ALASKA LEGISLATURE COMMITTEE FILES 1985-1986 8072

4292 SRES SB 460

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02-519 (REV 8/78)

SB

460

SUMMARY

LAND PLANNING AND CLASSIFICATION POLICY STATEMENT

1. Alaska's economic base is in its land and water resources.

2. Article VIII of Alaska's Constitution established the state's natural resources policy.

3. Alaska legislature recognized that a system of planning and classification was needed for its lands.

4. Alaska Miners Association has endorsed and participated in the development of plans, but cannot endorse all aspects of the planning process as it appears inefficient, duplicative and has potential for removing land from significant multiple purpose

5. AS 38.05.300 states that "...State land, water or land and water area may not, except by act of the state legislature, be closed to multiple purpose use if the area involved contains more than 640 acres."

6. Because of the broad definition of multiple use it is possible to hold that multiple use could be two uses, both recreational.

7. The planning process is expensive, estimated at one-half million dollars per Area Plan. Each Area Plan spawns "management plans" which can cost $150,000 per plan.

8. During last legislative session at least 14 new management areas were proposed, each requiring a special management plan with a different staff and more dollars.

9. Current plans cover vast tracts of land for which inadequate data is available to determine their best use.

SOLUTION

1. Classification of most state lands under a broad "Multiple Use Management" classification.

2. A practical definition of "multiple use" with management techniques rather than effective withdrawals used to mitigate conflicts between the several uses.

3. Review the allocation of funds within DNR between planning and classification units to a DNR Resource Development Program to encourage infrastructure, incentives, and land management policies favoring economic activity on state lands.

SUMMARY

COASTAL ZONE MANAGEMENT POLICY STATEMENT

1. Program far exceeds intent of 46.40.020.

2. Jurisdiction expanded 100's of miles inland, and more expansion is being asked for.

3. The program has resulted in creation of additional bureaucracy - at least 8 full-time state employeees alone needed to coordinate program allowing permit process to be subject to political pressure. This additional layer of government can negate the work of numerous state and federal agencies.

SOLUTIONS

1. Require legislative approval of all coastal management plans.

2. Require legislative affirmation of coastal zone boundaries as defined by ADF&G in 1978.

3. Only allow boundary extensions based on facts where activity on uplands poses serious impact on coastal resources.

4. Reassert that mining, oil and gas and other resource developments are Uses of State Concern and cannot be unduly restricted by local coastal plans - ACC 85.900(d)

5. Support HB 73 entitled "An Act Relating to Processing of Permits by State Agencies and to Administration of the Alaska Coastal Management Program."

6. Support legislation aimed at reducing the cost of government at a time of declining state revenues.

ALASKA MINERS ASSOCIATION
LAND PLANNING AND CLASSIFICATION POLICY STATEMENT
December, 1985

Alaska's main economic base, for the present and foreseeable future, is in its land and water resources. Congress clearly recognized this when it granted the new state approximately 104 million acres in 1958. It was held that this entitlement was necessary to insure that the new state would be an economic asset, not a liability to the nation. In turn, Article VIII of Alaska's constitution established the state's natural resources policy ". . . to encourage the settlement of its land and the development of its resources by making them available for maximum use consistent with the public interest". Subsurface resources were reserved to the state, and it was recognized that there must be legal safeguards in any disposal of the state lands. Later the Alaska legislature recognized that, as it acquired lands, a system of planning and classification was needed. Guidelines were set up to allow fee disposals of the surface estate.

The Alaska Miners Association participated in development of the planning and classification legislation and has endorsed and participated in the development of plans. We cannot, however, endorse all aspects of the planning process currently being implemented by DNR. This process appears to be inefficient and duplicative and has the potential for removing the land from <u>significant</u> multiple purpose use.

THE MULTIPLE USE PROBLEM AND MINING

The fundamental statutory authority for mining is AS 38.05.185. In this statute, broad authority is given to the Commissioner, but the authority to withdraw tracts in excess of 640 acres from mineral location and mining refers to AS 38.05.300 which states that: ". . . State land, water, or land and water area may not, except by act of the state legislature, be closed to multiple purpose use if the area involved contains more then 640 acres."

Most commissioners have interpreted 38.05.185 and 38.05.300 in a conservative fashion, returning to the legislature for significant withdrawals or at least aggregating 640 withdrawals where considered to be warranted. The emphasis was definitely on giving multiple use a rather tight definition, before closing any areas to mineral entry.

Because of the broad current definition of multiple use in 38.04.910, it is possible to hold that multiple use could be of two uses, both, perhaps recreational. Although the applicable regulations (11 AAC 55.040(e) still indicate that state land may not be closed to mineral entry and location unless the Commissioner finds that mineral entry and location is incompatible with significant surface uses", the finding can now be made in the <u>area plan</u>.

In the context of economic survival of the state, we would propose that multiple use still must generally mean a balanced use of several resources, with management tools, rather than withdrawals used to balance multiple use conflicts.

LAND PLANNING

As documented below, the state's main land planning effort carried out in DNR is expensive, duplicative, may not obtain a balanced public input, and has the potential to deny significant multiple purpose use of Alaska's state owned land. We propose that the planning process should be simplified, should develop new ways for determining public attitudes, and needs firm policy direction as to what is "multiple use" and in establishing priority uses of state land.

During the current planning process, in most instances, the resource public is not given any advance information about the resource capabilities of the land, rather they are given several alternatives relating to how intensively an area is to be used. Too often, the public is skewed, with the pressure of both development interests and preservationists, but not of the silent majority. Perhaps this will always be the case, but there are other tools to elicit public response which should be used to supplement the public meeting process.

