworth

Phil R. Holdsworth

The Honorable Cliff Davidson, Chairman,
House Resources Committee,
Alaska Legislature,
P.O. Box V,
Juneau, Alaska. 99811.
(907) 465-2418 [FAX]

2/11/1990

Chairman Davidson:

INTRODUCTION

I write this letter to you for purposes of explaining my thoughts on HB 332, "An act establishing the Goodnews Bay Critical Habitat Area; and providing for an effective date." I am a former fisheries biologist who worked with various state and federal agencies in the State of Alaska between 1964 and 1984. One of those positions was as a forage fish biologist for Outer Continental Shelf studies in the Bristol Bay southern Bering Sea area including Goodnews Bay between 1976 and 1979. For one of those years, we were partially funded by the North Pacific Fisheries Council. At that time, like now, I resided in Kodiak and worked for the Alaska Department of Fish and Game.

My activities with the project terminated because my PCN was transferred to Anchorage, and I voluntarily moved to another general fund project with the ADF&G to remain resident in Kodiak. Subsequent to my fisheries career, I changed professions and I'm now a College Instructor at Kodiak College.

During my studies of forage fish, I co-directed activities on the ground; these were basically limited to AWL studies completed by field crews and myself. The aerial survey portion of the study was conducted by myself, and during the year of NPFC funding, other state biologists.

Please be advised that I'm making the testimony on short notice, and since I'm temporarily on creative leave in the State of Washington, I'm separated from all of my annual and quarterly reports and charts; hence, I'm forced to work by memory.

PERSONAL OBSERVATIONS

During my activities I flew aerial surveys into Goodnews Bay between six to ten occasions. In 1978 I had a field crew posted at Security Cove, which is comfortably within the migratory range of all the forage fish I shall discuss.

During two surveys in Goodnews Bay I observed spawning herring, and on two occasions I observed stranded male capelin (spawned out) on the outside of the spit where the store is located. On the first occasion that I observed herring in Goodnews Bay, I estimated the school to be approximately 15-20 tons; on the second occasion, I observed herring actively spawning, and the school(s) were larger than my first sighting by a factor of two or three. Sighting capelin schools on the outside of Goodnews Bay was a frequent experience, as was large schools of herring and/or forage fish between Security Cove and Namvak Bay.

The common resident forage fish of this area that were sampled consists of five species: 1)Pacific herring, 2)capelin, 3)boreal smelt, 4)eulachon, 5)sand lance. There are other forage fish species present, but I cannot state if they are resident in large numbers.

From my own observations, I conclude that the dominant

species of forage fish inside Goodnews Bay and immediately outside it are herring and capelin. Though I suspect that boreal smelt and sand lance are vital, I cannot state that with any certainty.

I have witnessed marine mammals and birds feeding on forage fish resources inside Goodnews Bay and between Cape Newenham and Goodnews Bay on hundreds of occasions, (e.g. gulls, kittiwakes, murres, cormorants, grey whales, and various pinnipeds and cetaceans which I could not identify.) Additionally, numerous marine crustaceans feed upon forage fish carcasses, (e.g. isopods [marine sow bugs], amphipods [sand fleas], copepods [fish lice], decapods [crabs & shrimp], etc.).

COMMENTARY

I believe it is poor policy to legislate resource and habitat management on a regional level; also, I think it is poor policy to alter state statutes for each user group conflict that occurs. Clearly, domestic platinum resources are rare and the industrial need for platinum is established. Mr. Smith's testimony indicates that all the platinum production in the Goodnews Bay area since 1935 has roughly equaled a single year's production of that metal from the U.S.S.R. and the United Kingdom, not including the Republic of South Africa which greatly exceeds all the former. I wonder if these figures adequately support the significance of this area as a platinum producer?

Forage fish are a clear and established contributor to the food chain in the Bristol Bay area, as well as north of Cape Newenham. They are primary forage for many species of finfish, including several species of salmon which are critical commercial species in this area. My surveys between 1976 and 1979 clearly indicate that Alaska Natives utilized herring and capelin resources for subsistence purposes. Other studies, both before and after my activities, have established this. Pacific herring is an important commercial species in its own right, and capelin's commercial importance is now in the developmental stage.

Early in this century estuarines became recognized by many biologists and oceanographers as irreplaceable contributors to the primary productivity of continental shelf areas. The steady decline of total estuarine acreage and/or their pollution in the United States and abroad has become a high-profile environmental problem for all policy makers in coastal governments.

Goodnews Bay is one of the many valuable estuarines that contribute to the Bristol Bay area. In fact, it is the sheer number of these estuarines that powers the ecological mechanisms supplying the large amounts of feed needed to support the massive population of juvenile sockeye salmon that have become such an irreplaceable contributor to our state's economy. The loss or compromise of one of those estuarines, I feel, is something your committee should approach with the utmost caution.

CONCLUSION

I think there should be a state estuarine advisory group mandated; this might avoid some of the problems that have immediately preceded the introduction of this bill. Such a

other coastal areas. Experience with such advisory groups, I feel, is positive.

Is there presently a State estuarine policy statement and/or guidelines in existence? If there is, how does it apply in the present situation? If there is not, one should definitely be developed ASAP.

In view of the evident immediacy of dredge activities in Goodnews Bay, I support the passage of HB 332. I do this despite my stated reservations because of the environmental reasons stated in the discussion section of this testimony. I would advise--if possible--that a sunset provision be inserted in the bill by amendment, especially if workable mechanisms come into existence that will address user group conflicts in respects to environmental concerns.

Thank you for your time, Mr. Chairman. If there are any further questions, I would be happy to be of service.

IRVING M. WARNER

Irving M. Warner

[Permanent]
BOX 3073,
Kodiak, Alaska.
99615

[Temporary]
381 Farnsworth Place,
Sequim, WA. 98382

Thank you, Mr. Chairman.

For the record, my name is Bob Herron, staff assistant to Rep. Lyman Hoffman. The Finance Co-chairman is holding a DOT/PF subcommittee hearing at this time and apologizes for not being available. He has asked that I make a brief statement to this committee on his behalf.

The area outlined in the bill is home to a multitude of marine life that the Yu'pik people of the YK Delta have relied on for centuries. Abundant herring, salmon and smelt, the endangered Gray whale, the rare Stellar sea lion, beluga whales, and thousands of ducks, geese, and swans all frequent the Goodnews area.

Rep. Hoffman introduced this legislation before you today in response to DNR's proposal to issue offshore prospecting permits in and around Goodnews Bay. A proposal that is based on a questionable and flawed Resources Assessment Report.

It is Rep. Hoffman's understanding that there is no empirical knowledge of offshore platinum deposits in the Goodnews Bay area. Also, technology to harvest the **micron sized** placer platinum deposits of the Goodnews Bay area by conventional gravity sediment filtration systems does not currently exist.

The proposal by DNR is highly speculative and would gamble that a unique environment would be exposed to sediment and toxic heavy metals in the hopes that a suitable technology **may** be developed.

This critical habitat designation does not forever close mineral exploration. This legislation insures that suitable offshore dredging technology is developed and proven first in a less environmentally sensitive location prior to its being possibly employed in Goodnews Bay.

Rep. Hoffman requests your favorable consideration of the teleconference participants' testimony.

Thank you.

Cenaliulriit Coastal Management District
For the Yukon-Kuskokwim Coastal Resource Service Area
P.O. Box 1169 • Bethel, Alaska 99559 • 907/543-2243

February 7, 1990

Cliff Davidson, Co-Chairman
House Resources Committee
P.O. Box V
Juneau, Alaska 99811

Re: House Bill 332 "An Act establishing the Goodnews Bay Critical Habitat Area, and providing for an effective date".

Representative Davidson:

First of all I would like to remind the respected members of the House Resources Committee, Cenaliulriit Coastal Management Program was Federally approved in 1985 and has authority under Alaska Statutes 46.40.110. We represent over 40 villages and 48,000 square miles of the Yukon-Kuskokwim delta.

1) The 56 villages of the Association of Village Council Presidents (AVCP) fully support the opposition of the Offshore Prospecting Permit, and passed a resolution during the AVCP Annual Convention at the village of Kalskag in October 1989.

2) House Bill 332 reaffirms Cenaliulriit Coastal Management District's (CCMD) position to establish the Goodnews Bay Critical Habitat Area. The area is "essential" for fish and wildlife habitats sensitive to major development. The area is also important for subsistence and commercial harvests. Recreational activities also occur within the vicinity of Goodnews Bay.

3) There may be a significant public need for the proposed use or activity in the Offshore Prospecting Permit, but I remind the members that there are other sources available onshore.

4) The meterological and oceanographic conditions of Bering Sea is adversely unpredictable, and there is no current technology available to ensure long term protection of the fragile ecosystem and impacts to all our concerns versus a short term project which will benefit a few.

5) CCMD has determined the project or activity to a proposed Offshore Prospecting Permit and the Department of Natural Resource's leasing intent inconsistent with CCMD's policies and the requirements under the Alaska Coastal Management Program. Because land and water resources are so interdependent, protection of the entire ecosystem is essential.

SPECIES OF CONCERN

The species of concern are herring fish, presently threatened by domestic and foreign interferrence. Sea lions which have been declining over the years is also threatened. Elders of that area also stress tideflats and wetlands are used as stagging areas and as feeding grounds at low tides by the migratory waterfowl. Three species of waterfowl are already threatened, and one is endangered.

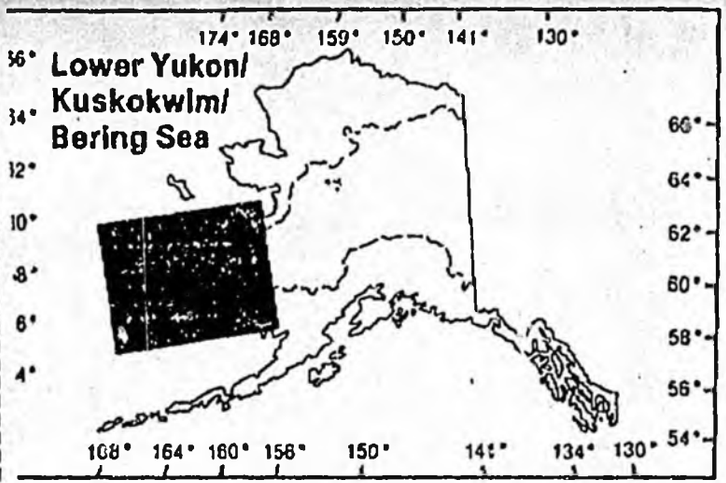
The western two-thirds of the of the Bay were designated critical habitat for capelin and herring spawning. (See illustration, dark lines, Cape Newenham to Goodnews Bay.) Food sources and natural habitats and spawning areas are threatened.

The area of interest for prospecting directly block and interfer with the migratory route of the anadromous fish species of salmon, which return to spawn in the watershed areas of Goodnews Bay. This interference will undoubtedly disrupt and impact the already threatened species.

All species mentioned above depend heavily on the areas natural balance.

ENDANGERED SPECIES

An endandered species of concern is the gray whale already known to feed on herring during their spring migration through the affected area.



nitions for map categories can be found in the Alaska itat Management Guide, Western and Interior Regions Map s.

nore detailed information, such as cases where data are too ll to portray at this scale, see the Alaska Habitat Manage- t Guide Reference Maps, Western and Interior Regions.

SCALE 1:1,000,000

0 10 20 30 40 50 Miles

10 0 10 20 30 40 50 Kilometers

ALBERS EQUAL AREA PROJECTION

STATE OF ALASKA
DEPARTMENT OF FISH AND GAME
HABITAT DIVISION
1986

KUSKOKWIM BAY

Kiglusuk

Kwigluk I

Kwigillingok

Eek

Quinhagak

Carter Spit

Goodnews

Goodnews

Knews

South Spit

Platinum

AREAS OF CONCERN

SPAWNING AREAS

Cape Newenham

Chagvan

Tongue Pt

165° 58° 164° 163° 162° 161°

SUBSISTENCE, COMMERCIAL AND SPORT FISHING

Goodnews Bay River, its middle fork and south forks, small creeks, sloughs and rivers, including ponds, lakes and the bay itself are all interdependent; just as subsistence, commercial and sport fishing in those areas are all threatened.

RESOURCE ASSESSMENT REPORT

We must note the Resource Assessment Report (RAR) is to be rewritten due to the "conflict of interest" on the part of a chief consultant who prepared the report also having financial interest in the Offshore Prospecting Permit, creating questions to the integrity of the report. The Alaska Coastal Policy Council met on January 30, 1990 and recommended that the Resource Assessment Report be rewritten.

DISTURBANCE OF OCEAN FLOOR

The RAR acknowledges that "...inside the Bay, turbidity would increase and depending where the spoils were deposited part of the Bay may be covered with a layer of sediments. If this were to cause destruction of eelgrass beds, a decline in the commercial herring fishery would probably result." The RAR also recognizes that Goodnews Bay is naturally turbid and that some areas may be at the limit of acceptable turbidity for survival of eelgrass, which is essential habitat for herring spawning.

INTERFERENCE WITH CURRENTS AND CIRCULATION

According to the RAR, "...dredging... will cause sediments to swell, thereby creating islands or areas of shallower water and somewhat restrict local navagation."

Such heavily silted process water will undoubtedly affect the environment into which it is discharged. The effects of depth and

channel changes will be caused by removal of material from the floor of the ocear, including changes in fish migration and changes in circulation and flow that will affect habitat quality.

NATURAL CURRENTS

Kuitsar, Inc. provided an illustration identifying natural currents inside and outside Goodnews Bay. CHARLIE KAVELELA [redacted], 75, a long time resident of Goodnews Bay was a valuable source. He travelled extensively between the Kuskokwim Bay, Bristol Bay and Goodnews Bay as a fishermen and has extensive knowledge from on-site observations over the years.

Currents flow into the Goodnews Bay estuary from the area of the Proposed Offshore Mining. The inflow and outflow of increased turbidity flowing in from the proposed area will create a double doseage of constant destruction. (See illustration).

ENTRAINMENT

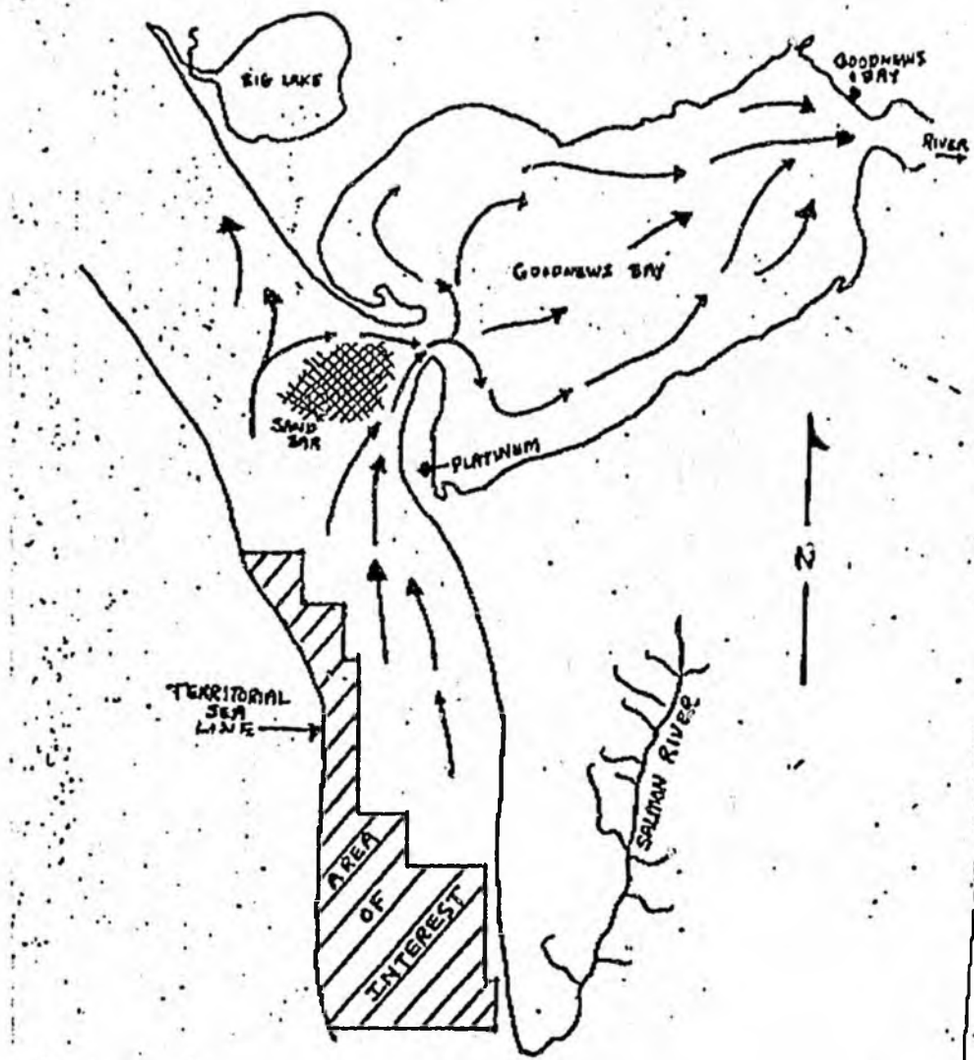
Even if entrainment of larger fish can be prevented, there will be a problem with destruction of smaller fish and pelagic organisms, with predictably adverse effects on subsistence and commercial fishing.

NOISE AND OTHER DISTURBANCE

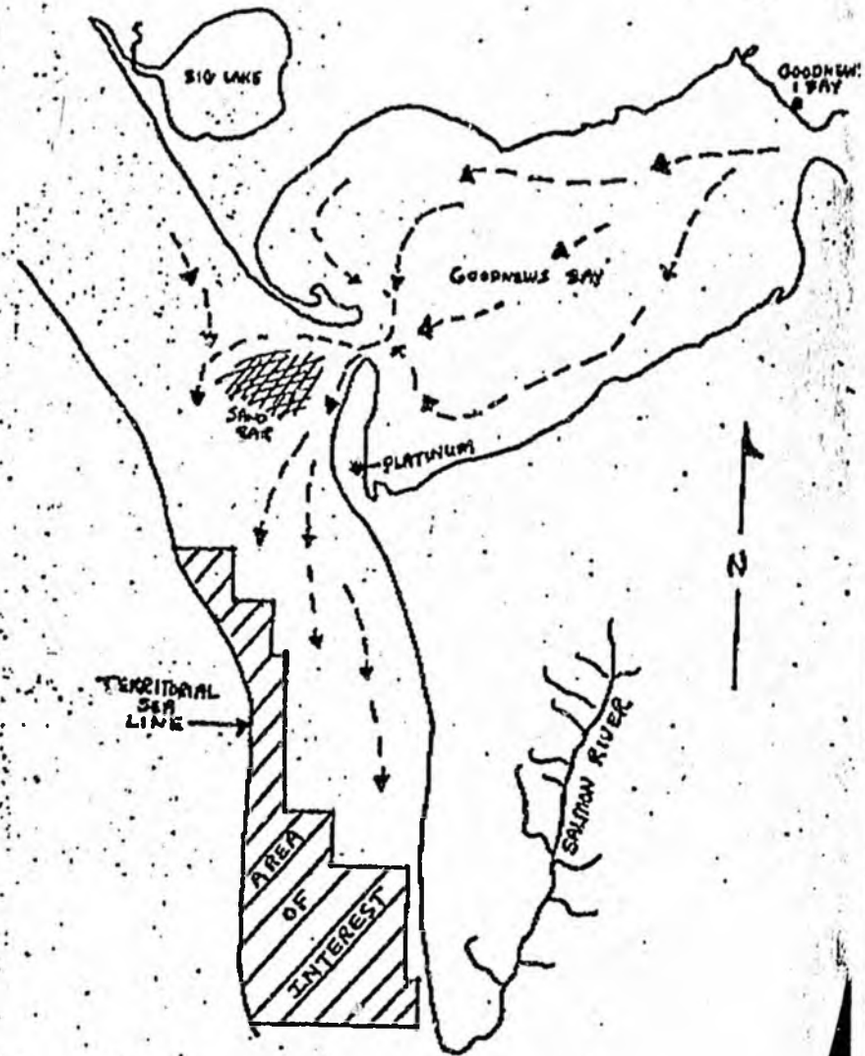
Noise, dredging, human presence, boat and aircraft activity will dramatically increase impacts to fish and wildlife in the migration routes and habitat areas.

HAULOUTS

The RAR indicates that sea mammals are present and haul out year round, near the North and South spits.



INCURSION
(RIP TIDE)



EXCURSION
(EBB TIDE)

MERCURY LEVELS

According to the federal Environmental Impact Statement on Norton Sound, "...mercury exists naturally in the Bering Sea." I may cite literature found by Kim Sundberg, Habitat Biologist of ADF&G, "It should be noted that persons who consume large amounts of seafood, including residents of Western Alaska have been found to contain high levels of mercury...Marine mammals in the Bering Sea such as seals have also been found to contain significant amounts of murcury." Such findings do show the seriousness of our concern for human health.

In conclusion, we strongly urge the House Resources Committee to support House Bill 332, to prevent a very destructive chain reaction. Our program requests to situate the proposed new development where it will not harm the resources or further frustrate the management efforts of fish and wildlife agencies. Productivity could be damaged by poorly conceived development. The ability of fish and wildlife suddenly to adjust to environmental chanages is limited. The pollutants common to modern industrial society are not compatible with fragile arctic habitats. Nearly a quarter of a million gallons of intermediate fuel oil and deisel fuel oil was spilled recently at St. Matthew Island, even the normal wastes from the villages, as they presently exist, are harmful. Support House Bill 332.

Qu'yana, for your time.

CENALIULRIIT COASTAL MANAGEMENT DISTRICT
Paul Chimiugak, Chairman

John J. Oscar

John J. Oscar
Program Coordinator

cc: Distribution

HAROLD SPARCK

Date: February 2, 1990

Presentation to the Alaska House of Representatives' Resources Committee on H.B. 322 and OPP in Goodnews Bay

I participated in the House Resources meeting last week. I listened to testimony from the Alaska Miners Association, and Tony Smith representing the OPP applicants. Both opposed the critical habitat designation for Goodnews Bay. I believe that some of their statements were inaccurate.

I wanted to participate in the discussion going on between Committee members and those in the room to set the record straight. Those of us on the teleconference were not asked, and I did not know Committee protocol.

I have two points to make at this time, and a conclusion.

1. The Alaska Miners Association mislead the Committee on the that proven economical deposits exists offshore of Goodnews Bay. The Goodnews Bay Mining District OPP's are therefore speculative.

a. I recently completed a literature search on Goodnews Bay. Unless new data is available through the Federal Bureau of Mines that was published in late 1989, there is no empirical knowledge of offshore platinum deposits in the Goodnews Bay mining district. There is mention in the literature of a positive show in the area seaward of the Salmon River, which is to this date, still unconfirmed.

Literature citation:

1) "Reliable quantitative analyses of beach and offshore sands around the Goodnews Bay Mining District are limited and the potential for economically extracting marine placers remain largely unknown....This study undertaken....to evaluate the offshore and coastal placer potential....possible economic concentrations of PGM [platinum group metals]... are hypothesized [my italics].
A Review of Favorable Offshore and Coastal Depositional Sites for Platinum-Group Metals in the Goodnews Bay Mining District. Zelenka. DOI-BOM. 1988

2) "Economically significant concentrations of PGM have not been reported in offshore or beach deposits between Goodnews Bay and Chagvan Bay." ibid.

3) "Page and others cite identified PGM resources of 5 million t oz contained in offshore deposits near Red Mountain and vicinity...; At the time of this report, however, no viable deposits have been delineated. Foreland and offshore exploration by the industry since

the 1930's have been inconclusive, and most analytical data from these activities are not available."
Placer Platinum-Group Metals Offshore of the Goodnews Bay Ultramafic Complex, Southwest Alaska. Barker and Lamal. DOI-BOM. 1988

4) Conclusion: "It has long been suspected that placer PGM may occur in deposits offshore of the Goodnews Bay ultramafic complex. Although nearby have produced 650,000 t oz. PGM, no offshore deposits are known."
ibid. 1988

2. That the technology to economically harvest and make a profit from dredging of the micron size platinum placer deposits does not currently exists.

a. Both DNR and supporters of the OPP applicant mislead the committee into believing that if platinum is found offshore, that it will be mined. The Committee was mislead into believing that universal economies of scale existed for offshore placer mining. Available literature demonstrates that the minute quantities and micron in diameter of Goodnews platinum placer deposits are beyond current technology.

Literature Citations:

1) "The United States produces only 1-2 percent of the platinum metals that it uses....More precise evaluation of these (U.S.) resources will not be possible without improved analytical techniques for the platinum-group metals at concentration less then 10 parts per million. The current lack of such techniques greatly hinders geological, geochemical, petrological, and mineralogical research necessary to evaluate the potential platinum resources.
United States Mineral Resources: Platinum-Group Metals. Page, Clark, et. al. U.S. Geologic Survey Professional Paper 820.

2) "The PGM and gold occurrences in this report coupled with geophysical data and geological observations suggest the offshore is favorable for placer PGM with associated gold and provides several promising exploration targets. Recovery of PGM and gold from low grade sediments, however, will require innovation beyond standard placer processing techniques."
Placer Platinum-Group Metals Offshore of the Goodnews Bay Ultramafic Complex, Southwest Alaska. Barker and Lamal. DOI-BOM. 1988

3) "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 calculations of minable reserves and 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 grain have been lost during on-shore dredging operations.
A Review of Favorable Offshore and Coastal Depositional Sites for Platinum-Group Metals in the Goodnews Bay Mining District, Alaska. Zelenka. DOI-BOM. 1988

3. Conclusion

The current proposal by DNR and the prospector are speculative. The technology to economically mine micron size PGM placer deposits does not currently exist. DNR is suggesting that during the ten year period of the OPP that technology will be developed.

This is all wishful thinking being proposed in a very sensitive and highly productive estuary and nearshore ocean area that offers critical habitat: spawning, rearing, and transportation corridors; for all forms of sea life. In addition, the area is the lifeblood of the two local villages that are solely dependent on the current biological situation. The near shore tidal movements along the shorefront between Chagvan Bay and Goodnews Bay would sweep silt and toxic metals into the estuaries during both tidal incursions and excursion, threatening the eel grass which is the unique substrata supporting the area's biota.

We remain in support of Representative Hoffman's HB 322. We believe that the critical habitat designation will underscore the importance of environmental conservation in this zone. This designation will discourage speculative offshore ventures promoted by DNR, which used Resource Assessment information produced by the OPP applicant to make its Preliminary Best Interest Funding.

By statute, critical habitat designation would further require any future offshore dredging technology be developed and proven first in a environmentally less sensitive location prior to its being employed in the Goodnews Bay mining district.

File: Cena1-2.90

Testimony to House Resource Committee on HB 332

February 6, 1990

Mr Chairman and members of the committee. My name is Greg Roczicka and I represent Nunam Kitlutsisti, a non-profit organization which addresses natural resource issues affecting the 56 villages in the Y-K Delta region. Thank you for the opportunity to provide further input into this very important piece of legislation.

I observed four major points of contention brought out during last week's hearing...

1. that this bill represented bad policy by precluding further development in the area of interest without giving developers a fair chance at the resource; 2. that prevention of mining in the designated area was a threat to national security due to platinum's status as a strategic mineral; 3. that concerned entities of the Y-K region did not understand the developers plan well enough to present a realistic opinion; and 4. the environmental concerns surrounding the maintenance of a highly productive ecosystem which already supports healthy and heavily integrated use patterns by man and nature alike.

The first three contentions are completely unfounded and a sad misrepresentation of the true situation, and the fourth presents a whole host of issues within itself.

First, this bill does <u>not</u> represent bad policy. It is a very appropriate response measure which addresses very legitimate environmental and socio-economic concerns that would otherwise be overridden by devoted interests which are dedicated to

monetary gain regardless of the consequences. The complete shut-down of mining activities within the area which was repeatedly alluded to simply will not occur. Still available and not affected by the bill are onshore/upland areas with equally high or greater (and proven) potential for economically recoverable deposits.

To add to this point - upon review of the November 1988 study by the USGS of this offshore area on platinum potential (A Review Of Favorable Offshore And Coastal Depositional Sites For Platinum Group Metals In The Goodnews Bay Mining District, Alaska) we find in its Conclusions and Recommendations the following remarks; "Given the appx. size of the various potential deposits around Goodnews Bay sample spacing is probably sufficient to determine if economically minable grades and volumes are present" and further, "The USGS has estimated the hypothetical resources of sub-economic grade (emph. added) to be 155,500kg from offshore placers." and that "beach and offshore sampling results suggest this value to be very optimistic."

National security is not threatened by protection of this one small block where mining potential exists. The market, price, and availability of platinum has remained stable over the years from worldwide sources (enjoying specific exclusion in South Africa economic sanctions) and shows no indication of changing in the near or late future. The "national interest" issue is merely a sensationalist ploy by industry to advocate their desire to fully exploit all available possibilities and play upon your sensibilities.

When and if the Goodnews Bay area actually achieves a status of "national concern", then at the very least we may perceive this legislation as holding the area in trust as insurance against future needs. (If indeed recoverable deposits exist within.)

Additionally efforts are currently underway in other areas of the state to identify less controversial sites with potential for exploration and exploitation. Initial review by the USGS has already identified several areas which show considerable promise, throughout the Kuskokwim Mtns. geological corridor. It is known as well that onshore/upland mining is a much safer, simpler, and more lucrative means of obtaining the resource.

Regarding the suggestive statements that proponents of this bill from the Y-K region do not understand the true impact of the proposed activity is perhaps the most ridiculous allegation of all. They understand only too well, and quite frankly it scares the hell out of them.

They understand very well that the resource assessment on which the PBIF was based, was bought and paid for by the mining interests directly involved in the proposed development, and the resulting bias is obviously reflected by the document's narrative & conclusions.

They understand very well that this assessment did not include subsistence use data provided to them by ADF&G habitat division. They understand very well that because mining would have to occur during ice free months that seasonal restrictions in the area are not practical. They understand very well that proposed restrictions cannot effectively mitigate the potential negative impacts

of mining on marine habitat within the area. They understand quite well that the proposed activity severely threatens the survival of the Goodnews Bay eco-system inclusive of all the human and marine populations who depend upon it.

I remind you that once the eel grass, benthic populations, or bottom life is depleted through suffocation or lack of sunlight due to increased sedimentation and/or turbidity of the habitat area as a result of mining activity regardless of well-intended mitigation efforts, that also gone will be the herring which are already in trouble from irresponsible harvest activity by ocean and domestic fleets; the crab & halibut larvae which nurture there; and the waterfowl which depend upon it as a restorative/feeding area during migration, to name only a few of the more sensitive species which currently abound in the affected area.

Much was said as well that attempts to prevent the issuance and working of the OPP's are too extreme as the current attempt is only to "prospect". This is a blatantly misleading statement as anyone with experience in the industry or beauracracy knows that in practical application exploration and development are one and the same should a chance for profit exist. To quote Mr. Gallegher (Director of the State Division of Mining) from the Feb. 4 issue of the Anchorage Times, "Ms. Sheardown would automatically receive a lease from the state if a workable mineral deposit were found."

We do not oppose responsible or necessary development. However the proposed mining of the Goodnews Bay area does not qualify in

either category. The technology simply is not currently exist to safely carry out this type of offshore mining in a safe and practical manner. We are asking that you do not jeapordize this highly productive and sensitive area by giving mining interests a green light to go ahead and experiment with their technology in and around Goodnews Bay. In all responsible fairness and justification, these techniques should be developed somewhere that is not of such critical concern in creating such potentially devastating impacts to the renewable resources and peoples affected by the proposed action.

Gentlemen you cannot in good conscience thwart this bill from going forward. To do so would be to bow to totally speculative interests and sensationalized rhetoric. I cannot believe that any of you would be on this committee if you were that gullible or insensitive to the issues at hand.

Development of offshore mining is neither necessary or desirable in the Goodnews Bay area, and creates a myriad of conflicts against the state's best interests. It pits short term monetary gain for avaricious interests and endangerment of a fully utilized eco-system, over the long-term maintenance, use and protection of the area. Alaska needs diversification and stimulation of its economy to some extent, but not at the expense of a highly productive area such as Goodnews Bay represents. And especially not when economically viable options and alternatives exist to accomadate developmental and industrial interests. We urge that you move this legislation along its proper course with your full support and recommendation for a Do Pass status. Thank you.

STEVE COWPER, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINING

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February 1, 1990

Mr. Tony Smith
Davis Wright & Tremaine
550 W. 7th Avenue, Suite 1450
Anchorage, AK 99501

Dear Tony,

As requested, enclosed are various articles on the platinum resources of Alaska and the U.S. The literature is extensive and dates back to 1937 when the Territorial Department of Mines sampled and drilled beaches in the Goodnews Bay area.

I have spoken with the Anchorage office of the U.S. Bureau of Mines and they are prepared, if requested, to present an overview of the platinum resources in Alaska.

Please call me at 762-2165 if you have any questions about this material.

Sincerely,

Gerald Gallagher
Director

PLACER PLATINUM-GROUP METALS OFFSHORE OF THE GOODNEWS BAY ULTRAMAFIC COMPLEX, SOUTHWEST ALASKA

by James C. Barker and Kathryn Lamal

with a section on mineralogy by C.L. Mardock

with a section on beneficiation by W.C. Hirt

**********OFR 53-88

UNITED STATES DEPARTMENT OF THE INTERIOR

Donald P. Hodel, Secretary

BUREAU OF MINES

T S Ary, Director

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UNIT OF MEASURE ABBREVIATIONS USED IN THIS REPORT

^{o}C	degree Celsius	min	minute
cm	centimeter	mm	millileter
ft	feet	mph	miles per hour
g	gram	oz	ounce
in	inch	pct	percent
kg	kilogram	ppm	parts per million
kHz	kilohertz	psi	pounds per in^2
km	kilometer	sp gr	specific gravity
lat	latitude	sec	second
lb	pound	t	ton
lb/yd^3	pounds per cubic yard	t oz	troy ounce
long	longitude	um	micron, micrometer
m	meters	yr	year
mg	milligrams		
mg/yd^3	milligrams per cubic yard		
mi	miles		

PLACER PLATINUM-GROUP METALS OFFSHORE OF THE GOODNEWS BAY ULTRAMAFIC COMPLEX, SOUTHWEST ALASKA

By James C. Barker[1] and Kathryn Lamal[2]

with a section on mineralogy

by C. L. Mardock[3], and a

section on beneficiation by

W. C. Hirt[4]

ABSTRACT

In 1981 and 1985-1986, the Bureau of Mines conducted orientation studies of marine placer platinum-group metals (PGM). PGM are derived from the Goodnews Bay ultramafic complex and magnetic surveys show that the complex extends offshore at least four mi. The present seafloor was an emergent foreland as recently as 8000 years ago. High-energy ocean processes are transporting and depositing sediment such that PGM-bearing materials are reworked and later masked by barren littoral drift.

Exploration targets include 1) placers formed since present transgression began, and 2) ancient marine and drowned fluvial deposits. Additionally, there is evidence of PGM solution transport and accretion. At least minor values of PGM in Recent lag-type placers and possible submarine strands are concentrated along an offshore scarp incised through glacial deposits into the preglacial surface between Flat Cape and Red Mountain. Other Recent PGM-bearing features include Flat Cape shoal, Chagvan Bay, Salmon River delta, and modern beaches. Ancient placers include possible N-S fluvial systems 2 to 3 mi offshore, a nearshore scarp 50 ft below sea level, and strands adjacent to projected ultramafic bedrock slopes. The existance of ancient placers is dependent on depth of glacial erosion.

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[1]Supervisory Physical Scientist, Alaska Field Operation Center, Fairbanks, AK.

[2]

[3]Geologist, Alaska Field Operation Center, Fairbanks, AK.

[4]Mineralogist, Albany Research Center, Albany, OR.

Chemical Engineer, Salt Lake City Research Center, Salt Lake City, UT.

SEM studies show PGM are principally isoferroplatinum and osmiridium, with minor sperrylite, moncheite, and platiniridium. Gold is a co-product, and concentrates comprise chromite, ilmenite, and magnetite. Beneficiation tests successfully concentrated precious metals from natural blacksand accumulations, but failed to concentrate low-grade lag gravels.

INTRODUCTION

As part of an on-going assessment of strategic and critical minerals in Alaska, the Bureau of Mines investigated marine placer deposits near the village of Platinum in southwest Alaska (fig. 1). The village is named for the nearby Salmon River platinum mine and serves as the logistical center for the region. Platinum group metals (PGM) were first mined from placer deposits in the Salmon River drainage in 1926 when platinum grains were identified in creeks draining the Goodnews Bay ultramafic complex at Red Mountain 5 mi south of Platinum village. Over the subsequent years more than 650,000 t oz

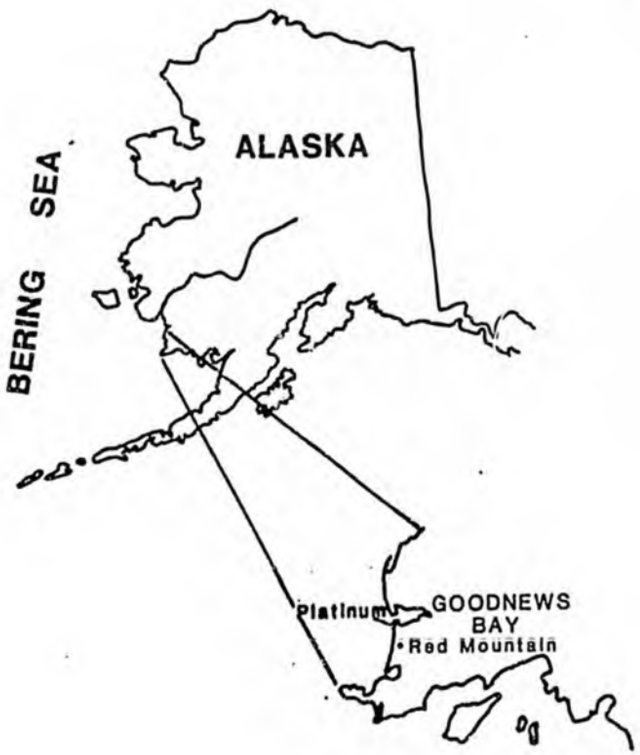

FIGURE 1. - Index map showing project area in southwest Alaska.

of PGM have been recovered by dragline and bucket-line dredge operations along the Salmon River (1-3).[5]

[5]Numbers in parentheses refer to items in the list of references at the end of this report.

It has long been suspected that placer PGM are concentrated in sediments in Goodnews Bay or offshore in the Bering Sea, west of Red Mountain. Page and others (4) cite identified PGM resources of 5 million t oz contained in offshore deposits near Red Mountain and vicinity: estimates based on limited field studies (5)[6] and on geologic inferrence to deposits elsewhere. At the time of this report, however, no viable deposits have been delineated. Foreland and offshore

[6]The U.S. Geol. Surv. performed reconnaissance level offshore studies in 1969. A report of their findings is being prepared concurrently with this report, and includes a more complete listing of references to the Goodnews Bay region (Barnes, Tagg, and Coonrad [in press]).

exploration by industry since the 1930s have been inconclusive, and most analytical data from these activities are not available (6). The most recent exploration took place in the early 1970s and there are reports that some drilling was undertaken. Exploration by Inlet Oil Corp. may have revealed recoverable concentrations of fine-grained platinum in sediments at a site offshore of Red Mountain (7), but no specific location is given and analytical tecniques at the time lacked the accuracy now available. Concurrently with the exploration by Inlet Oil, a series of academic studies under the auspices of Dr. J. R. Moore, University of Texas, Austin, focused on marine sediment transport, sedimentology, and trace element distribution in fine-grained sediments in the vicinity of Red Mountain (7-12). The results of those studies, particularly the sampling and magnetometer work by Bond (11) and Ulrich (12) provided direction for the 1981 starting point for investigations by the Bureau of Mines.

Part of the Bureau's program in Alaska, including the Exclusive Economic Zone (EEZ), is to appraise sub-economic and unconventional mineral resources, particularly those containing strategic and critical commodities, and to encourage their exploration and development by industry. Bureau investigations of chromium and PGM in the vicinity of Platinum, Alaska, are divided into two parts. The first was a study of the lode PGM in the Goodnews Bay ultramafic complex which is the source rock for placer PGM in the area (2-3); the report describes geologic investigations and includes assay results of approximately 1,000 churn drill holes by the Goodnews Bay Mining Co. in the Salmon River valley. The second part, which is the subject of this report, is an orientation-type reconnaissance of marine placer exploration targets and tests of various assessment techniques. The area investigated in this study includes the foreland, beach, and seafloor as far as four miles offshore. The offshore investigation included a magnetometer survey, low frequency acoustic profiling, bathymetric and geologic mapping, heavy mineral sampling, and mineralogical and beneficiation studies.

It is not the objective of the Bureau to make the actual discoveries of ore deposits but rather to investigate known occurences. Neither of the two parts of the Bureau's work were intended to, nor funded at a level needed to delineate a deposit or tonnage reserve. This was an orientation study only. It was also not possible to provide full areal coverage of the prospective favorable geologic units at this level of investigation. Although occurrences of PGM and gold were documented during the course of these orientation investigations, no discoveries of mineable or even sub-economic deposits were found.

ACKNOWLEDGMENTS

Several individuals provided helpful advice and support during the course of this investigation. Dr. J. Robert Moore, Professor, University of Texas, Austin, was a continuous source of assistance and encouragement since 1979. Helpful discussion, data, and manuscript review were provided by Mr. Steve Bond, former graduate student at the University of Texas, Austin. Manuscript review was also performed by Dr. Warren Coonrad, Geologist, U.S. Geological Survey. Technical advice, computer programing, and field assistance were given by Dr. Sathy Naidu, Professor, and his assistants John Smithisler and Dave Foster, Institute of Marine Science (IMS), University of Alaska, Fairbanks. During 1985 field studies, IMS and the Bureau jointly participated in cooperation with the French ocean institute, IFREMER (Institut Francais de Recherche pour l'Exploition de la Mer), which provided the vessel K-Way. Work in 1986 was partially supported by the Bureau's Salt Lake City Research Laboratory, Ocean Minerals Group.

Messrs. Dennis Southworth and Jeff Foley, authors of the companion report describing the Bureau's onshore work, contributed most helpful advice and field assistance toward understanding the offshore resource potential.

METHODS

Field studies were conducted during portions of the 1981 and 1985-1986 seasons, and were variously based onshore from the camp of the Goodnews Bay Mining Co., from facilities at the village of Platinum, and from a tent camp located above the beach in a semi-sheltered ravine south of Cabin Creek (fig. 2). Access along the shoreline for sampling, auger drilling, and geological mapping was gained by 4-wheel ATVs.

Limited work offshore was undertaken using motorized inflatable rafts that were launched, weather permitting, through the surf at the tent camp site. Seafloor mapping and underwater observation were done with use of SCUBA equipment.

Most offshore surveys were conducted from shallow draft vessels that provided living quarters as well as work area. In 1985, the French research vessel K-Way was used, and in 1986, the Fat Emma was contracted out of Dillingham, AK. It should be noted for the benefit of future investigations in the area, that support vessels must have shallow draft, preferrably no more than four feet, and be suitable for work during periods of prolonged foul weather. The lee of the South Spit of Goodnews Bay offers excellent anchorage and access to telephone and supplies at the village. Sheltered anchorage is also available

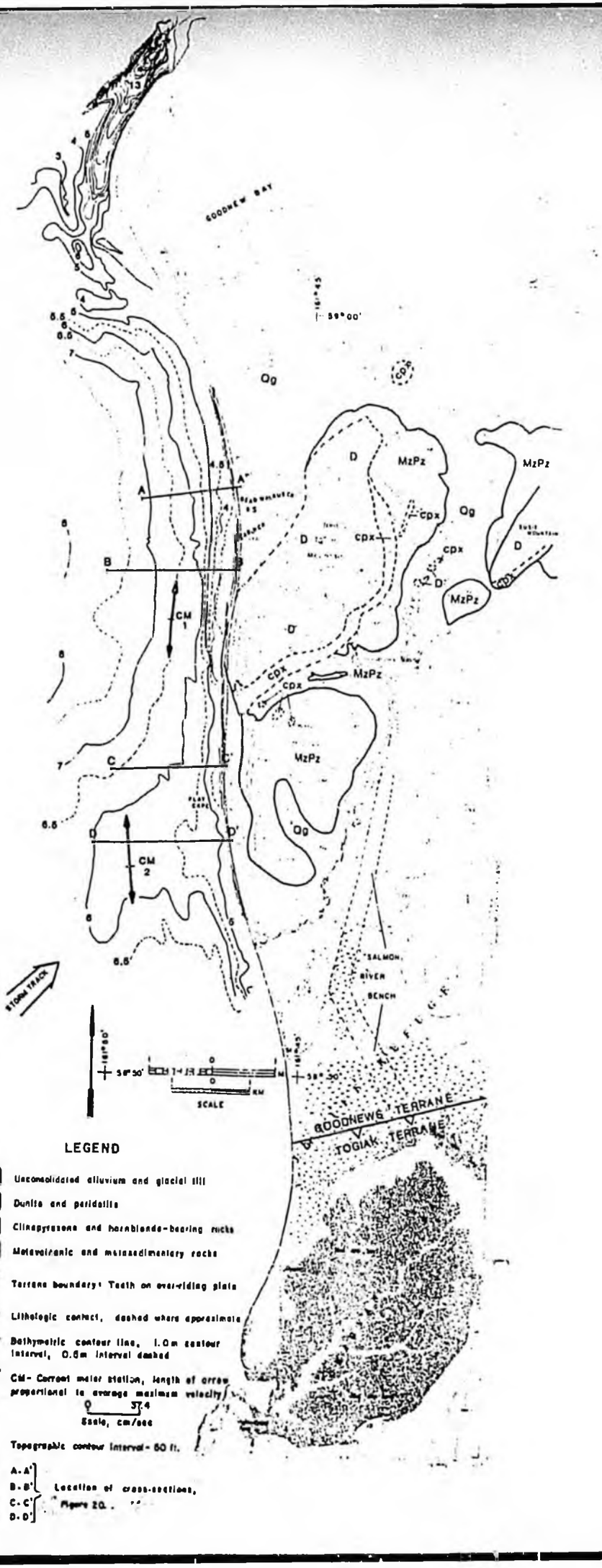

FIGURE 9 - Offshore bathymetry and current meter stations with onshore topography and regional geology

along the south side of Chagvan Bay, however the entrance into the bay is difficult to negotiate. Personnel working offshore must constantly be aware of the strong longshore currents that affect navigation, positioning, and underwater activities, and the incidence of sudden storms.