The entire planning procedure requires a budget estimated at about one-half million dollars per Area Plan for planners, hearings, travel, and the generation of mountains of paperwork, while creating results that tend to discourage new revenue-generating development. Each Area Plan spawns "Management Plans" which, in turn, have overall costs of about $150,000/plan. In aggregate, planning is expensive. In DNR alone, there are separate whole planning sections. The Division of Land & Water Management, for example, has two separate and distinct sections of planners (Resource Allocation Section and the Regional Office) which leads to conflicting schedules, duplication of effort, and added costs. Just the Anchorage office of DNR lists 47 "planners" in its directory. This does not include other support staff for these planners or planners in other DNR offices or other agency offices.

Planning procedures are duplicative in numerous ways. In developing a plan, the agencies may have various scoping meetings, workshops, planning meetings, open houses, and public meetings throughout several years of plan development. A full inter-agency team, comprised in some cases of two dozen people, attends each of these meetings. Both an Area Plan and Management Plans for the same area are developed by different teams. These teams are mainly composed of staff with limited resource knowledge or technical background. Most conflict decisions appear to us to be made by the planning teams without firm policy guidelines. Planners stress that conflicts are resolved during the planning process at the staff level, so that when a plan reaches the Commissioner level, it is nearly free of conflicts and can be signed off by the Commissioner. We submit

that certain critical elements of land use management should be determined in advance and constitute part of all plans. Under present procedures, there is a tendency to determine state land management by staff, many of whom are entry level personnel.

It should be clear that management plans developed with the cost, degree of intensity, public input and detail should be sufficient. However, as if these detailed plans were not enough, another layer of planning may be generated when a "special use" area is designated by legislation or administrative action and a new management plan is required, starting the procedure over again from scratch with a new planning team. During the last legislative session, at least 14 new management areas were proposed, and more will be introduced in this session. Further, local plans and coastal zone management plans often cover the same areas.

Current state planning efforts cover vast tracts of remote land, such as the Kuskokwim or Northwest Alaska areas, for which inadequate data is available to decide their best use. In addition, these areas are simply not under the degree of pressure from development interests that necessitates they be "protected" by land planning. Such large remote parcels should be classified as "Resource Management Land" per 11 AAC 55.200. Existing statutes and regulations are more than adequate to protect the land, water, and air supply.

We propose that the state planning and classification system has, at least, the potential to deny the state's responsibility to provide

balanced economic development. This is manifest primarily by its interpretation of "Multiple Use Lands", defined now as more than one use. Clearly, the state's mandate is to encourage multiple use on most state lands and to limit restricted areas to those of potential settlement and critical environmental concern. Thus, DNR contends that a very high percentage of its land classification is "multiple use"; but, in reality, the completed land plans have designated primary uses of greater than 80% of the state's land surface for public recreation and wildlife habitat. We are concerned that these designations will lead to challenges to mining on the basis of compatibility when a mining development is proposed.

The plans inhibit mineral development by ranking known surface values above as yet unknown and undeveloped subsurface resources. When fish, wildlife, and recreation are the highest priority surface uses (as in DNR's "multiple use" category), it discourages the spending of dollars on mineral exploration of the area, let alone development of a known mineralized area. At a time when state funds are being depleted, the state should be encouraging a mining industry in order to generate future revenues, and to provide jobs in the private sector.

The AMA supports the following resolution:

WHEREAS:

Due to the ANILCA and other withdrawals of federal land, most of Alaska's future economy will depend on resource development on state lands; and

WHEREAS:

The state's land planning procedures result in further restrictions on resource development; and

WHEREAS:

The state must reverse this trend and encourage resource development in order to generate new sources of revenue; and

WHEREAS:

The state's land planning process is duplicative internally as well as being repetitious of other planning procedures; and

WHEREAS:

In times of rapidly declining revenues, the state's operating budget for land planning costs millions of dollars each year and continues to increase at an alarming rate; and

WHEREAS:

There are adequate laws and regulations in effect to sufficiently protect public recreation areas, responsible mining activity, water quality, and fish and wildlife habitat;

BE IT HEREBY RESOLVED THAT THE ALASKA MINERS ASSOCIATION SUPPORTS:

1) Classification of most state lands under a "Multiple Use Management" classification;

2) A practical definition of "multiple use" with management techniques rather than effective withdrawals used to mitigate conflicts between the several uses.

3) Review of the allocation of funds within DNR between planning and classification units to a DNR Resource Development Program to encourage infrastructure, incentives, and land management policies favoring economic activity on state lands.

ALASKA MINERS ASSOCIATION
COASTAL ZONE MANAGEMENT
POLICY STATEMENT

The development and implementation of the Alaska Coastal Management program has far exceeded the intent of the original program established by the legislature in 1977. While the objectives stated in AS 46.40.020 clearly require both protection and balanced utilization of coastal resources, there has been a trend in recent years to use the Alaska Coastal Management Program as a tool to restrict or prohibit any type of development. We have watched Coastal Service Resource Areas, with the approval of the Coastal Policy Council, expand their jurisdiction hundreds of miles inland and claim that local subsistence uses have a priority over all other state, federal, and public uses. In effect, the State is giving up its regulatory authority to non-elected regional powers who answer to no one. This has resulted in far reaching unilateral decisions affecting resource development and subverting the intent of the original statute which was to promote the development of resources considered to be matters of state concern.

The Alaska Coastal Management Program has also resulted in the creation of additional bureaucracy within an already overgrown state government. Under the so-called "Permit Reform" regulations adopted by the Governor's Office (6AAC 50), the Office of Management and Budget coordinates consistency determination in the coastal zones. At least eight full-time state employees now "coordinate"--not review,

comment, or mediate--but just coordinate state agencies. The net effect has been to add paperwork, delay decisions, and allow the permit process to be subject to political pressure by controlling it in an area of the Governor's Office. This burdensome cost of an additional layer of government can, at its sole discretion, negate the work of numerous state and federal agencies already vested with the authority to review and approve permit applications.

The Alaska Miners Association supports the following actions to bring the Alaska Coastal Management Program into a balanced, fair program:

1) Legislative approval of all coastal management plans.

2) Legislative affirmation of coastal zone boundaries as originally defined in 1978 by the Alaska Department of Fish & Game.

3) Allow limited boundary extensions only where clear and convincing arguments can be made that activity in the uplands poses a serious impact on coastal resources.

4) The state must re-assert that mining, oil and gas development and other resource developments are Uses of Sta e Concern and, as such, cannot be unduly restr by local coastal plans. [ACC 85.900(D)]

5) The AMA supports HB 73 entitled "An Act Relating to Processing of Permits by State Agencies and to Administration of the Alaska Coastal Management Program."

6) The AMA supports legislation aimed at reducing the cost of government at a time of declining state revenues.

SUBJECT: STATE ASSUMPTION OF 402/NPDES PROGRAM

WHAT ASSUMPTION OF THE PROGRAM MEANS:

- o EPA is not out of the picture completely. EPA maintains responsibility for oversight and issuance of effluent guidelines.
- o State receives authority to write and enforce permits. However, State issued permits must follow Clean Water Act guidelines, thus it cannot make the permits any less stringent than they are now. Same with enforcement policy.
- o Existing 402 permits (there are about 1000 in Alaska) including the Pulp Mill permit, Valdez Ballast, and existing placer mining permits, would still be under EPA until they expire. At the time of permit renewal, the permittee would then apply through the State.
- o State would have to amend many of its domestic laws to conform to Clean Water Act.
- o Monitoring and enforcement of individual permit sites would be significantly increased.

PROS OF STATE ASSUMPTION OF THE PROGRAM:

- o Administrative Efficiency: State has more staff and more resources to process and enforce permits. With more staff, there can be better interaction with the miners. Reduce processing time, increase monitoring and enforcement.
- o Alaskans dealing with Alaskans: have more of an understanding of unique Alaska conditions.
- o State would have more control over program: i.e. establishing schedules and priorities for issuing permits.

CONS OF STATE ASSUMING PROGRAM:

- o State's flexibility in administering the program is limited: permits still have to be issued in conformance with Clean Water Act requirements, EPA has oversight responsibility and certifies many permits.

- High cost of assuming program: The cost of assuming the program: hiring additional staff, travel fees for staff who travel to remote Alaska to inspect permit sites, and technical and administrative support equipment.

- De-emphasis of other programs administered by DEC as resources are allocated to other areas.

SUBJECT: STATE ASSUMPTION OF CLEAN WATER ACT 402 PROGRAM

Procedure for the State to assume 402 program is about a two year process:

o Preliminary submission: State contacts EPA to request assistance to assume the program.

o EPA and State meet to discuss requirements. EPA provides counsel to the State and works with the State to determine what State laws and/or regulations have to be changed in order to meet the requirements of the Clean Water Act.

o State goes back to the legislature or the appropriate agency (Alaska Department of Environmental Conservation) to request the necessary changes in the laws or regulations.

o legislature takes action and/or State agency goes through formal rule making procedure.

When this process is completed: The Governor makes formal application to the EPA Administrator which contains:

-- A full and complete description of the program it proposes that demonstrates it can meet all requirements of Section 402 of the Clean Water Act.

-- A statement by the Attorney general or appropriate State legal counsel that State law provides adequate authority to carry out the described program.

-- A demonstration by the State that it has personnel with necessary expertise and adequate financial resources to carry out the requirements of the program.

-- A Memorandum or Agreement between the State and the EPA outlining what their respective roles are during the transition period and when the State has assumed the program.

A	B	C	D	E	F	G
cal			JANUARY			Feb 27, 1986
	13		15			17
no meeting			Joint Mtg. w/ HO&G, HR			HB 281 Trapping Cabins
			DNR Royalty Overview			SB 194 Water Sys Ops
	20		22			24
Mental Health OverV			SB 150 Water Rights			No Meeting
	27		29			31
SB 164 Fish bonds			Railbelt Energy			SB 349 Ag Debt
SB 150 Water Rts.			Overview			Arctic Research
			SB 338 & SB 123			Comm. Overview
						Jt.w/S.Trans 3:30 RS2477
			FEBRUARY			TAN ALL
	(3)		5. KATHY		7	
SB 294 Guide Bill			Haz Waste Overview			No Meeting
SCR 18 Guide Bd. Regs			SB375 Cleanup			
			SB 164 Fsh Bond			
			SB 349 Ag Debt			
	(10)		12			14
Royalty Gas			RDC conf. Anch - 12,13th			ANCH - Mining OvV
Cook Inlet			NO MEETING			inc. Red Dog
SB 309 & SB 276						
	17		19			(21) KATHY
Informal Meeting w/			SB 309 CkInlt Roy Gas			SB 375 Oil & Haz Wst Clea
Mnt Hlth Adv. Cncl.			HB 288 Subsistence			HB 100 Oil Spl/Vessal Sei
						SB 338 Railbelt Eng
						SB 155 Spt & Comb
	24		26tc CAC			28tc
SB 223 Susitna Forst.			SCS HB 288 Subsistence			SB 271 Local Hire
SR 8 AK Wds						
~~invite~~						

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

APR 23 1986

REPLY TO ATTN OF: M/S 601

Peter Goll, Chairman
Special Committee on Fisheries
House of Representatives
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Representative Goll:

This letter is in response to your April 19, 1986, letter which posed several questions relative to draft Senate Bill (S.B.) 460. Specifically, your questions, as we understand them, pertain to a section of S.B. 460 which reads, "The commissioner may not require a higher discharge quality standard for appropriated water than the water received for use."