NAVIGATION

All sample sites and data recordings were located by latitude and longitude using Loran-C navigation (King Marine 8001 Loran-C Receiver)[7] with multi-position waypoint memory and instantaneous position printout (King Marine 1060) capacity. Positions were located to the nearest 0.01 minute. During geophysical survey transects, the general course was held by predetermined waypoints and verified by radar. Positioning was recorded simultaneously with data collection. Position and geophysical data were later correlated by computer.

[7]Use of trade and manufacturer names in this report does not constitute endorsement by the Bureau of Mines.

BATHYMETRY

Previously available bathymetry, except for the entrance to Goodnews Bay, was limited to widely (approximately 1,000 ft) spaced soundings most of which were located further offshore than the area under investigation. For this project, bathymetric data was compiled for the area between the entrance of Goodnews Bay and the mouth of the Salmon River and extended offshore for about 3 to 4 mi (6.5 km; fig. 2). Soundings were profiled along survey lines with a chart recording depth finder (King Marine 1060) and a location was fixed every 20 sec according to the above description. Tidal variation corrections were simultaneously recorded at a pre-established tide gauge station located on the seafloor at current meter station CM-1. The gauge (Aandera WLR-5) had a pressure range of 0 to 400 psi with a resolution of 0.001 % at full scale. Tide gauge readings were automatically recorded every 15 min for five days while surveys were being conducted, and the stored data computerized with the depth soundings to correct to mean low tide. A maximum tide range of 8.43 ft (2.57 m) was recorded. Data were plotted by computer and manually contoured using 1.64 ft (0.5 m) contour intervals.

CURRENT METER STATIONS

Current meter data were collected at two stations, both of which were several miles from Red Mountain (fig. 2). The stations were located to determine the differential in longshore currents between those that flow across the top of the Flat Cape shoal and those across a deeper, presumably depositional area 3.9 mi (6.32 km) to the north. Data were collected only for the period of August 1-7, 1985, and are presented on figure 2 as vectors representing the average northerly and southerly components. The approximately opposite directed vectors reflect the periodic reversal of longshore currents due to the reversing tidal current. The magnitude and differential velocity between the stations

were calculated and are discussed and compared in the Interpretation section.

Current meters (Aandera RCM-4) were anchored approximately 3 ft (1 m) off of the seafloor and have a specified accuracy of $\pm 5^0$ at velocities of 2 to 39 in (5 to 100 cm)/sec. Readings were taken every 15 min and stored internally on magnetic tape.

MAGNETICS

An offshore total field magnetometer survey was conducted to determine the extent, if any, of the Goodnews Bay ultramafic complex under the seafloor. Due to the magnetic signature of the magnetite-bearing ultramafic complex, areas underlain by these rocks can generally be distinquished from areas underlain by nonmagnetic country rock.

The magnetic survey includes offshore transects and several onshore lines (fig. 3) that tie the survey to the known outcrop of the ultramafic complex (fig. 2). The offshore survey was conducted along lines parallel to the coast and spaced about 0.25 mi (405 m) apart. Magnetic data points were simultaneously located by latitude and longitude as previously described. To avoid magnetic interference from the vessel, the sensor unit (EDA Omnimag PPM 350) was mounted on a 4-ft (1.3-m)- vertical staff and towed 150 ft (46 m) behind in a nonmagnetic inflatable raft (fig. 4). A correction for this 150-ft-distance was made prior to plotting the data. The survey was conducted at a speed of about 2 to 3 knots (2.3 to 3.5 mph). The onshore data were collected with the same instrument mounted on a 10-ft (3.3-m)-vertical staff and positions were located on existing 1:63,360 scale topographic maps by hip chain and compass measurement from known map points. During all data collection, a self-recording base station (EDA Omnimag PPM 400) was established onshore to monitor diurnal magnetic variation which did not exceed 10 gamma during the survey. Both the field and base station data were recorded automatically and a field computer (EDA DCU 400 thermal printer) was used to correlate the two sensors and provide printouts of the corrected data. The corrected data for each line was then profiled.[8]

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[8]Corrected magnetic field data and profiles are available upon request from U.S. Bu Mines, 206 O'Neill Bldg., Fairbanks, AK 99775.

Following the survey, magnetic and location data were computerized and gradients of 250 gamma above and below the determined mean value (53,162 gamma) of the entire data set were determined. The data set was plotted by computer and manually contoured at these gradients. Results are discussed in the Interpretation section.

LOW-FREQUENCY ACOUSTICS

Simultaneous with the collection of the magnetometer data, seafloor profiling was done with a transceiver using a low frequency transducer operating at 7 kHz (Raytheon RTT-1000A). The objective was to ascertain the extent of loose, high-energy sand and fine gravel

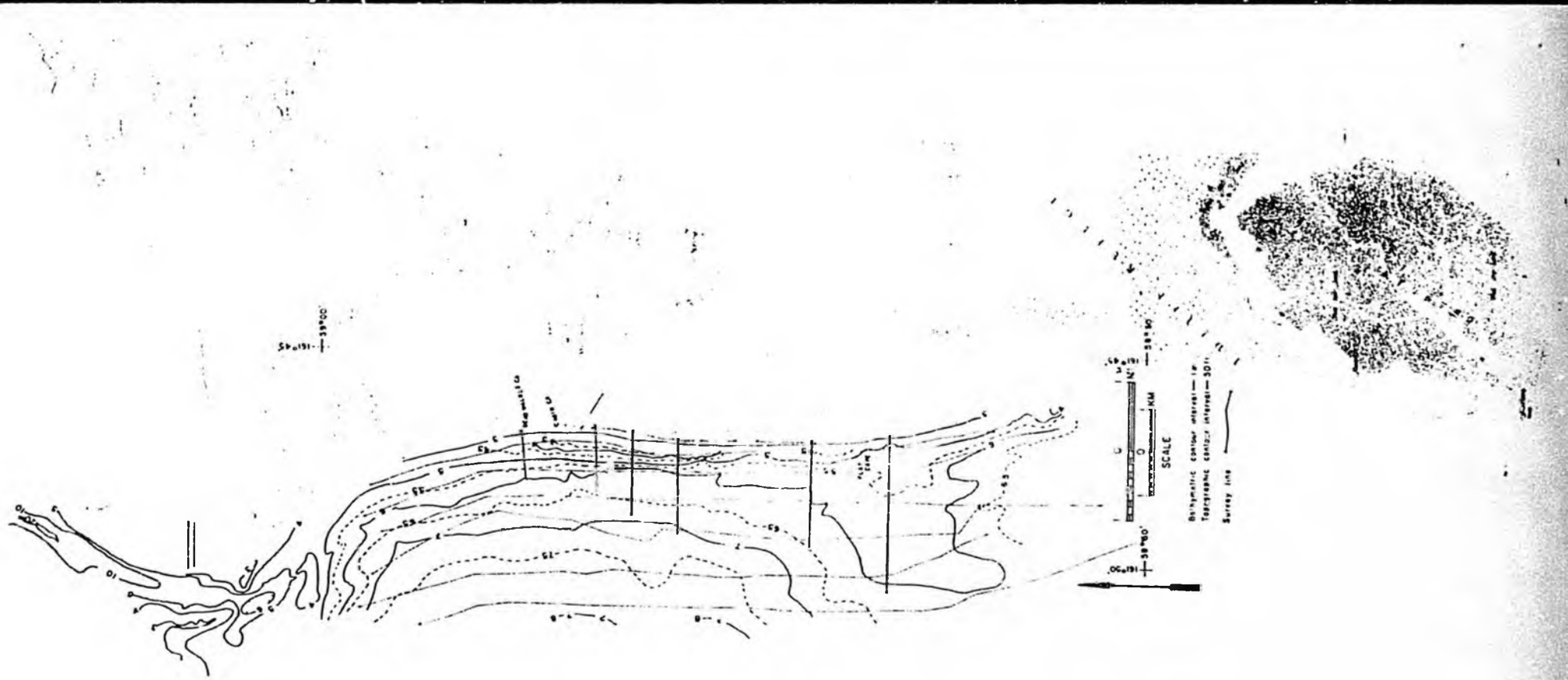


FIGURE 3. - Map showing location of offshore survey lines.

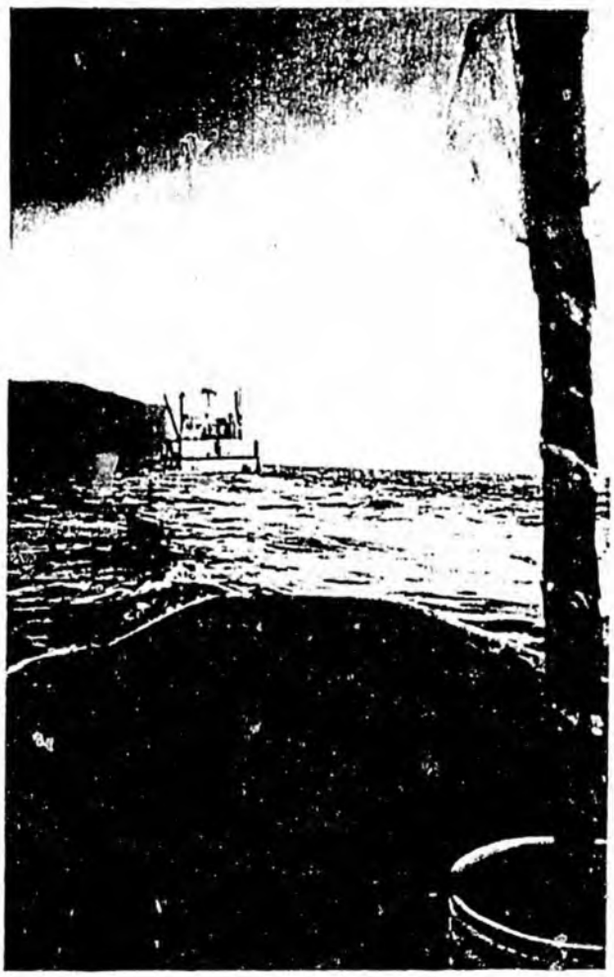


FIGURE 4. - Total magnetic field sensor unit on staff being towed in nonmagnetic raft on trackline parallel to shore. Red Mountain can be seen in distance.

deposits. Data were collected on chart strips and visually interpreted. Occurrences of multiple reflectors were spot checked by visual examination of the seafloor by divers. Isopachs of sediment depth to the second reflector were constructed from the data and plotted at contour intervals of 3.28 ft (1 m) (see discussion in Interpretation section).

MAPPING, SAMPLING, AND AUGER DRILLING

Unconsolidated sediments forming the coastal bluffs, beaches, and seafloor were sampled (fig. 5) and mapped. Sediments were classified according to their origin, lithology, and mode of transport. Aerial photography used to assist interpretation and included high-altitude

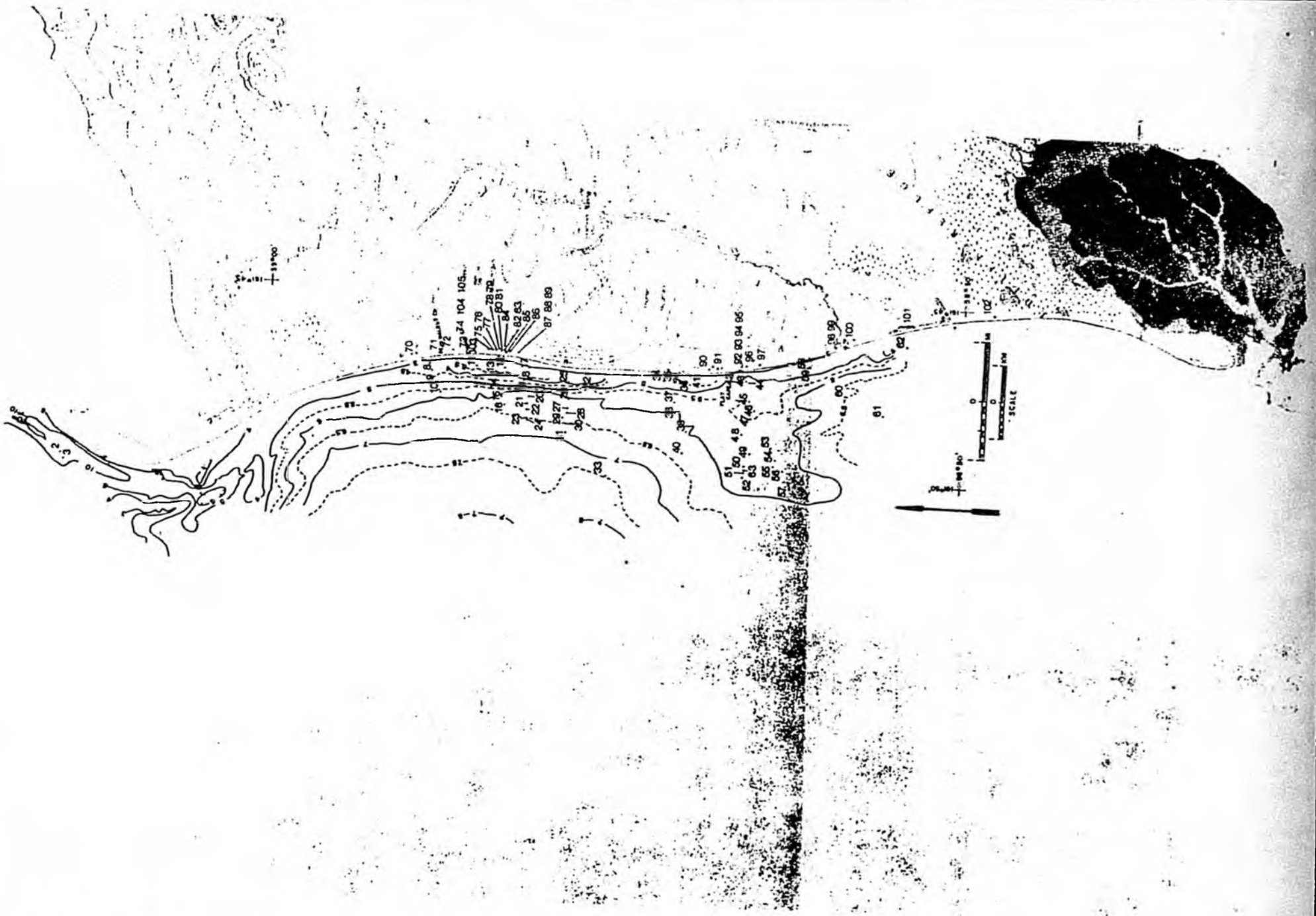


FIGURE 5. - Sample location map.

false-color photos flown in July, 1980.[9] Geologic cross-sections were prepared where sufficient information was available. Sampling was not

[9]Available from Alaska Photo Lab, Univ. of AK, Geophysical Inst.

confined to only areas or features estimated to contain PGM, but also included barren geologic features pertinent to the interpretation of the study area.

Several procedures were used to collect samples. Onshore, sediments were directly shoveled into buckets from the selected feature and weighed. Attempts to collect offshore samples using standard grab sample devices (Van Veen and Shipex samplers) had limited success due to (1) the limited amount of sediment obtained from each drop and (2) the problem of pebbles invariably jamming the devices partially open, resulting in loss of fine sediment while the device was being hoisted from the bottom. Sample values noted in appendix A as having been collected with Van Veen or Shipex samplers, should be considered as minimum values. Most seafloor samples were collected by shoveling into buckets while using SCUBA. Seafloor features and depth from which the samples were collected were also noted during the course of sampling.

Shallow auger drilling was performed at several beach sites (fig. x6). A portable auger, using 1.75-in (4.4 cm)-diameter auger flights, and powered with a chainsaw engine, was used. The auger stem required a tripod to remove it from the drill hole to recover the cuttings. Due to the clay content of the sediments, the holes generally

FIGURE 6. - Auger drillsite located on magnetic anomaly about 0.7 mi south of Cabin Creek (sample no. 77). West slope of Red Mountain is in right background, Bering Sea to left.

remained open so that drilling could be resumed. Holes were drilled to depths of 4 to 18 ft (1.3 to 5.5 m) and samples were collected from several intervals.

SAMPLE PROCESSING AND ANALYTICAL PROCEDURES

Samples generally consisted of 50 to 200 lbs (23 to 90 kg) of material prior to screening in the field. Site descriptions and other details are listed in appendixes A and B. Samples were screened at 20-mesh and the oversize fraction was examined, described, and split for sample archival. The undersize fraction was tabled to recover the heavy mineral fraction and table tailings were further processed by flotation using a precious metal, xanthate collector. Splits of the minus 20-mesh tailings were also retained for archival. The heavy mineral table concentrate was panned by hand to attempt recovery of native PGM and gold in a final pan concentrate of 0.066 lb (30 g) or less. Pan concentrates were examined under a binocular microscope and selected grains were removed for mineralogical characterization. Grains thus removed were later recombined prior to fire-assay analysis unless otherwise indicated.

Concentrates from the flotation cell and the pan concentrates were weighed and preconcentrated by fire-assay (1 assay-ton unit) using a nickel sulfide collector before platinum and gold analysis by direct coupled plasma (DCP).[10] In this manner, the entire recoverable platinum and gold concentrate from the original sediment sample was

[10]Analyses by Nuclear Activation Services, Inc., Ann Arbor, MI.

analyzed and the results reported in milligrams of metal present, provided no losses occurred during sample reduction. The foregoing procedure attempts to minimize the wide variance inherent to sampling material with random, particulate, high-value metal grains.

All particulate PGM and gold could not be completely recovered by panning and some remained in the residual heavy mineral fraction. Therefore, a 0.066-lb (30-g)-split of the heavy mineral fraction was analyzed for platinum by fire-assay followed by atomic absorption procedure, and for gold by direct irradiation on a fire-assay bead.[11] For samples in which platinum and gold were detected, these

[11]Analyses by Bondar-Clegg, Inc., Lakewood, CO.

values were included in the cumulative final assay value of the original sample site by dividing the analytical value (in ppm) by one million and multiplying by the weight (in milligrams) of the heavy mineral fraction recovered by tabling.

Placer deposits near Red Mountain, if present in the marine environment, may additionally contain by-product amounts of chromite, ilmenite, and magnetite. Analyses by X-ray fluorescence techniques for Cr, Ti, and Fe were performed and reported as weight percent of the heavy mineral fraction.

Volumetric weight tests of wet sediment were made in the field. Subsequently it was determined that a yd^3 of typical seafloor sediment weighs approximately 3,700 lbs (1,680 kg). This weight was used to

determine the estimated assay value per yd^3 by dividing 3,700 lb by the weight of the original sample and multiplying the result by the cumulative assay total of recovered metal weights (presented in milligrams/yd^3 for platinum and gold in appendixes A and B).

MINERALOGICAL PROCEDURES

Concentrates from 16 sample sites were examined by binocular microscope for color, reflectivity, hardness, structure, inclusions, size, and alteration products. Grains were selected for further study and mounted on stubs. These specimens were coated with carbon in a vacuum evaporator, and examined in an AMA 1000 with a Kevex 8005 energy dispersive X-ray (EDX) spectrometry system, equipped with a scanning electron microscope (SEM), and run at 20 kv working voltage to facilitate excitation of PGM. Examinations were done in the backscatter mode to simplify contrast between mineral phases by utilizing brightness, which is a function of atomic weight. The attainable resolution is less than 100 angstrom and Polaroid photographs were made to record the images.

Semiquantitative analyses of elements above atomic number 10 were done by EDX spectrometry. Because the grains were whole and presented a rounded surface for analysis, a certain amount of analytical error is introduced due to angular discrepancy and working distance variations. An attempt was made to analyze large enough (or numerous enough) spots to neutralize this error. Also, X-ray scans display shadowed areas as a result of the grain shape. It is also difficult in the EDX system to totally discriminate between some overlapping PGM signals and between platinum and gold. However, careful standard-based, gaussian deconvolutions were done on each grain analyzed; and the error was kept within 2 % reliability. Furthermore, during analysis of high platinum alloys, the platinum peak apparently overlaps into the gold peak zone enough to exceed the software's ability to delineate emission lines. A gold content of 2- to 5-weight-pct was consistently recorded during analyses of isoferroplatinum, but was discounted as probable analytical error.

BENEFICIATION TESTING

Three bulk samples were tested for gold and platinum recovery using gravity and flotation procedures. Samples were collected as previously discussed; note sample C is a composite from six sites over the Flat Cape shoal (fig. 7). Field screening was done at 8-mesh to remove cobbles and gravel and the undersize fraction was shipped in plastic drums to the laboratory. Care was taken to include all of the slimes with the undersize for processing.

In the laboratory, samples A and B were split into bulk and representative samples and each of these four samples was wet screened at 28-mesh. The plus 28- and minus 28-mesh fractions were run over the laboratory shaking table (Deister Super Duty Diagonal Deck Concentrating Table) to produce black sand concentrates (mostly chromite and magnetite) and tailings composed mostly of silicates (quartz, albite, diopside).

The table concentrates were panned to produce platinum and gold concentrates. One table concentrate was also amalgamated. Table

tailings and concentrates (if present in sufficient amounts) were also processed through a 10,000 g Galigher flotation machine to recover fine native metals which escaped gravity concentration. The flotation reagents used were 0.029 to 0.133 lb/st each of potassium amyl xanthate and Aerofloat 208 as collectors and 0.0015 to 0.0066 lb/st Aerofroth 65 and 0.0045 to 0.0198 lb/st MIBC as frothers.

In the case of the plus 28-mesh of sample A, a hand magnet and a laboratory magnetic sparator were used to attempt to produce high-grade iron and chromium concentrates from the table concentrate.

Sample C was first screened at 10-mesh and then separated into a heavy-mineral and a light-mineral fraction using a Humphrey spiral. Each fraction was then wet screened at 28- and 150-mesh using a Sweco shaking screen.

The plus 150-mesh fractions were treated on shaking tables in a rougher-cleaner circuit to produce heavy mineral concentrates, the higher grade cuts of which were hand panned to a final concentrate. Gravity tailings from the 28- by 150-mesh fraction and the minus 150-mesh slimes were similarly treated as above in laboratory-scale flotation cells (Denver and Agitair). The 10- by 28-mesh fraction was not treated by flotation because it could not be adequately suspended (agitated) in the float cells.

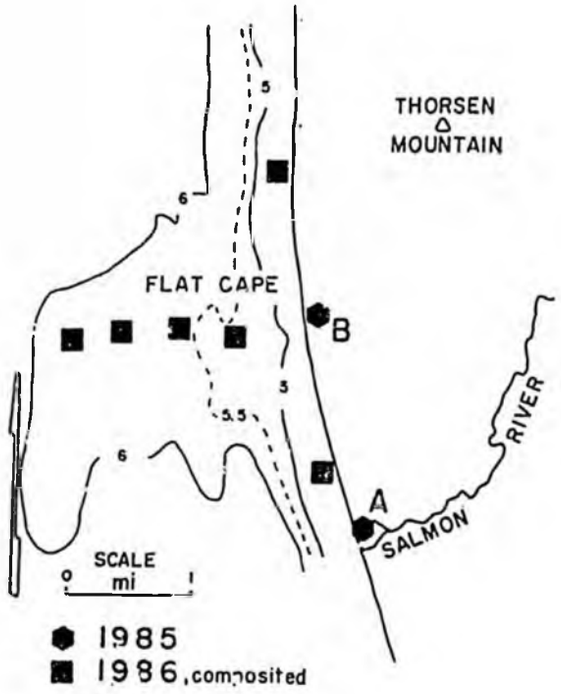


FIGURE 7. - Beneficiation sample location map.

GEOLOGY

GEOLOGICAL SETTING

Country rock in the vicinity of Goodnews Bay consists of Paleozoic and Mesozoic volcanic and sedimentary rocks which have been intruded by ultramafic rocks. Jones and others (14) divided the area into two tectonostratigraphic terranes; the Togiak terrane and the Goodnews terrane (fig.2). These terranes were divided into component subterranes by Box (15-16). The Togiak terrane is a structurally complex assemblage of volcanic and volcaniclastic rocks intercalated with chert, and ranges in age from Late Triassic through Early Cretaceous. The Goodnews terrane which includes the MzPz unit of Hoare and Coonrad (17), consists of pillow basalt, chert, limestone, blueschist, and greywacke, and ultramafic rocks. These rocks range in age from early Paleozoic to Early Cretaceous.

The Goodnews terrane is interpreted by Box (16) to have been structurally emplaced against and beneath the northwestern edge of the Togiak terrane during Mesozoic crustal shortening along an active southeast dipping subduction zone. After consequent accretion, the Goodnews terrane was intruded by ultramafic rocks called the Goodnews Bay ultramafic complex. Box (16) suggests the present configuration of the terranes is the result of Late Cretaceous right-lateral faulting along northeast trending faults including the Iditarod-Nixon Fork, and the Susalatna lineaments (16).

GOODNEWS BAY ULTRAMAFIC COMPLEX

Rocks of the Goodnews Bay ultramafic complex are exposed at Red and Susie Mountains. In addition, small bodies of intrusive rocks are found in the valleys of the Smalls and Salmon Rivers (2-3). There is an intrusive contact zone and country rock has been amphibolized up to 200 ft from the ultramafic contact.

The ultramafic rocks of the Goodnews complex are divided into mappable units based on their relative content of olivine, clinopyroxene, magnetite, and horneblende (3). Dunite, which is partially serpentinized, comprises more than 80 % of the ultramafic body. Ulrich (12) suggests two generations of serpentinization; the first related to late-stage hydrothermal activity, and the second related to near-surface H_2O-CO_2-olivine reactions. Wehrlite has been mapped discontinuously adjacent to the dunite core. Outwards from the dunite, olivine content decreases and magnetite and hornblende increase. As a result, lithology gradually changes from clinopyroxenite to hornblende clinopyroxenite to hornblendite. This concentric zonation is similar to complexes in southeast Alaska, British Columbia, and the Urals in the U.S.S.R. Where it can be mapped, there is an intrusive contact zone.

Minor amounts of Fe-Cu- and Fe-Ni-sulfide minerals were found along the southern margin of the Goodnews Bay ultramafic complex. In addition, accessory grains and rare pods of chromite are disseminated through out the dunite, and magnetite is a minor constituent. PGM display a chemical affinity for chromite and magnetite (6, 12, 18-19), and microscopic PGM mineral grains were observed in several cases during petrographic studies (12-13).

The ultramafic rocks occur in elongate northeast-trending lobes (2). Interpretation of gravity and magnetic data suggests that the Smalls and Salmon Rivers exposures, and the Red and Susie Mountain masses, are parts of the same larger convoluted ultramafic sill-like mass which is repeatedly exposed by one or more N-S folds or faults, and elsewhere covered by a thin veneer of country rock and surficial sediment (2-3).

LATE TERTIARY - PLEISTOCENE GEOLOGY

The area offshore from Red Mountain has experienced a complex history of sea transgression and regression cycles that have periodically inundated an extensive, low relief, coastal plain extending at least tens of miles to the west. Earlier strand lines were further west than the present coastline, and are now drowned. According to Hopkins (20), much of the region of the Bering Sea was above sea level throughout most of the middle and late Tertiary. Sometime during the Late Pliocene or the Early Pleistocene, the Bering-Chukchi Platform was lowered with respect to sea level and inundated, thereby drowning preexisting alluvial valleys. Subsequently, scarp platforms were locally cut into the bedrock that now lies below present sea level. Aerial photography suggests as ancient wave-cut scarp along the base of the ridge east of Flat Cape that is now covered by till deposits. Further suggestion of a buried scarp is indicated by results of drilling on the foreland in 1938 (6) which showed bedrock to be relatively flat and 40 to 50 ft (12 to 15 m) below sea level at the very base of the steep bedrock slope near lat 58° 55.' The inferred scarp can be projected south-southeast toward the confluence of Happy Creek and Salmon River.

During the Pleistocene, sea regressions coincided with glacial advances, intermittently exposing the broad coastal plain. Corresponding interglacial rises in sea level, however, do not appear to have attained the present-day level. There is no known evidence of marine deposits in or above the glacial and glaciofluvial accumulations onshore or in the coastal bluffs near Red Mountain. The entire offshore area of this investigation was a foreland prior to transgression of the sea that began with conclusion of the last glacial epoch and has continued through approximately the last 10,000 yr. Transgression is still actively occurring as evidenced by continuing encroachment of the surf against the bluffs. As much as one half meter of shoreline retreat per year is cited (21) and is evident in the field.

GLACIATION

The area around Red Mountain was glaciated by at least four glacial advances, ranging back in age from 8,910 ± 110 yr to greater than 45,000 yr, possibly even late Tertiary in age (21). Although the main portion of the Salmon River valley escaped glaciation, major WSW-trending glaciers advanced along the ancestral Goodnews River and along the Unaluk and Kinegnak Rivers into Chagvan Bay (21). Glacial till and glaciofluvial outwash sediment from the younger glacial events, Unaluk and Chagvan advances, are well exposed in bluffs both north and south of Red Mountain. Till deposits are characteristically

fine-grained and there are few cobbles and boulders which are usually associated with high-energy, high-gradient glaciation.

It is unclear how far glaciation may have extended southward along the western, seaward side of Red Mountain and to what extent the ice disrupted the preglacial surface. Porter (21) and Mertie (1) both suggested ice encroached upon the western flank of Red Mountain. Mertie (1) suggested that glacial scouring removed placers that had most likely formed on the west and northwest sides of Red Mountain. Several small cirques are preserved on the northern end of the Red Mountain ridge crest, and Mertie (1) reported finding glacial erratics as high as 825 ft (250 m), apparently the result of a large lobe of glacial ice that widened over the area now occupied by Goodnews Bay. There is evidence of lateral moraine features oriented ENE on the foreland above the mouth of Last Chance Creek that would align with ice contact at the northern tip of the ridge, suggesting that ice movement diverged away from the central western mass of the mountain (fig. 8).

Although glaciers have advanced to the margin of Red Mountain, the principal course and focus of erosional energy of major ice movements was aligned WSW with the axis of present Goodnews Bay. The western slope and offshore area from Red Mountain are oblique to this direction of thrust and therefore would not be as directly affected. Other than glacial erratics on the northern-most end of the Red Mountain ridge, no additional erratics or till deposits were noted in contact with the western slope of the mountain. Sediment in bluff exposures from the last glacial advance (Unaluk drift) include ancient mudflat deposits,

FIGURE 8. - Photogragh of the north end of Red Mountain ridge. Note the elongate pond and vegetation line marking the lateral moraine from the most recent (Unaluk) Goodnews Bay glacier. Goodnews Bay is in the extreme left background of the picture and the Bering Sea in the foreground.

lake beds, and bedded till typical of marginal meltwater reworking, as well as alluvial channels (fig. 9) and cross-channel features such as those observed near Cabin Creek and at Flat Cape.

The extent of glacial scouring, near, or on the west side of Red Mountain, is an important factor regarding the preservation of preglacial PGM placers. Summarizing available information, only marginal glacial erosion with low energy ice-gouging is indicated and the principal ice contact is limited to the northern tip of the mountain mass. In comparison, south of Red Mountain, glacial scouring has not destroyed the ancient Salmon River placer bench which is up to 0.5-mi (800-m)-wide and now, 200-ft (60-m)-deep as it approaches the north side of Chagvan Bay (fig. 2, 2). Glacial ice, in this area overrode the preglacial platiniferious gravels. The glacier, nevertheless, may have truncated the more recent and shallower channel of the present Salmon River as suggested by Mertie (18), although the terminous of the paystreak may otherwise be due to an ancient sea scarp. Only a few traces of platinum were found in drill holes downstream of Claim 15 Below near the mouth of Happy Creek (2).

PHYSIOGRAPHY

The report area lies along a coastal region of subdued tundra-covered topography typical of southwest Alaska (figs. 2 and 8). The prominent 1,887-ft (575-m)-high Red Mountain is an exception to the moderate relief. The mountain mass and adjoining ridges separate the Salmon River Valley from the shallow Bering Sea. There is an abrupt and anomalous change in gradient along the steep western face of Red Mountain which sets off the sloping uplands from the virtually flat

FIGURE 9. - Paleochannel alluvial deposit with numerous dunite cobbles. Channel cuts outwash till of the Unaluk Glaciation near Flat Cape.

seafloor. Expansive, shallow, lagoonal-type water bodies of Goodnews and Chagvan Bays lie north and south of Red Mountain. Both bays are protected from frequent storms by well-formed sand spits several miles long. The prevailing south and southwest weather pattern, characterized by cool temperatures and frequent storms, are caused by low-pressure systems common over the Aleutian Islands.

CLIMATE

The climate in coastal southwestern Alaska is usually cool, wet, and windy from April through September. During the fall and winter months, storms are especially frequent; sea ice forms by late December but is intermittently broken up by sea currents, storms, and tides. Generally, sea ice is unsafe for travel except in the sheltered bays or for occasional short periods of unusually cold weather in late winter. Seawater temperature off of Red Mountain varied from 3.9°C in late May to a range of 12.5 to 13.6°C for early August. The mean ambient annual temperature is 0.6°C and annual precipitation is about 45 in (114 cm) with heaviest rainfall in late summer. Because of the relatively warm maritime influence, permafrost is rarely encountered, limited to relic lenses surviving from the last glacial period. The effective working season for the dredge operation on the Salmon River generally spanned late April to mid-December.

COASTAL PROCESSES

Seaward, the Bering Sea is a shallow, high-energy marine environment with a flat, featureless bottom interrupted by scattered ice-rafted boulders. The narrow channel into Goodnews Bay, scoured by tidal currents with observed velocities up to 10 mph (15 km/hr), is 70 ft (21 m) deep. Elsewhere, within four miles of the coast, water depths at mean high tide do not exceed 35 ft (11 m) and vary up to 10 ft (3 m) with tidal fluctuations. Nearshore sediments consist of compacted and shingled, rounded chert and quartz-rich gravel with a clayey, silty matrix. Highly-mobile, rippled sand and well-sorted, fine gravel locally overlie the shingled gravel, and increase in thickness as distance increases offshore.

The youngest sediments in the near coastal area have a distal, or seaward source. Littoral currents, driven by prevailing southwest winds and frequent storms, accompany a strong swell surge that rakes the seafloor for at least several miles from shore. The observed presence of rippled sand and fine gravel oriented perpendicular to the offshore swell direction indicates sediment transport toward the shore from further out to sea. On the basis of an average wavelength of incident waves of 120 ft (36 m) and a calculated surge depth of 60 ft (18 m), Welkie (7) also suggested a net movement of sediment toward shore occurs from as far out as 6 to 10 mi (10 to 16 km).

Wind generated, southwest, littoral current and accompanying drift, particularly during storms, approaches the shoreline between Goodnews Bay and Chagvan Bay, bifurcates along a subdued shoal off Flat Cape, and parallels the coastline both to the north and south (fig. 2). Currents flow faster over the Flat Cape shoal than the surrounding seafloor and support thick growths of mussel beds that thrive in the flowing water. The strong longshore currents transport sediment to a

northward-trending spit at the mouth of Goodnews Bay, and to the south toward a southward-trending spit at the mouth of Chagvan Bay. Measurements made during fair-weather summer conditions indicate combined littoral and tidal currents within one meter of the bottom and 1 to 2 mi (1.5 to 3 km) of shore, exceed 40 cm/sec (2.2 mph). It was observed that during storms the waters outside the surf zone are very turbid due to suspended sediment in longshore transport.

ANALYTICAL RESULTS

Analytical results for platinum, iridium, and gold in seafloor and onshore samples are listed in appendixes A and B. The values presented (in mg/yd^3) for iridium are calculated on the basis of Ir:Pt = 0.13, as determined from dredge cleanup data given by Mertie (1, 18). Weight percent analyses of chromium, iron, and titanium are similarly listed in appendixes.

MINERALOGICAL CHARACTERIZATION

by C. L. Mardock

The offshore mineral concentrates studied during this project include PGM minerals that fall into two major classificatons, isoferroplatinum and osmiridium; and three minor classifications, sperrylite, moncheite (?), and platiniridium (fig. 10). Also examined were native gold and other heavy mineral accessories. Over 100 PGM- and gold-bearing grains, collected from sixteen sites, were examined by SEM; 74 of which were quantitatively analyzed by energy dispersive

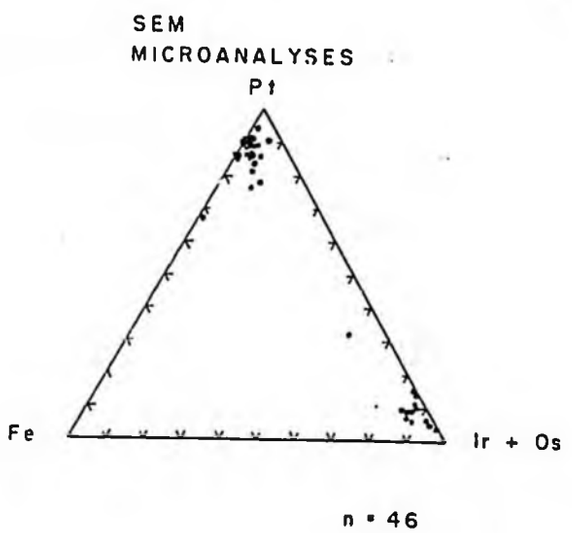


FIGURE 10. - Fe-(Ir+Os)-Pt ternary diagram of 46 SEM microanalyses on PGM grains.

X-ray spectrometry (EDX). Results of the EDX analyses are listed in table 1.

PGM MINERALOGY

The most common PGM-bearing mineral found in this study is isoferroplatinum $(Pt,Pd)_3(Fe,Cu)$ as defined by Fleischer (22). The isoferroplatinum grains contain 68- to 90-weight-pct Pt, with the majority containing approximately 90 % Pt, and the iron content is generally 10 %. The grains are not strongly attracted to a hand magnet, except when they are locked with magnetite. Locked grains are common in samples from onshore deposits and the magnetic concentrates from the Salmon River operation have traditionally been crushed, milled, and concentrated in order to recover the contained PGM. Apparently locked grains are less common in the PGM offshore as few of the grains examined in this study were similarly locked.

Isoferroplatinum with less than 90 % Pt generally contains from 1- to 5-weight-pct each of Ir, Os, and/or Rh. No appreciable palladium (<1.0%) was detected in any of the concentrates. Palladium is more soluble than the other PGM, especialy in a saline environment, and is subject to leaching. A previous electron microprobe study (23) of 13 Salmon River placer samples showed the Pt-Fe compositions of the principal platinum alloy to be very similar to those determined in this study, indicating no apparent Pt-Fe variation between onshore and offshore.

Isoferroplatinum grains are generally amoeboid in outline, quite pitted (fig. 11 A-B), with numerous cavities, and are layered or terraced (fig. 11 D-E). The size of the grains range from 50 to 500 um with a third dimension that is generally flattened. Grains are commonly liberated, however some also occur locked with osmiridium (fig. 12). In one sample, isoferroplatinum is present as a covering or growth on a grain of sperrylite. Isoferroplatinum was also observed locked with pyroxene or with small inclusions of chromite and magnetite. Previous studies (1-2, 6, 12, 23) have found that isoferroplatinum is commonly locked with either chromite or magnetite in the Salmon River placers.

The second most abundant PGM mineral in offshore samples is osmiridium (Ir,Os) as defined by Fleischer (22). It contains 58- to 80-weight-pct Ir, 6- to 30-weight-pct Os, and variable percentages of Pt, Ru, and Fe, each not exceeding 15 %. Chemically comparable osmiridium was also reported from onshore placers (23-24).

Osmiridium is commonly intergrown in a pseudoeutectic fabric with isoferroplatinum (fig. 12). Osmiridium is brighter than other PGM minerals and has silver-hued, high reflectance surfaces untarnished by alteration processes. Grains generally exhibit some abraided cubic crystal faces, but lack the amoeboid, layered, terraced or flattened characteristics of the isoferroplatinum. Furthermore, grains are smaller than isoferroplatinum grains, averaging 50 to 100 um in diameter. Figure 11A (sample no. 53) shows an osmiridium grain with interlocked pyroxene.

Sperrylite ($PtAs_2$) was identified in a few of the PGM-bearing grains. Figure 12B shows a well-rounded sperrylite grain interlocked with moncheite (?) $[Pt,Pd)(Te,Bi)_2]$. Sperrylite is a common mineral in the Salmon River concentrates and is associated with isoferroplatinum and Rh-bearing minerals (23).

TABLE 1 A. - EDX analyses of PGM placer grains in weight percent.

Sample #	Pt	Pd	Ir	Os	Ru	Rh	Au	Ag	Fe	Hg	As	Mineral Type
81-B	89	-	4	-	-	-	-	-	7	-	-	Isoferro-
		-			-	-	-	-		-	-	platinum.
88-A	84	-	-	-	-	2	-	-	13	-	1	Do.
13-A	85	-	1	-	-	-	-	-	14	-	-	Do.
13-B	90	-	1	-	-	-	-	-	9	-	-	Do.
13-C	91	-	1	-	-	-	-	-	8	-	-	Do.
89-D	68	-	-	-	-	-	-	-	32	-	-	Do.
89-E	87	-	-	-	-	-	-	-	13	-	-	Do.
89-F	87	-	4	-	-	-	-	-	9	-	-	Do.
96-B	86	-	3	1	-	-	-	-	10	-	-	Do.
96-C	87	-	3	-	-	-	-	-	10	-	-	Do.
96-D	90	-	-	-	-	-	-	-	10	-	-	Do.
96-E	91	-	-	-	-	-	-	-	9	-	-	Do.
96-F	91	-	-	-	-	-	-	-	9	-	-	Do.
96-G	87	-	-	-	-	-	-	-	13	-	-	Do.
96-H	87	-	1	1	-	-	-	-	11	-	-	Do.
96-I	85	-	5	1	-	-	-	-	9	-	-	Do.
97-A	88	-	2	2	-	-	-	-	7	-	1	Do.
97-E	89	-	-	1	-	-	-	-	9	-	1	Do.
97-F	90	-	-	1	-	-	-	-	9	-	-	Do.
97-G	85	-	-	-	-	5	-	-	10	-	-	Do.
97-H	86	-	-	1	-	4	-	-	9	-	-	Do.
52-B	77	-	8	-	-	-	-	-	15	-	-	Do.
100-D	91	-	-	-	-	-	-	-	9	-	-	Do.
100-E	90	-	-	-	-	-	-	-	10	-	-	Do.
53-A	87	-	3	1	-	-	-	-	9	-	-	Do.
53-F	89	-	1	-	-	-	-	-	10	-	-	Do.
53-G	89	-	-	2	-	-	-	-	8	-	-	Do.
53-H	86	-	5	2	-	-	-	-	7	-	-	Do.
89-A	6	-	63	31	-	-	-	-	-	-	-	Osmir-
		-		-	-		-	-		-		idium.
89-B	11	-	69	18	-	-	-	-	2	-	-	Do.
89-C	9	-	67	22	-	-	-	-	2	-	-	Do.
48-A	6	-	73	11	4	-	-	-	6	-	-	Do.
48-B	5	-	80	11	2	-	-	-	2	-	-	Do.
48-C	4	-	85	10	-	-	-	-	1	-	-	Do.
100-A	15	-	76	9	-	-	-	-	-	-	-	Do.
100-B	7	-	79	8	-	-	-	-	6	-	-	Do.
100-C	9	-	79	7	-	-	-	-	5	-	-	Do.
53-B	15	-	79	6	-	-	-	-	-	-	-	Do.
53-D	9	-	67	18	-	-	-	-	6	-	-	Do.
88-B	65	-	9	-	-	6	-	-	9	-	11	Sperry-
		-		-	-		-	-		-		lite.
97-I	62	-	-	-	-	-	-	-	3	-	35	Do.
81-A	10	-	83	-	-	-	-	-	7	-	-	Platinir-
		-		-	-		-	-		-		idium.
81-C	32	-	58	-	-	-	-	-	10	-	-	Do.