Your questions and EPA responses follow:

1. Would incorporation of the language in S.B. 460 in Alaska statute affect ADEC's ability to certify federal NPDES permits for placer mining? Specifically, do you foresee circumstances under which ADEC would be forced to forego its right to certify the federal permits.

   Response: The Federal Clean Water Act provides for states to review and certify that federally issued NPDES permits are consistent with state water quality standards. The language of draft S.B. 460 appears to preclude any consideration by the state of consistency of a permit with water quality standards particularly when intake water exceeds EPA proposed permit limitations. Under those circumstances, the state would probably have to waive the opportunity to certify.

2. Would passage of this legislation affect possible assumption by the state of the NPDES permitting program?

   Response: Legislation of this nature would definitely preclude delegation of the NPDES permitting program to the state of Alaska. If language of this nature were enacted , it would cloud the possibility of a delegation because it establishes a clear intent to operate in a manner inconsistent with federal law.

3. Would this legislation in any way effect federal funding of the state's water pollution control program or other projects, such as minicipal (sic) water and sewer construction grant funds?

   Response: Grant funding levels could be impacted by legislation of this nature. EPA program grants are performance based. Therefore, the state grant might well be reduced in proportion to the work currently being done by the state which the proposed the legislation would preclude.

I hope this information will be useful to you and your colleagues as you deliberate on this matter. If you need additional information, please feel free to contact Al Ewing, Assistant Regional Administrator for Alaska at (907) 271-5083.

Sincerely,

Ralph R. Bauer
Acting Regional Administrator

ALASKA OUTDOOR COUNCIL, INC.

9416 Long Run Drive
Juneau, AK 99801
(907- 789-7422)

April 29, 1986

Senator Arliss Sturgulewski
Chairman, Senate Resources Committee
Alaska State Senate
Pouch V
Juneau, AK 99801

Dear Senator Sturgulewski:

The following comments are those of the Alaska Outdoor Council as regards Senate CS for HB No. 627, "An Act relating to the appropiation of water" .

The AOC Board of Directors recommend do not pass re HB 627 in it's present form. The concern of the Board is that Section 1, will effectively remove the Department of Fish and Game from any review and input for water quality. AS 16.05.870 has pollution (water quality) as one of its' jurisdictional bases. Such important water quality components such as the amount of dissolved gases, or in the case of oxygen the lack of, and even the quantity of water available for aquatic life are all important components of the Departments responsibility to effectively manage and protect aquatic resources. This authority should not weakened or abrogated.

The Department of Fish and Game is the Department best equipped in expertise to make water quality determinations effecting fish and wildlife.

Thank you for the opportunity to comment.

Sincerly,

Rupe Andrews

Rupe Andrews, Legislative Representative

APR 17 1986 Kit

Miners Advocacy Council

452-6201

P.O. Box 83908

Fairbanks, Alaska 99708

April 14, 1986

Senator Arliss Sturgulewski
Alaska State Legislature
Pouch V
Juneau, Alaska 99811

Dear Senator Arliss Sturgulewski,

Enclosed please find a copy of an article entitled, "Beneficial Effects of Dredging Turbidity," and three pages from the "Spring 1986 Sierra Club Catalog."

The article was brought to our attention recently at the 8th Annual Alaskan Conference on Placer Mining in Fairbanks. The gentleman from California, M.J. Richardson, of Consolidated Placer Dredging, Inc., indicated we in Alaska were attempting to 'rewrite the book' on the effects of mining on water quality.

The Miners Advocacy Council has since been in contact with the organization which conducted over $45 million in research in the late 1960's and early 1970's on turbidity and related water quality. The enclosed article represents the tip of the iceberg.

At this time we are uncertain as to the applicability of this research to Alaska's cold waters. However, it has been the common practice of those attempting to halt development in this state to use data from other regions to support their views as to the harmful effects of turbidity. Perhaps this new data source will facilitate a balanced approach which is so greatly needed at this time.

The three pages from the Sierra Club's Catalog are included to point out that this environmental organization has but one objective -- the total shut-down of mining and agricultural projects in this State.

If you have any questions regarding this article or MAC's research activities, please don't hesitate to contact us.

For a responsible mining industry and reasonable regulations ;

Sincerely yours,

Bruce R. Geraghty
Executive Director

enclosures:2
BRG/cf

Supposed Toxicities of Marine Sediments

Beneficial Effects of Dredging Turbidity

by
J. F. Gustafson

Joel F. Gustafson, Ph.D., is president of Resources and Ecology Projects, Inc., a consulting firm specializing in marine pollution and environmental impact studies. He holds appointments in the Departments of Marine Biology and Ecology & Systematics at the California State University of San Francisco. This paper was presented at the Pacific Chapter meeting WODA in October, 1972.

In contrast to the usual procedure in presenting a topic, I shall place the major thoughts and conclusions first because I want you to have these in your minds as I develop the following topics.

It will take some time to reprogram our thinking about turbidity.

For decades, we have regarded turbidity as being dangerous (biologically), and undesirable (esthetically), and now controllable (politically). Recently, regulatory provisions of state and national origin have been created or are being proposed to reduce man-caused turbidity to a minimum level, and to prohibit it wherever possible.

These actions have been taken in almost complete ignorance of the degree of damage, if any, due to turbidity, and in spite of the fact that wind and tide-created turbidity dwarf those of man's activities (Gustafson 1972).

Our state and federal agencies concerned with environmental issues are products of our own culture. The technical staffs of these agencies operate on the bases of information, assumption, and political expediency.