See notes at end of table.

TABLE 1 B. - EDX analyses of gold placer grains in weight percent.

Sample #	Pt	Pd	Ir	Os	Ru	Rh	Au	Ag	Fe	Hg	As	Mineral Type
81-D	-	-	-	-	-	-	85	15	-	-	-	Gold
23-A	-	-	-	-	-	-	92	8	-	-	-	Do.
23-B	-	-	-	-	-	-	85	15	-	-	-	Do.
96-A	2	-	3	1	-	-	85	2	-	7	-	Do.
96-J	-	-	-	-	-	-	96	4	-	-	-	Do.
97-B	-	-	-	-	-	-	98	2	-	-	-	Do.
97-C	-	-	-	-	-	-	95	-	3	-	2	Do.
97-D	-	-	-	1	-	-	91	-	8	-	-	Do.
52-A	-	-	-	-	-	-	93	7	-	-	-	Do.
49-A	-	-	-	-	-	-	91	9	-	-	-	Do.
49-B	-	-	-	-	-	-	91	9	-	-	-	Do.
49-C	-	-	-	-	-	-	96	4	-	-	-	Do.
100-F	-	-	-	-	-	-	99	1	-	-	-	Do.
100-G	-	-	1	-	-	-	98	-	1	-	-	Do.
53-C	-	-	2	-	-	-	94	4	-	-	-	Do.
53-E	-	-	1	2	-	-	95	2	-	-	-	Do.
53-I	-	-	-	-	-	-	88	9	3	-	-	Do.
62-A	-	-	-	-	-	-	89	11	-	-	-	Do.
62-B	-	-	-	-	-	-	92	8	-	-	-	Do.
6-A	-	-	-	-	-	-	90	11	-	-	-	Do.
6-B	-	-	-	-	-	-	99	1	-	-	-	Do.
6-C	-	-	-	-	-	-	84	16	-	-	-	Do.
6-D	-	-	-	-	-	-	91	9	-	-	-	Do.
6-E	-	-	-	-	-	-	96	4	-	-	-	Do.
6-F	-	-	-	-	-	-	92	8	-	-	-	Do.
2-A	-	-	-	-	-	-	84	16	-	-	-	Do.
64-A	-	-	2	1	-	-	97	-	-	-	-	Do.
64-B	-	-	-	-	-	-	95	3	2	-	-	Do.
64-C	-	-	2	2	-	-	89	7	-	-	-	Do.
64-D	-	-	1	1	-	-	98	-	-	-	-	Do.
64-E	-	-	-	1	-	-	92	5	2	-	-	Do.

Notes: Numbers refer to sample location, fig. 5. The letters following the numerical identifier refer to serialization during examination.
- Not detected.

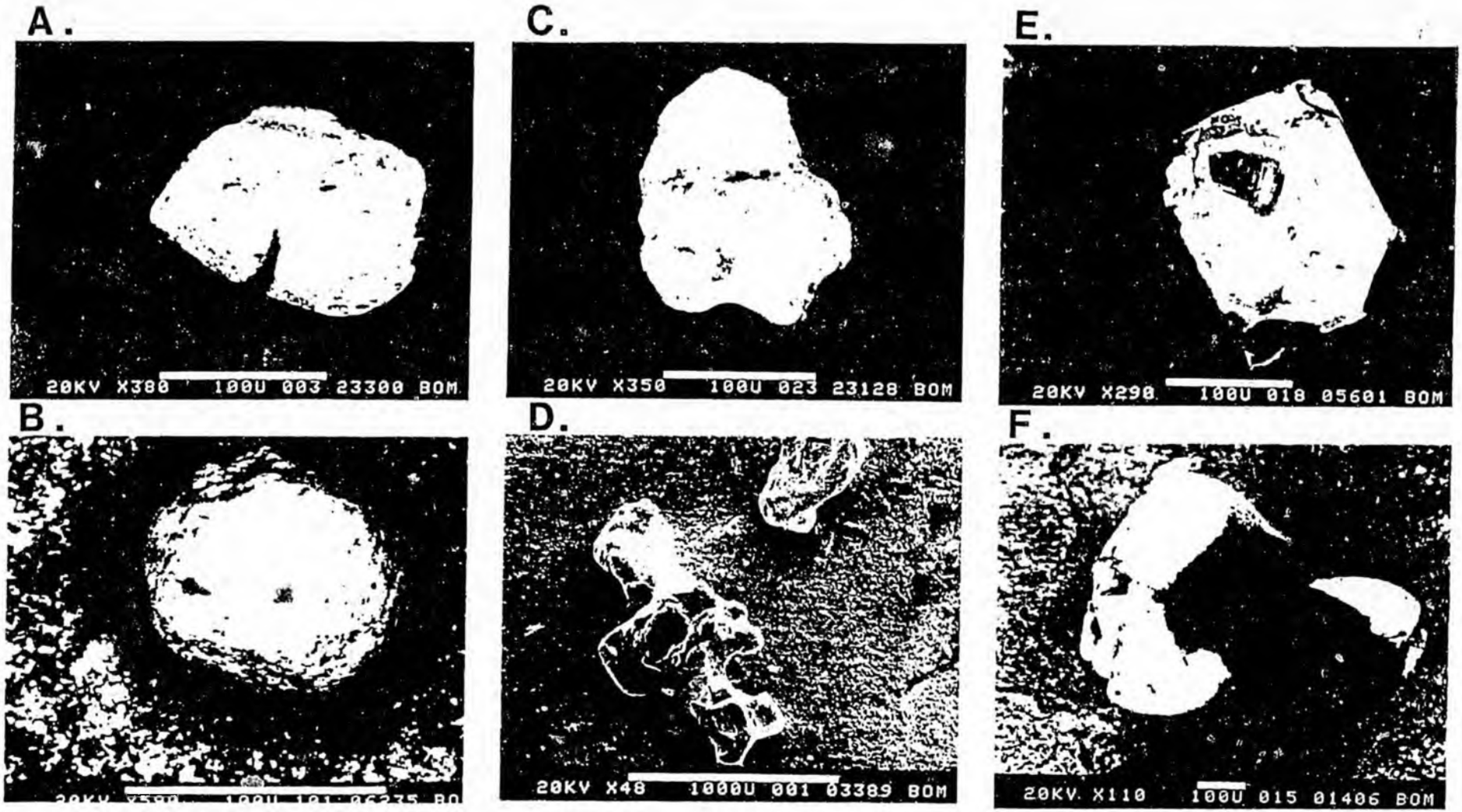


FIGURE 11 A-F. - SEM backscatter images of types of PGM grains found in marine sediment samples. Note scale on each image given in microns. A) Well-rounded osmiridium with interlocked pyroxene from sample 53. B) Typical rounded isoferroplatinum grain, sample no. 97. C) Faceted osmiridium grain, note high brightness, from sample 100. D) Lower, darker, and largest grain is highly sculptured isoferroplatinum, whereas the two grains above are platiniridium, sample no. 81. E) Crystalline isoferroplatinum from sample no. 45. F) Crystalline isoferroplatinum from sample no. 88.

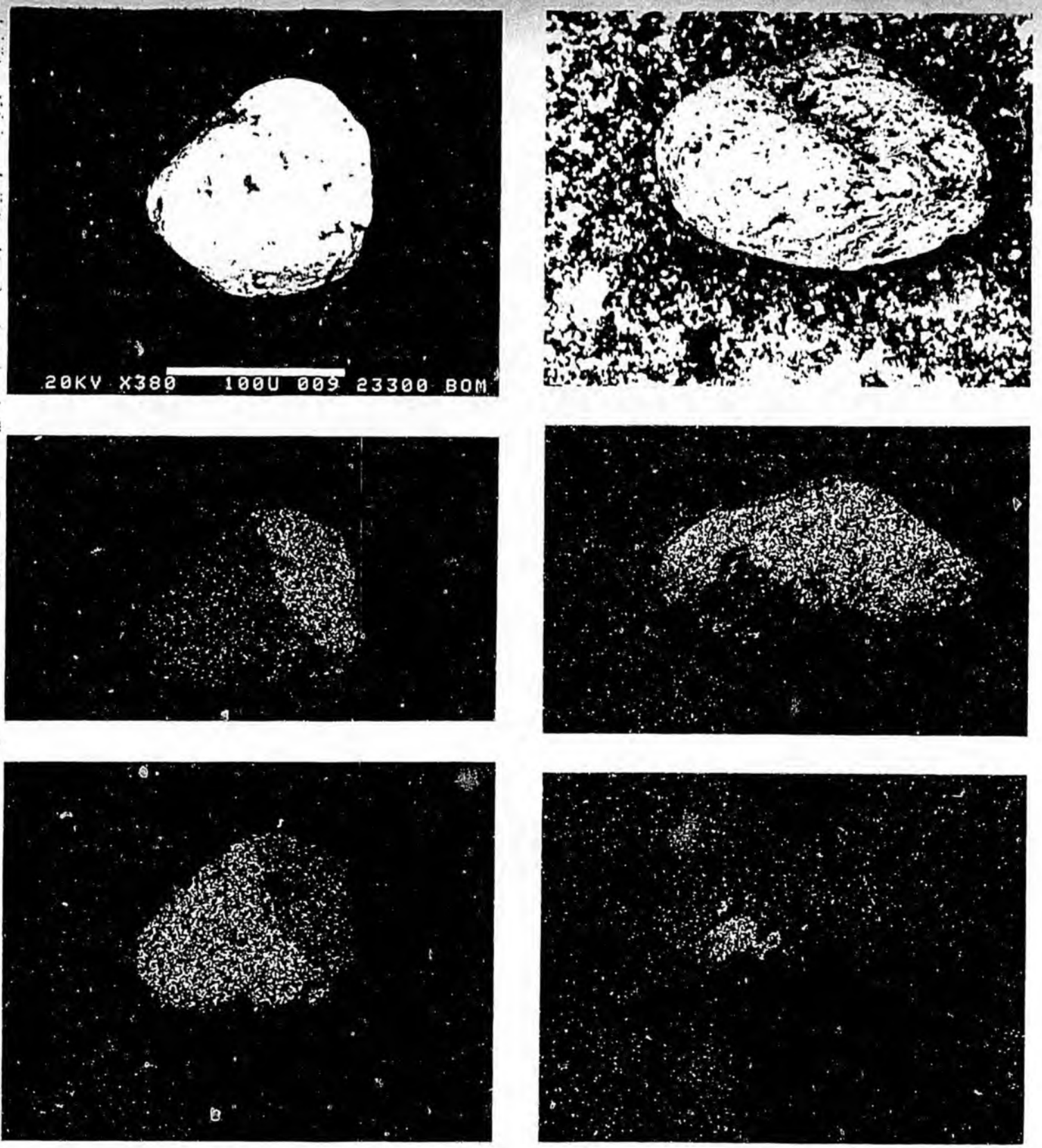


FIGURE 12. - PGM grains with interlocked alloy compositions. Note scale bar in upper-left SEM backscatter image is 100 microns. The grain on the left (sample no. 53) comprises osmiridium and isoferroplatinum. X-ray may in mid-left is iridium, lower left is platinum. Grain on the right is sperrylite from sample no. 97. Mid-right X-ray map is arsenic. There is a large inclusion of moncheite (?) as indicated by the lower-right X-ray map for tellurium. Alloy-bimodal zoned compunds.

Two platiniridium (Ir,Pt) grains were found in concentrate from sample no. 81 (fig. 11D, upper 2 grains). Their compositions are $Ir_{84}Pt_{10}Fe_6$ and $Ir_{58}Pt_{32}Fe_{10}$. The grains are large and moderately rounded, approaching 500 um in diameter, and have faint outlines that indicate layering. As seen in figure 11D, they appear brighter than the larger adjoining isoferroplatinum grain. Rosenblum and others (23), have also reported bladed crystals of an unnamed Ir-Fe mineral in magnetic concentrates from Salmon River.

GOLD MINERALOGY

Gold grains were present in concentrates from all but four sites. Generally, gold comprises an appreciably higher percent of the precious metal concentrate offshore than the 2 to 3 % reported for the Salmon River placer (1).

Gold is generally coarser than the PGM mineral grains and commonly ranges between 300 and 500 um in diameter; several grains up to 3 mm were noted (sample no. 23). Some grains exhibit a marked layered structure as shown in figure 13; grains show both undercut and overhang layering, and exhibit a honeycomb structure apparently caused by preferential leaching. All of the observed layers are about 5-um-thick, and each layer lies flat without undulation.

The outer form of many gold grains is amoeboid, much like that of the isoferroplatinum (fig. 14). The surfaces are pitted with honeycomb and fracture cavities that may represent voids left after inclusions of other minerals have been mechanically or chemically removed. Gold content at the surface lacks most common alloy metals (e.g., iron, copper) and samples range from 84- to 99-weight-pct Au with a corresponding balance of silver values to total 100 %. In several grains, iridium and osmium were additionally detected by EDX analyses in amounts up to 2 weight pct each. Gold has been reported to contain iridium and platinum in solid solution (24) and palladium, platinum, and rhodium concentrations in gold have been documented (25), however there is no reference to the occurrence of osmium.

ACCESSORY HEAVY MINERALS

Accessory minerals in heavy mineral concentrates primarily include magnetite, ilmenite, chromite, and pyroxene (enstatite?), with lessor amounts of olivine, zircon, barite, monazite, arsenopyrite, pyrite, pyritized microfossils, hematite, garnet, leucoxene, cinnabar, and native mercury (fig. 15). Mertie (1) additionally identified rutile, tremolite, epidote, spinel, sphene, diamond, tourmaline, topaz, and corundum in Salmon River concentrates.

Magnetite is the most common accessory mineral. Grains are uniform in size and average 80- to 100-um diameter. The grains are generally subhedral, moderately rounded, and often exhibit vestigial octahedral crystal faces. Surfaces analyzed by EDX contained approximately 93 weight pct iron oxide and a few percent each of chromium and titanium oxides. The occurrence of chromium, as well as PGM in Red Mountain magnetite is documented onshore (1, 12, 23, 26).

Chromite comprises up to 20 % of the offshore concentrates. PGM, as inclusions in chromite, have been reported from Red Mountain (1-2, 12-13), however, as with magnetite, similar inclusions of PGM are

suspected but were not observed in the offshore chromite grains tested. Chromite is subhedral, exhibits incipient octahedral crystal faces, and incorporates sufficient iron to be more accurately termed chromian magnetite.

Traces of both cinnabar and native mercury occur in a few of the samples; discrete cinnabar grains and globules of mercury are shown in figure 15. In addition to these Hg-bearing minerals, a single grain of Au-Ag-Ir-Os-Pt-amalgam was identified (sample no. 48).

BENEFICIATION RESULTS

by W. C. Hirt

Three samples for beneficiation testing were collected (fig. 7). The first two were from natural black sand accumulations; sample A was from

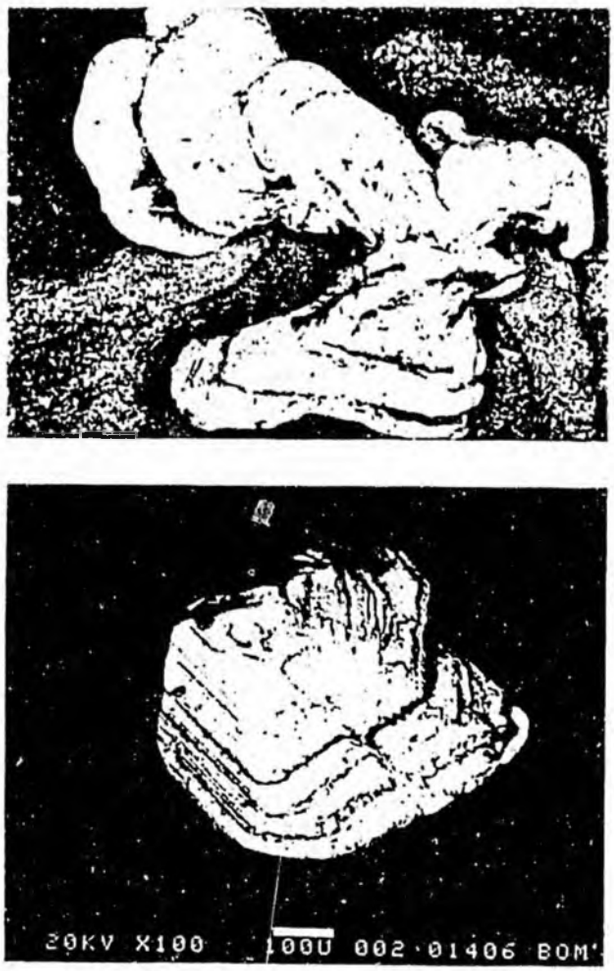


FIGURE 13. - SEM backscatter images showing layering in gold grains from sample no. 6 offshore of Platinum village. Note scale bar is 100 microns.

black sand layers on ferricreted gravel at the mouth of the Salmon River, and sample B was an 18-in-wide channel sample of the black sand layer between the swash zone and the bluff at Flat Cape. Sample C is a composite of material shoveled from the upper 16 in (40 cm) of the seafloor sediment at six locations over the Flat Cape shoal. Table 2 summarizes sample weights, assays, and recoveries.

For the black sand beach samples (tables 3 and 4), the best platinum and gold recoveries were in the minus 28-mesh fraction gravity concentrates from sample B (representative), which contained 95.45 % of the Pt and 82.32 % of the Au. Notably there was a 7.85 % recovery of fine-grained gold from the minus 28-mesh fraction by flotation. Additionally, a middlings heavy mineral product that assayed 16.7 % Cr_2O_3 had 75 % recovery for chromium; this was the highest grade Cr_2O_3 product produced in this work.

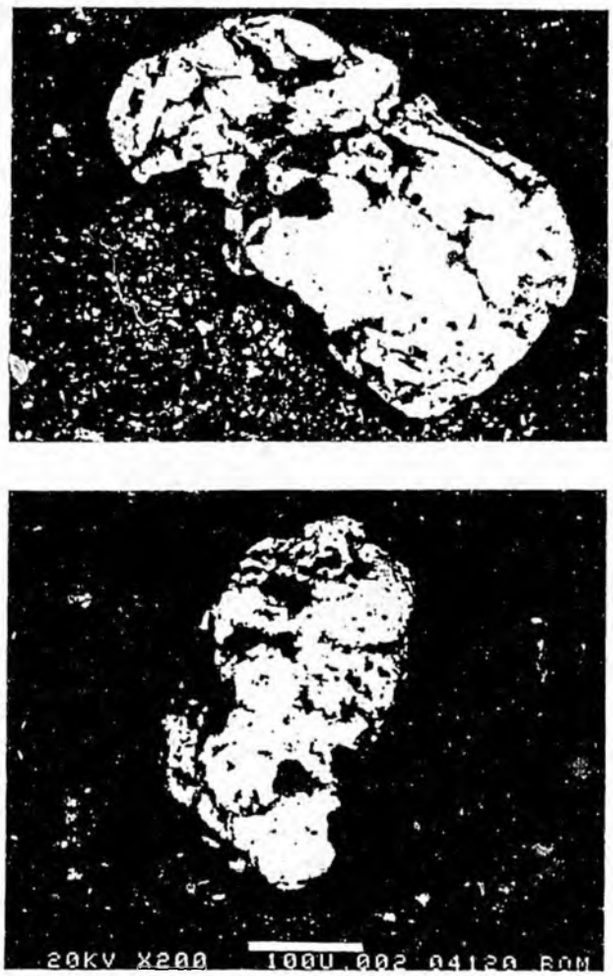


FIGURE 14. - SEM backscatter images of typical rounded amoeboid gold grains from sample no. 49 offshore of Flat Cape. Note scale bar is 100 microns.

More attention was given to sample C (table 5) due to the larger resource potential it represented and the posssible occurrence of ultra-fine platinum grains suggested by previous studies (7, 12). The highest grade products from laboratory separation work ranged from only 0.105 to 0.9 t oz Au/t and 0.01 to 0.03 t oz Pt/t. Metal recoveries were negligible suggesting most of the platinum and gold were interlocked with other minerals and thus failed to concentrate.

INTERPRETATION

LITTORAL CURRENTS AND SEDIMENT TRANSPORT

Bathymeteric mapping, low frequency acoustics (fig. 16), and visual observations, reveal a smoothed seafloor where sediment is accumulating in depressions and around obstacles such as ice-rafted boulders. On a broader scale, mobile sand and fine gravel derived from non-local lithologies and transported from further offshore, are accumulating with carbonaceous muds both north and south of Flat Cape. Bedrock is relatively shallow along this portion of the coast and outcrop is exposed at or near sea level at the base of Red Mountain. At sample site 35 ultramafic bedrock rubble was observed in 15 ft (5 m) of water at the base of the dropoff beyond the surf zone. Bedrock surface dips to greater depths both north and south of this area. Previous exploratory churn drilling has shown that the bedrock surface slopes to more than 100 ft (30 m) below sea level north of Red Mountain (6) and to 200 ft (60 m) south of the Salmon River (2, 21). The thickness of

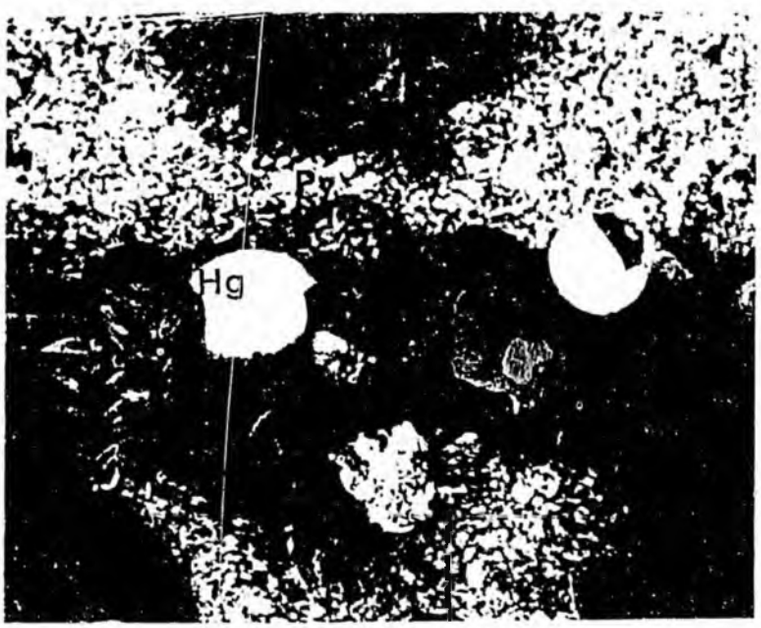


FIGURE 15. - SEM backscatter image of accessory heavy minerals including globule mercury (Hg) and pyritized microorganism (Py). From sample no. 48 taken offshore of Flat Cape. Note image is approximately 1000 microns across.

TABLE 2. - Summary of weights, assays, and percent recovery for beneficiation test samples.

Sample Number	Wt-lb raw	Wt-lb lab (-8m)	Assays, t oz/st				Recovery%	
			Head		Concentrate			
			Pt	Au	Pt	Au	Pt	Au
A (Total)	300							
A (representative)		53.0	<0.001	<0.0008	5.253	0.834	42.0	16.3
(pan con from table con from -28-mesh)					.056	3.27	.25	16.0
(flo con from table con from -28-mesh)								
A (bulk)		149.4	<.001	.003	1.392	19.83	1.7	23.6
(pan con fron non-mag-table con from +28-mesh)					.058	9.085	.13	20.0
(amalgam from high-grade table con from -28-mesh)					13.93	.146	14.34	.15
(pan con from high-grade table con from -28-mesh)					1.44	12.5	3.2	27.6
(flo con from cleaner table con from -28-mesh)								
B (Total)	302							
B (representative)		39.7	.017	.049	.639	44.18	.06	6.7
(pan con from table con from +28-mesh)					494.2	269.5	95.45	82.32
(pan con from high-grade table con from -28-mesh)					.881	36.4	.12	7.85
(flo con from table con from -28-mesh)								
B (bulk)		45.2	.032	.043	33.69	10.73	2.19	.82
(pan con from high-grade table con from +28-mesh)					8.34	2.86	9.36	3.80
(pan con from table con from +28-mesh)					50.97	45.36	75.64	79.70
(pan con from high grade table con from -28-mesh)					2.594	.68	5.82	1.81
(pan con from table con from -28-mesh)					.578	36.7	.15	11.69
(flo con from table con from -28-mesh)								
C	1,320	588	.00096	.00105	.03	0.9	.53	.29

TABLE 3. - Placer test product distribution of sample A.

Sample Mesh Size	Sample Product	Weight lbs	Weight % Dist	Au Actual Assay	Au Unit wt Au	Au Dist % of Au	Au Calc oz/ton	Pt Actual Assay	Pt Unit wt Pt	Pt Dist % of Pt	Pt Calc. oz/ton
Representative Sample A:											
+28	Pan con-table con	0.027	0.0515	0.028	0.3472	.78052		.497	6.1628	5.6632	
	Pan tail-table con	.25	.4714	.001	.1135	.25515		.002	.227	.2086	
	Flo con-table tail	.023	.0428	.028	.2884	.64833		.02	.206	.1893	
	Flo tail-table tail	16.3	30.7273	.001	5.9184	13.3048		.003	22.194	20.3947	
+28	TOTAL	16.6	31.29		6.6675	14.99	0.000885		28.7898	26.46	0.00362
-28	Pan con-table con	.019	.0361	.834	7.2558	16.31133		5.253	45.7011	41.9961	
	Pan tail-table con	3.326	6.2734	.001	1.5104	3.39544		.002	3.0208	2.7759	
	Flo con-table con	.010	.0204	3.27	16.023	36.02034		.056	.2744	.25215	
	Flo tail-table con	22.427	42.2901	.001	8.1456	18.31163		.002	20.364	18.71309	
	Flo con-table tail	.022	.042	.101	1.0201	2.29323		.101	1.0201	.9374	
	Flo tail-table tail	10.629	20.0446	.001	3.8608	8.67923		.002	9.652	8.8695	
-28	TOTAL	36.436	68.71		37.8157	85.01	0.002286		80.0324	73.54	.00436
SAMPLE TOTAL		53.031	100.0		44.4832	100.0	0.001848		108.8222	100.0	.00452
Bulk Sample A:											
+28	Pan con-non-mag-table con	.005	.004	19.83	53.541	23.63377		1.392	3.7584	1.6832	
	Pan tail-non-mag-table con	1.811	1.213	.001	.8226	.36311		.003	2.4678	1.1052	
	Mag sep con-table con	5.94	3.9768	.001	2.697	1.19049		.003	8.0910	3.6235	
	Pan con-non-mag (hand mag) frac of table con	.042	.0282	.044	.8404	.37096		.063	1.2033	.5389	
	Pan tail-non-mag (hand mag) frac of table con	.121	.0814	.048	2.6496	1.16957		.002	.1104	.0494	
	Hand mag con-table con	1.502	1.0056	.001	.682	.30104		.004	2.7280	1.2217	
	Flo con-table tail	.045	.0307	.021	.4368	.19281		.010	.2018	.0904	
	Flo tail-table tail	60.814	40.712	.001	22.088	9.74996		.002	55.2200	24.7299	
+28	TOTAL	70.285	47.05		83.7574	36.97	.00262		73.7807	33.04	.00231
-28	Amalgam-high-grade table con	(.011)		9.085	45.3469	20.01677		.058	.2895	.1297	
	Pan con-high-grade table con	.005	.0034	.146	.3358	.14823		13.93	32.039	14.3485	
	Pan tail-high-grade table con	.755	.5058	.018	6.174	2.72529		.081	27.783	12.4424	
	Flo con-table tail	.035	.0237	-	-	-		-	-	-	
	Flo tail-table tail	28.775	19.2634	.001	10.4512	4.61331		.001	13.064	5.8506	
	Flo con-cl table con	.011	.0074	12.5	62.5	27.5884		1.44	7.2	3.2245	
	Flo tail-cl table con	26.638	17.8331	.001	9.6752	4.27077		.004	48.376	21.6649	
	Flo con-cl table tail	.008	.0059	-	-	-		-	-	-	
	Flo tail-cl table tail	22.863	15.3057	.001	8.304	3.66551		.002	20.76	9.2972	
-28	TOTAL	79.093	52.95		142.7871	63.03	.00398		149.5115	66.96	.00416
SAMPLE TOTAL		149.378	100.0		226.5445	100.0	.00334		223.2922	100.0	.00329

" From. Cl cleaner. Con concentrate. Flo flotation. Tail tails.

TABLE 4. - Placer test product distribution of sample 8.

Sample Mesh Size	Sample Product	Weight lbs	Weight % Dist	Au Actual Assay	Au Unit wt Au	Au Dist % of Au	Au Calc oz/ton	Pt Actual Assay	Pt Unit wt Pt	Pt Dist % of Pt	Pt Calc. oz/ton
Representative Sample B:											
+28	Pan con-table con	.003	0.0001	44.18	75.106	6.747		.639	1.086	.06169	
	Table con	1.673	4.2157	.001	.7596	.06824		.004	3.038	.17258	
	Flo con	.009	.0003	-	-	-		-	-	-	
	Flo tail	12.154	30.6241	.001	5.518	.49572		.001	5.518	.31346	
+28	TOTAL	13.84	34.87		81.384	7.31	.01295		9.642	.54773	0.00153
-28	Pan con-high-grade table con	.007	.0002	269.5	916.3	82.317		494.2	1,680.28	95.45	
	Pan tails-high-grade table con	.535	1.3492	.01	2.431	.21839		.14	34.034	1.93	
	Pan con-table con	.104	.2631	.01	.474	.04258		.18	8.532	.48468	
	Flo con-table con	.005	.0001	36.4	87.36	7.848		.881	2.114	.12009	
	Flo tail-table con	12.947	32.6220	.001	4.702	.4224		.001	5.878	.33391	
	Flo con-table tail	.018	.0005	1.91	16.044	1.441		.382	3.209	.18229	
	Flo tail-table tail	12.229	30.8128	.001	4.442	.3991		.003	16.656	.94618	
-28	TOTAL	25.847	65.13		1,031.753	92.69	.08792		1,750.703	99.44715	.14919
SAMPLE TOTAL		39.688	100.0		1,113.137	100.0	.06178		1,760.345	100.0	.0977
Bulk Sample B:											
+28	Pan con-high-grade table con	0.001	.0034	10.73	7.511	.82479		33.69	23.583	2.19	
	Pan tail-high-grade table con	.238	.5285	.01	1.085	.11915		.02	2.170	.20127	
	Pan con-table con	.026	.0589	2.86	34.606	3.80012		8.341	100.926	9.36	
	Pan tail-table con	1.185	2.6207	.004	2.152	.23631		.006	3.228	.29941	
	Flo con-table tail	.019	.0434	-	-	-		-	-	-	
	Flo tail-table tail	14.088	31.1556	.001	5.117	.56190		.002	12.792	1.18650	
+28	TOTAL	15.559	34.41		50.471	5.54	.00715		142.699	13.24	.0202
-28	Pan con-high-grade table con	.035	.0779	45.36	725.76	79.69648		50.97	815.520	75.64	
	Pan tail-high-grade table con	.192	.4248	.01	.872	.09576		.09	7.848	.72793	
-28	Pan con-table con	.053	.1179	.68	16.456	1.80705		2.594	62.775	5.82258	
	Flo con-table con	.006	.0141	36.7	106.43	11.68719		.578	1.676	.15545	
	Flo tail-table con	18.876	41.7454	.001	6.856	.75286		.005	42.850	3.97	
	Flo con-table tail	.005	.0132	-	-	-		-	-	-	
	Flo tail-table tail	10.488	23.1962	.001	3.810	.41838		.001	4.762	.44169	
-28	TOTAL	29.658	65.59		860.184	94.46	.06388		935.431	86.76	.06947
SAMPLE TOTAL		45.218	100.0		910.655	100.0	.04436		1,078.130	100.0	.05252

- from. Cl cleaner. Con concentrate. Flo flotation. Tail tails.

TABLE 5. - Placer test product distribution of sample C.

Sample Mesh Size	Sample Product	Weight		Au				Pt			
		lbs	% Dist	Actual Assay	Unit wt Au	Dist % of Au	Calc oz/ton	Actual Assay	Unit wt Pt	Dist % of Pt	Calc. oz/ton
+10	Pan[1]	101.4	17.24	.0008	.081	13.00	.0008	.001	0.10	17.69	.001
-10+28	Pan con[2]	0.02	.003	.209	.004	0.65	.209	.001	.00002	.00009	.001
	Tail cl[2]	0.14	.023	.002	.0003	.00005	.002	.001	.0001	.0002	.001
	Table tail[2]	0.97	.165	.0008	.0008	.128	.0008	.001	.0009	.159	.001
	Ro table tails[2]	256.8	43.67	.0008	.205	32.92	.0008	.001	.257	45.42	.001
-10+28	TOTAL	257.9	43.86		.210	33.70	.0008		.258	45.58	.001
-28+150 (HF)	Pan con[2]	0.10	.017	.105	.011	1.78	.105	.03	.003	.530	.003
	Pan tail[2]	0.02	.003	.113	.0023	.369	.113	.001	.00002	.0003	.001
	con cl[2]	0.07	.012	.06	.0042	.674	.06	.001	.00007	.00012	.001
	Table tail cl	1.09	.185	.0008	.0009	.144	.0008	.001	.0011	.194	.001
-28+150 (LF)	Pan con[2]	.002	.0003	.90	.0018	.289	.90	.01	.00002	.00004	.01
	Pan tail[2]	4.03	.685	.019	.0766	12.30	.019	.001	.004	.707	.001
-28+150 (Composite)	Flo con[3]	.40	.068		.011	1.78	.028		.0012	.212	.003
	Flo tail[3]	192.8	32.79		.19	30.50	.001		.193	34.10	.001
-28+150	TOTAL	198.5	33.76		.298	47.84	.001		.202	35.75	.0011
-150	Flo con[3]	2.8	.476		.010	1.61	.004		.0025	.442	.0009
	Flo tail[3]	27.4	4.66		.024	3.85	.0009		.0028	.495	.0001
-150	TOTAL	30.2	5.14		0.034	5.46	.0011		.0053	.936	.0002
SAMPLE TOTAL		588.04	100.0		.623	100.0	.00105		.566	100.0	.00096

HF heavy fraction. LF light fraction. - from. Cl cleaner. Con concentrate. Flo flotation. Tail tails. Ro rougher.

[1] Only one split of full sample assayed after coning and quartering.
[2] Products of shaking table gravity separation.
[3] Products of flotation.

FIGURE 16. - Low frequency acoustic isopac map showing extent of high-energy sediment reflector.

littoral drift and lag deposits north and south of Flat Cape shoal is unknown and likely overlies glacial outwash or till that was below, and unaffected by the transgression.

Data collected from the two current meter stations indicate that currents regularly reverse with the change of tides and flow parallel to the shoreline in both directions. Longshore current has two principal components; the SW littoral current, and the tidal current. The northward current is strongest when the tide is rising and is about 10 % stronger than the southward, or ebb-tide current (table 6). Note that current meter station CM-2 records a persistently greater current velocity apparently due to the shallower depths across the Flat Cape shoal. Southwest storm winds accentuate the littoral current and will likely cause higher tides than normal and consequently even stonger northward currents north of Flat Cape. Velocity data for both stations are compiled in figure 17.

There is a pronounced 10- to 16-ft (3- to 5-m)-deep, well-shingled dropoff just outside of the surf zone where the ocean swells impact the coast (fig. 2). From Flat Cape to Goodnews Bay, most longshore sediment transport was to the north either in 1) a zone 200- to 500-ft (60- to 150-m)-wide immediately outside the 3- to 5-m dropoff, or 2) in the swash zone on the beach. In certain wave-surge combinations, finer grained material is eroded from the base of the dropoff by orbital surge, carried in suspension, and subsequently deposited on the beach. Previous investigators described the further transport of sediment along the beach and ultimate deposition in the low-energy zones at Goodnews and Chagvan Bays (11-12).

In summary, sediment from non-local, probably non-PGM-bearing areas, is being deposited on, and is in net one-way transport over, the pre-transgression land surface. Only where the wave-cut scarp is actively eroding into the preglacial surface along the base of an underwater dropoff, are locally-derived materials (including PGM) part of the littoral drift. This condition was observed at the base of the 3- to 5-m dropoff near lat 58°54' (sample no. 35, bedrock rubble exposed underwater) and extends at least intermittently north past Red Mountain to lat 58°56.5.' The locally-derived materials entrained in littoral transport are deposited either in a very narrow zone at the base of the dropoff or on the beach. As the coastline, including the offshore dropoff, continues to recede, a wave-cut platform is left which is rapidly mantled by mobile fine-grained, well-sorted sediment from offshore. The broad subdued shoal extending southwesterly off of Flat Cape is interpreted as being a wave-cut platform. The PGM values in samples from on top of the shoal (fig. 18) show that mixing of local sediments exposed there occurred as the scarp has advanced eastward to its present position.

MAGNETICS

The contoured magnetometer data in figure 19 indicates a southwest-trending feature strikes offshore about 3 mi (5 km) to the southwest of Red Mountain. The cross-structure, NW to SE dipole arrangement, is indicative of a structure with a southeasterly dip. Onshore, the Goodnews Bay ultramafic complex is interpreted on the basis of gravity and magnetic data and geologic mapping, as a convoluted sill-like body that also dips southeast and includes

TABLE 6.- Weighted average direction and maximum velocity from current meter stations. Station sites are shown in in figure 2.

Station	Rising tide direction	Ebb tide direction	Velocity[1/] (N:S)
CM 1	5°	183°	0.77:0.73
CM 2	353°	175°	1:0.84

[1/] Velocity is calculated as the average of the maximum velocities over the interval of time that data were collected; strongest average velocity equals 1.0.

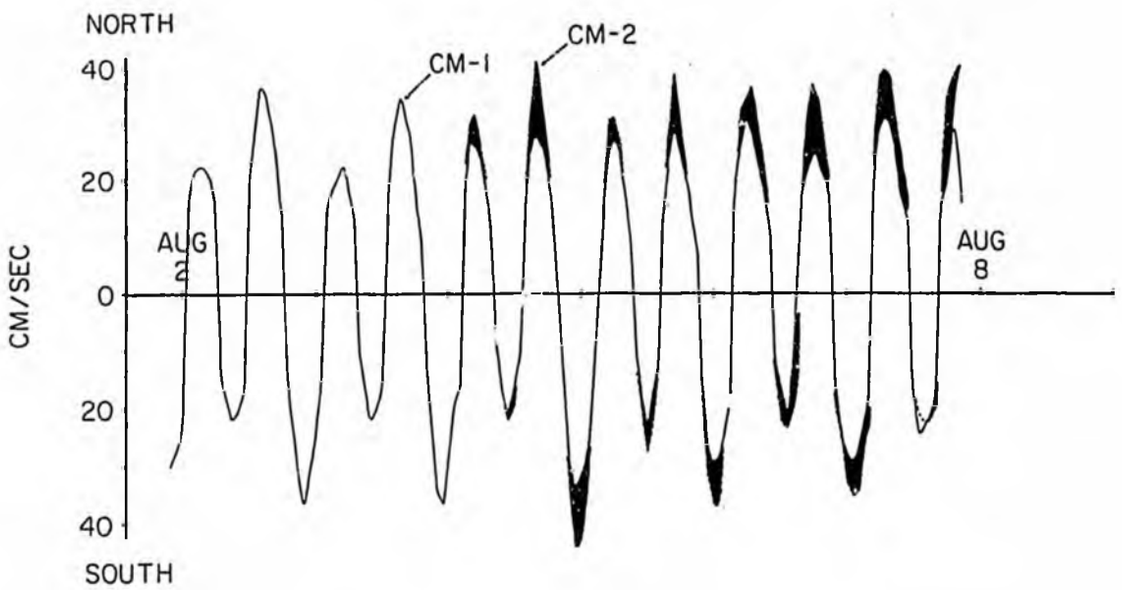


FIGURE 17. - North and south directed current velocity data collected at current meter stations from Aug. 2 to 8, 1985.

ultramafic rock at both Susie and Red Mountains (2-3, 27). The southwest trending dipole offshore of Red Mountain is interpreted, therefore, as an extension of the Goodnews Bay ultramafic complex.

Furthermore, the similar, but offset dipole in the west central part of the magnetometer survey is suggestive of either fault displacement, or an additional convoluted fold similar to that interpreted by Southworth and Foley (2) between Susie Mountain and Red Mountain. The offset is part of a 10-mi (16-km)-long linear feature representing a major lithology change or disruption in bedrock. In either case the structure of the ultramafic complex appears open to the west of the survey. The decreasing magnitude in total field readings along survey lines further from shore likely correlates to an increasing depth to bedrock.

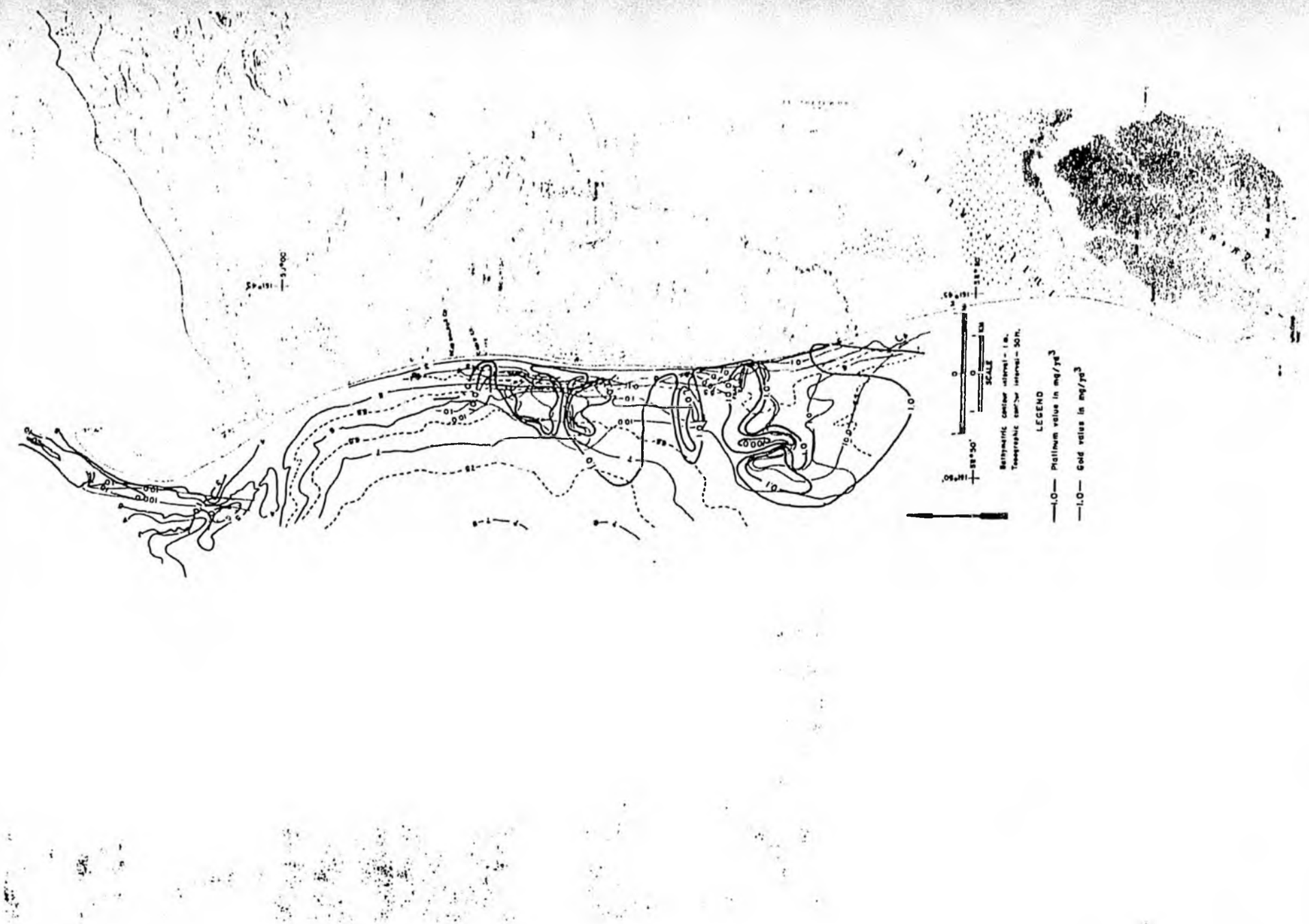


FIGURE 18. - Contoured values of Pt and Au sample analysis.

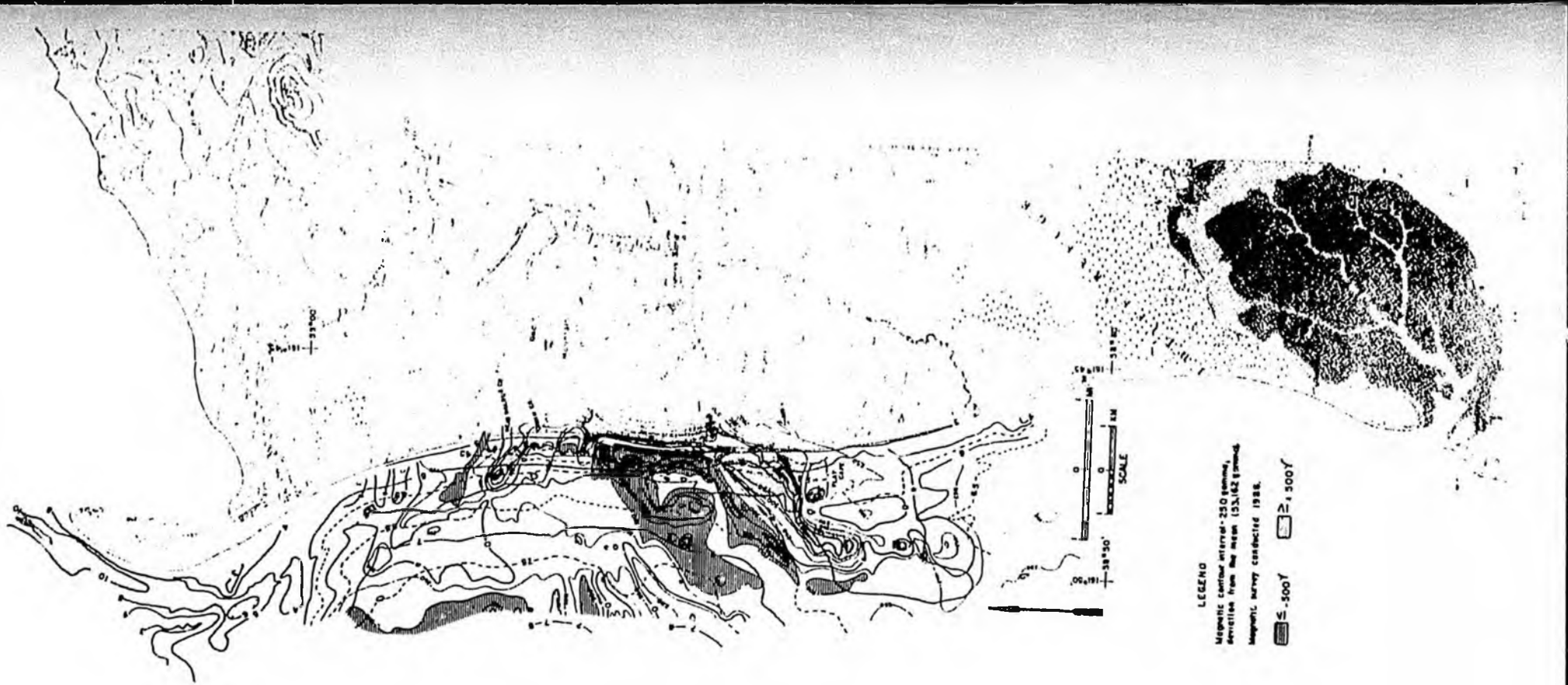


FIGURE 19. - Contoured magnetic data.

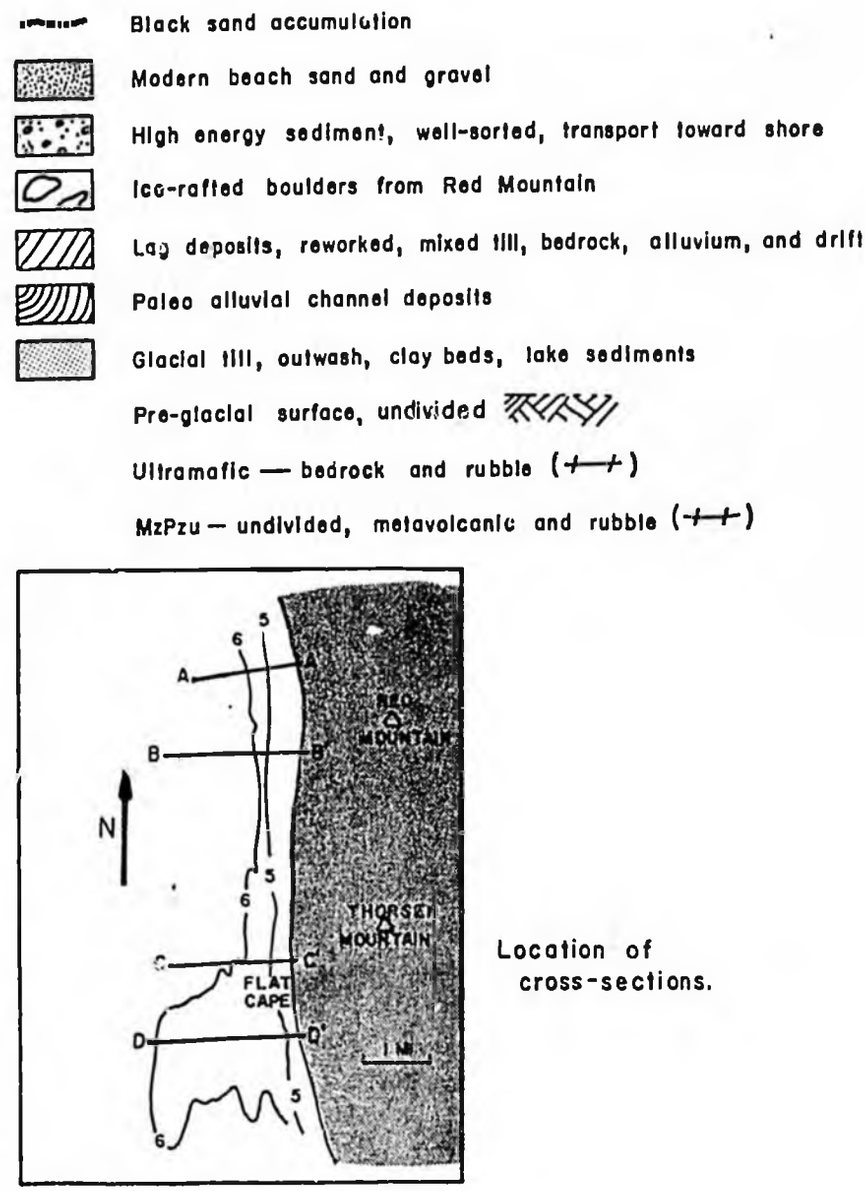


FIGURE 20. - Legend and location map of cross-sections 20-A-D of the coastline and seafloor near Red Mountain. .

The interpreted offshore extension of the ultramafic bedrock lies to the north of the northwestern margin of the Flat Cape shoal. The shoal likely is underlain by the same resistant metavolcanic rocks that form the hanging wall to the ultramafic complex onshore. These rocks are well-exposed at Thorsen Mountain immediatly south of Red Mountain, and also form the summit and SE flank of Susie Mountain.

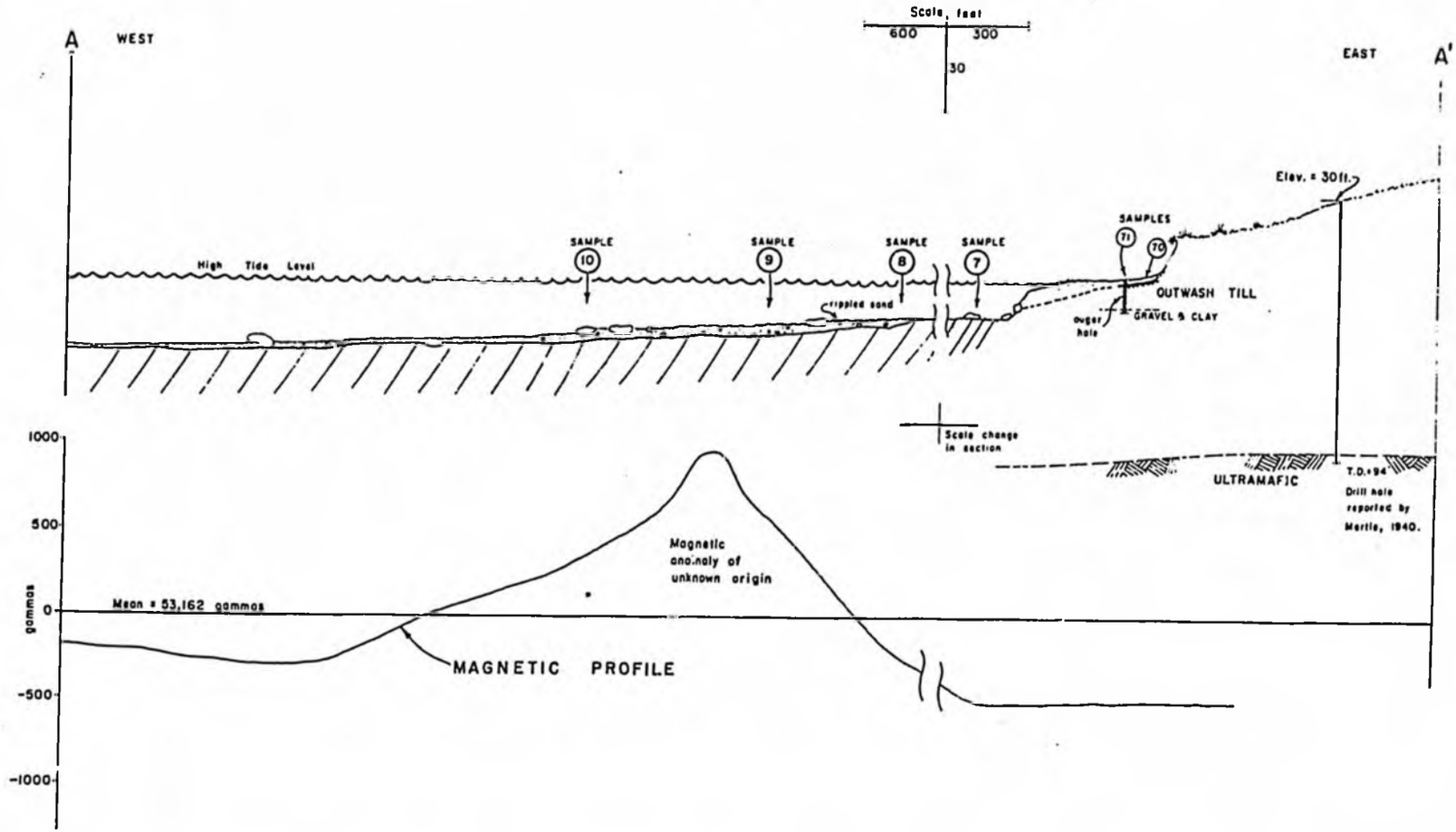


FIGURE 20-A. - Geologic and magnetic cross-sections A - A,' of seafloor offshore Dead Walrus Creek.

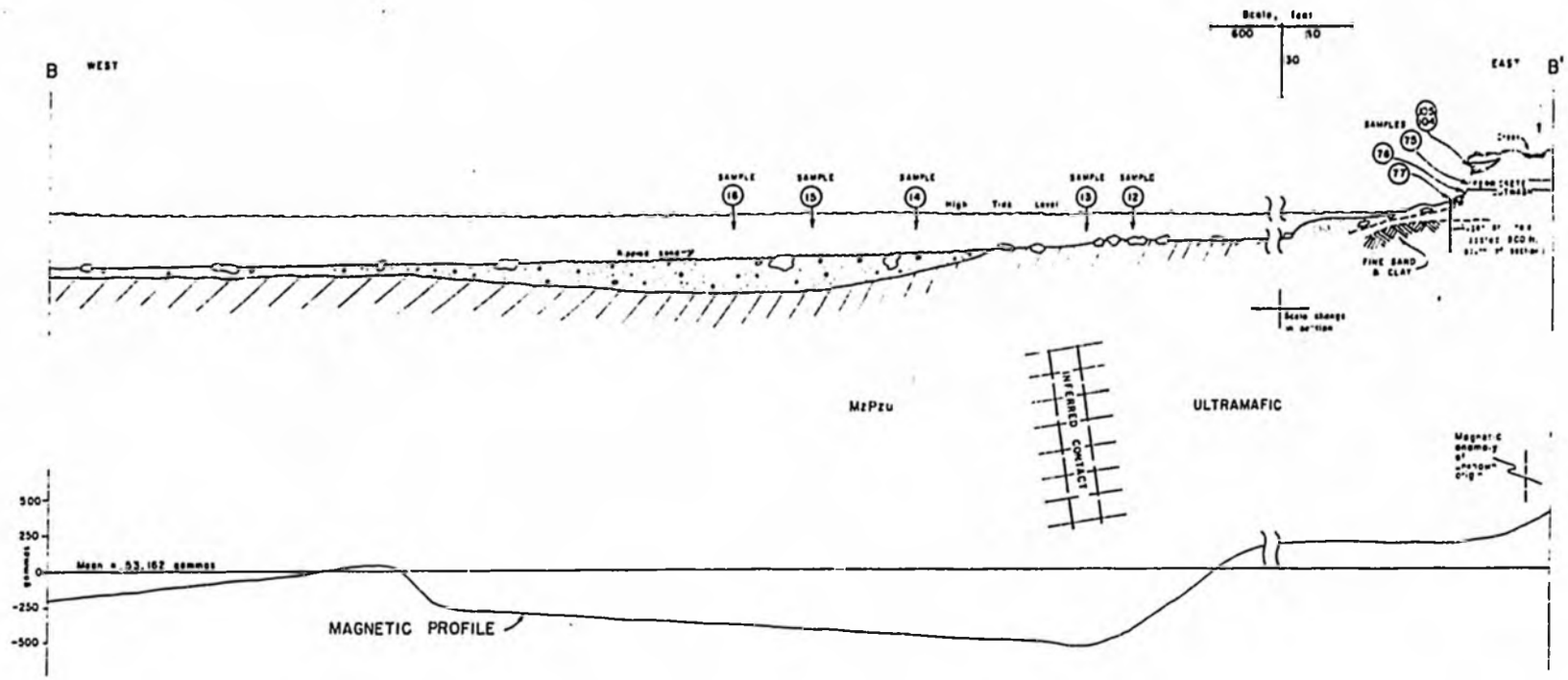


FIGURE 20-B. - Geologic and magnetic cross-sections B - B,' of seafloor south of Cabin Creek.

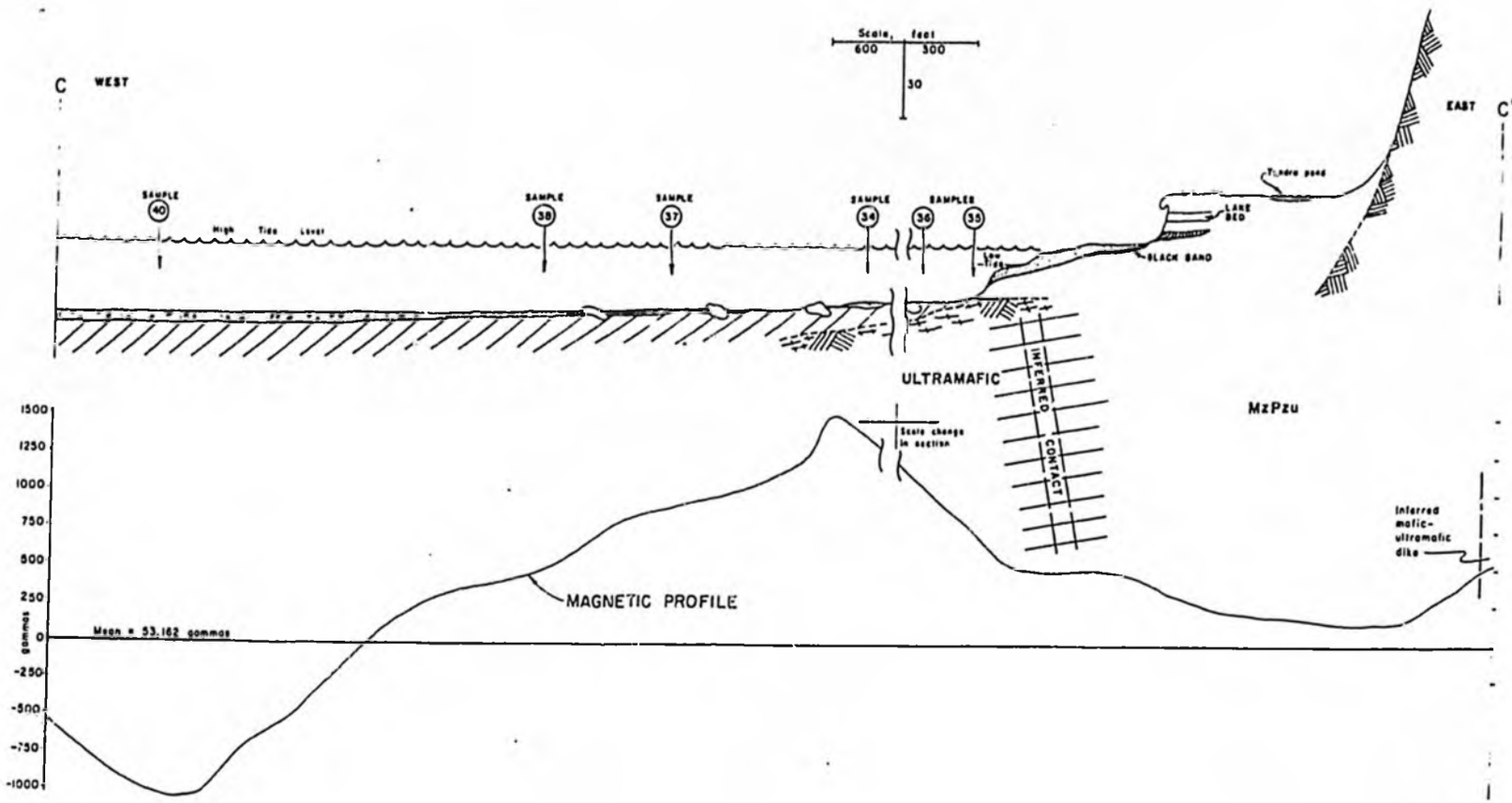


FIGURE 20-C. - Geologic and magnetic cross-sections C - C,' of seafloor offshore Thorsen Mountain.

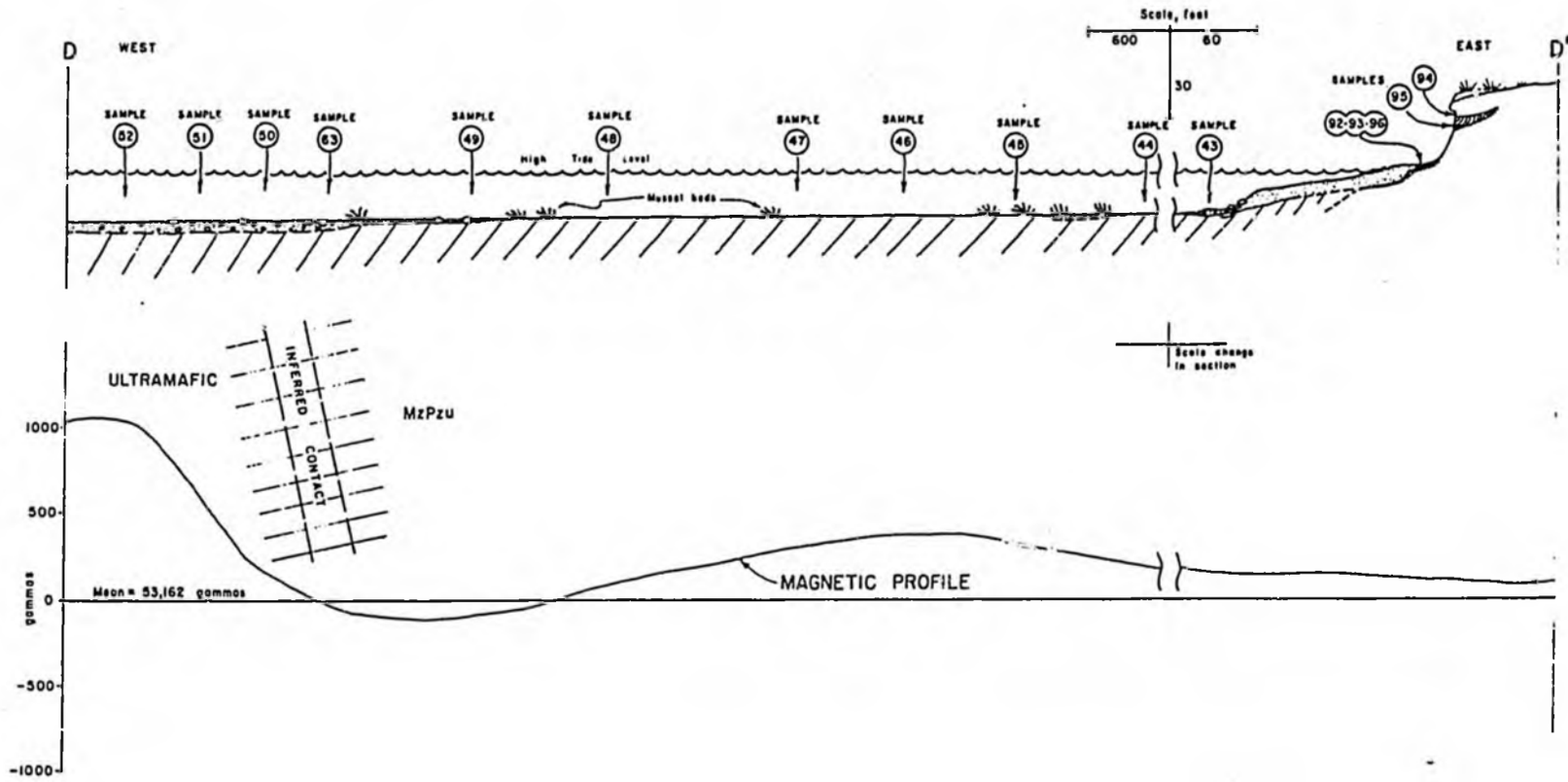


FIGURE 20-D. - Geologic and magnetic cross-sections D - D,' of seafloor offshore Flat Cape.

Several more localized features were examined in closer detail. A sinuous magnetic high in the vicinity of lat 58°57' and long 161°47' twice crosses the beach. More abundant, coarser-grained PGM, up to 3.0 mm, was found in samples from the sites within the southern lobe of the anomaly. Subsequent auger drilling to a depth of 18 ft (5.5 m; sample no. 77) encountered fine-grained, magnetite-rich olivine sand, and green clay. In 1982, Bond, and in 1984, Ulrich (11-12) also noted higher concentrations of PGM and higher amplitude ground magnetics at a beach site (referred to as Dead Walrus Creek) that coincides with the northern lobe of the feature. Additionally, within the northern lobe, Mertie (6) reported a mid-1930s drill location near the mouth of the first creek south of Last Chance Creek (presumably Dead Walrus Creek) that encountered ultramafic bedrock at a depth of 94 ft (30 m).

The sinuous anomaly and spatially associated PGM concentrations are suggestive of a magnetite-bearing channel or well-developed paleo-strandline, the later indicated by the fine-grained heavy minerals from the auger hole. It is likely that the wave-cut scarp at the base of the offshore dropoff is encroaching upon this buried feature and suppling the PGM to the northward littoral drift (sample nos. 11, 13) and local beach. The abruptly terminated ends of the feature may correspond to truncation resulting from one of the glacial episodes. Alternatively, due to the magnitude of the anomaly (fig. 19), this feature may represent near vertical dipping magnetic dike(s) or magnetic outer zones to the complex perhaps with PGM enrichment. In either case, it has locally been noted that PGM has an affinity for magnetite in the ultramafic complex.

Two magnetometer lines were placed E-W across the South Spit of Goodnews Bay (fig. 3). The magnetic gradient from west to east across the spit was relatively flat except for a pronounced 250 gamma rise approaching the eastern shore. Cause of the anomaly is unknown, however its location closely coincides with an aerial photo linear that marks the bluff scarp northward from the village cemetery (lat 58° 59,' long 161° 47.5') and continues north to trace the lower course of the Smalls River. Magnetite concentrations along an ancient wave-cut scarp, perhaps fault related, is a possible interpretation.

COASTAL GEOLOGY

Geologic mapping of sediments in relation to bedrock sources and littoral processes distinquished six map units overlying the preglacial surface comprizing ultramafic and metavolcanic bedrock and colluvium: (1) till of distal origin and associated glaciofluvial outwash, lake beds, peat bog, and clay deposits, (2) paleo-alluvial channel sediment of local derivation, (3) lag deposits left behind the receding coastline, (4) ultramafic boulder fields due to ice-rafting near Red Mountain, (5) mobile seafloor sediment from distant offshore sources, and (6) beach sand and gravel. Figures 20-A-D show these features and units in cross-section along four approximate E-W lines where sufficient information is available from field studies. Location of cross-sections is also shown on figure 2 for reference to regional geology. The geologic configuration of these cross-sections has developed as transgression of the sea progressed from west to east over the last several thousand years.

DISTRIBUTION OF PGM AND GOLD

Samples containing PGM are generally confined to a zone parallel to shore and across the top of the Flat Cape shoal (fig. 18). Analytical results show that seafloor sediments of unit 5 previously described, generally are barren of platinum, whereas lag gravels of unit 3 which have been mixed with sediment from till (unit 1) and from materials below the preglacial surface generally contain at least traces of platinum. Thus, as predictable from geologic observation, PGM is found on the surface of the seafloor only in high energy sediment transport zones and on the shoal where fast currents deter sediment accumulation of unit 5. Elsewhere, lag materials extend outward and offshore under unit 5. The exposure of PGM to ocean processes at the base of the dropoff is the apparent source of the fine-grained PGM that is seasonally entrained in the beach sediment of unit 6. Due to the rapid rate of transgression, the lag deposits that are presently exposed on the seafloor are immature and poorly developed which reflects in the relatively low metal grades.

The occurrence of gold (fig. 18), on the other hand, does not completely correlate with PGM, nor the exposed extent of the preglacial surface, suggesting gold enrichment is largely derived from the glacial till of unit 1 or its reworked equivalent. Some gold, however, occurs in most samples that also contain PGM thereby indicating the degree to which the two placer sources have been mixed. The data indicate the higher grade gold values are due to a sporadic occurrence of gold grains that tend to occur where the glacial sediments have been most reworked and redeposited, e.g., samples nos. 2-6 in the channel leading into Goodnews Bay. In contrast, beach and near-shore samples near the base of Red Mountain comprise material mostly derived from the preglacial surface (sample nos. 11,13,77-89); these contain PGM, but little or no gold.

Chromite, as indicated by chromium analyses (appendix A-B), shows an obvious correlation to PGM as would be expected. Chromite is considered a possible by-product commodity and is shown to be recoverable, however, the overall content of chromium, as well as titanium, in the offshore samples is no more than a few lb/yd^3. This lower tenor may be due in part to significant losses of lighter heavy minerals during sample processing. Similar to chromite, there is an apparent correlation of cinnabar to PGM in samples; most concentrates from the Flat Cape shoal contained traces of cinnabar and/or native mercury (Hg-minerals noted in sample nos. 18,46,48,49,51,53).

Because iridium values reported in this study are determined on the basis of the cited Ir:Pt content of onshore dredge concentrates, the assigned value of 0.13 times the analyzed platinum value in samples may be lower than the actual presence of iridium. There is a tendency for iridium content of PGM placers elsewhere to be greater in relation to platinum, particularly where PGM grains have undergone additional reworking in a saline environment (28). Examination of the concentrates by SEM suggested a higher abundance of Ir-alloys in samples collected during this study than would be accounted for with a ratio of 0.13.

DEPOSIT-TYPES AND RECOMMENDED EXPLORATION TARGETS

On-going littoral processes are forming heavy mineral concentrations, and at the same time are depositing sediment that may mask drowned alluvial or ancient marine placers. Exploration should focus on 1) recent transitional and marine placers and 2) ancient, pre-trangression deposits. In addition, there is inconclusive evidence of PGM placer enrichment related to low temperature solubility, solution transport, and alloy accretion.

Due to the relative short transgression period (+ 10,000 yr) in or near the study area, it is likely that the more significant targets predate this event.

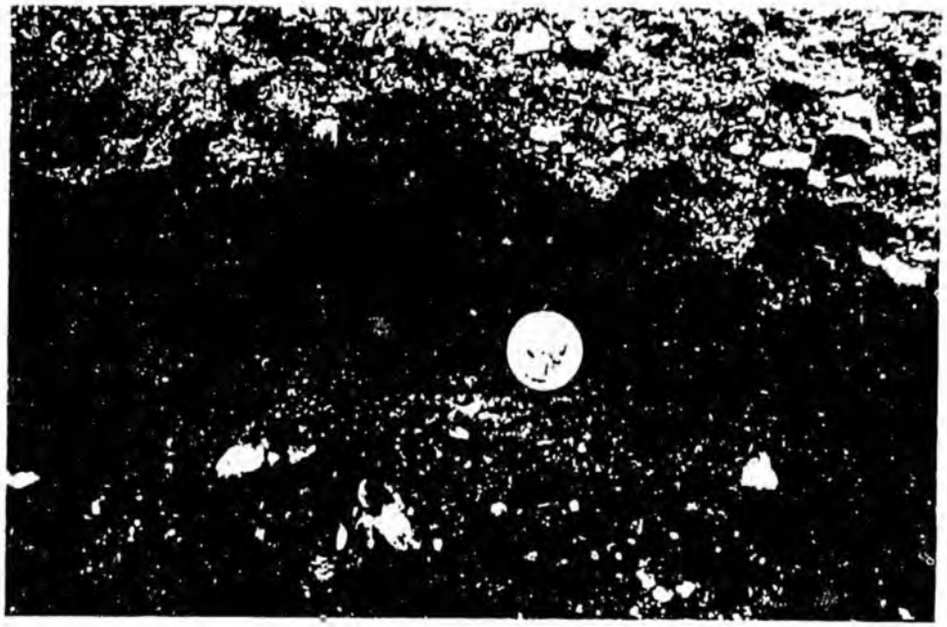
RECENT MARINE PLACERS

As the coastline recedes, lag deposits remain behind which host at least minor PGM values. These lag gravels contain preglacial locally derived sediment and PGM, and are exposed only in a narrow zone along the base of the offshore dropoff and on the Flat Cape shoal. Bottom samples contain PGM, but most values are far below the grade required for mining. Exploration should attempt to delineate stillstand strandlines within the rising sea level environment where more enriched strand deposits may have developed. The location of sample no. 49 may be an example of this.

Beach accumulations of PGM and gold were documented by Berryhill (29), Bond (11) and Ulrick (12). Assay grades from Bureau sampling (appendix B) demonstrate that fine-grained PGM and gold can be readily panned from black sand. From Seattle Creek to Chagvan Bay, seasonal deposits of black sand form a nearly continuous thin layer, typically 0.25- to 1.0-in-thick, overlying clay-rich till and under as much as several feet of washed beach gravel (fig. 21 site of beneficiation sample B). Such deposits may be present in the spring, but widely dispersed in the winter. Due to the highly immature nature of the rapidly receding beach, the resource potential is of little significance and may at times be stripped away by storm waves and consequently missing.

Black sand accumulations over semi-consolidated stratified ferricrete gravel till near the mouth of the Salmon River (fig. 22) are similar to beach heavy mineral accumulations, but are more widespread at this location. Sample A described in the Beneficiation section and sample nos. 98-99 were from this site. Full extent of this occurrence is unknown, however, shallow offshore drilling may resolve whether this occurrence is limited to the present beach area or is a wider deltaic feature extending offshore.

It has been suggested that fine-grained PGM entrained in sediment transport along the beach, may be accumulating in sediments of Goodnews and Chagvan Bays where beach transport terminates (7,9,11-12). Bottom samples (nos. 2-6) within the channel leading into Goodnews Bay contained minor gold values, probably concentrated from glacial sediments, but barely detectable platinum. PGM was, however, found along the beach offshore of Chagvan Bay (samples nos. 100-102, appendix B). Due to the closer proximity of Chagvan Bay to the projected ultramafic bedrock, the existence of modern and ancient PGM-bearing channels of the Salmon River leading toward Chagvan Bay, and the



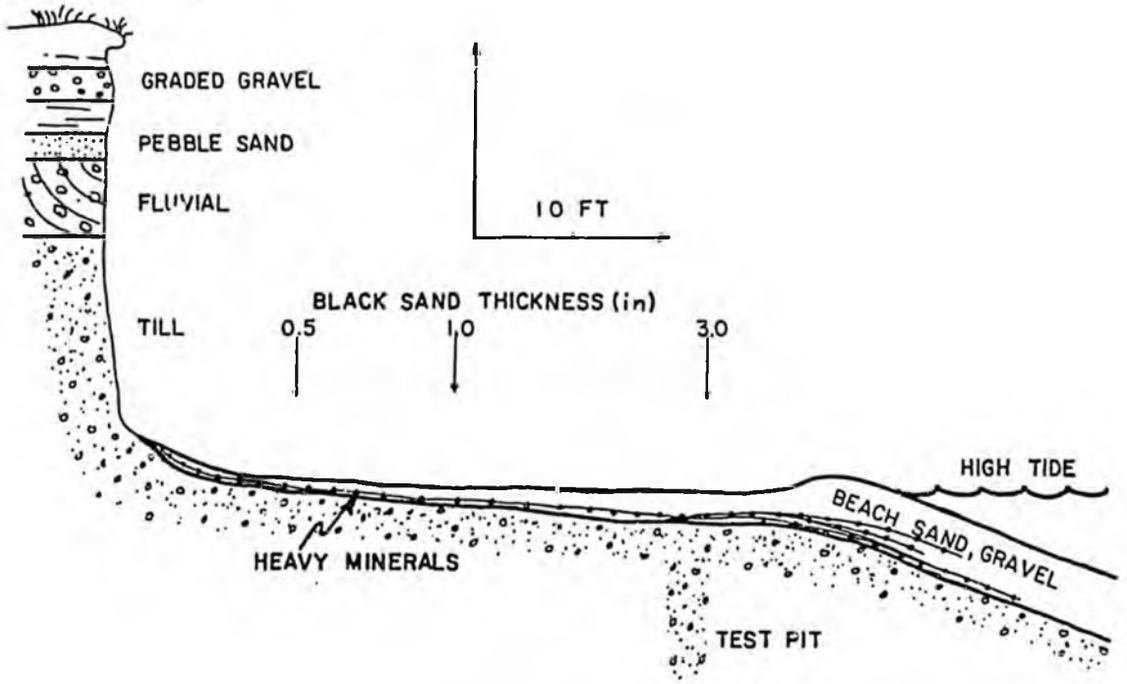


FIGURE 21. - 3-in-thick layer of heavy minerals, accumulated in June, 1985, on glacial till underlying up to 2 ft of beach gravel above the swash zone near Flat Cape. Cross-section shows site of beneficiation sample B.

possibility of offshore drowned channels trending that direction as well, it is likely that Chagvan Bay represents a more viable target for PGM concentrations in a low energy zone. PGM, if present in either bay, may, however, be too fine-grained to be recovered with gravity separation techniques.

FIGURE 22. - Ferricreted till strata near the mouth of the Salmon River creates a false bedrock surface on which heavy minerals with PGM and gold have accumulated. This site was found exposed following a storm in Aug, 1981.

ANCIENT MARINE AND DROWNED ALLUVIAL DEPOSIT-TYPES

At lower sea levels in the past, an extensive bedrock and alluvial plain extended well beyond the area of this study. The magnetometer survey indicates approximately as much ultramafic bedrock lies offshore as is known onshore, posing several potential deposit-types. Ancient placer deposits if present, will be buried by overburden of unknown thickness. Seismic surveys and drilling which was not a part of this project, will be required for further delineation.

Drowned alluvial channels likely exist beneath the offshore sediments. For example, a paleo-bench of the Salmon River has been explored from Medicine Creek to the margin of Chagvan Bay where it likely extends offshore (fig. 2). The gradient of the ancient channel is greater than the present channel and near Chagvan Bay it is overlain by up to 200 ft (61 m) of sediment (2). The magnetic interpretation of a N-S fault or fold offset of the ultramafic complex located about 2.5 miles offshore offers a plausable site for an ancient south to southwest-flowing alluvial channel. This direction would mimic the general trend of onshore valleys (e.g., Salmon and Kinegnak Rivers). Elsewhere, paleochannels are exposed in the bluffs at Flat Cape (sample no. 93, fig. 9) and south of Cabin Creek (sample nos. 103-104). These contain ultramafic detritus and traces of PGM. Other deeper channels

may also exist below the bluffs, close to, or within the preglacial surface.

Ancient offshore strand lines from former transgression/regression cycles also represent favorable exploration targets. These include bedrock slopes along the northwestern margin of the projected ultramafic bedrock, and the southern margin of the Flat Cape shoal.

Closer to shore, strand deposits may correlate to an ancient wave-cut scarp. As previously described, near the base of the slope east of Flat Cape there is evidence of a buried and drowned, wave-cut scarp predating at least the last glacial advance. The scarp may additionally correlate to the deep incision at the base of Red Mountain, and the aerial photograph linear that extends northward from there to the bend in the South Spit. The occurrence of fine sand, clay, and magnetite associated with the sinuous magnetic anomaly north of Red Mountain, and the spatial association of PGM with this site is suggestive of deposition along a possible drowned scarp. South-southeast projection of the ancient scarp would coincide with the apparent terminous of the Salmon River paystreak between Claims 15 and 16 Below, near the confluence of Happy Creek. Exploration is recommended for potential PGM enrichment along the possible scarp, probably at depths of 50 ft (16 m) or less below sea level.

Unconventional Deposits

Examination by SEM of PGM grains found some to be quite crystalline with angular edges showing no abrasion (fig. 11E-F). As previously described, some grains are bimodal and comprised of several interlocked

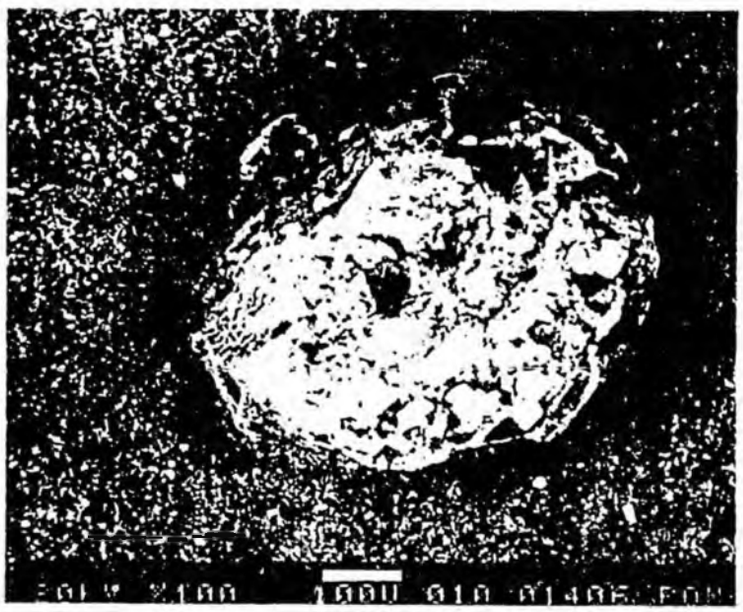


FIGURE 23-A. - Rounded sperrylite grain about 0.5 mm in diameter from test pit site sample no. 88. Note scale bar is 100 microns.

FIGURE 23-B. - Enlargement of lower center portion of sperrylite grain in above photograph. The platy crystalline growths (?) are composed of isoferroplatinum. Note scale bar is 100 microns.

alloy phases. In addition, plate-like growths (?) of Pt-Ir alloy were found as a rind on a sperrylite grain (figs. 23-A and -B). The coated sperrylite grain is evidence of possible accretion of isoferroplatinum at the expense of, or nucleated around sperrylite. The sperrylite grain is well-rounded but the euhedral isoferroplatinum crystals coating it are sharply delineated and appear not to have been abraided.

Evidence has been presented that platinum can be leached at low temperatures in an acidic, oxiding environment such as during serpentinization, then transported in migrating groundwater as soluble chloride complexes (28,30). Accretion of soluble platinum occurs where the platinum can nucleate in a more reducing environment.

A reducing environment is indicated within seafloor sediments. Crystalline pyrite was found in several samples of sediment overlying and along the northern flank of the Flat Cape shoal (e.g., sample no. 15). Bright white crystals of euhedral pyrite as loose grains up to 0.3 in (1 cm) across and as small dendritic branches were particularly abundant in the clayey matrix of the ultramafic bedrock rubble (sample no. 35). In several cases pyrite was also seen to have replaced microorganisms (figs. 15 and 24).

Layered gold shown in figure 13 may also have developed from precipitation of gold within a quiet depositional environment. The possibility of leaching, ground water convection into near shore sediments, and platinum accretion in localized PGM enriched placer zones, should be further studied.

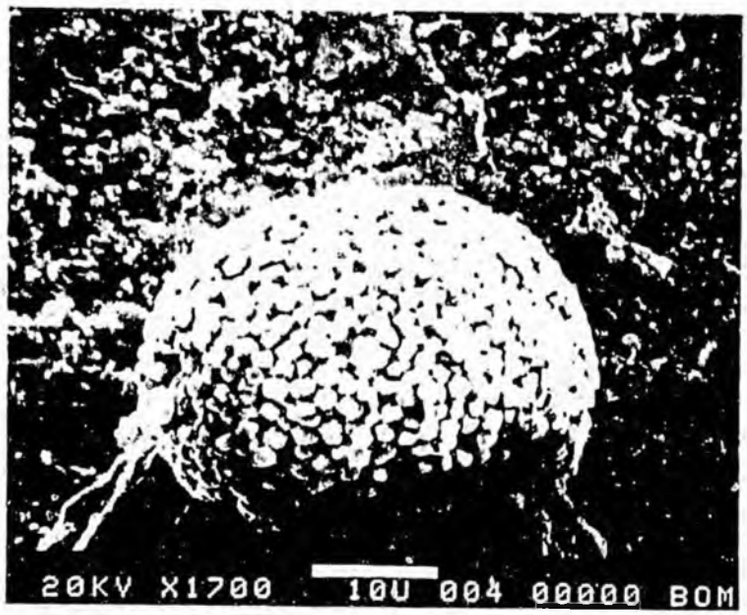


FIGURE 24. - Pyrite relacement and crystalline growth on diatom from sample no. 48, about 2 mi off Flat Cape. Scale bar is 10 micron.

CONCLUSIONS

It has long been suspected that placer PGM may occur in deposits offshore of the Goodnews Bay ultramafic complex. Although nearby onshore placers have produced 650,000 t oz PGM, no offshore deposits are known. There is, however, at least one report of PGM found in a seafloor drill hole west of Red Mountain.

The area offshore from Red Mountain has experienced a complex history of high-energy ocean processes with transgressive and regressive cycles that have periodically inundated an extensive coastal plain extending west at least tens of miles. On-going littoral processes are forming heavy mineral concentrations, and at the same time, depositing sediment that mask drowned alluvial or marine placers. Where the wave-cut scarp is actively eroding the preglacial surface, locally-derived materials (including PGM) are part of the littoral drift and resultant lag deposits. This condition was observed at the base of the 10- to 15-ft (3- to 5-m) below-sea-level dropoff scarp near lat 58°54' and extends at least intermittently north past Red Mountain to lat 58°56.5.' The locally-derived materials entrained in longshore transport are confined to a narrow zone at the base of the dropoff. As the coastline continues to recede, a wave-cut platform is left which is rapidly mantled by mobile, fine-grained, well-sorted sediment from offshore.

The extent of glacial scouring, near, or on the west side of Red Mountain, is an important factor regarding the preservation of PGM placers. A lobe of the Goodnews glacier was near the northwest face of Red Mountain, but appears to have been a relatively low-energy ice

sheet with marginal erosional force. The principal ice contact is limited to the northern tip of the mountain mass. An ancient PGM-bearing channel of the Salmon River extending to and possibly below Chagvan Bay is known to have survived glaciation in the Chagvan Bay area.

Magnetometer data indicates approximately as much ultramafic bedrock lies offshore as is known onshore and the complex is open to the west, posing several potential deposit-types for exploration. Exploration targets should focus on 1) recent placers with particular emphasize on offshore lag deposits or strands at stillstand locations, and 2) ancient, pre-trangression deposits that include drowned fluvial channels and strands parallel to wave-cut scarps. There is photolinear, magnetometer, sampling, and drillhole indications of an ancient wave-cut scarp near but about 50 ft (15 m) below the present coastline. In addition, there is inconclusive evidence of PGM placer enrichment related to low temperature solubility, solution transport, and accretion.

The PGM and gold occurrences discussed in this report coupled with geophysical data and geologic observations suggest the offshore is favorable for placer PGM with associated gold and provides several promising exploration targets. Recovery of PGM and gold from low grade sediments, however, will require innovation beyond standard placer processing techniques.