This statement is not unduly harsh. If the actions were not taken under the protective cover of environmental concern, then it would be necessary to develop facts prior to the initiation of regulations. Despite the hundreds of millions of dollars now being spent by many industries to clean up their air and water discharges, too many still resist such programs and the resentment of the public is high. It has been the intent of regulatory agencies to force industry to develop pollution control devices, practices and procedures. If the regulations are excessive, industry must prove its case for lesser degrees of control.

Do not misunderstand me. As an ecologist I believe that the need to protect and enhance the quality of our environment is paramount. In many areas of air and water pollution it may take a decade or more to significantly reduce the pollutants in the environment even after the discharges cease (Meadows et al, 1972).

The costs of cleaning up our environment will be many billions of dollars. It behooves us, then, to spend wisely because we will not be able to do it all at once, and some programs may be delayed for many years.

The present trend of regulations to control turbidity in our estuaries and harbors is based upon a "fear syndrome." The teachings of the evils of turbidity have created a "knowledge" that all turbidity in all places is bad. Acting under this fear, and in a determination to protect the environment, agencies have placed the dredging industry in a hazardous position.

Let me first point out the natural role of fine sediments in fresh water and marine environments, and then let me offer some indications that the toxicity part of the "fear syndrome" is without basis in fact.

BENEFICIAL ROLES OF CLAYS

Clay sediments consist of particles of mineral matter which are near colloidal sizes. Each clay particle attaches to itself a shell or a halo of water molecules. Due to the orientation of the water molecules, the clay + water shell assumes a negative charge. Each of these units (clay + water shell) travels as a unit and acts as a unit. The many chemicals attached to the clay mineral particles dissociate from the clay surface and extend out into the water halo. These chemicals, although they are physically bound to the clay particles, are also available for exchange with other chemicals in the water beyond the halo. The chemicals which are exchanged are

predominantly positively charged radicals (cations). Among the cations which are exchanged from the surrounding water into the water halo are the plus two charged metals such as arsenic, cadmium, chromium, copper, lead, mercury and zzinc. These, and other metals, and other chemical substances, are drawn out of the surrounding water and are quite firmly attached to the clay particle.

In fresh water situations the clay particles remain suspended until all water movement ceases and then they slowly fall out of the water column and accumulate as sediments on the bottom. As fresh waters bring clays into marine areas, the clay units aggregate into small clumps as the salinity approaches 14 percent. This is due to the fact that the abundant numbers of positive ions in salt water change the surface charge of some of the clay particles to a positive charge. As more and more clay masses assume positive charges, they join with negatively charged clay masses. Aggregations of such combinations join together to form flocculents. Flocculents fall out of the marine waters during periods of slack tide. Those areas within an estuary or a harbor in which this phenomenon of aggregation and flocculation is most evident, are nature's construction terraces—commonly known as mudflats.

The abilities of clays to remove materials out of the water column is astounding. The greatest removal of material is accomplished within the first 20 minutes of suspension of the clay within the water. (Marshall 1962). The longer the period of suspension, the greater will be the success of removal. Oils, pesticides, sewage pollutants (with the exception of nitrates), and metals are all stripped or scrubbed from the water by the clay sediments. In the case of the large organic molecules associated with sewage, the molecules from layers on the outside of the water shell of the clay particle. We might compare this grossly with an onion in which the leaves surround the plant embryo. Within a period of a few minutes, each particle may attach two and a half times its own bulk of organic sewage molecules to its water halo.

We know that bacteria attack these attached sewage substances much more readily when they are attached to the clay than when they are dispersed within the water. In this sense, then, the adsorption of sewage to clay makes the subsequent release by bacteria of the nutrients from that sewage more rapid. However, this is true only so long as the clays remain suspended. As the clays in the marine environment fall to the bottom to form mud sediments, the lack of oxygen greatly reduces the liberation of organic nutrients from the sewage molecules attached to the clay halo.

In organically rich sediments. oxygen becomes deficient at the surface, becomes negligible ⅛th of an inch within the sediment, and typically, is absent completely at depths greater than ½ of an inch. As the clays fall and become bottom sediments, the materials which have been stripped out of the water column are almost completely isolated. The great majority of the organic sewage molecules and of toxic substance such as oil, metals and pesticides have been removed from the water column and placed in semi-permanent storage. The activity of the burrowing bottom organisms, such as worms, clams, and crustaceans does very little to increase the turnover of substances stored on the clay particles. As clay sediments form, bacteria and diatoms produce copious amounts of mucous which assist in the binding together of the clay particles. Consequently it requires considerable energy on the part of winds or tides to lift and suspend muddy sediments. Such resuspension is limited to the uppermost portion of the bottom sediments. Therefore the toxic substances and the sewage particles which are adsorbed to the clay particles are literally placed in deep storage.

CONCENTRATIONS

Table I portrays concentrations of toxic substances in bay sediments and the bay water. It also presents some data on the toxicity (poisonous) levels of some metals. At this time I have no further data from the Environmental Protection Agency (except that listed on the acceptable maximum limits of certain metals (5th column).

Reference No. 1 illustrates the very much larger concentrations of the metals attached to the sediments versus those concentrations suspended in the water. The difference in concentrations between sediment and water speaks to the adsorptive capacity of the sediments and proves their important role in the removal of these undesirable chemicals from the water.

The reader may note that all of the references cited in this paper are recent. This illustrates the fact that we have not been doing the kind of work that we should have been doing until recently. Unfortunately the eye of most investigators seems drawn to the closeness of the concentrations between the toxic levels and the normal levels of bay water. It is my opinion that most toxicity levels have been determined in aquaria using filtered sea water.

Table I
CONCENTRATIONS OF TOXIC METALS IN SEDIMENTS AND WATER

Metal	Dredge Spoils	Sea Water		S.F. Bay Water		Toxicity		F.W.Q.A. Criteria (4)
Cadmium	130	0.08	(1)	0.06	(3)	0.01 - 10	(1)	0.005 — 50 ppm
Chromium	150	0.00009		0.02		1.0		
Lead	310	0.00003		0.02		0.1		0.0001 — 1 ppm
Nickel	610	0.0054		0.06		0.1		0.005 — 50 ppm
Mercury		0.00003	(2)	0.0002				
Zinc		0.01		0.02				
Copper		0.003		0.02				

Concentrations in Mg/l = ppm

Concentration in % on a dry wt. basis

(1) — Ocean Dumping 1970
(2) — Water Quality 1968
(3) — Gustafson, February 1972
(4) — F.W.Q.A. Criteria

Table II presents the results of a pilot study designed to test the effectiveness of adsorption and the permanence of that adsorption when subjected to vigorous agitation. (One hundred grams of sediment in 1 liter of bay water was agitated with a propeller for 20 minutes. Following the drop of the sediments after an additional 30 minutes, sample water was removed, carefully decanting so as not to resuspend the sediments.)

It should be noted that in four of the five instances the resuspension of bay sediments caused an increased removal of the metals from the water. These rates of increased removal ranged from 69.8 percent to 97.4 percent. In the fifth case there was a 45 percent increase in the concentration of cadmium following the resuspension of the muds. This single increase might have been an error in analysis. I must emphasize that this simple experiment was nothing more than a pilot study. The evidence indicates that sediments upon resuspension typically do not liberate metals but rather further remove metals from the water in which they are suspended. Pesticides and PCBs followed the action of the metals.

Table II
Adsorption of Toxic Metals from San Francisco Bay Water Following Resuspension of San Francisco Bay Muds

in ppm	Bay Water	Water + Sediments	Removal
Mercury	0.0014	0.0000361	97.4%
Lead	<0.02	<0.0024	88.0%
Zinc	<0.02	0.0024	88.0%
Copper	<0.04	0.0121	69.8%
Cadmium	<0.02	0.0290	45.0% (gain)

The experiment just cited contains no replicates. It therefore lacks both substance and reliability. It is presented at this time as an indication of the kind of experiment that should be done many times in many locations.

The dredging industry must take a role in developing those kinds of information which are sadly lacking at the present time. This experiment consists of the determination of concentrations of the water before and after bay sediments are resuspended. Although not necessary, it would be informative to also analyze the concentrations of these metals in the sediments. Sediment analysis requires additional laboratory work, and therefore expense. If expense is a criterion in some locations, the sediment analysis can be omitted, but no area of the United States, and presumably elsewhere, can afford to omit the expense of the simple experiment indicated above.

If the dredging industry were to develop an overwhelming mass of information on this point it would produce an almost immediate improvement in their present low status.

NATURE DWARFS MAN

What about the sewage organics that are adsorbed to the clays? The short-time resuspension of sediments such as might occur during dredging or even during disposal in confirmed areas will not produce an excessive growth of algae. The "fear syndrome" assumes that a sudden liberation of sewage products is accomplished by the resuspension of sediments. Previously (Gustafson 1972) we detailed evidence showing that in waters subject to wind action and to tidal scouring that the resuspension by nature dwarfs that of man's activities. We do not see algal blooms or extensive growths of plankton following strong or persistent winds, nor do we in fact see algal blooms following the very great introduction of new sediments and agricultural wastes which are brought into a bay by flood. At this time we do not know enough to explain why algal blooms occur or do not occur. But, for our immediate purposes, we know that they are not obviously associated with the resuspension of bay sediments.

There are some additional beneficial roles which I shall mention in conclusion, even though we have previously demonstrated the very important beneficial roles of turbidity particles. Turbid waters offer shelter and protection to the multitude of larval and immature marine life that utilize bay waters as nursery grounds. Turbidity prevents the penetration of light and perhaps this is one of the several factors involved in the failure of rich bay waters to produce excessive algal growths. The increased turbidity levels would reduce the depth of the water in which algae could engage in photosynthesis. The food substances attached to clays are digested by many of the marine organisms that live within the bottom sediments and by many organisms which are filter and particle feeders.

CLAM EXPERIMENTS

In another pilot study (Gustafson 1972b) we explored the critical question of whether marine organisms could or would digest the metals and pesticides off of clay particles. We selected a common bay clam, *Mya arenaria*, a filter feeder, as our test organism. Three 25-gallon aquaria were used in our experiments. Two of

these aquaria were test aquaria into which bay sediments were added and kept suspended for twenty minutes. The third aquarium was a control for the other two. The clams were carefully washed, measured and paired so as to get clams of equivalent sizes in each of the aquaria. About three-four inches of sand was placed in the bottom of each aquarium and 10 clams were carefully placed in an upright position in the sand.

Four times each day, 15 gallons of San Leandro Bay salt water were added or removed so as to duplicate the tidal regime of the bay. The "tides" were added at 0800 (8 am), removed at 1300 (1 pm), added at 1800 (6 pm) and removed at 2200 (10 pm), thus providing nine hours per day of feeding time. Each aquarium was aerated vigorously for the first hour after the "tide" water was added. To test the effects of a high turbidity level, 100 cc of bay channel sediment was added to 100 cc of bay water and stirred rapidly for several minutes. Then the thick slurry was slowly added to each of the test aquaria. This addition of sediment created a turbidity level of approximately 1500-2000 Jackson Turbidity Units. A small electric motor and propeller kept the sediment in suspension for 20 minutes. The actual levels of turbidity were measured with a Jackson Turbidity Meter, and much more accurately by a Beckman Spectronic 20 Meter, and much more inaccurately with a Secchi Disk. The vigorous addition of oxygen for the first hour of each new "tide" (addition of fresh bay water and the addition of the sediment) was made in order to simplify the number of stress situations presented to the clams. When large amounts of sediments are suddenly resuspended, there is a marked reduction in the oxygen level in the water. We were concerned in this experiment with the ability of the clams to rmove metals and pesticides from the sediments. Aeration (oxygen) was added to the water to remove the additional factor of a depressed oxygen level .