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APPENDIX A - Sample analyses and descriptions for offshore sites

Map number	Sample number	Original sample kg	-20 mesh kg	Weight of heavy mineral-table q	Weight of pan conc-Pt concentrate q	Flotation conc q	mg/yd³ [1] Pt	Ir [2]	Au	Weight pct in heavy mineral concentrate Fe	Ti	Cr
1	23318	21.2	3.0	NS	1.6	5.09	T	T	T	NA	NA	NA
2	23319	22.9	1.1	85.9	11.2	NS	T [4]	T	131.09 [4]	4.9	0.71	0.09
3	23307	71.3	9.2	48.4	24.2	NS	T	T	1.02	6.2	.73	.18
4	23178	36.3	NS	187.4	104.1	NS	T	T	94.56	2.9	.23	.1
5	23317	45.1	6.5	NS	5.7	NS	N	N	28.67	NA	NA	NA
6	23310	34.5	19.6	88.6	26.5	5.14	5.75	.31	211.72	12.0	1.63	.87
7	23077	53.3	25.3	42.5	19.9	10.49	2.76	.36	.29	17.0	2.18	3.08
8	23074	39.0	33.1	93.0	28.3	2.54	.72	T	.55	25.0	3.82	4.09
9	23075	48.5	28.5	158.5	46.5	16.17	.82	.11	.55	27.0	4.25	3.66
10	23076	34.2	8.1	53.1	25.1	4.78	1.03	.18	.42	10.0	1.24	1.33
11	23311	36.8	29.0	456.4	37.3	NS	26.76	3.48	7.67	30.0	2.98	5.50
12	23302	6.8	2.3	NS	33.0	NS	.76	.10	.76	NA	NA	NA
13	23029	63.1	13.2	28.4	21.9	12.06	11.95	1.55	.14	34.0	2.95	9.62
14	23030	42.7	28.2	87.1	36.0	21.0	.13	T	.01	36.0	3.72	8.29
15	23034	50.8	12.8	115.0	19.5	21.0	.94	.11	3.92	19.0	1.86	4.33
16	23033	44.9	25.9	40.0	22.1	8.5	T	T	.29	28.0	5.20	4.11
17	23041	50.4	3.5	NS	16.9	15.2	1.13	.15	.12	NA	NA	NA
18	23040	64.5	26.7	479.1	32.0	22.9	.44	T	8.72	36.0	4.18	6.57
19	23039	61.7	32.6	247.1	52.6	15.0	.10	T	2.72	22.0	2.24	5.09
20	23038	54.9	14.5	100.8	26.8	20.7	.04	T	2.50	22.0	2.24	5.09
21	23035	54.9	5.3	67.9	16.7	3.0	.30	T	.20	15.0	1.38	3.14
22	23036	62.2	15.8	61.7	27.9	14.0	T	T	.90 [4]	24.0	3.34	4.31
23	23037	39.1	10.8	468.5	20.0	31.0	.88	T	1,251.20 [4]	7.3	.52	.59

	Description
1	Sub-rounded, sandy gravel. Predominantly chert, few UM. Van Veen grab.
2	Well-rounded gravel, minor sand. Au grain = 1.5 mg, Au attached to qz. 5 Pt specks. Cinnabar in pan concentrate. Shipax grab.
3	Sub-rounded to rounded, sandy gravel. 1 Pt speck, 1 Au speck in check pan. Van Veen grab.
4	0.5 ft loose, sorted gravel overlying clayey gravel from bottom of channel. Sample diluted when hole sloughed in.
5	Rounded, silty-clayey gravel with dark gray mud from toe of slope. 3 Au grains = 0.2 mg, 4 Pt specks. Chert, quartz, volcaniclastics comprise gravel. Van Veen grab.
6	Fine, sandy beach sand from deepest part of channel. Au grain = 2.4 mg. 3 Pt specks in check pan. Van Veen grab.
7	Sand and gravel overlying 0.5 ft coarse, sub-rounded, cobbly gravel, overlying compacted clayey, gravel. Sample from compacted gravel. Scattered UM boulders.
8	Sample taken from cobbly gravel overlain by 0.75 ft loose rippled sand.
9	0.9 ft brown, rippled sand overlying salt and pepper sand. Sample taken from salt and pepper sand. Scattered UM boulders.
10	0.5 ft gravely sand overlying compacted clay-rich gravel. Sample was taken at edge of and beneath large UM boulder, and from depth of 0 to 1.25 ft below seafloor.
11	Fine sand with beach pebbles from upper edge of dropoff. 6-10 Au specks. Van Veen grab.
12	Tightly compacted gravel with abundant UM boulders. Van Veen and Shipex grab.
13	Sample taken from 0.75-ft-deep hole in cobbly, silty, compacted gravel, with UM boulders up to 1 ft nearby.
14	Sample taken from 0.75-ft-deep hole in 0.25 ft of rippled sand overlying sandy, silty gravel, with cobbles up to 0.75 ft.
15	Sample taken from silty gravel with cobbles overlying veneer of rippled sand. 1 Au flake.
16	0.25 ft of rippled sand overlying sandy gravel. Sample taken from 0.8-ft-deep hole in sandy gravel.
17	Cobbly gravel. 2 Au specks.
18	Black, silty, sandy gravel.
19	Sample taken from sandy gravel overlain by rippled sand, scattered boulders nearby. A few Au and Pt specks.
20	Sandy gravel, sample depth of 1 ft .
21	Relatively loose, silty gravel, cobbles.
22	0.75 ft cobble bed overlying silty, clayey sediment. Sample from 1.5-ft-deep hole, which includes the clay-rich zone. 5 Au specks.
23	Sample from loose, silty, clayey gravel with numerous rounded boulders, a few to 4-ft-diameter. 28 mg of Au grains, Au is angular to sub angular, some attached to qz, some are flat scales. A few Pt specks also found.

See notes at end of table.

APPENDIX A - Sample analyses and descriptions for offshore sites--Continued.

Map number	Sample number	Original sample kg	-20 mesh kg	Weight of heavy mineral-table q	Weight of pan conc-Pt concentrate q	Flotation conc q	mg/yd³ [1] Pt	Ir [2]	Au	Weight pct in heavy mineral concentrate Fe	Ti	Cr
24	23206	42.8	17.9	NS	24.9	NS	.04	T	1.56	NA	NA	NA
25	23055	37.2	6.3	84.7	20.4	NS	6.42	3.31	5.08	50.0	2.49	11.60
26	23053	52.7	11.2	68.7	35.8	8.00	.06	T	.69	10.0	1.28	1.18
27	23071	52.2		24.2	25.7	2.00	.17	T	.10	36.0	4.25	7.90
28	23073	52.2	26.3	0.0	34.0	30.70	.10	T	1.82	NA	NA	NA
29	23323	2.5	NS	0.0	9.1	NS	.15	.02	8.14	NA	NA	NA
30	23054	49.5	12.2	0.0	27.9	6.10	.08	T	.04	NA	NA	NA
31	23072	52.2	16.2	303.8	37.8	21.10	.71	.09	.64	8.0	.96	.79
32	23316	47.2	27.2	127.1	23.8	NS	.04	.01	.43	16.0	1.99	2.43
33	23305	51.3	7.7	0.0	27.9	NS	.33	.04	2.10	NA	NA	NA
34	23312	30.4	7.9	54.8	39.8	15.80	3.67	.48	2.16 [3]	38.0	4.41	6.29
35	23201	47.3	15.6	2,332.0	67.0	NS	.53	.07	>.34 [3]	5.3	.60	.12
36	23202	49.9	32.9	3,208.0	61.4	NS	.13	.02	31.36	NA	NA	NA
37	23203	45.0	7.4	0.0.	45.8	NS	.56	.07	.78	NA	NA	NA
38	23313	95.3	4.6	35.0	32.6	4.92	.02	T	.34	30.0	5.10	3.64
39	23204	45.0	6.3	0.0	117.3	NS	.16	.02	21.46	NA	NA	NA
40	23205	42.8	5.0	330.3	NS	NS	.08	T	140.10	NA	NA	NA
41	23208	25.7	8.0	0.0	24.9	NS	1.75	.23	4.02	NA	NA	NA
42	23299	33.3	2.3	0.0	30.0	NS	20.00 [4]	2.60 [4]	47.00 [4]	NA	NA	NA
43	23296	30.0	22.4	124.8	54.7	NS	>2.18 [4]	>.28 [4]	4.06 [4]	36.0	4.21	4.21
44	23297	32.0	3.2	0.0	11.8	NS	.46	T	.27	NA	NA	NA
45	23298	45.7	14.5	64.4	44.0	2.38	68.52	9.11	123.33 [3]	6.6	.77	.45
46	23126	56.8	35.4	84.4	.5	NS	1.0	.10	>29.30 [3]	26.0	1.80	N
47	23125	56.8	49.9	73.7	4.6	NS	.44	T	>1.33 [3]	24.0	1.90	>3.00
48	23124	56.8	40.0	111.6	.2	NS	.50	T	>2.66 [3]	25.0	1.60	>3.00
49	23123	56.8	21.4	552.9	11.1	NS	141.26	18.36	>353.00 [3]	38.0	>2.00	>3.00

Map number	Description
24	Sample taken from gray, clayey gravel covered by 0.6 ft of rippled sand. 3 Au specks.
25	Sample of silty, clayey gravel collected beside a 4-ft UM boulder.
26	Sample from 1 ft hole in compacted, clay-rich sediment. Mussle bed present. 12 Pt specks.
27	Sample of sandy gravel from 1- to 2-ft hole.
28	0.5 ft silty gravel overlying 0.6 ft loose pea gravel, overlying compacted, clayey gravel. Sample includes all three.
29	1 small Au flake in one pan. Van Veen grab.
30	Sample of silty gravel from 1 ft hole.
31	Clayey, sandy, cobbly gravel with boulders to 3-ft-diameter. Sample collected from edge of boulder. Visable Au and Pt specks.
32	Sample of rounded, loose sandy gravel, overlying a clay-layer not included in sample.
33	Sample of sandy gravel. 1 Pt speck in check pan. Van Veen grab.
34	Sample of sandy gravel from toe of dropoff. 1 Pt speck. Van Veen grab.
35	Sample of compacted clay-gravel, UM rubble, from toe of dropoff, from 1.5-ft hole. Abundant white metalic sulfide (pyrite). A few Pt and Au specks in final concentrate.
36	Sample from 0.75 ft hole in tightly compacted, sandy, rounded gravel with small, rounded UM boulders
37	Sample from 1.2-ft hole in compactad sandy gravel.
38	Sample of loose, fine-grained, well-sorted gravel. 1 Au speck in check pan. Van Veen grab.
39	Sample of loose, well-rounded, sandy gravel from 2-ft-deep hole.
40	Sample of loose, well-rounded, sandy gravel which is forming shallow bars.
41	Sample from gravelly clay, with boulders embedded, from toe of drop off. 2 or 3 Pt specks in check pan. Ferricrete on pebbles.
42	Sample from loose gravel, which is overlying sandy, clayey gravel. Sponges and starfish in vicinity. 1 Pt speck in pan. Van Veen grab.
43	Sample of loose, sandy, sub-rounded gravel. 1, 0.3 mm Au flake; 5, 0.1 to 0.2 mm Au flakes; 2, 0.05 mm Pt. Van Veen grab
44	Sample of sub-rounded, sub-angular gravel. Some small metallic grains. Van Veen grab.
45	Sample of subangular gravel, in mussel bed. 1, 0.02 mg Pt speck; 1, 0.03 mg Pt speck. Van Veen grab.
46	Sample from compacted cobbly gravel. Cinnabar in concentrate.
47	Sample from clayey, cobbly gravel.
48	Sample from subangular and subrounded gravel. Pt speck in oversize fraction.
49	Sample of loose, cobbly gravel overlying compacted clayey gravel, taken from 0.1- to 0.8-ft depth. Au and Pt specks, coarser Au grains to 0.5 to 10mm; Pt grains to 0.3 to 1.0mm.

See notes at end of table.

APPENDIX A - Sample analyses and descriptions for offshore sites--Continued

Map number	Sample number	Original sample kg	-20 mesh kg	Weight of heavy mineral-table g	Weight of pan conc-Pt concentrate g	Flotation conc g	mg/yd³[1] Pt	Ir[2]	Au	Weight pct in heavy mineral concentrate Fe	Ti	Cr
50	23121	56.7	10.5	742.0	51.50	3.63	.06	T	.24	7.2	0.87	0.58
51	23079	56.2	38.0	116.0	4.40	NS	.17	T	>14.30[3]	30.0	>2.00	>3.00
52	23078	55.7	23.6	57.9	.77	NS	N	N	---[3]	18.0	>2.00	1.41
53	23300	39.9	8.7	84.8	40.20	28.90	11.28	1.47	3.53	29.0	4.14	4.42
54	23301	39.5	6.9	18.3	11.40	14.12	.03	T	.61	15.0	2.78	0.86
55	23306	27.5	2.0	0.0	21.10	NS	.07	T	1.03	NA	NA	NA
56	23303	28.6	1.1	69.8	18.60	2.84	2.39	.31	.99	5.3	0.68	0.12
57	23304	20.7	2.5	27.6	17.40	13.21	.09	T	4.17	17.0	2.95	1.33
58	23173	45.0	6.1	0.0	61.23	NS	5.55	.72	.74	NA	NA	NA
59	23172	49.5		0.0	52.90	NS	1.08	.14	.35	NA	NA	NA
60	23308	19.1	13.6	11.8	20.70	7.24	.25	T	10.20	28.0	3.90	2.84
61	23200	47.3	12.4	0.0	63.55	NS	.25	T	95.14	NA	NA	NA
62	23309	37.0	20.0	137.0	28.10	NS	.32	T	43.41	18.0	2.23	1.86
63	23122	62.1	15.8	NS	34.00	NS	.51	T	1.30	NA	NA	NA

Map number	Description
50	Coarse, subangular, loose gravel overlying compacted clayey gravel.
51	Sample from top 0.6 ft of loose, coarse gravel overlying compacted cobbly gravel.
52	Sample from top 0.5 ft of loose, sub-rounded gravel overlying compacted cobbly gravel.
53	Sample of sandy, silty gravel with few fines. Au, Pt, and cinnabar in concentrate. Van Veen grab.
54	Sample of sandy gravel. Van Veen grab.
55	Sample of subangular gravel. Van Veen grab.
56	Sample of loose, sandy gravel. 2 small Pt specks in check pan. Shipek and Van Veen grab.
57	Sample of loose, sandy gravel. Small Pt specks in check pan. Van Veen grab.
58	Sample from 0.75-ft-deep hole in compact, cobbly gravel. Au and cinnabar in concentrate.
59	1.3-ft hole dug through 0.5 ft gravelly sand, then loose sandy gravel.
60	Sample of subangular and subrounded, sandy gravel. Van Veen grab.
61	Sample collected 0.5 ft down in loose, well-rounded gravel.
62	Sample of angular to subrounded, sandy gravel. 1 Pt in check pan. 1 Au grain = 0.5 mg. Van Veen grab.
63	Sample from 0.75 ft hole through loose cobbly gravel overlying compacted gravel.

qz quartz. b.s. black sand. UM ultramafic. T trace value. N not detected. NA not analyzed. NS no split prepared. kg kilogram. g gram. mg milligram.

[1]Conversion from mg/yd³ to t oz/yd³ is x 0.000032; mg/yd³ used to simplify data presented in this table.

[2]Calculated iridium values based on reported Ir:Pt of 0.13 given by Hertie (1940).

[3]Spurious high Pt or Au value reported for analysis of heavy mineral concentrate, no final assay calculated due to high level of bias.

[4]Partial analysis, grains previously removed for mineralogical study.

APPENDIX B - Sample analyses and descriptions for onshore sites

Map number	Sample number	Original sample kg	-20 mesh kg	Weight of heavy mineral-table q	Weight of pan conc-Pt concentrate q	Flotation conc q	mg/yd[3] [1] Pt	Ir [2]	Au	Weight pct in heavy mineral concentrate Fe	Ti	Cr
70	23011	4.5	NS	NS	20.30	1.50	151.70	20.20	25.20	NA	NA	NA
71	23106	18.2	NS	NS	27.10	NS	1.92	.26	T	NA	NA	NA
72	23015	1.0	NS	NS	4.17	NS	61.70	8.01	N	NA	NA	NA
73	23018	1.4	NS	NS	20.30	NS	1.33	0.17	10.53	NA	NA	NA
74	23043	18.2	5.9	0.0	16.00	NS	24.75	3.21	.37	NA	NA	NA
75	23004	5.0	NS	387.8	13.6	NS	13.35	1.74	8.89	NA	NA	NA
76	23006	20.0	3.1	320.1	20.0	NS	.59	T	.43	NA	NA	NA
77	23007	4.4	3.8	273.6	29.9	NS	96.20	12.90	7.80	NA	NA	NA
78	23010	3.6	NS	0.0	20.30	NS	1.16 [4]	.15 [4]	.05	NA	NA	NA
79	23032	29.2	7.2	106.7	40.10	10.04	>28.51 [4]	>3.70 [4]	1.75	34.0	1.50	14.90
80	23031	5.0	NS	231.7	NS	NS	5.36	.70	5.36	NA	NA	NA
81	23009	16.0	NS	122.0	25.20	NS	468.70	71.15	.02	21.0	1.16	6.00
82	23127	32.2	7.2	61.5	45.50	1.40	13.30	1.45	8.40	37.0	2.04	9.71
84	23086	5.0	NS	NS	22.30	NS	1.63	.21	N	NA	NA	NA
85	24444	39.0	NS	391.9	NS	NS	27.30	3.55	149.30	NA	NA	NA
86	24445	39.0	NS	866.4	NS	NS	12.84	1.67	2.57	NA	NA	NA
87	23027	32.2	7.2	61.5	68.20	1.40	57.09	7.42	4.61	37.0	2.04	9.71
88	23028	39.0	7.2	91.0	23.30	4.19	36.99	4.80	.05	18.0	.89	4.21
89	23042	29.1	6.5	516.6	40.51	5.39	252.64	32.84	1.23	23.0	1.15	5.67

Map number	Description
70	Sample of b.s. with visable Au and Pt.
71	Sample from 10-ft auger hole. 0- to 2-ft, beach wash; 2- to 9-ft glaciofluvial; 9+ ft gravelly clay.
72	Sample from 5-ft auger hole. Mostly beach sand and gravel.
73	Sample from 3-ft-deep auger hole on beach. 1- to .3-mm Au flake. Clasts of chert, UM, volcanics.
74	Pan concentrate of active channel. 0.3 mm Pt grain and 2 small Pt specks.
75	2-ft channel sample of well-rounded, Fe-oxide coated gravel of possible ancient fluvial deposit in beach bluff.
76	Channel sample of green-gray, sub-rounded to subangular, loose gravel, lower 3.5 ft exposed in bluff below sample 75.
77	Sample from 0- to 8-ft-interval of auger hole, consists of 1 ft loose pea gravel overlying green clayey sand. Abundant fine grained magnetite.
78	Sample collected from 6.5-ft auger hole in back beach.
79	Channel sample of a 2-ft-thick green clay/silt layer with subangular serpentinite clasts, overlying a ferricrete gravel unit. 4 coarse and 15 fine Pt grains found in concentrate.
80	Sample of clay and fine gravel from 1.5- to 8-ft-interval in auger hole on back beach.
81	Channel sample, top 1.5 ft of same auger hole as sample 80, contains minor b.s. Six Pt grains, measuring 0.4 to 1.5 mm, weighed 5.5 mg, combined.
82	Sample from 1.5- to 7.5-ft-interval of auger drill hole, consists of sandy gravel and clay. Ferricrete layer at 5.5 ft.
84	Sample of gravel from top of bluff. Concentrate contained 5 Pt specks.
85	Sample from 0- to 2.2-ft-interval of test hole, consists of ultramafic cobbles and boulders with a sandy matrix.
86	Sample from 1.75-ft-deep pit in beach sand with UM cobbles and boulders.
87	Sample 87, 88, 89 from 4-ft-deep pit in back beach. Sample 87 collected over 0- to 1-ft-interval of beach sand. Contained visable Au and Pt.
88	See no. 87. Sample from 1- to 2-ft-interval, consists of clay and sand.
89	See no. 87. Clay rich sample from 2- to 4-ft-interval.

See notes at end of table.

APPENDIX B - Sample analyses and descriptions for onshore sites--Continued

Map number	Sample number	Original sample kg	-20 mesh kg	Weight of heavy mineral-table g	Weight of pan conc-Pt concentrate g	Flotation conc g	mg/yd³ [1] Pt	Ir [2]	Au	Weight pct in heavy mineral concentrate Fe	Ti	Cr
90	23068	27.2	NS	659.2	NS	NS	78.69	10.23	19.77	33.0	.78	>3.00
91	23066	28.8	25.9	2,231.6	45.00	NS	31.22	4.06	251.21	46.0	2.62	11.80
92	23058	40.9	NS	apx 500	45.00	NS	34.95	4.65	39.90	37.0	.76	10.55
93	23056	4.5	NS	NS	54.36	NS	452.20	60.41	579.60	NA	NA	NA
94	23119	50.0	NS	0.0	33.30	NS	.81	.11	T	NA	NA	NA
95	23057	40.0	NS	0.0	25.40	NS	3.70 [3]	.50 [3]	1.30 [3]	NA	NA	NA
96	23060	27.9	8.8	5,469.0	NS	NS	--- [4]	--- [4]	--- [4]	44.0	2.52	10.70
97	23069	17.3	17.0	1,542.7	NS	NS	>307.00 [4]	>165.00 [4]	>39.00 [4]	48.0	2.56	11.60
98	19421	2.5	NS	2.5	NS	NS	2,948.30	383.00	346.90	NA	NA	NA
99	19422	5.5	NS	5.5	NS	NS	6,590.60	857.00	1,503.00	NA	NA	NA
100	23128	9.1	NS	47.0	37.40	NS	>18.50 [5]	>3.40 [5]	>5.42 [5]	50.2	2.59	11.30
101	23129	6.8	NS	NS	49.30	NS	59.20	7.90	6.20	NA	NA	NA
102	23130	10.9	NS	NS	45.00	NS	74.00	9.80	154.00	NA	NA	NA
103	23012	.1	NS	NS	97.47	NS	3,074.80	399.72	12,128.30	NA	NA	NA
104	23197	27.0	NS	NS	82.50	NS	2.40	.32	.06	NA	NA	NA
105	23196	36.0	NS	NS	21.40	NS	T	T	T	NA	NA	NA

Map number	Description
90	1.2-ft channel sample across 3 layers of b.s. in beach gravel below swash.
91	Sample of b.s. from back baach. Pan concentrate had 10 Au- and 6 Pt-coarse grains, and over 100 fine colors.
92	Channal sample from 2-ft hole in back beach, includas narrow b.s. layer overlying till and under beach sand.
93	Sample from 0.33-ft-thick b.s. layer, which had 20 Pt- and 100-Au specks in check pan.
94	Channel sample of well-graded gravel and coarse gravel and sand, 8- to 12-ft fluvial interval.
95	Sample is lower zone of sample no. 94, consists of 2-ft-thick UM fluvial coarse gravel and sand.
96	Channal sample of .05- to .25-ft-thick b.s. layer. Sample is 0.5-ft-wide by 16-ft-long, in back beach and includes only the b.s. layer. Abundant visable PGM-Au.
97	Sample of b.s. layer underlying beach.
98	Sample of b.s. accumulation on ferricrete. Analysis represents minimum value as "riffles" on ferricrete could not be thoroughly cleaned.
99	Sample of b.s. accumulation, as in no. 98, but this sample included b.s. washed from farricrete.
100	Sample from b.s. layer below 1-ft of loose gravel. 20 Au and 15 Pt specks found. Grains removed for mineralogic study.
101	Sample from b.s. layer overlying coarser graval, collected over 50-ft-interval along back beach.
102	Sample of high-grade b.s. up to 0.25-ft-thick, overlying well-compacted, clayey gravel. Fine Au and Pt recovered from check pan.
103	Sample from 2-ft hole consists of pebble, sand, and boulders.
104	Channel sample of 3-ft-interval of well-rounded, well-sorted, paleo-alluvial gravels in bluff. Pan concentrate contained 3 to 4 specks of Pt.
105	3-ft channel sample of loose gravel, possibly from paleo-channel trough. Contained a few specks of Pt.

qz quartz. b.s. black sand. UM ultramafic. T trace value. N not detected. NA not analyzed. NS no sample. kg kilogram. g gram. mg milligram.

[1] Conversion from mg/yd³ to t oz/yd³ is x 0.000032; mg/yd³ used to simplify data presented in this table.

[2] Calculated iridium values based on reported Ir:Pt of 0.13 given by Hartle (1940).

[3] Spurious high Pt or Au value reported for analysis of heavy mineral concentrate, no final assay calculated due to high level of bias.

[4] Partial analysis, grains previously removed for mineralogical study.

Information Circular 8869

Critical and Strategic Minerals in Alaska

Cobalt, the Platinum-Group Metals, and Chromite

By James C. Barker, Jan C. Still,
Thomas C. Mowatt, and John J. Mulligan

UNITED STATES DEPARTMENT OF THE INTERIOR
James G. Watt, Secretary
BUREAU OF MINES
Robert C. Horton, Director

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

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CRITICAL AND STRATEGIC MINERALS IN ALASKA

Cobalt, the Platinum-Group Metals, and Chromite

By James C. Barker,[1] Jan C. Still,[2] Thomas C. Mowatt,[3] and John J. Mulligan[4]

ABSTRACT

A uniquely mineralized area extends from northwestern Canada through Alaska into eastern Siberia. Some of the metals found there are relatively rare in the conterminous United States. Among these are cobalt, the platinum-group metals, and chromite. Geologic evidence suggests that cobalt and the platinum-group metals may be present in deposits that could constitute nationally important reserves. Chromite in potentially minable deposits is known, but it may be relatively less abundant. Limited reserves of these metals have been delineated, but most of the favorable terranes and reported occurrences throughout the vast expanse of Alaska remain unexplored.

As part of the mineral studies mandated under the Alaska National Interest Lands Conservation Act, the Bureau of Mines' Alaska Field Operations Center and the Bureau's research centers at Albany, Oreg., and Reno, Nev., are cooperating in a long-range program to investigate occurrences and delineate reserves of cobalt, the platinum-group metals, and chromite in Alaska. Studies of other critical and strategic minerals will be phased in during succeeding years, as ongoing projects are completed. This first in a series of annual reports summarizes available information about deposits and past production of cobalt, the platinum-group metals, and chromite, and describes current and planned Bureau investigations of these minerals.

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INTRODUCTION

One of the world's uniquely mineralized areas extends from northwestern Canada through Alaska and into eastern Siberia. Some minerals that are relatively rare in the conterminous United States occur there. Critical and strategic minerals normally imported from foreign sources have been produced in Alaska during the First and Second World Wars, the Korean and Vietnam conflicts, and other times of unusual shortage or demand. Alaska's contribution to U.S. industry has included tin, tungsten, the platinum-group metals, antimony, mercury, chromite, and minor amounts of asbestos.

As a major part of the mineral studies mandated under the Alaska National Interest Lands Conservation Act,[3] the Bureau of Mines' Alaska Field Operations Center (AFOC) is evaluating economic and subeconomic reserves of critical and strategic minerals in Alaska. Evaluations will include an estimate of the degree of certainty with which the reserves are known. Initial investigations during 1981 will include field reconnaissance of some potential sources of cobalt, the platinum-group metals, and chromite. Studies of other minerals will be phased in during future years, as currently ongoing projects are completed.

This is the first report on these Bureau of Mines investigations. It summarizes available information about deposits and past production of cobalt, the platinum-group metals, and chromite, which was obtained during investigations of these metals through May 1981. Subsequent reports will be issued annually to cover critical and strategic minerals investigations during the preceding field seasons, and the resultant laboratory and office studies.

ACKNOWLEDGMENTS

This report includes data compiled from referenced sources, data collected by the Bureau of Mines during the numerous mineral land assessments resulting from the Alaska Native Claims Settlement Act[4] and related legislation, and data resulting from investigations of mineral deposits containing platinum-group metals and chromite, made in cooperation with the Bureau's Albany (Oreg.) and Reno (Nev.) Research Centers.

The basic reference is "Mineral Terranes of Alaska" (*1*),[7] a series of 1:1,000,000-scale maps with explanatory text, prepared under Bureau of Mines contract J0199051 by the University of Alaska Arctic Environmental Information and Data Center, with the cooperation of the U.S. Geological Survey, the State of Alaska Division of Geological and Geophysical Surveys, and representatives of several mining and mineral consulting firms. Some additional data were acquired from U.S. Geological Survey mineral investigations resource maps (*5*). The mineral deposit location map (fig. 1, pocket) was adapted from topographic and land status maps of Alaska published by the U.S. Geological Survey. Historic production records were compiled by the Bureau of Mines State mineral specialist for Alaska. Data on reserves are from publications referenced or footnoted.

Platinum samples were preconcentrated at the AFOC and analyzed at the Reno Research Center. Metallurgical testing was done at the Albany Research Center. Petrographic analyses were performed at the AFOC, but quantitative analyses other than for platinum-group metals were usually made in commercial laboratories.

HISTORY AND PRODUCTION

COBALT

No cobalt is known to have been produced in Alaska. The available information on cobalt was compiled almost entirely from data gathered during the exploration of mineral deposits for other metals, mostly in southeastern Alaska. The low prices that prevailed—because cobalt could be imported from south-central Africa—have until recently resulted in a general lack of interest in Alaskan deposits.

PLATINUM AND PLATINUM-GROUP METALS

Platinum was recognized in the placer gravels at widely scattered places throughout Alaska during the early years of this century. About 96 percent of the reported Alaskan production of platinum-group metals was from the placers of Salmon River and its headwater tributaries about 15 miles south of Goodnews Bay on the west coast of Alaska

[3]Public Law 96-487, Dec. 2, 1980, title X, sec. 1010.
[4]Public Law 92-203, Dec. 18, 1971.
[7]Italicized numbers in parentheses refer to items in the list of references at the end of this report.

Table 1.—Estimated production of platinum-group metals, ounces

Source	PGM[1] (crude)	Platinum	Palladium	Iridium	Ruthenium
Placer mines:					
Goodnews Bay:[2]					
1927-34	3,000	2,580	30	70	30
1934-75	[3]641,000	551,000	6,000	14,000	6,000
Miscellaneous (1900-41)	3,500	3,000	30	ND	ND
Total, placer mines	647,500	556,580	6,060	14,070	6,030
Lode mine: Salt Chuck (1918-21, 1924-26, 1935-41)	14,271	ND	[4]14,271	ND	ND
Grand total	661,771	556,580	20,331	14,070	6,030

ND Not determined.
[1]Platinum-group metals.
[2]Estimated data for Goodnews Bay are derived from references *4* and *12*.
[3]Actual production data (*13*).
[4]From unpublished Bureau of Mines data; reference *11* suggests that this total may include platinum and other platinum-group metals.

(fig. 1). The known placer reserves of platinum-group metals are also in this area. About 3 percent of the Alaskan production of platinum-group metals was from the Salt Chuck Lode Mine about 10 miles north of the head of Kasaan Bay on Prince of Wales Island, southeastern Alaska. The remaining 1 percent was recovered as a by-product from gold placer mines in many areas, including the Koyuk area, the Ruby-Poorman area, the Tolstoi area, the Snow Gulch area, several headwater tributaries of the Yentna and Kahiltna Rivers, headwater tributaries of the Chistochina River, and Lituya Bay in the Glacier Bay National Park. Production statistics are summarized in table 1.

CHROMITE

Chromite production from 1917 to 1957 is shown in table 2. No production has been recorded since 1957. All production was from near Seldovia on the Kenai Peninsula. Despite the sporadic production, there has been relatively little exploration for chromite in Alaska.

Table 2.—Chromite production[1]

Source	Production, long tons	Grade, pct Cr_2O_3	Ratio, Cr:Fe
Star 4 Claim (Red Mountain)	21,435	[2]48	2.9:1
Chrome Queen Claim (Red Mountain)	[3]6,500	ND	ND
Reef Mine, Claim Point (Seldovia)	[3]2,000	44	ND

ND Not determined.
[1]Data are from reference 19.
[2]Hand-sorted, metallurgical grade.
[3]Approximate.

DESCRIPTION OF DEPOSITS

TYPES OF DEPOSITS

Table 3 is a listing of the types of deposits of cobalt, platinum-group metals, and chromite that are either known or believed to exist in Alaska. The deposits or areas from which production of platinum or chromite has been reported, and the deposits listed as typical examples under "Selected known deposits or prospects" are identified by name on figure 1. The reported or suspected occurrences that will be the objective of reconnaissance investigations are also shown on the map (by symbol), but most are not identified by name.

COBALT

The cobalt reserves presently known in Alaska are associated with large nickel-copper deposits in southeastern Alaska. On Yakobi Island, the Bohemia Basin deposit (fig. 2) contains cobalt reserves of 14 million pounds together with 85 million pounds of copper and 140 million pounds of nickel.[8] On the west coast of Chichagof Island at Mirror Harbor, a nickel-copper deposit has inferred reserves of 960,000 tons of ore[9] containing some cobalt.[10] On Admiralty Island, the Funter Bay deposit contains proven reserves of 0.82 million pounds of cobalt, 4.8 million pounds of copper, and 5.39 million pounds of nickel (*8*). On Prince of Wales Island, cobalt is known in a variety of deposit types, but no reserves have been calculated. In Glacier Bay National Park, the nickel-copper deposits under Brady Glacier apparently contain cobalt that may be recoverable as a byproduct of copper-nickel mining. The deposit is estimated to contain 100 million tons of ore, containing some cobalt in the proven ore body, and perhaps an equal amount in the inferred extensions (*20*).

Cobalt occurs in a wide variety of geologic environments (*21*). Most well known in Alaska are associations of cobalt with copper and nickel sulfides in ultramafic rocks, such as the deposits mentioned above. Carbonate deposits of copper, lead, or zinc can contain cobalt, as exemplified by the deposits in the Mississippi Valley region. The large copper deposits at Bornite on the south slopes of the Brooks Range are known to contain associated cobalt, but testing is still in progress. No figures on cobalt reserves have been released by the owners. Other carbonate sulfide deposits in Alaska have not been evaluated for cobalt. The vast carbonate terrane of the Brooks Range and the sequences alined along the Tintina-Kaltag fault systems are considered to warrant investigation.

The other forms of cobalt deposits described in table 3 also warrant investigation. No reports were found that indicate exploration for them by either the Government or prospectors.

PLATINUM-GROUP METALS

Alaska's measured and indicated reserves of platinum-group metals are 500,000 ounces of platinum and platinum-group metals (*13*) near Goodnews Bay on the western Alaska coast and less than 1,000 ounces at Salt Chuck on Prince of Wales Island in southeastern Alaska.[11] Reported resources of unknown economic tenor include 6.8 million ounces in the Goodnews Bay area, 7.5 million ounces in the Kuskwan deposit, and 4.5 million ounces in the Snettisham deposit (*3*). These resource estimates must be considered very tenuous because mining costs and the percentage of metallurgically recoverable platinum-group metals remain unknown.

Platinum-group metals are known in Glacier Bay National Park. Recent work by Czamaske (*7*) has indicated that platinum may be recovered as a byproduct from the proven Brady Glacier nickel-copper ore body. Platinum has been reported elsewhere in the park, and very small amounts of platinum-group metals were produced from beach sands near Lituya Bay (*12*).

Palladium and platinum occasionally have been produced as a byproduct of gold placer operations. With the recent dramatic increase in placer gold mining, it is possible that some platinum-group metals will be produced, although no production has been reported to date.

Platinum and other platinum-group metals are believed to occur throughout Alaska, associated with ultramafic-mafic complexes. The most extensive of these are in the western Brooks Range. Present information on grade ranges from limited to nonexistent. There is potential for both lode and placer deposits.

[8]Public release by Inspiration Development Co., March 1978.
[9]Inspiration Consolidated Copper Co. Letter to S. P. Wimpfen, Mar. 15, 1977.
[10]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.
[11]Fox, P. E. Salt Chuck Cu-Au-Pd Deposit. Unpublished examination report, Apr. 22, 1980. 16 pp. For information, contact J. J. Mulligan, Bureau of Mines, Juneau, Alaska.

Table 3.—Types of known and potential deposits of cobalt, the platinum-group metals, and chromite

General geologic setting[1]	Known or probable commodities[2]	Selected known deposits (d) or prospects (p)		Sites recommended for evaluation[4]
		Location	Map[3]	
Mafic-ultramafic igneous rocks.	Ni, Cu, Co, PGM, Cr.	Brady Glacier (d), Bohemia Basin (d), Mirror Harbor (d).	17-19	Fairweather, Crillon-La Perouse, and Astrolabe-De Langle mafic-ultramafic complexes in Glacier Bay National Park.
Do	Ni, Cu, Co, PGM, Cr.	Spirit Mountain (d)	13	The Spirit Mountain deposit in the Chugach Range, the Rainbow Mountain prospects north of Paxson in the Alaska Range, and the Salcha prospects in the Yukon-Tanana Uplands.
Do	Ni, Cu, Co, PGM, Cr.	Blashke Island (p), Salt Chuck Mine (d), Duke Island Ultramafic (p) and Yellow Hill (p).	24, 26 28	Salt Chuck Mine, Poor Mc Mine, and numerous other mines and prospects in the vicinity. Other prospects in southeastern Alaska at Funter Bay, Yellow Hill, Blashke Island, Duke Island, Snettisham, Klukwan, Windham Bay, Snipe Bay, and Union Bay.
Do	Cr, PGM (and probably other commodities).	Western Brooks Range (p)..	1	Western Brooks Range—chromite and PGM were noted in samples obtained by the Bureau of Mines in 1975 and 1976. Additional mapping has been undertaken by the U.S. Geological Survey recently. More detailed investigation is needed.
Do	Cr	Kanuti River area (d), Seldovia-Red Mountain (d), Eklutna-Chugach trend (p).	3, 11-12	The southwestern extension of the Kanuti ultramafic belt and the Eklutna-Chugach trend.
Do	Cr	Red Bluff Bay (p), Mt. Burnett (p).	22, 25	Red Bluff Bay and Hill prospects and vicinity on Baranof Island; Mt. Burnett prospect and vicinity on Cleveland Peninsula, southeastern Alaska.
Stratabound-hydrothermal replacement.	Co associated with Cu, Pb, Zn.	Bornite-Ruby Creek (d)	2	Extensions of the Bornite-type mineralization are possible. Other copper-lead-zinc deposits of the western Brooks Range should be investigated for cobalt. Preliminary Bureau of Mines data from the Mt. Schwatka area of central Alaska and the copper occurrence north of Arctic Village in the eastern Brooks Range indicate a cobalt association.
Do	Co associated with Cu, Pb, Zn.	Orange Point (p)	16	Near the Orange Point deposit is similar geologic terrane that may have similar deposits. The Sumdum, Jingle-Jangle, and Sweetheart ridge deposits south of Juneau, the Glacier Basin and Groundhog Basin deposits east of Wrangell, and the massive sulfide deposits of the Alaska Range should also be evaluated for cobalt potential.
Hydrothermal vein type	Cu, Co, As	None	...	There are very limited unpublished Bureau of Mines data on a copper-cobalt-arsenic vein south of Livengood, in the Yukon-Tanana Uplands.
Do	Cu, Zn, Au, Ag, PGM.	...do	...	Portage Mountain prospect and vicinity on Kupreanof Island, southeastern Alaska. Vein-type copper-gold deposits in the area near the Salt Chuck mine on Prince of Wales Island may include cobalt and PGM.
Contact metasomatic type.	Cu, Fe, Co	Sultana (p)	27	There are numerous contact-type iron-copper mines and prospects on Prince of Wales Island, including the Jumbo and Green Monster mines that may also contain cobalt and PGM. Contact deposits near Chandalar on the south slopes of the Brooks Range may contain cobalt.
Stratiform sedimentary—red beds.	Fe, Mn, Cu, Co ..	None	...	Very limited unpublished Bureau of Mines data indicate a possibility for cobalt association with the iron-rich red beds of eastern Alaska near Eagle, and of copper-zinc-manganese-cobalt enrichment of shales east of Arctic Village.
Stratiform sedimentary—manganese nodule-bearing marine shales.	Mn, Co, Cu	...do	...	Manganiferous shales with nodule horizons and occurrences of copper and lead sulfides of the central Arctic National Wildlife Refuge may be favorable for cobalt. The stratigraphy was mapped by the U.S. Geological Survey, but no sample analyses have been reported to date.
Stratiform sedimentary—laterites.	Ni, Co	...do	...	Cenozoic deep weathering of some interior Alaska mafic-ultramafic complexes (e.g., Christian Complex in the eastern Brooks Range) may be favorable for laterites.

See footnotes at end of table.

Table 3.—Types of known and potential deposits of cobalt, the platinum-group metals, and chromite

General geologic setting[1]	Known or probable commodities[2]	Selected known deposits (d) or prospects (p)		Sites recommended for evaluation[4]
		Location	Map[3]	
Stream placers .	Au, PGM, Ti, Fe ..	Goodnews Bay (d)	8	Major deposits occur on Salmon River south of Goodnews Bay; additional reserves are likely. There are numerous, generally unverified reports of placer PGM associated with placer gold deposits. Reports of placer platinum north of Paxson near Rainbow Mountain on the south slopes of the Alaska Range may be significant. Placers may be associated with the western Brooks Range ultramafics. In all cases, further work is needed.
Marine placers .	Au, PGM, Ti, Fe ..	Beach sands north and south of Lituya Bay (p).	14	The beach sands near Lituya Bay are very extensive, but major concentrations of minable grade have not been reported despite reported production of small amounts of gold and PGM, and sporadic exploration for many years. Occurrences of PGM in the beach sands also have been reported on the western shores of Kodiak Island. South of Goodnews Bay are coastal beach sands, both of present day and ancient formation, reported to contain PGM.

[1]This list of geologic settings is not intended to represent a classification of Co, PGM, and Cr deposit types, but to indicate those settings for which present data indicate favorability for occurrence.
[2]Arsenic (As), chromite (Cr), cobalt (Co), copper (Cu), gold (Au), iron (Fe), lead (Pb), manganese (Mn), nickel (Ni), platinum-group metals (PGM), silver (Ag), titanium (Ti), zinc (Zn).
[3]Numbers refer to locations on figure 1.
[4]Deposits and occurrences recommended for evaluation may not be listed on figure 1, but the commodity location is indicated by symbol.

Figure 2.—Takanis Peak, Yakobi Island, southeastern Alaska. The low hill in the foreground is the north end of the Bohemia Basin copper-nickel-cobalt deposit.

CHROMITE

The area near Seldovia, from which chromite has been produced in the past, is at present being explored by industry. Other potential chromite belts in Alaska include the Kanuti River occurrences (fig. 3), the Eklutna-Chugach trend, the occurrences at Red Bluff Bay, Baranof Island, in southeastern Alaska, and the western Brooks Range deposits.

Chromite has also been reported at other Alaskan locations, but present information on these occurrences is inadequate to suggest a level of favorability or even the type of source rocks. Further exploration certainly is warranted in the Goodnews Bay area, the Kuskokwin region, and on Prince of Wales Island in southeastern Alaska.

Published data on metallurgical characteristics are limited to the Seldovia deposits. Preliminary metallurgical testing has just been completed by the Bureau of Mines on the Kanuti chromite deposits, and a report is being prepared that includes field descriptions and the results of metallurgical tests.[12]

Chromite is rather unique in nature in that only two types of deposits are mined—stratiform and podiform—both associated with ultramafic rocks. Stratiform deposits contain most of the world's reserves, but the podiform deposits are generally of higher grade, and have been and continue to be important sources of production (*16*). In the United States, podiform deposits have been intermittently mined to meet wartime needs. The known chromite deposits in Alaska are of the podiform type. The widespread occurrence of chromite-bearing ultramafic rocks in Alaska and the unusually large size of the ultramafic bodies in the western Brooks Range indicate that there is an opportunity to develop nationally valuable reserves. However, present information suggests that these will not be major occurrences on the world scale.

Figure 3.—Massive chromite lenses in podiform deposits of the Kanuti River region.

BUREAU OF MINES INVESTIGATIONS

Since 1978, the AFOC has made limited studies, including literature review, fieldwork, and cost evaluations, specifically directed toward reserves of cobalt, platinum-group metals, and chromite (*14-15*). The Albany Research Center (ALRC) has been performing metallurgical analyses of bulk samples, principally directed toward platinum-group elements but including associated metals. Evaluation of nonultramafic cobalt ore samples is planned for next year. A report jointly authored by the AFOC and the ALRC, on chromite (and associated platinum-group elements) in the Kanuti area, is now in preparation.[13] The Reno Research Center has been and will continue evaluating platinum-bearing samples. It is anticipated that this cooperative approach will be continued and that other research centers with special expertise may also participate.

The results of the Bureau's studies can be found in the reports that are summarized in table 4 and in the Minerals Availability System property evaluations that are listed in table 5.

The investigations of Alaskan critical and strategic metals are planned as a combined evaluation of geologic parameters, deposit grades and dimensions, metallurgical characteristics, and recovery costs. Because of the lack of previous exploration, field investigations frequently begin with a search to determine if the reported deposit or suspected occurrence actually exists. Future work will include the following:

1. Onsite investigations of deposits and reported or suspected occurrences of cobalt, platinum-group metals, and chromite.

2. Analyses of samples of other mineral deposits that may contain cobalt or platinum-group metals recoverable as byproducts. These metals have not always been analyzed for in the past.

3. For deposits found to contain cobalt, platinum-group metals, or chromite, ascertaining the mode of mineralization and geologic character, and estimating dimensions of the deposits. The implications of associated geologic structures in estimating extensions of the deposit or additional deposits are particularly important in this phase of the investigation.

4. Determination of deposit grade and, if size and grade warrant, determination of metallurgical characteristics from bulk samples. Estimation of recovery costs.

5. Monitoring the results of industry exploration for cobalt, platinum-group metals, and chromite.

6. Possible recommendation of specific deposits for more detailed evaluation by geophysical exploration, drilling, or other methods.

Reconnaissance of some of the known occurrences began in 1981 and will continue into the succeeding years. It is anticipated that more detailed evaluations of specific

[12]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.

[13]Work cited in footnote 12.

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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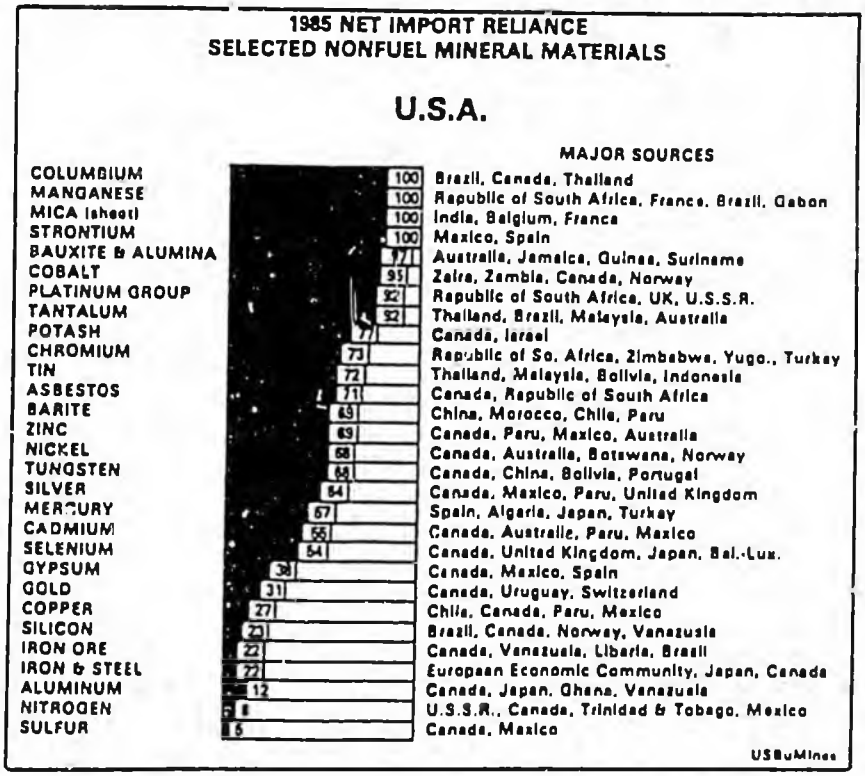


Table 1 — US and World Reserve/Cumulative Demand to 2000 Ratios. (All data rounded to 2 significant figures)

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.

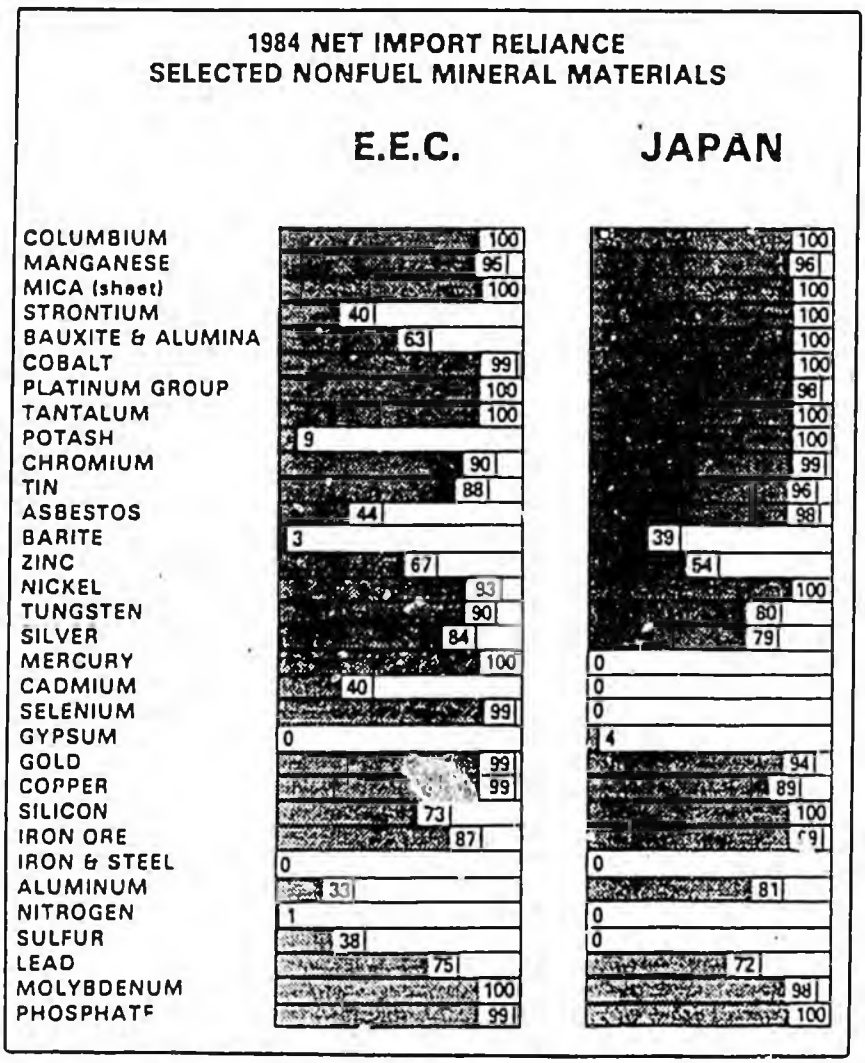
During a supply disruption, the first action to be taken would be to monitor exports and, if necessary, to control them. A worsening supply situation would require imposition of a system of priority under Title I of the Defense Production Act, whereby rated orders would have to be filled first. If priorities 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

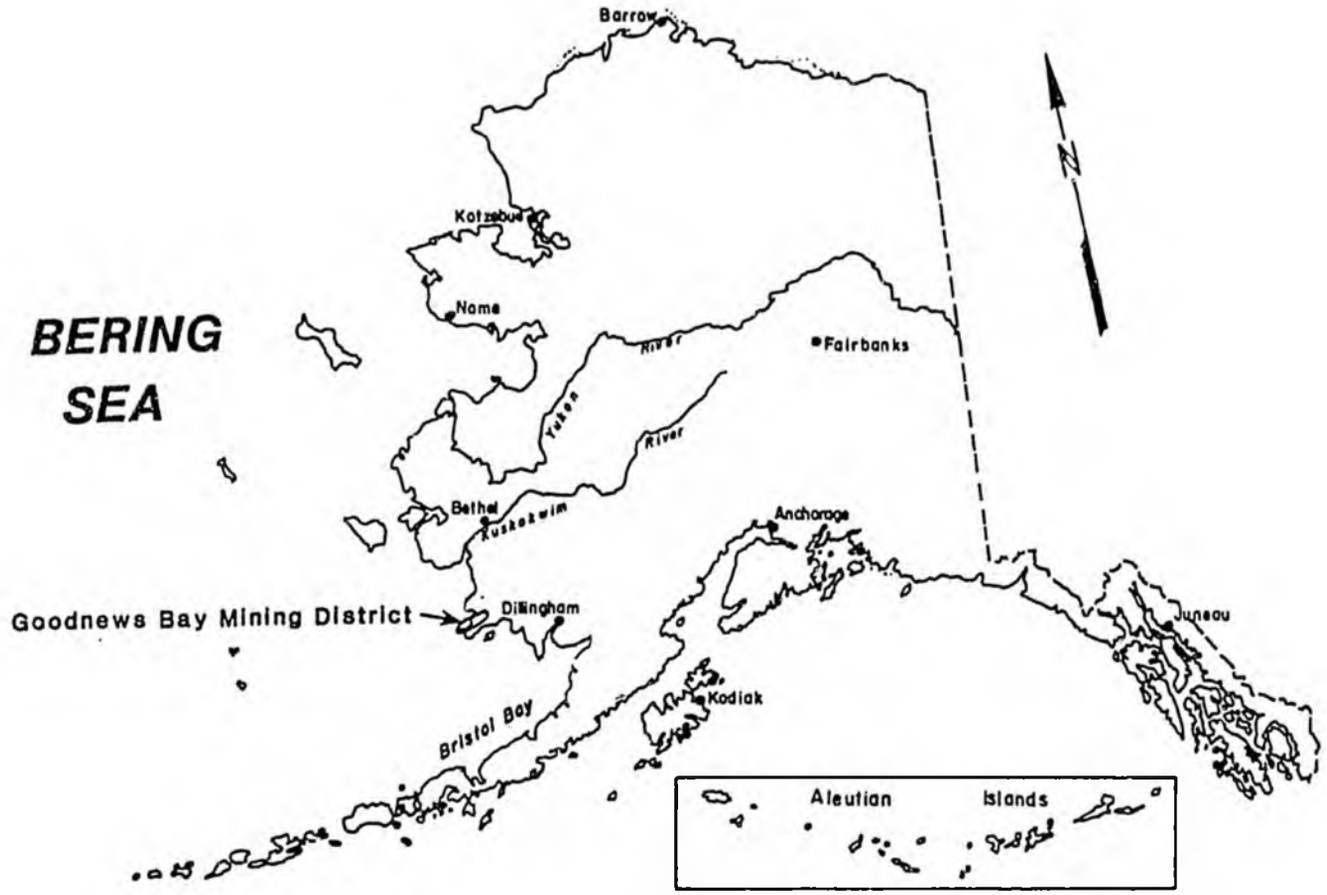

FIGURE 1. Location map of the Goodnews Bay Mining District, Alaska.

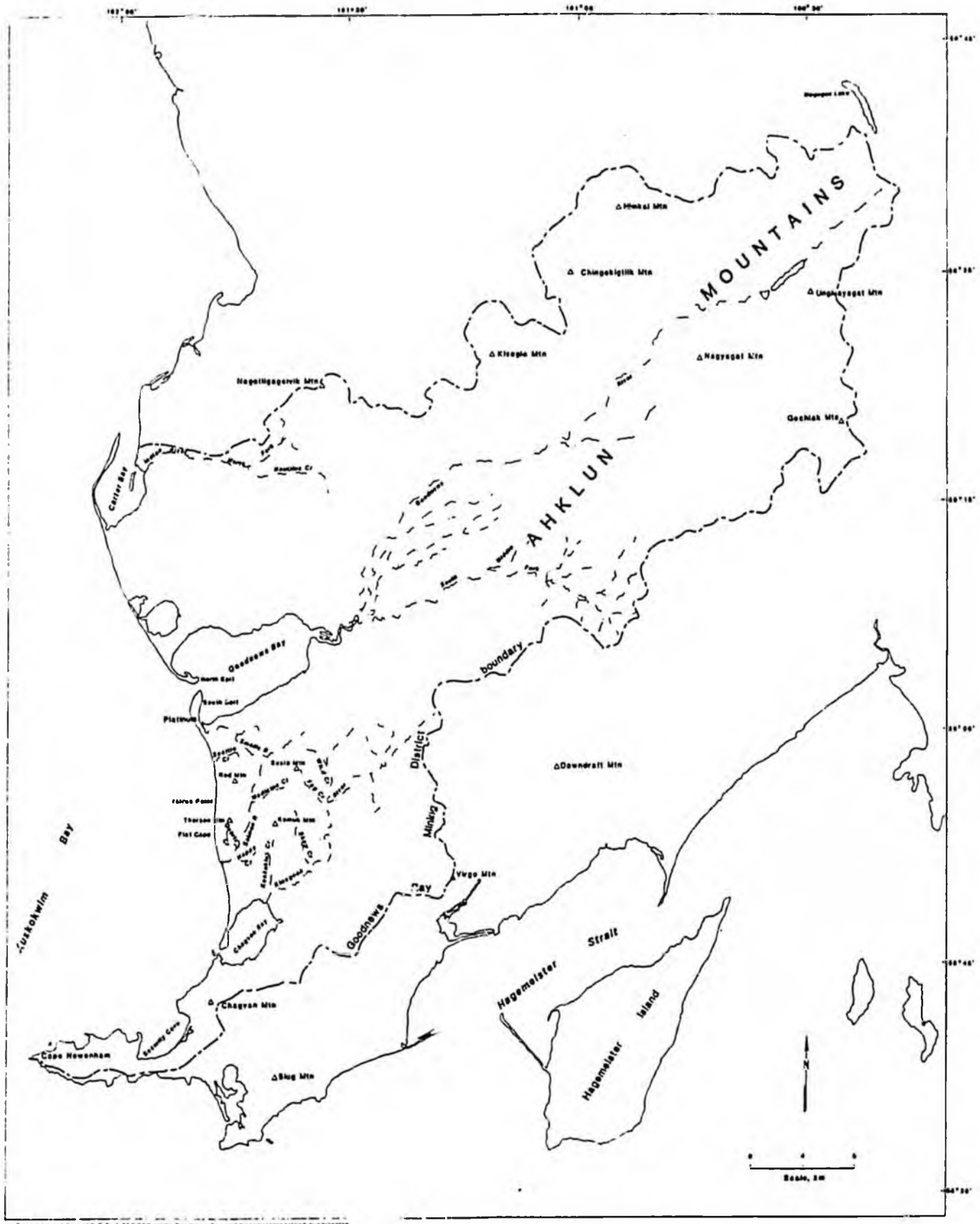

Figure 2. – Detailed Location Map showing boundaries of the Goodnews Bay Mining District and main topographic features

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.

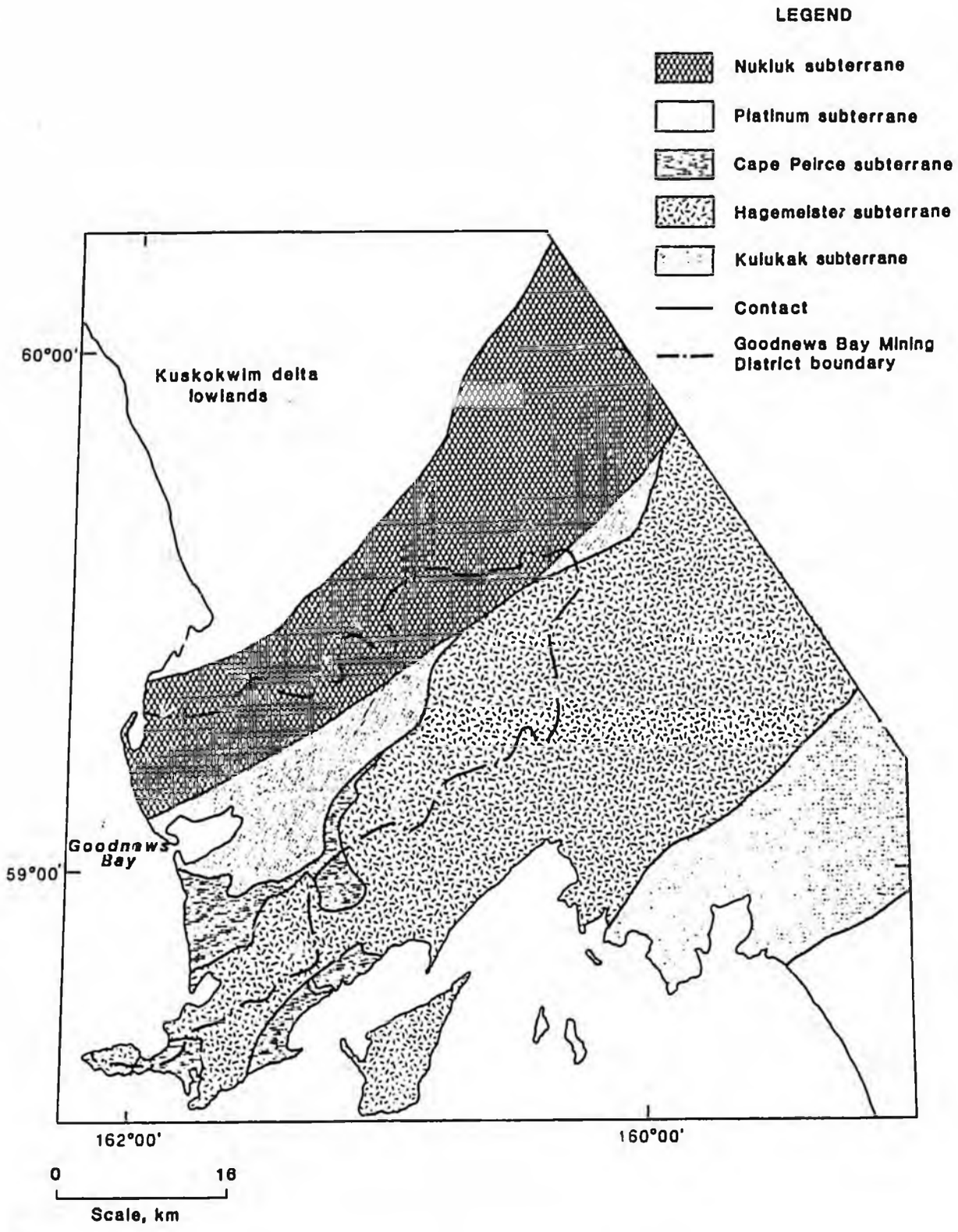

FIGURE 3. Teconostratigraphic terrane map of the Goodnews Bay Mining District

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

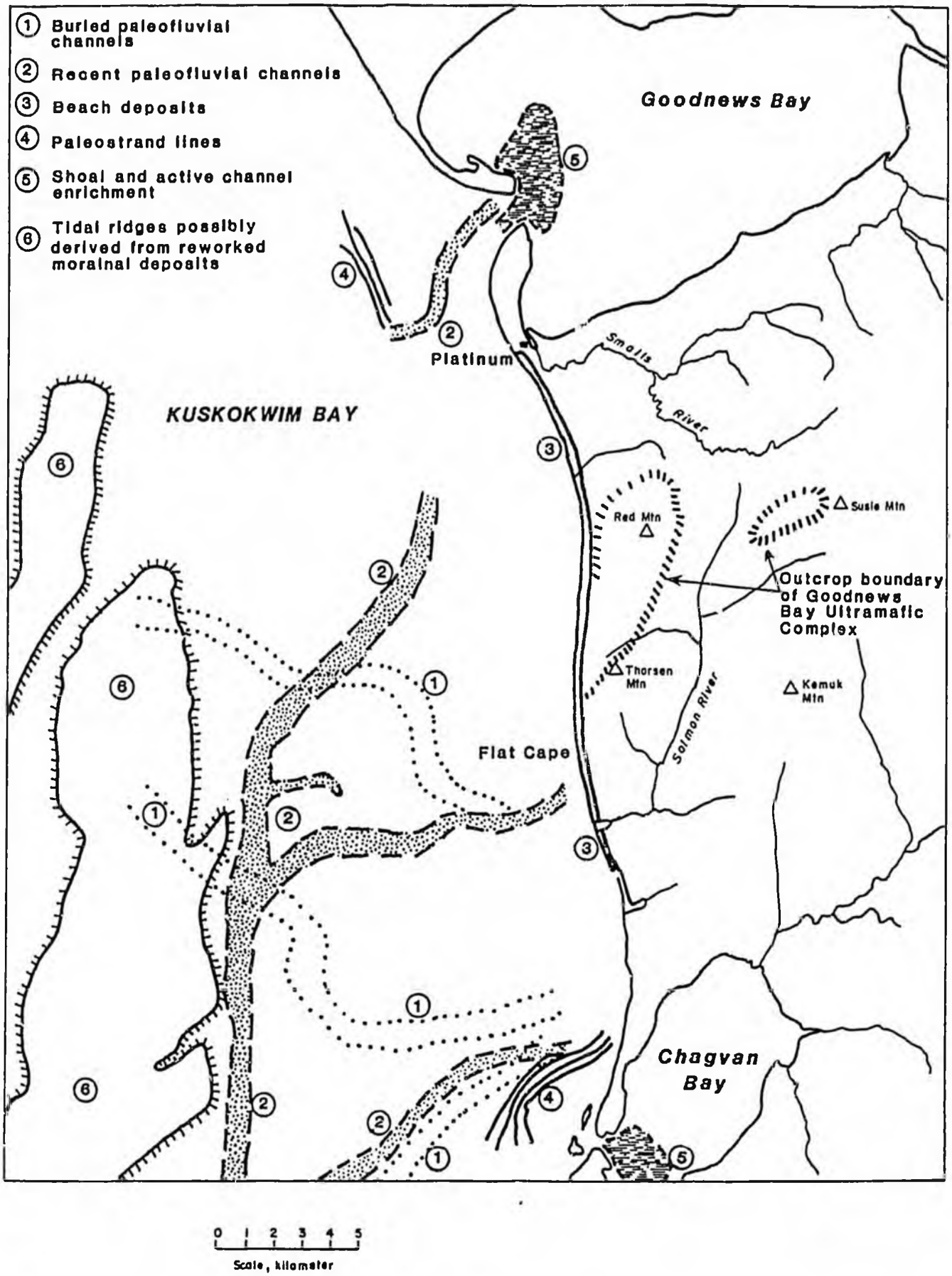

FIGURE 4. Favorable offshore and coastal platinum-bearing depositional environments.

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

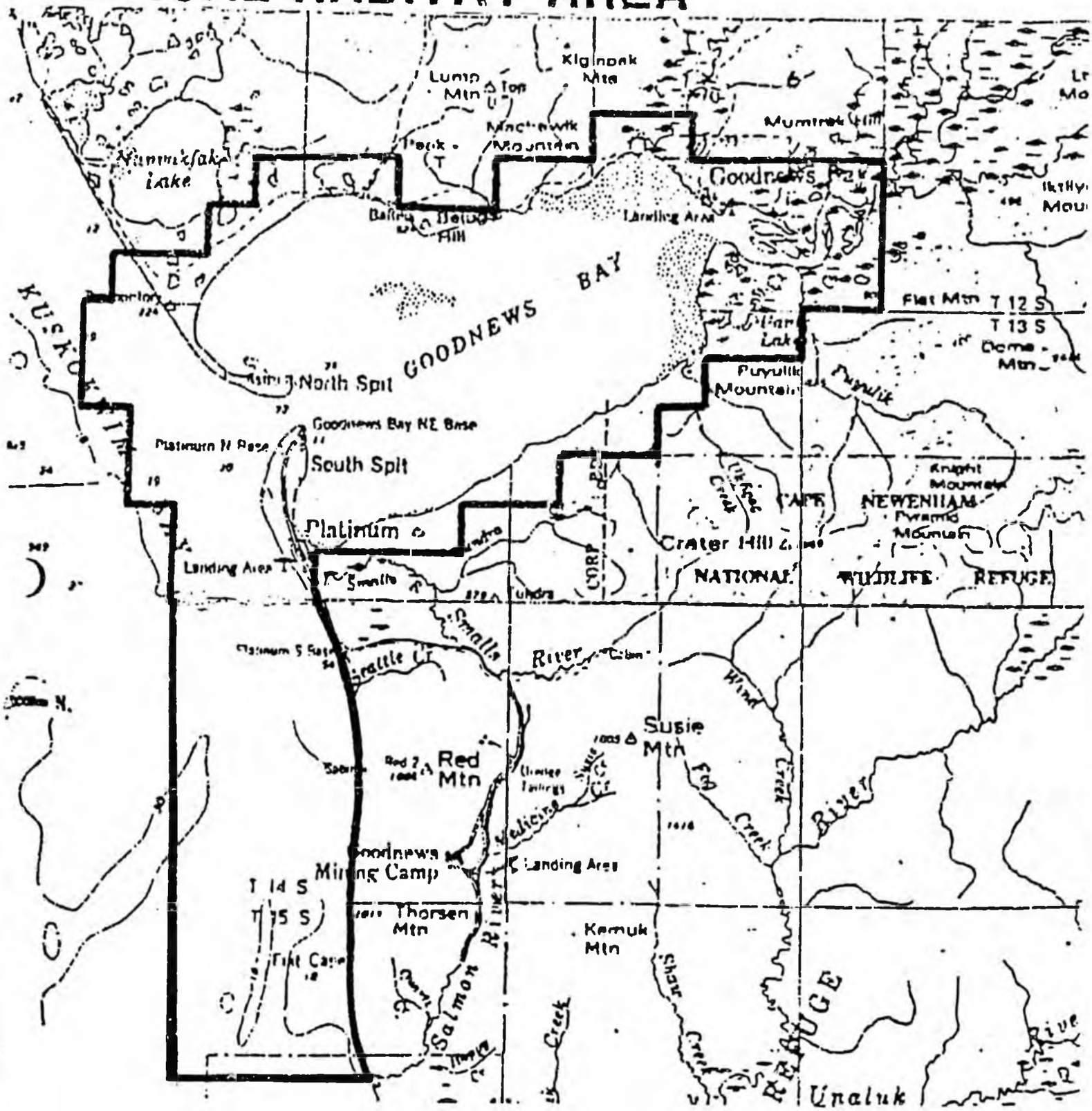
Section 36

(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,

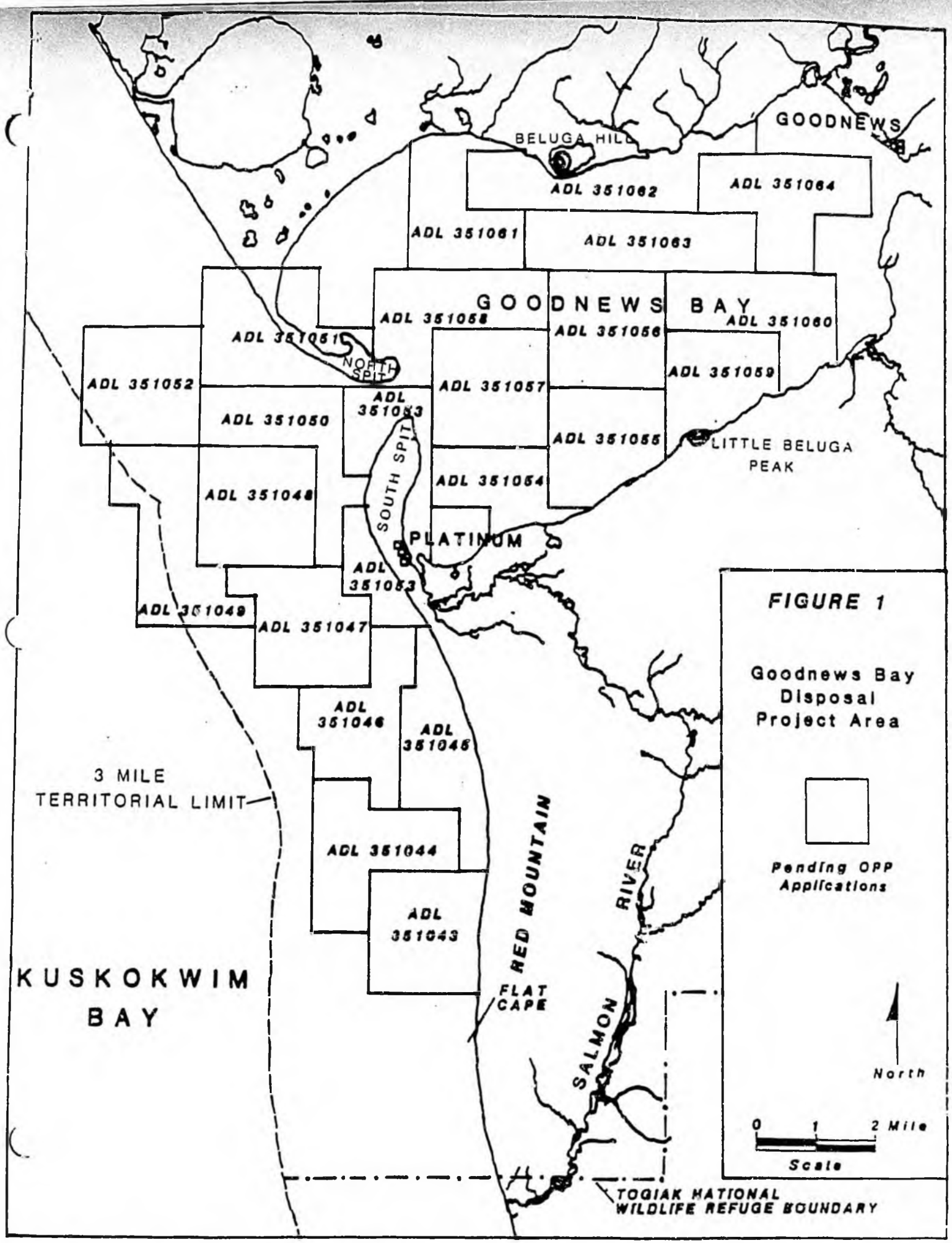
G Gallagher

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.

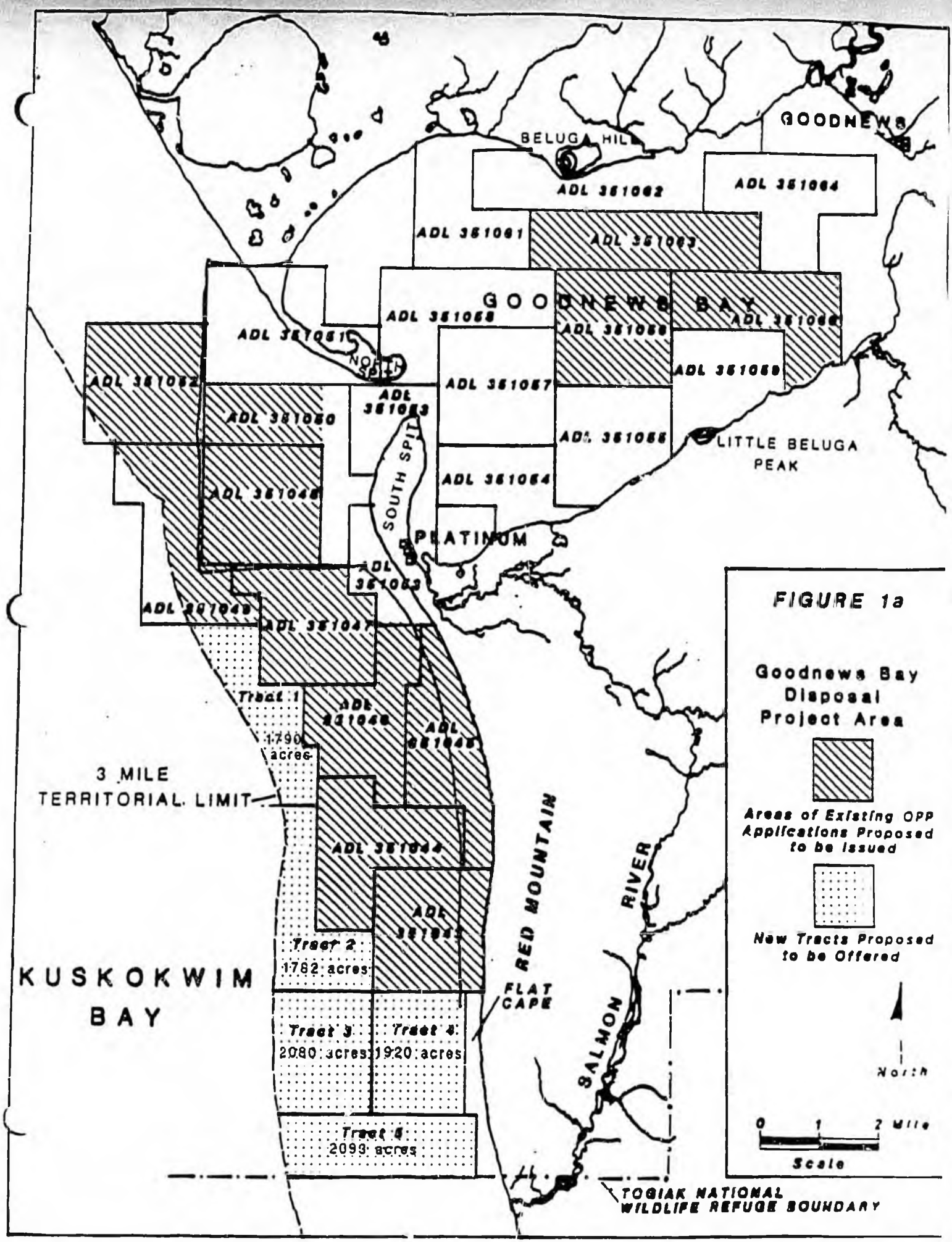

GOODNEWS
BELUGA HILL
ADL 351062
ADL 351064
ADL 351061
ADL 351063
GOODNEWS BAY
ADL 351058
ADL 351059
ADL 351060
ADL 351057
ADL 351056
LITTLE BELUGA PEAK
ADL 351054
NORTH SPIT
SOUTH SPIT
PLATINUM
ADL 351053
ADL 351048
ADL 351047
Tract 1
1790 acres
ADL 351046
ADL 351045
3 MILE TERRITORIAL LIMIT
ADL 351044
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
PHONE: (907) 543-3100

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

Although we have concerns about the potential impacts of mineral exploration and mining for the remainder of the project area, offshore of Goodnews Bay, we believe that these impacts can be mitigated if the DOM and other applicable regulatory agencies (i.e., the Department of Environmental Conservation and the Environmental Protection Agency) enforce measures that require the operator, among other things, to meet state water quality standards, to conduct biological monitoring, and to restore the seabed to a condition that will allow for productive regrowth of marine life.

The department intends to provide detailed recommendations to DOM concerning tract deletions and permit stipulations in our response to the Preliminary Best Interests Finding and Proposed Coastal Consistency Determination. We will provide Cenaliulriit with a copy of our response. Thank you for sharing your comments with us.

Sincerely,

Frank Rue
Director
Habitat Division

cc: Norman A. Cohen
Jerry Gallagher

Bob —

KUITSARAK, INC.
P. O. Box 19
Goodnews Bay, AK 99589

January 12, 1990

JAN 18 1990
JAN 19 1990

Senator Johne Binkley
P.O. Box V
Juneau, AK 99811

Re: HB No. 332, SB 318 "Critical Habitat" Bills

Dear Senator Binkley:

Thank-you for your consideration. Since the corporation has become directly involved in matters relating to the prevention of mining in and offshore of Goodnaws Bay, it would be a good idea to let you know we will fully support your efforts all the way. We would like to see the preservation of Goodnews Bay and offshore continue indefinetely, not only for the sake of the local people, but for the people of the region.

We know for a fact, almost unanimously the people of Goodnews Bay and Platinum, strongly oppose any attempts by the state, and the mining companies, to come into the pristine environment for purposes of offshore dredging. There are still many questions that need to be answered. Not only do the people of Goodnews Bay and Platinum depend on the Bay and offshore for their living (subsistence and commercial), but villages in the Kuskokwim region extending north of Goodnews Bay also. The Bay is an estuary, and it supports a wide variety of marine inhabitants. It has a history of use by a maritime culture, mainly that of the coastal Yup'ik Eskimos.

We know that the Division of Mining (DOM), under the Department of Natural Resources, has submitted a proposal to allow outside mining companies to come in and "dispose" of the non-renewable resources (if any) for a time span of approximately ten years. After that, just what are the Natives in the area going to do, when the Bay and offshore areas they depend on are destroyed? DOM's proposal has been found to be, and still remains, questionable.

Consequently, we feel it is absolutely imperative HB 332, and SB 318, successfully passes through the Resources Committees of the House and Senate, and all the way onto being signed into law. We applaud you and Representative Hoffman's efforts, on responding to our concerns by submitting similar bills proposing to create the Goodnews Bay area as "critical habitat."

We would appreciate it if we could be informed as soon as possible, after the date becomes known when the "critical habitat" bills are up for consideration by the appropriate Resources Committee.

If there is anything we can do to help, please do not hesitate to call 967-8428, or write to the above address.

Thank-you for your time.

Sincerely,

Vern Bavilla

Vernon Bavilla
Director

cc:
Gov. Cowper
Representative Hoffman ✓
House Resources Committee Member, Representative George Jacko
Senate Resources Committee Member, Senator Fred Zharoff
Cenaluiriit
Nunam Kitlutsisti
Traditional/IRA Village Councils; Goodnews, Platinum, Quinhagak, Eek, Tuntutuliak, Kwigillingok, Kongiganak, Atmauthluak, Akiachuk, Kwethluk
ANCSA Corporations; Platinum, Quinhagak, Eek, Tuntutuliak, Kwigillingok, Kongiganak, Atmauthluak, Akiachuk, Kwethluk
City Councils, Goodnews, Platinum, Quinhagak, Eek, Tuntutuliak, Kwigillingok, Kongiganak, Atmauthluak, Kwethluk.

NUNAM KITLUTSISTI

Protectors of the Land, Inc.
P.O. Box 2068 • Bethel, Alaska 99559
907/543-2856

January 17, 1990

Representative Lyman Hoffman
Alaska State Legislature
P.O. Box V (MS 3100)
Juneau, Ak. 99811

Dear Lyman:

Regarding upcoming deliberations on HB #332 which you co-sponsored and its companion SB #318 establishing a Goodnews Bay Critical Habitat Area, be assured that Nunam Kitlutsisti and its Board of Directors wholeheartedly support the intent and purpose of these two bills. Too often in the past we have seen the disruption and devastation resulting from dependance on presumptive management principles where substantial and/or irreversible damage has occurred prior to responsible protective measures being adopted. These concerns were presented in detail through our own and many other responses to the proposed activity so we will not reiterate those many pages of concerned analyses again here.

It is clear from the majority of responses to the preliminary best interest finding by objective and partisan interests alike that it would be extremely difficult, if not practically impossible, for the proposed activity to prevent serious detrimental impacts to the existing renewable resources of this already fully utilized and highly sensitive area. It is of critical importance not only to the migratory and resident populations of marine life and waterfowl populations which are dependant on the area's productivity for their very existence, but to the people who rely on these same populations for their basic sustenance and survival throughout their annual cycles.

It is totally unacceptable to allow this (or any other) development to occur for the possible lucrative pocket lining of a select few, at the risk and expense of a highly developed eco-system which already supports healthy populations of many species and a people's ability to sustain their own livelihood.

We urge all involved to support HB 332 & SB 318 to the best of their ability throughout the legislative process. If we may be of any service in the duration please don't hesitate to contact us at the above address.

Regards,

Greg Roczicka

Greg Roczicka
Resource Coordinator N/K

cc:
Gov. Steve Cowper
Sen. John Binkley
Sen. Fred Zharoff
Rep. George Jacko
Kuitsarak Inc.
Platinum IRA Council
Quinhagak IRA Council
Eek IRA Council
Kwigillingok IRA Council
Kongiganak IRA Council
AVCP Inc.
RARA

JAN 19 1990

Cenaliulriit Coastal Management District

For the Yukon-Kuskokwim Coastal Resource Service Area
P.O. Box 1169 • Bethel, Alaska 99559 • 907/543-2243

January 15, 1989

Representative Lyman Hoffman
P.O. Box V
Juneau, Alaska 99811

Subject: House Bill 332

Representative Lyman Hoffman:

House Bill 332 reaffirms Cenaliulriit's position on the Goodnews Bay Offshore Mining in and around the bay area. This bill presents the need to preserve important fish and wildlife resources, sensitive habitats, the significance of commercial and subsistence harvesting to villagers, and the need to prevent some probable adverse impacts of exlporation and mining.

Only a few Natives from Goodnews Bay and Platinum will benefit over a short period, at the price of an essential ecosystem and impacts to the values, traditions and lifestyles; while monetary and economic gains flow elswhere. The majority of those employed will come from outside the Yukon and Kuskokwim regions, while a majority of subsistence and commercial users suffer along the bay area and estuarine sanctuaries. Quinhagak, Eek, Tuntutuliak, Kwigillingok, Kongiganak and some Kuskokwim fishermen also use that area.

The area is important for essential fish and wildlife habitats such as marine mammal haul outs, herring concentration and migration areas, capeline and smelt spawning areas, clam and mussel beds. Frank Rue, Director of Habitat Division with the Alaska Department of Fish and Game said, "even with seasonal restrictions on mining, it would be difficult to protect the area effectively."

Cenaliulriit endorses the passage of House Bill 332, "An Act establishing the Goodnews Bay Critical Habitat Area; and providing for an effective date."

Thank you for the opportunity to comment.

Qu'yana,
CENALIULRIIT COASTAL MANAGEMENT DISTRICT
Paul Chimiugak, Chairman

John J. Oscar
Coordinator

Cenaliul:iit Distribution

cc: Representative Sam Cotten, Speaker of the House
Senator Johne Binkley
Senator Al Adams
Representative Mike Davis
Representative Richard Foster
Representative George G. Jacko, Jr.
Representative Loren Leman
Representative Eileen Panigeo
Representative Mike Navarre
Representative Swackhammer
Representative Kay Wallis
Bob Polasky, RurAl Cap
Joe Chimeralrea, Nunam Kitlutsisti
Vernon Bavilla, Kuitsarak, Inc.
Arviq, Inc., Platinum

BOB - Good News!

INLET SALMON

A DIVISION OF INLET FISHERIES, INC.

P.O. Box 530
Kenai, Ak 99611
(907) 283-9275
(FAX) 283-4097

JAN 15 1990

P.O. Box 690
Kasilof, AK 99610
(907) 262-4730
(FAX) 262-3962

January 11, 1990

Representative Lyman Hoffman
P.O. Box V
Juneau, Alaska 99811

Dear Representative Hoffman,

Inlet Salmon would like to go on record as supporting House Bill # 332. We are very hopeful that your colleagues in the House and Senate will understand how critical it is that this area be set aside for the people that live there and will not be swayed by the short term revenue gains. The Goodnews Bay Critical Habitat Area must be established in order to provide a stable environment for the local residents to survive.

I have included a copy of a letter that I wrote to Kerwin Krause in the Department of Natural Resources detailing our objections to the proposed mining leases in the Goodnews area.

You and Senator Binkley are to be commended for your efforts to protect your constituents way of life. If we can be of any assistance, please let me know. Thank you for your time.

Sincerely,

Scott Earsley

Scott Earsley
Inlet Fisheries, Inc.

INLET SALMON

A DIVISION OF INLET FISHERIES, INC.

P.O. Box 530
Kenai, Ak 99611
(907) 283-9275
(FAX) 283-4097

P.O. Box 690
Kasilof, AK 99610
(907) 262-4730
(FAX) 262-3962

April 30, 1989

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

RE: Issuance of Offshore Prospecting Permits for the Goodnews Bay Area

Mr. Krause,

Inlet Salmon would like to go on record as not supporting any offshore prospecting or mining in any of the tracts in the Goodnews Bay Disposal Project Area.

We support resolutions passed by the Platinum Traditional Council, Goodnews Bay Traditional Council, Goodnews Bay, Inc., Quinhagak IRA Council and the Rural Alaska Resource Association that opposed any offshore prospecting or mining because of the possible negative impacts to their subsistence lifestyle. These people subsist primarily from food harvested from the sea, their way of life should not be jeopardized by any development.

The Goodnews Bay area has been nominated as an Area Meriting Special Attention in the Canaliulriit Coastal Management Program. However, the issues addressed in the Consistency Analysis for this lease program are just the general standards for the whole Canaliulruit Coastal Management Program. Since the standards for a Consistency Review for this AMSA will be in greater detail, there should be no further development or leases until all the issues for that area have been identified and addressed.

Unless the proposed prospecting leases can enlist the support of the people that inhabit the area, we do not think that this program should go forward as planned.

sincerely,
Scott Earsley
Scott Earsley
Secretary
Inlet Fisheries, Inc.

DEAN

NUNAM KITLUTSISTI

Protectors of the Land, Inc.
P.O. Box 2068 • Bethel, Alaska 99559
907/543-2856

April 26, 1989

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

Dear Mr. Krause;

This is in response to the Preliminary Best Interest Finding and Proposed Consistency Determination regarding the issuance of Offshore Prospecting Permits (OPP) in and around the Goodnews Bay area. After thorough review of the document's content and appended studies, we cannot agree with Mr. Gallegher's conclusion that the Finding is in the state's best interest. We feel that it is at best a premature decision and inconsistent with approved Cenaliulriit Coastal Management Program standards. (See Attachment A)

At the public meetings which were held in May of 1988 and February 1989, people were given informal information of the Division's and industry's interests. However this is the first actual document we have seen which fully outlines the scope of the proposed activities. It provided an initial 5 week comment period (which was graciously extended) and stated a final decision forthcoming on May 15, 1989. We find it somewhat alarming that the Division stands ready to make a final determination so soon, with no further public input into an issue which could so dramatically affect the area under consideration.