TURBIDITY IN DUMPING

We emphasize that in dredging operations, turbidity levels of 350-400 Jackson Turbidity Units (JTU's) would be reached in the disposal (dumping) of bucket dredge operations and that this condition would clear in a matter of minutes. There would be almost no increase in the turbidity units by the removal of sediments by a bucket or clamshell operation. Hydraulic dredging operations produce a low level of turbidity on removal and about 2000 JTU's on disposal, and this level of turbidity would persist for several minutes and then rapidly clear to the normal level of turbidity (Anon 1970).

The normal background level of turbidity in San Francisco Bay is about 50 JTU's. This small amount of turbidity is almost below the ability to measure with a Jackson Turbidity Meter. The probable turbidity caused by a bucket dredge removal of bay sediments would not raise the turbidity level above that of the normal background level. In our test and control aquaria, the roiling action of winds did not occur and consequently our experimental levels of turbidity eventually became lower than that would be normal levels in San Francisco Bay.

Our experiments subjected the clams to an average turbidity of 1,000 for 240 minutes for 10 days! This experiment then increased the possible turbidity level by 20 times and the period of exposure by 120 times. Surely if the clams were to remove metals or pesticides from the sediments, the experiment gave them ample opportunity to accumulate the materials. The high turbidity was not conducted for longer periods of time for the reason that clams will cease feeding for a time if the water quality is objectionable. This indeed did happen. (See the data under five days in the following table). Our timing of high turbidity exposure periods was designed to provide the opportunity of feeding during high turbidity periods but most of the time the clams were at or below normal background levels of turbidity.

All chemical determinations were conducted by Pacific Environmental Laboratory at San Francisco, California. The clam turbidity experiments commenced on June 28, 1972 at 0800 and terminated on July 8, 1972 at 0800 hours.

Table III
Concentration of Toxic Metals and Pesticides in Clams

in ppm	721922 Control	721923 5 days	721924 10 days	721925 10 days
Mercury	0.06	0.11	0.09	0.12
Lead	1.7	1.3	1.8	1.8
Zinc	15	6.7	11	7.1
Copper	19	13	17	16
Cadmium	10	8.0	14	12
Polychlorinated Biphenyl	0.11	0.07	0.17	0.16
Chlorinated Pesticides	<0.01	<0.01	<0.01	<0.01

Mercury analyses were determined by flameless atomic absorption. Other metal analyses were determined by AAS spectrophotometry. Analyses for pesticides were by GLC, Tracor Electron Capture and Coulson Electrolytic Conductivity.

Prior to making any analyses of the data, we remind the reader that the levels of turbidity were five times that which could be produced by bucket dredge removal or 20 times that of disposal and for a period of time 120 times that which could be seen on both removal or disposal. It is not possible scientifically to divide the data cited by 600 or 2400 to equate the degree of increase or loss of each chemical that would be developed during a bucket dredge operation, since we have no knowledge as to whether these actions are linear or not.

'FORCED FEEDING'

An examination and interpretation of the data of Table III should be made with great caution. The level of turbidity selected in this pilot study was much too high. The clams were force-fed excessive amounts of clay particles. The drop after five days of exposure in concentration of five of the six chemicals demonstrated that the clams ceased feeding, and in a forced diet digested some of their own tissues and liberated metals. Mercury increases make even this conclusion suspect. The irregularity of increases and decreases suggests that the experiment should be redesigned at more appropriate levels of turbidity. I suggest that experiments be conducted at turbidity levels of 100, 250 and 500 JTU's, and that replicate analyses be made. At this moment, I suspect that clams and presumably other surface feeding organisms would cease feeding when turbidity levels are excessive. This would diminish the possibility of any significant increases of the toxic substances.

STUDIES URGED

This paper has presented evidence detailing the many beneficial roles of clay particles and the sediments which they form. Incomplete understanding by many of the nature of adsorption and the relative permanence of this attachment have contributed to the very serious position in which the dredging industry finds itself.

Even though one normally does not publish data from

pilot studies in which determinations are made on single events, we have done so because we think the indications are important and wish that many others will get involved in these studies. Our preliminary investigations have demonstrated the probability that the toxic metals adsorbed to clays are not released when the clays are resuspended.

Our discussion has indicated that organic molecules are not liberated when resuspended in amounts sufficient to cause concern on the part of marine ecologists. The clam experiment did not prove whether or not metals are digested off from clays. I suspect that they are not. Unfortunately the lack of sufficient understanding on the part of many has nurtured a level of apprehension which I have titled the "fear syndrome." In consideration of this dilemma the dredging industry is urged to take part in studies to demonstrate those beneficial roles of clay particles which we have described.

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(continued on page 72)