This in itself constitutes a gross presumption that no further substantial research would be necessary after receiving public comments. By moving ahead so quickly, this also places the Division and the public in a reactionary response mode, rather than operating under sound management and planning principles.

Unacceptable as well, is what appears to be a predetermination by the Finding that OPP's will be issued regardless of the level or content of public comment received. This perception is bolstered by the attached reports which go into extensive detail on how mining activities will be carried out. It is true that disclaimers are present at intro and conclusion, but the prevalant tone throughout the document is that the decision has already been made.

Overall, the Finding's review of potential affects to existing resources is incomplete and needs much more in-depth study. The mitigation requirement of restricted seasonal operations is a good start. There is however, not a bit of substantiating data or assurance that residual effects from the proposed activities

would not "winter over" or remain hidden and cause major problems the following spring or in subsequent seasons.

Is the offshore area a settling point for crab and halibut larvae brought north by Bering Sea currents? How extensively might offshore dredging affect inter and sub-tidal zones used for spawning by herring, smelt and capelin? Do the juvenile halibut and razor clam population harvested by locals originate directly out of Goodnews Bay? Might the activities raise the already high turbidity and siltation levels within Goodnews Bay to the point where Eelgrass would begin to die out? How finely balanced is the eco-system within the Bay regarding turbidity and siltation through tidal influence?

The only answer to the above questions that can be derived from the Finding and attached reports is that "it is unknown at this time".

Phrases such as "cannot be determined" or "unknown at this time" are evident throughout the support documentation to the Finding. The doubts and questions raised need to be answered BEFORE exploration and development is allowed to occur.

The issue of sedimentation and turbidity alone is deserving of much more intense consideration than it was given. The attached biological report states clearly the high levels which already exist naturally, and that they may occasionally limit light penetration causing negative survival impacts to the Eelgrass beds. We cannot afford to take the chance of adding to natural levels until we first get a definite determination of what the current situation is, and what mining impacts might be.

Further, siltation in the Finding addresses only the materials which are actually removed from the bottom during dredging operations. What of the disturbed material that is left behind? The attached reports state that the exceptionally strong tidal flows would clear away some of these churned spoils, but neglect to mention or do not know (more likely the latter) where it will eventually end up being deposited. Perhaps from one side of the Bay to the other. It is highly likely that the strong onshore and tidal currents which are recognized as being responsible for some of the existing siltation, will escalate these levels. Again we must stress that the added load and redistribution of these sediments may well be of critical importance, and could potentially destroy what is now a delicately balanced and highly productive eco-system.

Another question unanswered (indeed not even addressed) by the Finding is the potential for heavy metals such as arsenic and mercury to be present in the spoils. Freeing these and other toxic elements into the water columns could have devastating effects on plant and animal life through current and tidal actions both offshore and within Goodnews Bay. Again, another unknown which deserves full-scale investigation prior to any exploration or development.

The question of the state assigning priority over the opposing interests presents no difficulty whatsoever with a little reasonable deliberation. To postpone further action until more of these concerns are answered means that a private venture may have to wait some years before capitalizing on the area. On the other hand, if damage to the aquatic environment is a result, it may

take generations to recover. According to the geological reports these mineral deposits were placed somewhere around 100 million years ago. It is extremely doubtful that they will go anywhere in the foreseeable future. Developing first without knowing or understanding the consequences is an inequitable and irresponsible trade-off.

The people of Platinum and Goodnews Bay have ardently voiced their concerns on many of the issues presented above. Their greatest fear is losing the environment and resources which provide for their livelihood to a short-term capital gain activity. Renewable resources are the only long term value that supports self-sufficiency in their area.

To their perspective, someone from Anchorage came out from Anchorage last year and informed them that offshore mining of the area was being looked into. Someone showed up again a couple of months ago to say that plans were in the works, but as yet nothing had been developed that was ready for review. One month later the Preliminary Finding appeared in the mail, containing proposals directly within and around areas which they had identified earlier as critical to the local subsistence economy.

We are sure the Division of Mining was being up-front and operating in good faith under its own standards. The rural perspective however, is that something to which they have had minimal input and voiced a strong concern and opposition the two times they were consulted, is being shoved down their throats...

We are asked to review this document as a Preliminary Finding only. As we all know exploration and development go hand in hand. If economically recoverable deposits are located, they will be pursued vigorously and to the fullest extent; And the deplorable fact is, money talks louder than people. Let's get our priorities in the right order this time. A <u>full</u> assessment and understanding of negative impacts <u>MUST</u> come first before any exploration or development is allowed to take place.

Offshore development in this area should hinge on the existence of a cooperative relationship between the affected villages, regula-tory agencies, and developmental interests. Without this status their will continue to be distrust and misunderstanding at the local level, substantial non-compliance with consistency determinations at the administrative level, and increased operational costs to the industry. Difficulties with upland disposal areas, disruptive cultural contact, increased pressure, competition, and threats to existing renewable resource levels, name only a few.

In all fairness and equity to the area with its diverse and productive environments, exploration and development should be postponed indefinitely in the Goodnews Bay area. Until, at a minimum, substantiated information is available to ascertain the full effects of any proposed mining activities on the area's renewable resources.

Regards,

Greg Raczicka
Resource Coordinator N/K

cc - Cenaliulriit
Rep. Lyman Hoffman
City of Goodnews Bay
City of Platinum
RARA
AVCP

Attachment A

The following standards from the Cenaliulriit Coastal Management Program, though given some recognition by the Preliminary Finding, are still far from being adequately addressed. Too many short and long term questions raised by the proposed action remain unanswered. Only the first few steps have been taken in determining the resultant consequences of the proposed activities. There exists significant cause for concern due to the high degree of potential conflicts and degradation to the renewable resources of the area. The Preliminary Finding as it now stands cannot be considered to be in compliance with Cenaliulriit standards.

Issue 5. Subsistence
Standard:

5.1 Possible adverse impacts of the action on subsistence must be analyzed and safeguards provided to assure subsistence use.
Response: The analyses and safeguards provided are based on incomplete information.

5.2 The action will not curtail the age-old hunter/gatherer culture of the Yup'ik.
Response. The action could have severe implications on the culture through degradation of primary habitats and the attendant increase in human population inherent to the proposed activities.

5.3 The action will not remove indispensable fish or game habitat from use by the age-old hunter-gatherer culture of the Yup'ik.
Response: There is likely to be significant removal of fish and game habitat as a result of the proposed action.

5.6 The project will not cause a decrease in the range or extent of diversity within the local ecology that the village depends on for food.
Response: The action has high potential to cause a decrease in the range and diversity of plant and animal populations within the local ecology.

Issue 6. Environmental Management
Standard:

6.1 The action will not damage the fragile ecosystem of the area to the extent that species cannot recover to previous levels of abundance.
Response: The action could result in significant damage to the local ecosystem, causing extreme difficulties for species to maintain or return to previous population levels. Arguments to the contrary are based on unknowns.

Attachment A cont.

Issue 7. Development In General
Standard:
7.5 Mining and mineral processing will be regulated, designed, and conducted to be compatible with the standards of the Alaska Coastal Management Program, adjacent land uses, and state and national needs.
Response: The action could have severe negative impacts on adjacent land uses and is not compatible with the Alaska Coastal Management Program through Cenaliulriit standards.

Issue 8. Fish and Wildlife Habitats
Standard:
8.2 All essential habitat will be managed to maintain or enhance the biological, physical, and chemical characteristics that contribute to its capacity to support life.
Response: The proposed action has a high potential of negative impacts to essential habitat.

8.3 Essential offshore habitat will be managed as a fisheries conservation zone so as to maintain or enhance the state's sport, commercial, and subsistence fishery.
Response: The proposed has a high potential for degradationof the area's commercial and subsistence fisheries.

8.4 Essential estuary habitat will be managed to assure adequate water flow, natural circulation patterns, nutrients, and oxygen levels.
Response: The effect the proposed action would have on essential estuary habitat is an unknown quantity. Nutrients and oxygen levels could be severely impacted.

8.5 Essential wetland and tidal habitat will be managed to assure adequate water flow, nutrients, and oxygen levels and avoid adverse affects on natural drainage patterns.
Response: The effect of the proposed action on essential tidal habitat is an unknown quantity. Nutrients and oxygen levels could be severely impacted.

8.8 Essential high-energy coastal habitat will be managed to assure the adequate mix and transport of sediments and nutrients and avoid redirection of transport processes and wave energy.
Response: The proposed action has extremely high potential of causing severe negative impacts to the level and content of existing sediment and nutrient mix within the area.

KUITSARAK, INC.
P.O. BOX 10
GOODNEWS BAY, ALASKA 99589

April 29, 1989

Representative Lyman Hoffman
Pouch V
Juneau, Alaska 99811

Re: Goodnews Bay Offshore Mining Disposal, as proposed by the Division of Mining, Department of Natural Resources.

Dear Representative Hoffman:

Your constituents of Mumtrak (Goodnews Bay) are living a very fragile way of life in today's fast-paced world. And with the recent proposals by DNR, Mining Division, to open up Goodnews Bay and nearby waters for offshore mining, is placing our way of life, when considering our economic dependency on the Bay (based on renewable resources), in jeopardy.

The subsistence way of life, and the existing commercial dependency upon the bay, is the safest bet for the psychological well-being of the local people, some twenty or hundred years in the future. The locals surrounding the bay are not looking for some 50 jobs that will end in a "bust" cycle. Our Economic Base is growing, and we would like to see that continue. We do not want to witness the destruction of our foundation, especially by some "alien" company who will come in for his or her own economic gain, regardless of the consequences.

As constituents, we are asking for your support in our opposition to the proposal by the Division of Mining, DNR, to open up the Bay for mining purposes. Please consider the letter to the Director, Resolution 89-03-07, the newspaper article, and my testimony during the hearing held in Goodnews Bay on April 19, 1989. Thank-you for your consideration.

Sincerely,

Vernon Baville

Vernon Baville
President

cc: file
Attachments(4)

April 19 1989

To: Gerald Callagher, Director DNR Division of mining

After review of the preliminary "best interest finding" regarding the issuance of offshore prospecting permits in and near Goodnews Bay Alaska, we, the undersigned concerned residents of Platinum Alaska, respond.

Our findings of the proposed offshore prospecting permits show that the informational material as provided is rather slanted and downplayed in terms of its perspective towards the overall environmental and social-cultural impacts that this activity will generate.

We, the residents of Platinum, wish to maintain the quality of our lives, preserve its pristine ecosystem, and protect our community from unwanted population growth and the resultant social impacts it will most definitely have on our subsistence community.

Mr. Gallagher, we understand that under State law, that before issuing a permit you are required to prepare a written finding that the States interests will best be served by issuance of said permit. (AS 38.05.035 e) It must also document whether the plan is consistent with the Alaska Coastal Management program. What we seek to do here is state why we determine it is not at all acceptable and not in the best interests of State, Coastal Management, or the residents of Goodnews Bay and Platinum.

Biological resources are the mainstay of life here. Our most sensitive marine environment is a rich and tremendously valuable ecosystem, providing for its aboriginal peoples for centuries. It takes many years of intense observation for one to fully comprehend the wildlife values here, and interlocking relationships each species has critical to eachother.

Our offshore areas are not renewable like a new mowed lawn. Capelin and smelt use the surfzone for spawning in Spring. All species use the offshore area as a migration corridor. Grey whales, an endangered species, Beluga and Bowhead whales Walrus and Sea Lion use this route predictably. Its disruption or loss would then dislocate these species. Their presence in the food chain is based on bottom food supplies.

A diverse array of organisms, clams, snails, crabs, fish and more live on the bottom. Crabs and clams are abundant. Nineteen species of marine mammals inhabit the nearshore area. Herring spawning areas are dependent upon the presence of eelgrass beds. Tens of thousands of Pelagic seabirds and migrating waterfowl use the shorelines, tidelands and Bay. Mr. Gallagher, in page 10 of your best interest finding, last sentence of the fifth paragraph you state : " In general, the offshore coastal areas are less environmentally sensitive and are utilized less than those areas within Goodnews Bay."

We feel that the statement is incorrect and misleading. On page 13 of your finding you also state that "with proper timing exploration activities will have negligable effects on fish migrations, fish spawning, marine mammals, clam beds or blue mussel beds." The Departments claims of "proper timing" are all too shallow and weak a defense when there is a tremendous and irreplacable wildlife habitat at stake.

Of your report, on page B-14 of the biological resource assessment by Dames and Moore, the fourth paragraph states in reference to Grey Whales: " ..any major damage to their food chains would undoubtedly have a negative effect on their numbers.."

Can we assume then Mr. Gallagher, that one or more 100 foot bucketline dredge working 24 hours a day devastating a rich sea floor to cause such damage? In section B page 16 it addresses the subject of exploration impacts inside Goodnews Bay. In reference to bird nesting colonies and Eagle nests at Beluga hill it states: " These species could be threatened by potential fuel spill pollution during fuel transfer and handling on exploration vessels. Disturbance effects could also result from the combined effects of harassment by workers and vessel traffic..."

Of the same report, on page B-17 when considering mining impacts it states: " The swelling effect of Dredge spoil material could result in the creation of islands or increasingly shallow water.." Further it states: " Detailed impacts and constraints to marine reclamation cannot be determined..."

We must ask you Mr. Gallagher, did you actually read the biological impacts as written in the report for the OPP applicant and then in good conseince deem it to be of insignificant wildlife impact? The last sentence of the next page indicates further mitigation measures such as " Develop a fuel spill contigecy plan and have a good supply of spill clean up equipment on site. " We all know how well such plans work now, do we not?

On page five of the summary as prepared by WGM Inc. it states that "..impacts of exploration...are limited to fuel spills and increased ship traffic and noise that could cause their displacement.." This was in reference to local wildlife. As you probably had read but surely cannot fully embrace, is the fact that residents of this Bay area lead a subsistence lifestyle. As this is being typed boats of seal hunters float in the Bay hoping to bring home fresh meat.

Further of the same summary by WGM Inc. on page 5 it states; " biological activity will be lost.....longterm biological impacts could result if critical species such as eelgrass failed to recolonize..." In the next paragraph it speaks of turbidity as a result of exploration : " If this were to cause destruction of eelgrass beds, a decline in the commercial and subsistence fishery would probably result."

For these reasons and more to be discussed, we feel all plans of providing prospecting permits to be a long term monumental exercise in poor judgement tantamount to the Valdez incident, and obviously done without full regard to the environment whatsoever, or the residents indigenous to the area. Is that truly in the best interests of the state then ? Its residents ?

Under State law, (11 AAC 86.500) this area is open to prospecting permit applications unless the State finds that " mining would be incompatible with significant surface use..." Looking at the long term effects of exploration and eventual Dredging our area then, destroying our ecosystem, disrupting and damaging a wildlife migration corridor causing biological upheaval and relocation of myraid species, reducing the local fishery and disrupting the subsistence way of life, is that incompatible in your perspective ?

Mr. Gallagher, the mitigation alternatives as proposed are not at all substantial enough in terms of overall safeguards. They are shallow, contrived, and inadequate. Other perhaps less obvious impacts are at issue. The overall quality of life is at stake for the residents of the area. On page A-9 as written by Westervelt Engineering it states; " Two seperate dredging systems may be required.... and as a result " a substantial facility would be established in the area..." (page A-10)

We ask, on Native land claims ? We absolutely do not want to see a sudden boom of activity and then find a mining camp in our midst, which would require a fuel storage facility, waste and refuse disposal. The other demands on community infrastructure would be only unhealthy.

An increase in population would impact the school creating unreasonable classroom conditions. There is a limited amount of supplies available, housing and services. The population here would double. Then we would have a situation where these outsiders would compete for our resources of fish and game recreationally, and we do not want that.

Many times over in the mining plan summary it indicates that local jobs would be generated. People here do well enough and do not need to work on or with such mineral activity. Local job offers is hardly equitable when weighing the overall upheaval of such a project. Further, we feel that few if any would actually take part in this proposed crime.

After the tragic incident at Valdez, we wish to protect out lands and our way of life. Your proposed best interest findings projects only the most negative and overwhemingly detrimental impacts to this region. Be advised then we do not want this to occur now or in the future.

The City council of Platinum

Joseph M. Ramirez

Phillip Solomon

Anna M. Small

Linda Echuck

Paul Moses

Margaret Echuck

Absent
Dave Gilbert

: Goodnews City council
Dept. of fish and game
Dept. of fish and Wildlife
Gov. Steve Cowper
Greenpeace
Tundra Drums
Cenaliulriit

Kuitsarak, Inc:
P.O. Box 10
Goodnews Bay, AK 99589

March 20, 1989

Gerald Gallagher, Director
Dept. of Natural Resources,
Division of Mining
P.O. Box 107016
Anchorage, AK 99510

Re: Comments on Goodnews Bay (herein "Mumtrak") Offshore Mining Proposal, by DNR, Mining Division

Dear Gerald:

Thank you for sending a copy of the "Preliminary finding of the director." Please consider this letter before making any decisions that will affect the people of Mumtrak adversely.

I am sure you are well aware of the local residents' opposition to any move that will open up the Bay for poisioning, especially by outside mining companies, who will come into the bay for their own gain, regardless of the consequences. After reading an article on offshore mining poisioning (see attachment), I strongly feel there is insuffient studies done concerning the effects that offshore mining has on marine life, and the people who eat them, while surrounding such operations. You may also know that the Yup'ik residents of Mumtrak, and the surrounding Native villages, are heavily dependent on the Bay and its resources for their livelihood.

Mr. Gallager, when a state system intends to deprive its Yup'ik citizens of their cultural way of life, all for its own economic gain, does it not sound like economic genocide being placed against the affected people, namely, the people of Mumtrak? I would say so. If the state does allow the mining companies to proceed with prospecting and leasing, then it is allowing for the persecution of the people in the surrounding Bay to begin. Therefore, it is a violation of our human rights. History has shown the U.S. to be notorious for their human rights violations against the original inhabitants. If you decide in favor of the mining companies,

Mr. Gallager:

I won't be surprised at all. History is trying to repeat itself here. The system you represent can become the perpetrator. You are making the choice.

In this modern day, I hear a lot about four worlds - Western Civilization being the 1st. The Soviet Union being the 2nd. Then there are the "Third World" countries. I supposedly belong to the "Fourth World," a makeup of Indigenous groups throughout the globe. Only throughout history, Forth World people have been, and still continue to be, persecuted by state systems. We just want to be left alone, yet your system has forced its way into our lives. In this day and age, nothing is impossible. The people look forward to the day when persecutions against them will exist only in the past.

Let this letter spark some thought.

Sincerely,

Vernon Bavilla
Chairman

Enclosures
cc:Gov. Steve Cowper
Sen. Johne Binkley
Rep. Lyman Hoffman
Attorney David S. Case
Director, Division of Governmental Coordination
Editor, Tundra Drums

State to warn western towns of mercury risk

By PATTI EPLER
Daily News reporter

Mercury poisoning may be threatening the health of western Alaska residents who eat large amounts of seafood, state and federal officials say.

Concerns over mercury also could derail a proposed federal mining lease sale off the coast of Nome, because officials are worried that dredging for gold stirs up already high levels of mercury in the sea floor and spreads the contaminant to fish and other marine creatures eaten by people.

A letter signed by state and federal officials will be sent soon to health organizations in the Norton Sound area suggesting tests be conducted of coastal residents to determine current mercury levels in people, according to Patty Bielawski of the state Division of Governmental Coordination and Alan Powers of the federal Minerals Management Service.

Mercury in some forms is known to have striking effects on the nervous system, ranging from emotional problems like anxiety and depression to speech disorders and loss of motor control. The expression "mad as a hatter" refers to mercury poisoning that afflicted hatters who used the substance to soften the felt in hats and frequently became mentally ill after years in the profession, according to a health handbook.

The issue of mercury poisoning among coastal people has been raised by scientists

Please see Back Page, MERCURY

Anchorage Daily News
March 15, 1984

MERCURY: State recommends testing

Continued from Page A-1

with the Minerals Management Service who are identifying environmental impacts that could occur if the federal government allows offshore gold mining in Norton Sound near Nome.

The government is considering holding a lease sale in January. Western Gold Exploration and Mining Co., or WestGold, now operates the world's largest offshore dredge to scrape gold from the sea floor on state leases.

In 1987, WestGold asked that it be allowed to move to federal waters. Since then, two other companies have expressed an interest in such a sale.

The state is involved in the sale through a joint state-federal coordination team that is reviewing issues associated with the sale.

"I think what has caused the concern is it's pretty well known ... that folks who eat a lot of fish and organs of marine mammals ingest more mercury than those who don't," said Powers. "That translates generally to Native populations along the Bering Sea."

Bielawski and Powers say no one knows for sure whether mining aggravates a natural mercury problem. It's also not known whether the form of mercury found in the Norton Sound area is highly toxic to humans, they said.

Studies of WestGold's dredging operation have reported elevated levels of mercury in the water but the state thinks the studies are inconclusive, Bielawski said.

And Power said the studies, conducted by the Environmental Protection Agency and the state Department of Environmental Conservation, seem to be using flawed testing methods that are picking up other metals in the water but reporting it all as mercury.

Still, a draft environmental impact statement recently released by MMS says the proposed mining program could have a major impact on human health. The draft includes a chapter devoted to health effects which says mercury contamination of food sources "could pose a serious health threat to Nome residents harvesting seals, walrus, fish, shellfish and birds."

The draft report says a 1976 study of Yupik mothers with infants in the Yukon-Kuskokwim Delta showed mercury levels up to five times higher than Anchorage mothers, because the Yupik women frequently ate seal and fish while the Anchorage women did not. The draft report said it's likely mercury levels in Nome residents would be comparable to those in the delta area.

Bielawski did not know if any more recent studies of mercury had been done or if the state had taken steps after the 1976 study to alert health officials to potential mercury problems.

In November, the coordination team brought experts on mercury to Anchorage for a three-day workshop. One noted physician, Dr. David Marsh, suggested that mercury levels in coastal communities, particularly Nome, may already be dangerously high, to the point of affecting developing fetuses.

Marsh, reached at his New York home, declined to talk about the mercury issue on Tuesday. "I couldn't possibly talk about it over the phone," he said. "It's much too complicated."

At the conference, according to people who attended, Marsh urged that residents be tested to see what level of mercury already existed, then monitored to see if the contamination increased over time.

The coordination team is passing that recommendation along to Nome-area public health agencies. Powers didn't know what other communities would receive the letter and Bielawski wasn't sure if it would be distributed along the Bering Sea coast, although, she said, "it's a potential issue for any of the coastal populations."

Who would pay for the tests has not been resolved, Bielawski said.

When tests would be conducted also is unclear, and neither Bielawski nor Powers could say that mercury levels in Nome residents would be determined before they decide to proceed with the sale.

Powers said the sale might be delayed until tests are conducted. But he emphasized that a clear link between offshore mining and mercury in residents has not been established.

"I don't know that there's a mercury problem and I don't know that mining is going to create a mercury problem," he said. "We want to be careful not to raise a big scare about this."

Kristine Benson of the Alaska Center for the Environment attended the mercury workshop last fall. "It left you shaking your head," Benson said, "over why there seems to be a move to go ahead with the leasing when there are so many unanswered questions."

"I think the next step is to test the population that's at risk," she said, suggesting companies interested in mining pay for the tests. "They shouldn't be putting these women at risk for their own profits."

KUITSARAK, INC.
P.O. BOX 10
GOODNEWS BAY, ALASKA 99589

April 29, 1989

Representative Lyman Hoffman
Pouch V
Juneau, Alaska 99811

Re: Goodnews Bay Offshore Mining Disposal, as proposed by the Division of Mining, Department of Natural Resources.

Dear Representative Hoffman:

Your constituents of Mumtrak (Goodnews Bay) are living a very fragile way of life in today's fast-paced world. And with the recent proposals by DNR, Mining Division, to open up Goodnews Bay and nearby waters for offshore mining, is placing our way of life, when considering our economic dependency on the Bay (based on renewable resources), in jeopardy.

The subsistence way of life, and the existing commercial dependency upon the bay, is the safest bet for the psychological well-being of the local people, some twenty or hundred years in the future. The locals surrounding the bay are not looking for some 50 jobs that will end in a "bust" cycle. Our Economic Base is growing, and we would like to see that continue. We do not want to witness the destruction of our foundation, especially by some "alien" company who will come in for his or her own economic gain, regardless of the consequences.

As constituents, we are asking for your support in our opposition to the proposal by the Division of Mining, DNR, to open up the Bay for mining purposes. Please consider the letter to the Director, Resolution 89-03-07, the newspaper article, and my testimony during the hearing held in Goodnews Bay on April 19, 1989. Thank-you for your consideration.

Sincerely,

Vernon Bavilla
President

cc: file
Attachments(4)

(8)

QANIRTUUQ, INCORPORATED

QUINHAGAK, ALASKA 99655 PHONE NO. (907)-556-8211

RESOLUTION 90-01

A RESOLUTION OF QANIRTUUQ, INC. SUPPORTING HOUSE BILL #332, AN ACT ESTABLISHING GOODNEWS BAY CRITICAL HABITAT AREA AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, The Goodnews Bay area is utilized by villages in their commercial fishing efforts for their economic well being, and;

WHEREAS, The area is also utilized for subsistence hunting and fishing.

THEREFORE BE IT RESOLVED THAT, Qanirtuuq, Inc. supports H.B.#332 an act establishing Goodnews Bay critical habitat area and providing for an effective date.

PASSED AND APPROVED this 11 day of January, 1990, by the Board of Directors of Qanirtuuq, Inc..

Joshua Cleveland
Chairman of the Board

Mary J Hill
Secretary

TO REPRESENTATIVE LYMAN HOFFAN

POUCH V

JUNEAU, AK 99811

FROM

JAN 19 1990

QANIRTUUQ, INC
PO. Box 69
QUINHAGAK, AK 99655

SUBJECT

DATE / /

MESSAGE ENCLOSED IS A RESOLUTION PASSED BY THE BRD OF DIRECTORS IN SUPPORT OF HOUSE BILL #332. THE BOARD OF DIRECTORS AND QANIRTUUQ INC WISHES YOU A ~~HAPPY~~ NEW YEAR. THANK-YOU.

SIGNED Jerry J. Small / President

REPLY

SIGNED

DATE / /

REDIFORM 4S 472

SEND PARTS 1 AND 3 INTACT - PART 3 WILL BE RETURNED WITH REPLY.

CARBONLESS

POLY PAK (50 SETS) 4P472

PLATINUM TRADITIONAL VILLAGE
PLATINUM TRADITIONAL COUNCIL
BOX 49
PLATINUM, ALASKA 99651

Resolution opposing Platinum Mining Proposal in the Goodnews Bay, Chagvan Waters.

Whereas; The Village of Platinum is an Alaska Native village traditionally organized and recognized by the United States thru the Secretary of the Interior; and

Whereas; The Platinum Traditional Council is the tribal governing body of the village of Platinum; and

Whereas; Local residents rely heavily in the subsistence resources from its waters; and

Whereas; The local residents money resources comes from its commercial fisheries; and

Now Therefore Be It Resolved that the Platinum Traditional Village, Platinum Traditional Council strongly opposes Platinum Mining Proposal in the Goodnews Bay and Chagvan Waters.

Adopted this 18 Day of April, 1989,

Quorum Constituted by 5 For 5 Against 0

Marcus Kilbuck
Traditional Council President

James T. Larsenchi
Attest: Secretary

cc: Files

City of Goodnews Bay
P.O. Box 70
Goodnews Bay, Alaska 99589-0070
(907) 967-8614

Resolution No. 89-Offshore

A Resolution of Concurrence with Entities that oppose the State of Alaska's proposal to open up the Goodnews Bay, Alaska Offshore Area to mining activities.

Whereas: The City Council of Goodnews Bay, Alaska is the local governing body, and

Whereas: The State of Alaska through the Department of Natural Resources, Mining Division is in the process of hearings for it's proposal to open up the Goodnews Bay offshore Area to mining, and

Whereas: The proposed area is used by renewable subsistence resources and commercial fishery resources that would suffer in detrimental ways as a result of proposed mining activities, and

Whereas: The now infamous Prince Williams Sound Oil Spill will effect the amount of fish and other foodstuffs that are used by Alaskans for sustenance, now

Therefore Be It Resolved that the City Council of Goodnews Bay, Alaska joins Entities in opposing the State of Alaska, Department of Natural Resources, Mining Division proposal to open up the Goodnews Bay Offshore area to exploration and mining activities.

By Quorum of the City Council of Goodnews Bay, Alaska this 12th day of April, 1989.

Mayor Lisa S. Small

Dorothy D. Daniels

Angela Nanok

William Walker

Bessie A. Galila

Henry Chingliak

Attest: City Clerk

copy/file

Dept. of Natural Resources
Division of Mining
Attn: Kerwin Krause
P.O. Box 107016
Anchorage, Alaska 99510

April 5, 1989

Hello Mr. Krause;

First of all I w nt to thank you and your colleagues for giving/the public a chance to see if we can stop this proposal before it kills off unlimited number of coastal animals, fishes, shelled beings and plants where living coastal resources and humans survive using. If the Division of mining is not going to replace the income of the fishermen of GoodNews, Platinum, Yukon and Kuskokwim recieves, why try and destroy the economic provider which like I mentioned, your office will not be able to provide on a long term bases? Everybody understands that the state of Alaska is going broke and its pushing for developement to keep alive. But to destroy living creature which you can not reproduce or recreate is not a way to do it. There is an example here in our region, its' Tuluksak River mining activity. What its doing is that it is poisoning the river year round. Arsenic material deeps on running down river, and water can not be consumed. Same results will occur even on the coastal region where tides and current never ever stops. Conserving our valuable resources should be supported and be held on to instead of wasting it. The beauty of Creation is the gift to Mankind from God himself to be enjoyed as food or as some food along the chain of variety of food sources of the living resources. And mankinds' got the ability to destroy everything in a single day. This proposal is just going to get few people rich, why let them take advantage of the Natives food which they will never pay for or replace?

cc; Office files
Cenaliulriit-Bethel
Yupiit Nation

In Peace;

Fritz George

Fritz George
Land Manager

Native Village of Kwinhagak

Quinhagak IRA Council
Quinhagak, Alaska 99655
Phone: (907) 556-8449

RESOLUTION 89-02

A resolution of the Native Village of Kwinhagak, Quinhagak IRA Council defining it's objection to the Alaska Board of Game's and Fisherie's proposed Walrus Sanctuary in the (Naunvak Bay) Cape Pierce Area.

WHEREAS, The Native Village of Kwinhagak, Quinhagak IRA Council is recognized by the United States Government, organized through the Department of Interior, and;

WHEREAS, The Quinhagak's poor economic condition forces the local people to rely heavily on the subsistence year round, and;

WHEREAS, The Quinhagak community will always rely on the subsistence harvest as a life style, and;

WHEREAS, The Quinhagak subsistence resources (food) includes the Walrus, which are available year round, and;

WHEREAS, The Native Village of Kwinhagak, Quinhagak IRA Council on behalf of it's people wishes to participate in rejecting the proposed Walrus Sanctuary, and;

THEREFORE BE IT RESOLVED THAT,, The Walrus Commission rescind the proposed Walrus Sanctuary in the Togiak National Refuge (Naunvak) Cape Pierce.

NOW THEREFORE BE IT FURTHER BE RESOLVED THAT The Eskimo Walrus Commission accept the objection of the Quinhagak Native People for the [illegible] Sanctuary at (Naunvak) Cape Pierce.

QUORUM CONSTITUTED BY 5

VOTING FOR 5
VOTING AGAINST ____

DATED THIS 6th DAY OF April 1989.

John O. Mark
I.R.A. COUNCIL PRESIDENT

Wanda Basilla
Vice President

[illegible]
Secretary/ Project Director

Aldolph Porter
member

Sam Carter
member

Henry Matthew
member

member

cc/files; Quinhagak IRA Council
Togiak Councils, Goodnews Bay Councils, and Platinum Traditional Council.
Conservation, Nunam Kitlutsisti, Fish & Wildlife Service-Anch., T.N.W.R.-Dillingham.

Native Village of Kwinhagak

Quinhagak IRA Council
Quinhagak, Alaska 99655
Phone: (907) 556-8449

RESOLUTION 89-01

RESOLUTION OPPOSING PLATINUM MINING PROPOSAL IN THE GOODNEWS BAY WATERS AND CHAGVAN WATERS.

WHEREAS, The Native Village of Kwinhagak, Quinhagak I.R.A. Council is recognized by the United States Government Organized through the Department of Interior, and

WHEREAS, The residents of Quinhagak go to Goodnews Bay and Platinum to Commercial Fish for salmon and herring during the Commercial Fishing seasons, and

WHEREAS, The Quinhagak residents basically are subsistence people and are highly dependent on the natural resources of the Goodnews Bay and Platinum area, and

WHEREAS, The Native Village of Kwinhagak, Quinhagak I.R.A. Council strongly opposes Platinum Mining Proposal in the Goodnews Bay waters and Chagvan waters, and

WHEREAS, Cenaliulriit resolved to oppose the proposed Platinum Mining in the Goodnews Bay Waters and Chagvan Waters presented by the Division of Mining Department of Natural Resource State of Alaska, and

WHEREAS, The Native Village of Kwinhagak Supports Cenaliulriit Resolution 89-02-01 and

NOW THEREFORE BE IT RESOLVED THAT The Native Village of Kwinhagak, Quinhagak I.R.A. Council support Cenaliulriit Resolution 89-02-01.

ADOPTED THIS 4th DAY OF April 1989,

QUORUM CONSTITUTED BY 5

5 FOR

____ AGAINST

John O. Mark
I.R.A. COUNCIL PRESIDENT

ATTEST: SECRETARY/

cc; files
Dept. of Natural Resources, Division of Mining - Anchorage.
Cenaliulriit, Nunam Kitlutsisti, Platinum Council, Goodnews Bay Council
Tribal Councils

AKIACHAK NATIVE COMMUNITY
Akiachak Indian Reorganization Act Council
Post Office Box 70
Akiachak, Alaska 99551
(907)825-4626

APR 10 1989

April 6, 1989

To Whom It May Concern:

Enclosed is the Resolution 89-03-02 of the Akiachak IRA Council opposing Goodnews Bay Offshore Mining Project. The resolution is self-explanatory and any questions should be addressed to the signatory below at the above phone number.

AKIACHAK NATIVE COMMUNITY
Akiachak IRA Council

Willie Kasayulie
Chairman and Chief Executive Officer

cc: Office of the Governor
DCRA Commissioner
DNR Commissioner
Senator Johne Binkley
Representative Lyman Hoffman
AVCP, Incorporated
Cenaliulriit
Goodnews Bay Traditional Council
Kuitsarak, Incorporated
City of Goodnews Bay
files

AKIACHAK NATIVE COMMUNITY
Akiachak Indian Reorganization Act Council
Post Office Box 70
Akiachak, Alaska 99551
(907)825-4626

Resolution Opposing Goodnews Bay Offshore Mining Project

Resolution 89-03-02

WHEREAS, The Akiachak IRA Council is the governing authority for the Akiachak Native Community; and

WHEREAS, The Council has become aware of mineral mining proposals in the vacinity of the Mumtrak (Goodnews Bay) homelands and water-ways; and

WHEREAS, The Mumtrak residents share the cultural identity of the residents of Akiacuar (Akiachak) through dependence of subsistence caught resources from land and sea throughout countless generations; and

WHEREAS, No evidence exists of the effects the off-shore mining activity will have on the resources in Goodnews and Kuskokwim Bays to substantiate off-shore mineral activity.

NOW THEREFORE BE IT RESOLVED THAT:

1. The Akiachak IRA Council hereby opposes the proposed mineral off-shore mining in the Goodnews Bay and Chagvan waters;

2. The emotional, cultural and physical well-being of the Mumtrak people should be given primary consideration; and

3. The existing and future subsistence and commercial uses of renewable resources be given the highest priority when any decision is to be made concerning the Goodnews Bay Offshore Mining Proposal.

Passed and approved this 29th day of March 1989.

Willis Kavagnaluk
Chairman

Attested by:

Secretary/Treasurer

Traditional Village Council
P.O. Box 58
Goodnews Bay, Alaska 99589
March 25, 1989

Governor Steve Cowper
State of Alaska
P.O. Box A
Juneau, Ak. 99811-0101
RE: Opposing Offshore mining

Dear Governor Cowper,

At the joint meeting of the TVC, City Councils, and the Health Board held in Goodnews Bay Comm. hall March 24, 1989, the enclosed resolution opposing the Goodnews Bay Offshore Project was approved and adopted.

In our communication between the leader to leader, lets keep in mind that our residents major money resource producer is in it's fisheries.

Lets support the developement of the Fisheries, rather than endangering by mining or drilling, which can be destructive to the water Life.

Thank you for considering our concerns and your time.

Sincerely,

James M. Smith
TVC President

Enclosures
cc: file
Governor Cowper,City,and Trad. Councils of Togiak, Trad. council of Platinum, IRA Council of Akiachuk,AVCP Bethel, Senator Binkley, Representative Hoffman, Senator Adams, Rural Alaska Resources Assn., Cenaliulriit, Yukon/Kuskokwim Fisheries Task Force, D.G. Hoffman Commissioner Department of Comm.& Regional Affairs

Resolution 89-Mining-01

A Resolution opposing the Offshore Mining in Goodnews Bay Area and other Fishing Region Waters.

Whereas, the Goodnews Bay Traditional Village Council is recognized by the Department of the Interior through it's Secretary, and

Whereas,the Traditional Village Council represents it's residents in Social, Health, and Economic interests, and

Whereas, local residents rely heavily in the Subsistence resources from it's Waters, and

Whereas, the local residents money resources comes from it's Fisheries, and

Whereas, Residents knew that the past drilling in the Goodnews Bay effected a decline in fish, and other water life, and

Whereas, the residents opposed the Goodnews Bay Offshore mining.

Now Therefore Be It Resolved that the Goodnews Bay Traditional Village Council rejects the Goodnews Bay Offshore mining project proposed by the Department of the Natural Resources, Mining Division, and

Be It Further Resolved that this resolution supports the Fishing Organizations, Traditional, and City Councils, Corporations, and other organized groups opposing the Offshore mining and drilling in the subsistence and commercial fishing area waters.

Duly adopted by the quorum on this 24th day of March, 1989.

Traditional Village Council, President

TVC Member

TVC Member

TVC Member

TVC Member

cc: file
City and Trad. Councils of Togiak
Traditional Village Council of Platinum
IRA Council of Akiachuk
AVCP Bethel
Gov. Steve Cowper
Senator Binkley
Representative Hoffman
Senator Adams
Rural Alaska Resources Assn.
Cenaliulriit
Yukon/Kuskokwim Fisheries Task Force

STEVE COWPER
GOVERNOR

STATE OF ALASKA
OFFICE OF THE GOVERNOR
JUNEAU

April 21, 1989

APR 25 1989

Mr. James M. Smith
President
Traditional Village Council
P.O. Box 58
Goodnews Bay, AK 99589

Dear Mr. Smith:

Thanks for providing me with a copy of the Traditional Village Council's resolution opposing offshore mining in Goodnews Bay. I appreciate your sharing your comments with me and have taken them into consideration.

I have also sent copies of your letter and resolution to my Commissioners of the Departments of Environmental Conservation, Fish and Game, Natural Resources, and to the Director of the Division of Governmental Coordination for their consideration.

Again, thanks for taking the time to write.

Sincerely,

S/S Steve Cowper

Steve Cowper
Governor

cc/enc: Commissioner Dennis Kelso
Commissioner Don Collinsworth
Commissioner Lennie Gorsuch
Bob Grogan

Resolution 89-Mining-01

A Resolution opposing the Offshore Mining in Goodnews Bay Area and other Fishing Region Waters.

Whereas, the Goodnews Bay Traditional Village Council is recognized by the Department of the Interior through it's Secretary, and

Whereas,the Traditional Village Council represents it's residents in Social, Health, and Economic interests, and

Whereas, local residents rely heavily in the Subsistence resources from it's Waters, and

Whereas, the local residents money resources comes from it's Fisheries, and

Whereas, Residents knew that the past drilling in the Goodnews Bay effected a decline in fish, and other water life, and

Whereas, the residents opposed the Goodnews Bay Offshore mining.

Now Therefore Be It Resolved that the Goodnews Bay Traditional Village Council rejects the Goodnews Bay Offshore mining project proposed by the Department of the Natural Resources, Mining Division, and

Be It Further Resolved that this resolution supports the Fishing Organizations, Traditional, and City Councils, Corporations, and other organized groups opposing the Offshore mining and drilling in the subsistence and commercial fishing area waters.

Duly adopted by the quorum on this 21th day of May, 1989.

Traditional Village Council, President

TVC Member

TVC Member

TVC Member

TVC Member

KUITSARAK. INCORPORATED

RESOLUTION NO. 89-03-07

TO OPPOSE THE GOODNEWS OFFSHORE MINING PROJECT PROPOSAL AND LEASE SALE BY THE STATE OF ALASKA, DEPARTMENT OF NATURAL RESOURCES, MINING DIVISION (DNR).

WHEREAS, Kuitsarak Incorporated, is a corporation established under the Alaska Native Claims Settlement Act of 1971, for the best interest of the people of Mumtrak (Goodnews Bay), and

WHEREAS, the people of Mumtrak, since prehistory have always subsisted, and still do, for their main diet of fish and mammals from the renewable resources of Goodnews Bay and nearby waters, and

WHEREAS, the commercial fishing industry in Goodnews Bay is the only income for the majority of the residents of Mumtrak, and,

WHEREAS, the State of Alaska, through DNR, Mining Division, is considering a proposal to open up the Bay and nearby waters for offshore dredge mining to private mining companies, and

WHEREAS, the consequences of such a move would only benefit the outside companies and would result in a "Boom/Bust" form of economic development at the expense of the established economy based on renewable resources.

WHEREAS, standard or modified buckline dredge mining of the Bay would increase turbidity, destroy existing marine habitat and wildlife dependent on the bottom of the bay and would poison the Bay with minerals, and

WHEREAS, the results of such an action would only be detrimental for the health and well-being of the people who depend on the very Bay and its' life for their survival.

NOW THEREFORE BE IT RESOLVED THAT:

1. Kuitsarak, Inc., opposes any decision to open up Goodnews Bay and nearby waters for mining purposes, and

2. The State of Alaska, through the Department of Natural Resources, Mining Division, should halt all lease sales to private companies and deny any proposal to open up Goodnews Bay and nearby waters for prospecting or mining purposes.

3. The emotional, cultural, and physical well-being of the people of Mumtrak, Alaska, should be given primary consideration before any action is taken, and

4. Existing and future subsistence and commercial uses of renewable resources should be given the highest priority when any decision is to be made concerning the Goodnews Bay Offshore Mining Proposal.

5. Kuitsarak, Inc. requests support from Native organizations, conservation advocates and other interested parties for this position.

Adopted by quorum on this 7th day of March 19 87, by the Board of Directors.

Vernon S. Bonsella
Chairman

ATTEST:

Maggie K. Schaltz
Secretary/Treasurer

Cenaliulriit Coastal Management District

For the Yukon-Kuskokwim Coastal Resource Service Area
P.O. Box 1169 • Bethel, Alaska 99559 • 907/543-2243

February 27, 1989

Dear Traditionl Council:

Attached is a resolution Cenaliulriit Board of Directors passed during the board meeting, February 23, 1989 in Bethel.

The resolution is opposing offshore mining in Goodnews Bay and outside the Bay. Your support is needed to oppose this project. Sometime in mid March Department of Natural Resources (DNR) will held a public hearing in Goodnews Bay, Platinum and Bethel. We will inform you when the exact date is set for public hearing.

Enclose is the study of offshore mining in Goodnews Bay by DNR.

Sincerely,

Anna Phillip

Anna Phillip
Coordinator

enclosures

cc: Files
Cenaliulriit Board of Directors
Ms. Estus, DGC
Mr. Duffy, DCRA

Cenaliulriit Coastal Management District
For the Yukon-Kuskokwim Coastal Resource Service Area
P.O. Box 1169 • Bethel, Alaska 99559 • 907/543-2243

RESOLUTION 89-02-01

RESOLUTION OPPOSING PLATINUM MINING PROPOSAL IN THE GOODNEWS BAY WATERS AND CHAGVAN WATERS.

WHEREAS, Cenaliulriit Coastal Management District represents 43 villages as a Coastal Resource Service Area under the authority of Section 46.40.110-180 of the Alaska Coastal Management Act; and

WHEREAS, The seven member elected Board of Directors has the right and obligation to oversee the performance of the staff and the working of the district; and

WHEREAS, The Cenaliulriit Board of Directors has become aware of Platinum mining proposal in the Goodnews Bay waters and outside the Goodnews Bay waters, and

WHEREAS, In the past, when drilling was done in the Goodnews Bay waters, the people in the area began seeing dead - Smelt and Herring Fish, and

WHEREAS, The resident of Goodnews Bay and Platinim have already expressed opposition to Platinum mining in the Goodnews Bay waters and Outside the Goodnews Bay waters, and

WHEREAS, The area residents basically are subsistence people and therefore are highly dependent on the natural resources of the Goodnews Bay area, and

WHEREAS, The area residents get their very important meager cash income for the year from commercial fishing for Herring and Salmon Fish, and

WHEREAS, The sound and clean environment is very important to continuing presence of the natural resources, and

WHEREAS, One of Cenaliulriit's objectives is to look after a sound and clean environment in the district.

NOW THEREFORE BE IT RESOLVED that the Cenaliulriit Board of Directors expresses its opposition to the proposed Platinum mining in the Goodnews Bay waters and Chagvan waters, and

BE IT FURTHER RESOLVED that copies of this resolution be send to Govenor Steve Cowper, Division of Mining DNR, Senator Binkley, Senator Adams, Representative Hoffman, Representative Wallis, Representative Foster, Alaska Department of Fish and Game Habitat Division, Subsistence Division, AVCP, Nunam Kitlutsisti, Fish and Game Advisory Board, Yukon/Kuskokwim Fisheries Task Force and Village IRA and Traditional Councils.

ADPOTED THIS 23rd DAY OF February 1989, BY THE CENALIULRIIT BOARD OF DIRECTORS AT THE CENALIULRIIT BOARD MEETING IN BETHEL, ALASKA.

Paul Chimiugak

Paul Chimiugak, Chairman

Peter Black

Attested By: Peter Black, Secretary/Treasurer

RURAL ALASKA RESOURCES ASSOCIATION
P.O. Box 200908
Anchorage, Alaska 99520
(907) 279-2511

March 16, 1989

Governor Steve Cowper
State of Alaska
P.O. Box A
Juneau, AK 99811-0101

DEPARTMENT OF NATURAL RESOURCES
MAR 20 1989

Dear Governor Cowper:

At a meeting of the Rural Alaska Resources Association (RARA) held in Juneau February 20-21, the enclosed resolution opposing the Goodnews Bay Offshore Project was unanimously adopted.

RARA believes there is insufficient information on the effect of the proposal on fish, marine mammals, waterfowl and other renewable resources. We understand the project is currently being considered by the Department of Natural Resources.

We believe that rural Alaskans must be assured that the renewable resources that sustain their livelihood are adequately protected before a major development project, such as the Goodnews Offshore Project, proceeds.

Thank you for hearing our concern in this matter.

Sincerely,

Arnold Melsheimer

Arnold Melsheimer, Acting Chairman
RURAL ALASKA RESOURCES ASSOCIATION

Enclosure: Resolution 89-5

cc: Lennie Boston-Gorsuch, Commissioner, Dept. of Natural Resources
Nunam Kitlutsisti
Traditional Council, Goodnews Bay
Board of Directors, RurAL CAP

RURAL ALASKA RESOURCES ASSOCIATION
P.O. Box 200908
Anchorage, Alaska 99520
(907) 279-2511

RESOLUTION 89-5

ENTITLED: TO SUPPORT GOODNEWS BAY (MUMTRAK) IN ITS OPPOSITION TO THE GOODNEWS OFFSHORE PROJECT.

WHEREAS, the Rural Alaska Resources Association (RARA) is reliably informed that the people of Goodnews Bay oppose the Goodnews Offshore Project now being considered by the Department of Natural Resources (DNR), Mining Division; and

WHEREAS, the proposal to open up Goodnews Bay and nearby waters for offshore dredge mining to private mining companies is likely to have an adverse impact on subsistence and commercial use of renewable resources and to otherwise adversely affect the environment; and

WHEREAS, there is insufficient information on the effect of the proposal on fish, marine mammals, waterfowl, and other renewable resources;

NOW, THEREFORE, BE IT RESOLVED

that the Rural Alaska Resources Association supports the community of Goodnews Bay (Mumtrak) in their opposition to the DNR Goodnews Offshore Project proposal.

ADOPTED unanimously in Juneau, Alaska on February 21, 1989 by members of the Rural Alaska Resources Association.

Arnold Melsheimer

Arnold Melsheimer, Actg. Chairman
RURAL ALASKA RESOURCES ASSN.

February 21, 1989
Date

(9)

April 19, 1989

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

Karin Sheardown
3512 Campbell Airstrip Rd.
Anchorage, Alaska 99504

HAND DELIVERED

Dear Mr. Krause:

I have reviewed the Preliminary Best Interest Finding and Proposed Consistency Determination regarding the issuance of offshore prospecting permits in and near Goodnews Bay, Alaska. Please accept this letter as my comments.

I don't think that the State should reject any OPP's unless it can be shown that prospecting will have an extreme adverse effect. The Preliminary Best Interest Finding of the Director says:

> *"Extreme adverse effects created by a disposal will be avoided by deletion of certain areas from that disposal."*

These potential 'extreme adverse effects' don't relate to prospecting at all, they relate to mining. I'm not applying for a mining permit. If we're successful in discovering valuable platinum deposits, then we can weigh the costs, benefits, and 'extreme adverse effects'.

By the time a platinum discovery is made, platinum may be considered so precious that it takes precedence over other competing resources. For example the new platinum-dependent cold nuclear fusion process may prove to be a boon to mankind and tremendous benefit to the U.S.A.

New technologies with their marvelous benefits bring with them a price. They compete with the old methods and eventually replace the outdated and inefficient. In the best situations we may find areas where diverse resources such as fish and minerals can be harvested without competing with each other, but most of the time we must compromise. Sometimes we need to make a hard decision and choose one very important resource to the detriment of another very important resource.

In the preliminary best interest finding, the State is saying that it will never be in the State's best interest to choose the platinum over the herring. My logic tells me otherwise. Platinum deposits are severely restricted in their distribution, if we can't mine them where they are, then we have no other choice. We have to do without platinum. There's no other place in the U.S.A. with a similar platinum potential to the one at, in and near Goodnews Bay. On the other hand,

Goodnews Bay isn't even the best place in the State to get herring. I believe that if we only knew whether or not the platinum was there and how much was there, we would then be in a position to decide which was more important--the herring or the platinum. I think that at some concentration of platinum, it must be in the State's best interest to choose the platinum over the herring.

The State can't make a truly informed choice unless it knows where the platinum is, how much of it is there, and whether or not it can be successfully extracted. If the State grants the prospecting permits, it will allow us to find those answers. What justifiable reason could the State use to prevent us from gaining this information?

The preliminary finding admits,

> *"Exploration activities in the portions of the bay containing eelgrass would have very little impact upon the biological productivity associated with the eelgrass...".*

The preliminary finding goes on to say that upon mining, the eelgrass would be destroyed so let's reject the OPP's. The point I'm trying to make is that if exploration is not going to cost the State anything or cause any harm, then why won't the State allow us to complete the prospecting? I think it would make sense for the State to have this information before making so important a decision to lock up our precious resources.

According to the Preliminary Best Interest Finding, Inlet Oil Corp. converted a portion of three Goodnews Bay OPP's into a lease after showing working platinum deposits off of Beluga Mountain. They lost the lease for failure to pay rent. What were the 'extreme adverse effects' of Inlet Oil's activities? What would have happened if they had continued to pay their rent? Is it fair for me to be locked out of the old lease area and not even be given the opportunity to see if there is a workable deposit? I don't think it's fair at all.

There is an important point to consider if the State decides to prohibit prospecting over parts of the offshore area. It will be unfair to me to flatly reject my applications, because if the State later changes its mind, I won't get any benefit. Suppose that I'm successful in outlining some very valuable ores and right next to me is part of an ore deposit on ground the State has rejected. Then seeing the value of these resources, the State may reappraise its best interest and decide to reopen these valuable tracts for someone else. If the State decides to prohibit prospecting on some or parts of my OPP applications, then to be fair to me, my applications should be put on hold again rather than rejected.

Another point should be considered if the State decides to prohibit exploration. With a couple of exceptions, the State proposes to reject certain applications in total.

Surely the arbitrary boundaries of these applications cannot coincide exactly with sensitive areas. Are there not some parts of these applications less sensitive or nonsensitive? Particularly within Goodnews Bay, it appears that entire OPP's are recommended for rejection even though they are not entirely over sensitive ground.

Thank you for considering my comments.

Sincerely,

Karin Sheardown

Karin Sheardown

GOODNEWS RESOURCES INC.

935 Marine Building, 355 Burrard Street, Vancouver, BC V6C 2G8
Telephone: (604) 687-7169 Telecopy: (604) 682-4033

VIA COURIER

April 17, 1989

Mr. Gerald Gallagher
Director, Division of Mining
Alaska Department of Natural Resources
Suite 880
3601 C Street
Anchorage, Alaska 99503

Re: Goodnews Bay Offshore Project

Dear Mr. Gallagher:

As you are aware, Neptune Resources Inc. is interested in participating in the mineral exploration and development of the offshore lands near Goodnews Bay, Alaska. This letter sets forth our comments on the Preliminary Finding of the Director and Coastal Consistency Determination Regarding Issuance of Offshore Prospecting Permits in and near Goodnews Bay, Alaska, dated March 9, 1989.

Within Goodnews Bay

As explained in the resource assessment report and preliminary best interest finding, the ecological, environmental and subsistence characteristics of the Goodnews Bay estuary are unique. Your decision to reject certain of the applications in the Bay is therefore understandable, although we request that you carefully review the rejections in order to see if there are certain additional lands which might be issued to the applicant.

Outside of Goodnews Bay

Outside of Goodnews Bay the potential for the discovery of significant mineral resources is quite high while the potential for conflict with non-mineral resources and subsistence activities is much less than in the Bay. We therefore submit that it is not appropriate to reject any of the applications outside of the Bay, but rather that it is more appropriate to issue all such applications with specific conditional time closures and other stipulations designed to protect the non-mineral resources. This will allow the State to limit operations in sensitive areas while still permitting mineral exploration.

..../2

After the sensitive areas have been explored and the mineral potential determined, the State will be in a much better position to balance the competing mineral and non-mineral resource interests. If the applications are rejected at this early stage before there is a chance to obtain information as to the mineral resources, the State will be foreclosing an opportunity to develop what may be a very important resource. In addition, it is unfair to the applicant (who now has a priority right) to reject certain lands now which at some later time the State may decide to open up to mineral exploration and development.

As a member of the mining industry, we want to express our appreciation to the Division of Mining for committing the time and effort necessary to conduct the Goodnews Bay offshore lands disposal. We look forward to participating in mineral exploration and development in this and other areas of the State.

Yours very truly,

GOODNEWS RESOURCES INC.

Harris Saxon
Executive Vice President

/mw.H335

(10)

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4, Register 51; am 5/30/85, Regist

11 AAC 86.430. EXTENSION. (a) A request for extension of a
site must be filed in writing with the division before the
site expires.
quest for extension must
in the name and current mailing address of the locator;
in the name and any serial number assigned by the de-
the prospecting site;
why an extension is needed; and
gned by the owner or the owner's agent.
ector will, in his or her discretion, request that additional
be supplied to support the request for extension.
extension is granted, the prospecting site locator shall,
days after receiving the notice of extension, record the no-
recording district in which the site is located. (Eff. 9/5/74,
am 5/30/85, Register 94)

Authority: AS 38.05.020
AS 38.05.245

11 AAC 86.435. STAKING CLAIMS ON EXPIRED PERMITS.
The expiration of a permit does not prevent the locator or his successor
from staking a mining claim or leasehold location in the area formerly
covered by his prospecting site location if no intervening locations
have been made by others. (Eff. 9/5/74, Register 51)

Authority: AS 38.05.020

Article 5. Offshore Permits and Leases

Section
- applications
- date
- table permit work
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ment
- of permits
- extension
- sion of an offshore pros-
permit to a mining lease
- of "grandfather rights"
- 540. Lease rental
- 545. Leases granted by competitive bidding
- 550. (Repealed)
- 555. (Repealed)
- 560. (Repealed)
- 561. Surrender
- 565. Land in terminated permits and leases
- 570. (Repealed)
- 575. Production and lease extension
- 580. Suspension

11 AAC 86.500. PERMIT APPLICATIONS. (a) The procedures
11 AAC 82.105, 11 AAC 82.110, 11 AAC 82.200, 11 AAC 82.205, 11
AAC 82.300, 11 AAC 82.305, and 11 AAC 82.500 — 11 AAC 82.540
apply to offshore prospecting permits.

(b) An applicant may file for and be granted an offshore prospecting permit only on tide and submerged land that has been opened to offshore prospecting permits.

(c) Notwithstanding (a) and (b) of this section and 11 AAC 86.505, all prospecting permit applications pending as of January 2, 1983 will be adjudicated without regard to whether the area applied for was open to filing at the time of application. This action is intended to preserve priority rights established by the applications' order of filing. The commissioner is exercising his authority under AS 38.05.020 and AS 38.05.035(b)(2) to grant and preserve these priority rights in order to avoid inequitable detriment to diligent applicants due to situations over which the applicants had no control. The commissioner finds that this exercise of this authority under AS 38.05.035(b)(2) is in the best interests of the state.

(d) No person may file offshore prospecting permit applications that exceed, in the aggregate or in combination with offshore prospecting permits already held by that person, 300,000 acres.

(e) Notwithstanding (d) of this section, any person who, as of January 2, 1983, has pending prospecting permit applications that exceed 100,000 acres, shall, within 24 months after January 1, 1983, reduce the acreage under prospecting permit application to 300,000 acres or less. The department will adjudicate and issue up to 100,000 acres of offshore prospecting permits according to a priority list established by the applicant to the extent administratively practicable. If excess applications are not relinquished, adjudication of pending applications will take place in an order determined by the department.

(f) All tide and submerged land will be opened for offshore prospecting permit applications on June 30, 1984, unless the department finds that

(1) the land contains known mineral deposits that will be offered by competitive leasing;

(2) mining would be incompatible with significant surface uses; or

(3) adequate funding has not been appropriated for disposal of these minerals under the procedures provided by law.

(g) Issuance of an offshore prospecting permit is subject to requirements of AS 38.05.035(e), 38.05.830, 38.05.945, and 38.05.946.

(h) The filing of an application for an offshore prospecting permit does not vest a property right but merely creates a priority right to any permit that may be issued. The filing of an application segregates the locatable minerals in that tract. Until the application is adjudicated, those minerals are unavailable for location under AS 38.05.185 — 38.05.275. Prospecting permit applications filed will be shown as soon as possible on the department's land records and will immediately be entered on a list available by mail from the division. (Eff. 9/5/74, Register 51; am 1/1/83, Register 85; am 5/30/85, Register 94)

Authority: AS 38.05.020
AS 38.05.035
AS 38.05.250

11 AAC 86.505. EFFECTIVE DAT
... lease is as provided by 11 AAC 82

Authority: AS 38.05.020

11 AAC 86.510. ACCEPTABLE P
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...mit or group of permits. Work
...ements in one year may be cred
(Eff. 9/5/74, Register 51; am 1/

...ity: AS 38.05.020
AS 38.05.250

...AAC 86.515. COMPLIANCE
...QUIREMENT. (a) On or before th
...versary date of the offshore pros
...pay rental, submit an affidavit o
...al, or submit a combination of a p
...davit of work creditable against re
...davit of work must be filed with the
...davit constitutes certification that, t
...the work, or that portion of work
...ious year, has not been previously
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...The affidavit must be supported b
...ght be required by the commissione
...
(1) the location of the work perfo
(2) the nature, extent and cost of
(3) the general findings from the
(4) the name, address, and profess
...conducting the work.
...Failure to timely submit a renta
...an offshore prospecting permit is

38.05.265 and automatically terminates the offshore prospecting permit without prior notice.

(d) If any rental payment in combination with any work credit applied against rental is less than the amount due, the permittee will be granted 30 days after receipt of a notice from the director to submit the additional rental due. If the permittee does not correct the default within the time allowed in the notice, the offshore prospecting permit automatically terminates without further notice. (Eff. 9/5/74, Register 51; am 1/1/83, Register 85; am 5/30/85, Register 94)

Authority: AS 38.05.020 AS 38.05.250
AS 38.05.035 AS 38.05.265

11 AAC 86.520. GROUPING OF PERMITS. Contiguous permits may be grouped for work requirement purposes if it is shown to the satisfaction of the commissioner on or before the time provided in 11 AAC 86.515 that the permits are and were held under common ownership or assignment. For purposes of grouping permits, work affidavits must be filed on a group basis and in accordance with 11 AAC 86.515. (Eff. 9/5/74, Register 51; am 1/1/83, Register 85

Authority: AS 38.05.020
AS 38.06.250(a)

11 AAC 86.525. FAILURE TO COMPLY. Repealed 5/30/85.

11 AAC 86.528. PERMIT EXTENSION. An offshore prospecting permit will not be extended or renewed. (Eff. 5/30/85, Register 94

Authority: AS 38.05.020
AS 38.05.250

11 AAC 86.530. CONVERSION OF AN OFFSHORE PROSPECTING PERMIT TO A MINING LEASE. (a) At any time while an offshore prospecting permit is in effect, the permittee is entitled to a noncompetitive mining lease on that part of the permit area that has been shown to the satisfaction of the director to contain workable mineral deposits. The leased land will be described by legal subdivision according to the official survey or to the official protraction diagram approved by the Bureau of Land Management or the Department of Natural Resources.

(b) An application to convert a permit to a noncompetitive mining lease must be filed in accordance with 11 AAC 88.105. If the application is filed before the permit expires, the permit's expiration is postponed while the application is being processed. Until processing is completed, the permittee retains all rights specified in the permit until otherwise notified by the department, and the locatable mineral

land described in the conversion app
filing under other offshore p[illegible]spectin
locations. There is no further renta
expiration date. A decision denying co
accompanied by a written explanation of t
(c) A permittee applying to convert the
lease has the burden of demonstrating t
that each of the requirements for the issuan
and shall provide sufficiently reliable and d
and geologic, and engineering data to ena
knowledgeable decision. The following infor
in support of the lease application:
(1) an estimate of reserves, including
how reserves are measured, indicated,
sufficient geologic, geophysical, and engi
for the reserve estimates;
(2) the average grade of recoverable re
basis of the sample density, sample coll
preparation, and analytical testing met
(3) topographic, geologic, or ocean floo
the location of all samples, trenches, dr
surveys, and the outline of the ore bod
(4) a description of the probable mini
(5) an economic appraisal of the propo
estimates both the revenue from the sale
mine development and of extracting, n
concentrating the ore;
(6) an evaluation of toxic materials th
proposed mining area and proposed metho
these materials;
(7) any additional documentation requ
useful in evaluating the conversion of a pros
(d) Any financial information and geol
reserve, and cost data supplied by the applic
shall will be kept confidential at the appli
shall be clearly identified by the applicant
information not qualifying as confidential.
(e) In this section, "workable mineral de
mineral deposit that has been shown by the
reasonable prospect of developing into a succe
significance of one or more locatable minerals
quantity to induce a prudent operator to p
different conditions. (Eff. 9/5/74, Register 51
5/30/85, Register 94)

Authority: AS 38.05.020

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r 85; am 5/30/85, Register 94)

AS 38.05.250
AS 38.05.265

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, Register 51; am 1/1/83, Register 85

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**ERSION OF AN OFFSHORE PR
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and described in the conversion application remain segregated
under other offshore prospecting permit applications or as
ations. There is no further rental obligation after the origi-
expiration date. A decision denying conversion to a lease will be
ed by a written explanation of the grounds for the denial.

permittee applying to convert the permit to an offshore min-
has the burden of demonstrating to the director's satisfaction
of the requirements for the issuance of a lease has been met,
provide sufficiently reliable and detailed economic, geophys-
geologic, and engineering data to enable the director to make a
ble decision. The following information must be submitted
support of the lease application:

(1) an estimate of reserves, including a statement of whether
reserves are measured, indicated, or inferred, together with
geologic, geophysical, and engineering data to substanti-
the reserve estimates;

(2) the average grade of recoverable reserves, including a discus-
of the sample density, sample collection technique, sample
ation, and analytical testing methods;

(3) topographic, geologic, or ocean floor maps that clearly show
location of all samples, trenches, drill holes, and geophysical
eys, and the outline of the ore body;

(4) a description of the probable mining and recovery methods;

(5) an economic appraisal of the proposed mining operation that
mates both the revenue from the sale of the ore and the costs of
development and of extracting, milling, transporting, and
keting the ore;

(6) an evaluation of toxic materials that naturally occur in the
posed mining area and proposed methods to control the release of
materials;

(7) any additional documentation required by the director to as-
in evaluating the conversion of a prospecting permit to a lease.

(f) Any financial information and geological, geophysical, engi-
ing, and cost data supplied by the applicant as part of the applica-
will be kept confidential at the applicant's request. Such data
must be clearly identified by the applicant and separated from infor-
tion not qualifying as confidential.

(g) In this section, "workable mineral deposit" means a locatable
eral deposit that has been shown by the applicant to have a rea-
able prospect of developing into a successful mine, based on the
ence of one or more locatable minerals of sufficient value and
ntity to induce a prudent operator to pursue development under
ent conditions. (Eff. 9/5/74, Register 51; am 1/1/83, Register 85;
5/30/85, Register 94)

Authority: AS 38.05.020

(12)

Op-Ed

Tundra Drums 4-27-89

Offshore mining project overwhelmingly detrimental to area

by The Platinum City Council

After review of the preliminary "best interest finding" regarding the issuance of offshore prospecting permits in and near Goodnews Bay Alaska, we, the undersigned concerned residents of Platinum Alaska, respond.

Our findings of the proposed offshore prospecting permits show that the informational material as provided is rather slanted and downplayed in terms of its perspective towards the overall environmental and social-cultural impacts that this activity will generate.

We, the residents of Platinum, wish to maintain the quality of our lives, preserve its pristine ecosystem, and protect our community from unwanted population growth and the resultant social impacts it will most definitely have on our subsistence community.

Mr. Gallagher, we understand that under State law, that before issuing a permit you are required to prepare a written finding that the States interests will best be served by issuance of said permit. (AS 38.05.035 e) It must also donument whether the plan is consistent with the Alaska Coastal Management program. What we seek to do here is state why we determine it is not at all acceptable and not in the best interests of State, Coastal Management, or the residents of Goodnews Bay and Platinum.

Biological resoures are the mainstay of life here. Our most sensitive marine environment is a rich and tremendously valuable ecosystem, providing for its aboriginal peoples for centuries. It takes many years of intense observation for one to fully comprehend the wildlife values here, and interlocking relationships each species has critical to each other.

Our offshore areas are not renewable like a new mowed lawn. Caplin and smelt use the surfzone for spawning in Spring. All species use the offshore area as a migration corridor. Grey whales, an endangered species, Beluga and Bowhead whales Walrus and Sea Lion use this route predictably. Its disruption or loss would then dislocate these species. Their presense in the food chain is based on bottom food supplies.

A diverse array of organisms, clams, snails, crabs, fish and more live on the bottom. Crabs and clams are abundant. Ninteen species of marine mammals inhabit the nearshore area. Herring spawning areas are dependant upon the presence of eelgrass beds. Tens of thousands of Pelagic seabirds and migrating waterfowl use the shorelines, tidelands and Bay, Mr. Gallagher, in page 10 of your best interest finding, last sentence of the fifth paragraph you state: "In general, the offshore coastal areas are less environmentally sensitive and are utilized less than those areas within Goodnews Bay."

We feel that the statement is incorrect and misleading. On page 13 of you finding you also state that "with proper timing exploration activities will have negligable effects on fish migrations, fish spawning, marine mammals, clam beds or blue mussel beds." The Departments claims of "proper timing" are all too shallow and weak a defense when there is a tremendous and irreplacable wildlife habitat at stake.

Of your report, on page B-14 of the biological resource assessment by Dames and Morre, the fourth paragraph states in reference to Grey Whales: "any major damage to their food chains would undoubtedly have a negative effect on their numbers.."

Can we assume then Mr. Gallagher, that one or more 100 foot bucketline dredge working 24 hours a day devastating a rich sea floor to cause such damage? In section B page 16 it addresses the subject of exploration impacts inside Goodnews Bay. In reference to bird nesting colonies and Eagle nests at Beluga hill it states: "These species could be threatened by potential fuel spill pollution during fuel transfer and handling on exploration vessels. Disturb-

See OP-ED page 33

from the combination effects of harassment by workers and vessel traffic."

Of the same report, on page B-17 when considering mining impacts it states: "The swelling effect of Dredge spoil material could result in the creation of islands or increasingly shallow water.." Further it states: "Detailed impacts and constraints to marine reclamation cannot be determined..."

We must ask you Mr. Gallagher, did you actually read the biological impacts as written in the report for the OPP applicant and then in good conscience deem it of insignificant wildlife impact? The last sentence of the next page indicated further mitigation measures such as "Develop a fuel spill contigecy plan and have a good supply of spill clean up equipment on site." We all know how well such plans work now, do we not?

On page five of the summary as prepared by WGM Inc. it states that "impacts of exploration... are limited to fuel spills and increased ship traffic and noise that could cause their displacement..." This was in reference to local wildlife. As you probably had read but surely cannot fully embrace, is the fact that residents of this Bay area lead a subsistence lifestlye. As this is being typed boats of seal hunters float in the Bay hoping to bring home fresh meat.

Further of the same summary by WGM Inc. on page 5 it states; "biological activity will be lost... longterm biological impacts could result if critical species such as eelgrass failed to recolinize..." In the next paragraph it speaks of turbidity as a result of exploration: "If this were to cause destruction of eelgrass beds, a decline in the commercial and subsistence fishery would probably result."

For these reasons and more to be discussed, we feel all plans of providing prospecing permits to be a long term monumental exercise in poor judgment tantamount to the Valdez incident, and obviously done without full regard to the environment whatsoever, or the residents indigenous of the area. Is that truly in the best interests of the state then? Its residents?

Under State law, (11 AAC 86.500) this area is open to prospecting permit applications unless the State funds compatible with significant surface use..." Looking at the long term effect of exploration and eventual Dredging our area then, destroying our ecosystem, disrupting the subsistence way of life, is that incompatible in your perspective?

Mr. Gallager, the mitigation alternatives as proposed are not at all substantial enough in terms of overall safeguards. They are shallow, contrived, and inadequate. Other perhaps less obvious impacts are at issue. The overall quality of life is at stake for the residents of the area. On page A-9 as written by Westervelt Engineering it states: "Two separate dredging systems may be required...and as a result a substantial facility would be established in the area..." (page A-10).

We ask, on Native land claims? We absolutely do not want to see a sudden boom of activity and then find a mining camp in our midst, which would require a fuel storage facility, waste and refuse disposal. The other demands on communtiy infrastructure would be only unhealthy.

An increase in population would impact the school creating unreasonable classroom conditions. There is a limited amount of supplies available, housing and services. The population here would double. Then we would have a situation where these outsiders would compete for our resources of fish and game recreationally, and we so want that.

Many times over in the mining plan summary it indicates that local jobs would be generated. People here do well enough and do not need to work on or with such mineral activity. Local job offers is hardly equitable when weighing the overall upheaval of such a project. Further, we feel that few if any would actually take part in this proposed crime.

After the tragic incident at Valdez, we wish to protect our lands and our way of life. Your proposed best interest findings projects only the most negative and overwhelming detrimental impacts to this region. Be advised then we do not want this to occur now or in the future.

The City Coucil of Platinum; Joseph M. Ramirez, Phillip Solomon, Anna M. Small, Linda Echuck, Paul Moses, Margaret Echuck, Dave Gilbert.

Bruce Baker
Deputy Director
Habitat Division
Department of Fish and Game

February 5, 1990

267-2342

Heavy Metals -
Goodnews Bay

Kim Sundberg
Habitat Biologist
Region II
Habitat Division
Department of Fish and Game

The following is some information concerning the potential for mercury, cadmium, and arsenic contamination related to possible offshore platinum dredging in the Goodnews Bay area. Concerns about this issue were raised during review of the Division of Mining's preliminary best interests finding for pending Offshore Prospecting Permit applications by Karin Sheardown and associates and more recently during House Resources consideration of HB332 creating the Goodnews Bay Critical Habitat Area.

Dredging

Marine dredging including offshore mining can release trapped minerals and mineral compounds containing mercury, cadmium, and arsenic. These substances can enter the food web and impact marine animals and people who consume marine animals. Mercury, cadmium, and arsenic frequently occur in sediments contaminated by industrial wastes (including agricultural and urban wastes) and may be present in sediments in non-industrialized areas such as the Goodnews Bay region, as naturally occurring minerals. In general, dredging in industrialized areas has proven to be a greater problem with releasing mercury, cadmium, and arsenic to the environment than dredging in non-industrialized areas because the concentrations of these substances are usually higher in waste contaminated sediments and they occur in molecular forms that can more readily enter the food web.

Surficial sediment data for the Goodnews Bay area (Barker and Lamal, 1988) indicate that cinnabar (the mineral form of mercury) is present in some of the marine sediments tested in the Goodnews Bay region. Cinnabar was found at about six sample sites that were correlated with glacial deposits offshore of Flat Cape that may constitute overburden over placer deposits of platinum group metals (PGM). Pyrite, which is a mineral carrier of arsenic was found in some of the samples. The tests did not reveal mineral forms of cadmium at any of the sites although the analysis did not look specifically for this element (Jim Barker, pers.

comm.). Presently, there is insufficient data to determine whether mercury, cadmium, or arsenic occur in concentrations or molecular compounds that could cause problems for marine animals and humans if they were disturbed by dredging.

Westgold

Westgold has operated an offshore gold dredge in the Nome area since 1985. Cinnabar is present in significant concentrations in marine sediments in the Nome area and monitoring of mercury and other priority pollutants including cadmium and arsenic has been a requirement of Westgold's EPA/DEC waste discharge permit since the beginning of the project. Monitoring of disturbed sediments, water, king crab, and other benthic invertebrate tissue has been accomplished. Recently, caged blue mussels have been added to the monitoring program because of their ability to serve as bioindicators of pollution. Preliminary data do not indicate a significant increase in either mercury or cadmium in the environment resulting from Westgold's operations (Bob MacLean, pers. comm.). Occasional increases in arsenic have been detected but the source of arsenic has not been isolated.

Biological Concerns With Mercury (taken from Eisler, 1987)

* Mercury and its compounds have no biological function, and the presence of the metal in the cells of living organisms is undesirable and potentially hazardous.

* Forms of mercury with relatively low toxicity can be transformed into forms of high toxicity, such as methylmercury, through biological and other processes.

* Mercury can be bioconcentrated in organisms and biomagnified through food chains.

* Mercury is a mutagen, teratogen, and a carcinogen, and causes embryocidal, cytochemical, and histopathological effects.

* Some species of fish and wildlife contain high concentrations of mercury that are not attributable to human activities.

* Anthropogenic use of mercury should be curtailed, as the difference between tolerable natural background levels of mercury and harmful effects in the environment is exceptionally small.

It should be noted that persons who consume large amounts of seafood, including residents of Western Alaska have been found to contain high levels of mercury relative to persons

who eat less seafood and have not been exposed to other forms of mercury contamination. Marine mammals in the Bering Sea such as seals have also been found to contain significant amounts of mercury. These high levels have been attributed to bioaccumulation of naturally occurring mercury in the Bering Sea. The presence of mercury in marine animals and in coastal residents argues for prudent regulation and continued monitoring of activities which could potentially contribute to increased mercury levels in the environment. At present, it appears that more detailed analysis of sediments and indigenous bioindicator organisms such as blue mussels in the Goodnews Bay area could provide meaningful indications of background levels and whether problems are likely to occur as a result of offshore mining. At any rate, monitoring for priority pollutants including the use of bioindicator organisms should be one of the requirements for offshore mining in this area.

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January 30, 1990

Comments on SSHB 332 and SB 318
"An Act establishing the Goodnews Bay Critical Habitat Area; and providing for an effective date."

The following comments are presented on behalf of the Alaska Miners Association. The Goodnews Bay Mining District has provided the only platinum produced in the United States, beginning in 1916 with the annual production increasing to 37,000 ounces in a six-month's operation in 1938 - from a single operator. Production continued until 1975, and all production was from uplands.

Platinum is a critical/strategic metal and 93% of the nation's requirements are imported - from South Africa, the United Kingdom, and Russia. Renewed production from Alaska would certainly reduce the present imbalance of payments in international trade. The U.S. Bureau of Mines and the U.S. Geological Survey have conducted extensive surveys in this mining district in recent years indicating potential reserves, and have published their findings. These reserves are indicated both on-shore and off-shore lands. Renewed interest has been shown by the mining industry in this mining district.

An example of present-day mining technology practiced by the industry is best described by the Bima dredging operation of Westgold off-shore of Nome. Production has been on-going for the past three seasons and has had no adverse effects on the fishery. Environmental consequences of Westgold's Nome Offshore Placer Project after four years of study include:

1. After two to three years, substrate types occur in the same proportion as surrounding areas.
2. No change in oxygen concentration in water column.
3. No change in trace metal concentrations of eight priority metals.
4. Within three years recolonization community structure is similar to control areas; community appears to be moving through successional maturation process.
5. No avoidance of mined areas by King Crab.
6. No trace metals being concentrated in king crab, fish or king crab food items.
7. Community recovery based on existing database is estimated at less than five years for sand substrate and seven years for cobble substrates.

It should be pointed out that platinum metal does not amalgamate with mercury. Its recovery is simply a gravity concentration process with the concentrates shipped to a refinery.

The Alaska Miners Association is opposed to this type of legislation which, by creating a "Critical Habitat Area" and "closed to mineral entry and mineral leasing", would prevent the production of a critical/strategic metal such as platinum. This is not in the best interest of the state and nation.

Respectfully submitted,

Phil R. Holdsworth

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January 29, 1990

BY TELEFAX

The Honorable Cliff Davidson, Chairman
House Resources Committee
Alaska Legislature
P.O. Box V
Juneau, AK 99811

Dear Mr. Davidson:

RE: HB 332 (Goodnews Bay and Vicinity Critical Habitat)

I am writing at the request of Representative Lyman Hoffman's office regarding your committee's review of HB 332, a bill to establish "critical habitat" in the vicinity of Goodnews Bay. The bill was introduced last year in response to a proposal from the Department of Natural Resources ("DNR") to dispose of submerged lands in the vicinity of Goodnews Bay for platinum exploration and possible offshore mining. I am the attorney for Kuitsarak, Inc. the ANCSA village corporation for Goodnews Bay, and submitted extensive comments about the proposal last year to DNR on behalf of Kuitsarak, Inc. See my letter of May 8, 1989 to Kerwin Krause.

HB 332 would establish the Goodnews Bay Critical Habitat Area under A.S. 16.20.500 et seq. The area to be designated as "critical habitat" under the bill would include all the submerged lands which are now under consideration for disposal by DNR for offshore platinum exploration and mining. Kuitsarak, Inc. supports HB 332, not because the corporation is opposed to development in the vicinity of Goodnews Bay, but because it supports the current development of Goodnews Bay based on sport, commercial and subsistence uses of renewable fish and wildlife resources. Pursuant to A.S. 16.20.500, HB 332 would:

> protect and preserve habitat areas especially crucial to the perpetuation of fish and wildlife, and to restrict all other uses not compatible with that primary purpose.

COPELAND, LANDYE, BENNETT AND WOLF

Goodnews Bay and the offshore vicinity to be included as critical habitat under HB332 also meet the criteria for "essential habitat" under the Cenaliulriit Coastal Management Program ("CCMP") as described at pages 16 and 17 of my May 8, 1989 letter. Moreover, the CCMP specifically describes the vicinity of Goodnews Bay and Platinum as "special areas" requiring "careful planning and management." See CCMP at p. 7-5. Among other things, the CCMP requires that:

> Essential offshore habitat will be managed as a fisheries conservation zone so as to maintain or enhance the state's sport, commercial , and subsistence fishery. Id. at 6-24.

That is precisely what HB 332 would require as a matter of state law. See A.S. 16.20.510 - .530. Moreover, HB 332 would close the proposed Goodnews Bay critical habitat to mineral entry, and thereby assure that the existing and growing sport, commercial and subsistence renewable resource economy will never again be jeopardized by offshore mining within state waters. For the reasons stated in my May 8, 1989 letter, Kuitsarak, Inc. can conceive of no circumstances under which offshore mining in the vicinity of Goodnews Bay would be compatible with the existing economy of the area. Moreover, the already established economy ought to be protected and supported as a matter of state law from future similar threats. HB 332 would further all of these goals.

Sincerely,

COPELAND LANDYE, BENNETT and WOLF

David S. Case

cc: Kuitsarak, Inc.
Cenaliulriit
Lyman Hoffman (By Telefax)

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FINAL

TESTIMONY OF TONY SMITH
January 30, 1990
Before the House Resources Committee
HB 332, SB 318
Goodnews Bay Offshore Platinum Deposit

I am Tony Smith, a partner in Davis Wright Tremaine. I am representing Goodnews Resources, Inc. Goodnews Resources, Inc. is an Alaska corporation involved in the exploration and hopeful development of platinum prospects in and around Goodnews Bay and Platinum, Alaska. I appear before you today to urge you to reject HB 332.

Title 38 sets up a statutory and regulatory process for the exploration and development of resources in the State of Alaska. It is a balancing of various interests, ensuring input from all parties so that the best interest of the state can be realized. The Department of Natural Resources (DNR) is required to conduct their analyses and decision-making on the basis of that input. This procedure is working as designed. There has been extensive analyses and comment by Alaska Department of Fish & Game (ADF&G), the Department of Environmental Conservation (DEC) as well as local groups, industry groups and others.

The issue presented by this Bill is whether the legislature will politically overturn the statutory process and scientific and technical evaluations. The result will prevent the exploration and development of America's only viable platinum prospects.

GENERAL BACKGROUND.

The area in question, including the Salmon River platinum deposit, is one of only two platinum prospects in the United States. Platinum is a strategic metal which presently the United States imports from other countries. The major importation is from the Republic of South Africa. It should be noted that platinum is exempted from sanctions.

The platinum resource in Goodnews Bay and Platinum, Alaska, has been mined since 1935. In excess of 500,000 ounces of platinum has been taken from this geological formation since 1935. The U. S. Bureau of Mines identifies the areas in question as one of two highly prospective platinum deposit in the United States.

Platinum is a required ingredient in automotive catalytic converters. Each catalytic converter requires 1/20 of an ounce of platinum in order for it work. Thus, you need an ounce of platinum for each twenty cars manufactured in the United States.

The acceleration of world demand for platinum resulted from the Clean Air Act which turned platinum from a precious metal into an industrial metal. Thus a vote to shut down America's platinum prospect is hardly an environmental vote. The contrary is the case.

According to the latest Bureau of Mines Yearbook, the United States imported 3.8 million ounces of platinum in 1987. Approximately 1.8 million ounces was imported from the Republic of

South Africa. Approximately 400,000 ounces was imported from the U. S. S. R., and 500,000 from the United Kingdom. The balance came from Canada, Australia and some other countries. In imposing sanctions on the Republic of South Africa, Congress recognized that our air pollution effort required their platinum. Platinum was exempted from the sanctions. Once again this simple bill creates some interesting moral dilemmas.

The prospects are offshore. Thus the mining would be by dredging. This is the same process used by the "Bima" offshore at Nome. More important, dredging for platinum or gold is not any different than dredging the entrance of the Dillingham, Kodiak, Nome or Anchorage harbors. We are dredging all over the state to aid navigation, and the risks are the same.

Another issue raised has been whether dredging creates risks of high levels of mercury contamination. Recent study results developed by the Mineral Management Service (MMS), Norton Sound Health Corporation and the Indian Health Service (IHS) demonstrate that any perceived threat of mercury contamination from dredging and offshore mining is not there. You should note that it's the dredging, not the mining, which creates the perceived risk. Fortunately, that risk is not there.

The experience in the state with offshore mining has been excellent. In Nome the dredging operation has produced a number of seasonal and year-round jobs. In addition, the constant

monitoring has allowed the state to understand and document any adverse effects. On balance the risks are minimal when compared to the economic benefits to the local, regional and state economies. In our situation we have the nation's only viable prospect for a strategic mineral.

PROCEDURAL BACKGROUND.

In 1970 an offshore mining lease was issued in Goodnews Bay for the platinum prospects. In 1976 that lease lapsed. In 1982 22 "offshore prospecting permit applications" were filed for Goodnews Bay and adjacent seas for platinum prospects. The total acreage involved is 52,878 acres.

Commencing in 1982 to date the various departments and agencies began to process the applications, with DNR as the lead agency. In 1989 this process reached a point where DNR was ready to go forward with a Best-Interest Finding. The result was the publishing of the draft BIF in accordance with the statutes.

It is more appropriate that the Department of Natural Resources, as lead agency, detail the long involved process which has transpired in this particular case. Suffice to say that there have been meetings, comments from all affected agencies and departments, hearings in the affected communities, and ultimately a draft Best-Interest Finding. The Alaska Department of Fish & Game, the U. S. Bureau of Mines, the respective Coastal Zone Districts, and all affected groups have had an opportunity to

appear, comment, and participate in the process. It is now time for the issuance of a final Best-Interest Finding which will govern how we proceed.

Of major significance we believe has been the actions of Goodnews Resources, Inc. Attached to my statement is a letter sent by Goodnews Resources, Inc. to the people of Goodnews Bay and Platinum. The response from the supporters of HB 332's attorney was that they were not interested in any discussions, input or positive involvement whatsoever. They were opposed to any exploration or development whatsoever, irrespective of the science, the environmental safeguards or the benefits to the locality, the region, the state or the nation.

In analyzing the facts it should be noted that while there has been opposition in the public hearings, this is not unique in similar situations. In 1984 there was near unanimous opposition to the development of the coal prospect at Wishbone Hill in the Mat Valley. Now the sentiment is quite different. The same is true of many other instances in Alaska. That is why public testimony is only one input.

It appears that the goal of the bill is not the development of Alaska's resources with full knowledge and sensitivity to the environment. Instead, it appears that we are looking at a political effort to shut down forever one of America's only deposit of this strategic mineral.

THE INDUSTRY.

Alaska's mineral industry should be one of our principal economic sectors. The resources are here. In addition, there is enough known about Alaska's hardrock and precious metal reserves so that there should be a healthy mineral industry.

The problem has been that politically Alaska has discouraged investment in the development of our mineral industry. This is an international industry with a strong international network. When I was Commissioner of Commerce and Economic Development we found the executive offices and board rooms of our mineral companies looked at Alaska as a location of great potential, but with a political climate which dictated against investment. Since 1986 there has been a directed effort to remedy that, and the result has been a great deal of investment and development.

The proposed action before this Committee of creating a Critical Habitat overlay in the area of Goodnews Bay would be a strong signal that Alaska is opposed to the mineral industry for political rather than scientific reasons.

In 1986 Alaska was 46 out of the 50 states in mineral production. Across the board companies were choosing to not invest in Alaska. That's changed, but the enactment of this statute would send a strong signal to the mining industry that the pendulum is swinging back to opposition on political rather than environmental grounds.

Let's look at the benefits to the state of a decent investment climate. In 1986 total exploration, development and production amounted to $231,712,979. Only $8.9 million of that was in exploration. There had been a steady decline in exploration expenditures in Alaska starting in 1979.

By 1988 total exploration, development and production in the state had increased to $552,586,200. Importantly, exploration expenditures are up to $45 million, and the steady downward trend over the last ten years has been reversed.

Mineral industry employment has increased substantially since 1986. In 1988 the mineral industry employed 4353 people, an increase of 32% over 1987. These jobs are high-paying, year-round jobs. For example, Green's Creek Mine has employed every graduate of the University of Alaska's Mine Training Program, and the salaries average from $40 to $50 thousand a year. If current prospects come on line, the mineral industry is rapidly becoming one of the major industries in the State of Alaska.

This Committee should take pride in the fact that over the last three years the mineral industry has been able to prosper while meeting the tough environmental requirements of our state regulations and statutes.

I submit that a political decision to mothball the United States' platinum prospect, contrary to the scientific and technical facts, will have a major impact on long-term investment in the

mineral industry in Alaska. At a time when we finally have overcome the attitude that Alaska doesn't want mineral development, a decision to pass this bill will be a clear signal that Alaska is still a poor political risk.

CONCLUSION.

The Department of Natural Resources and Goodnews Resources, Inc. have done everything in accordance with the regulations and statutes. The data demonstrates that this prospect should be allowed to go forward in the normal course. The evidence does not support a political decision to terminate exploration and development of the subject offshore prospect permits.

A vote in favor of HB 332 is a statement of the Legislature that we don't want a mineral industry in the State of Alaska for political, rather than environmental or technical reasons. That's bad public policy. In addition, that ensures that we will not be able to diversify our economy.

As much of the investment in the mineral industry is international capital, it also sends a strong signal to the international financial market that Alaska is a bad place to do business.

I would be glad to answer any questions.

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