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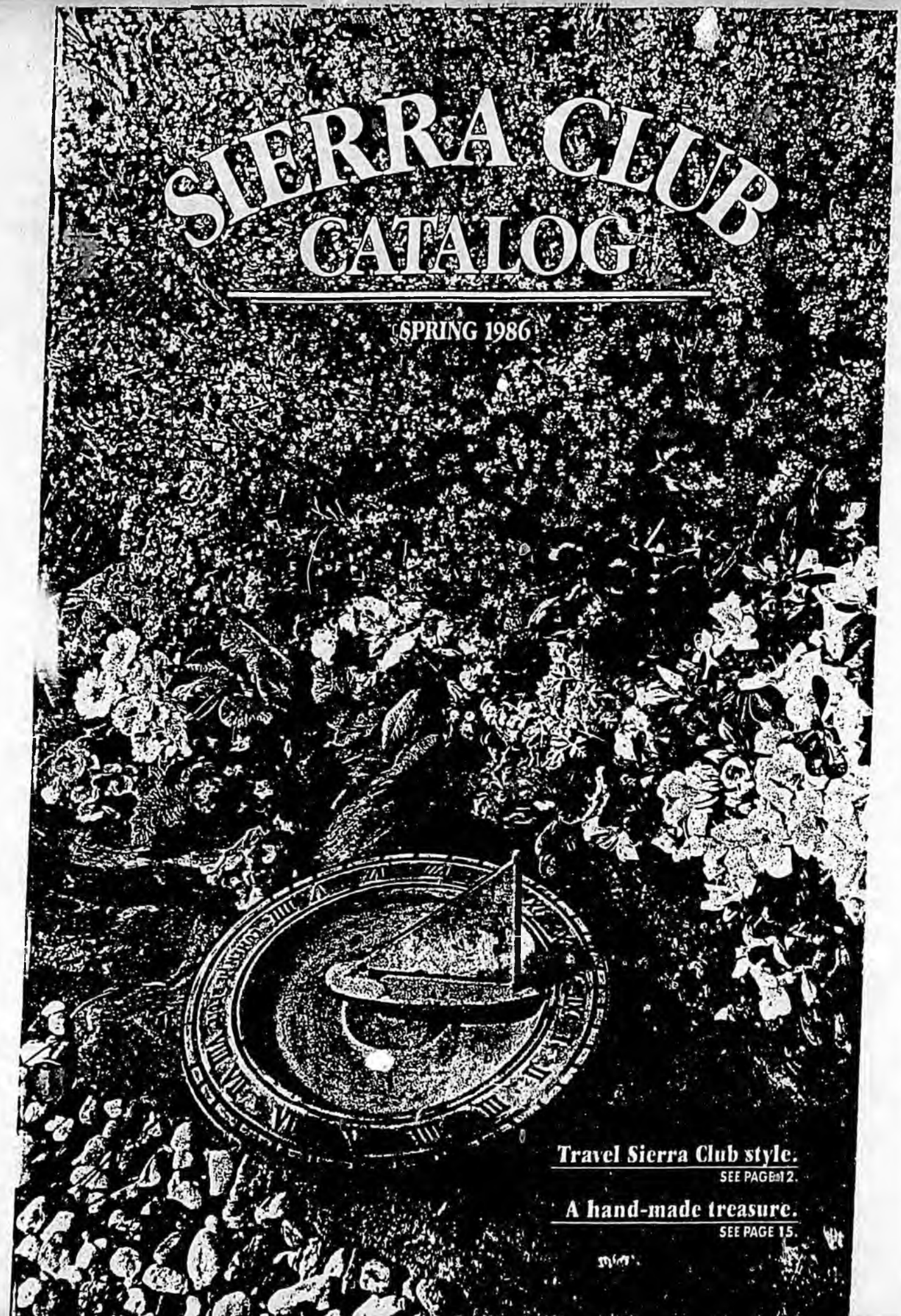

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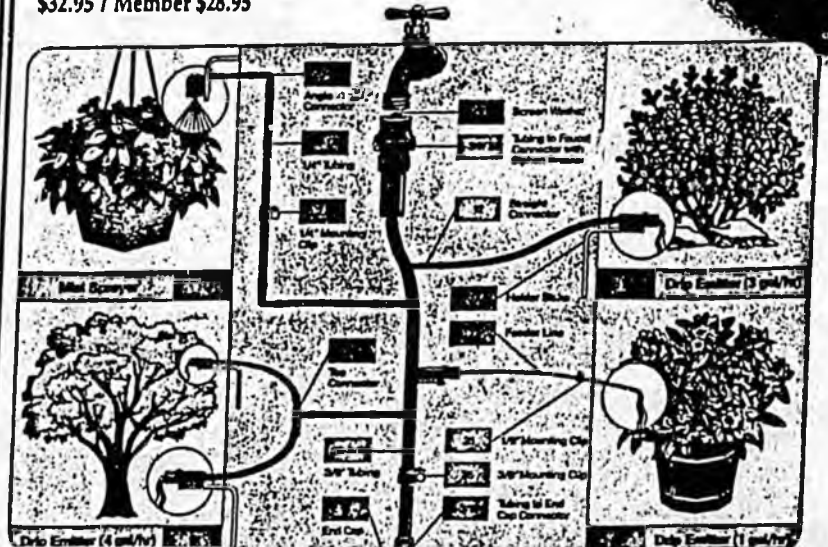

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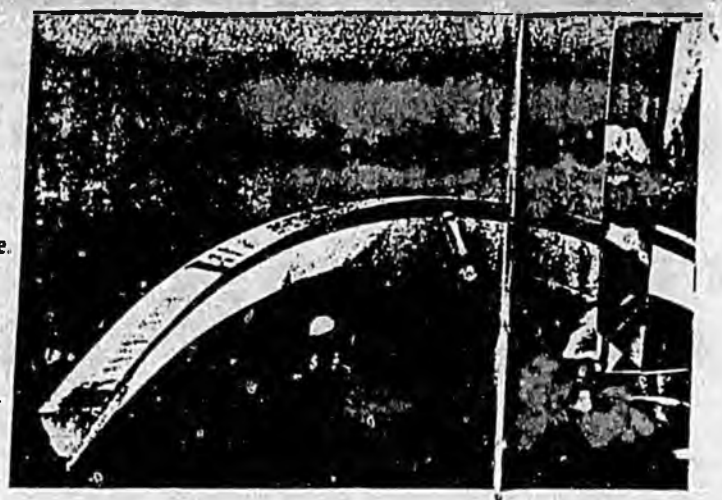

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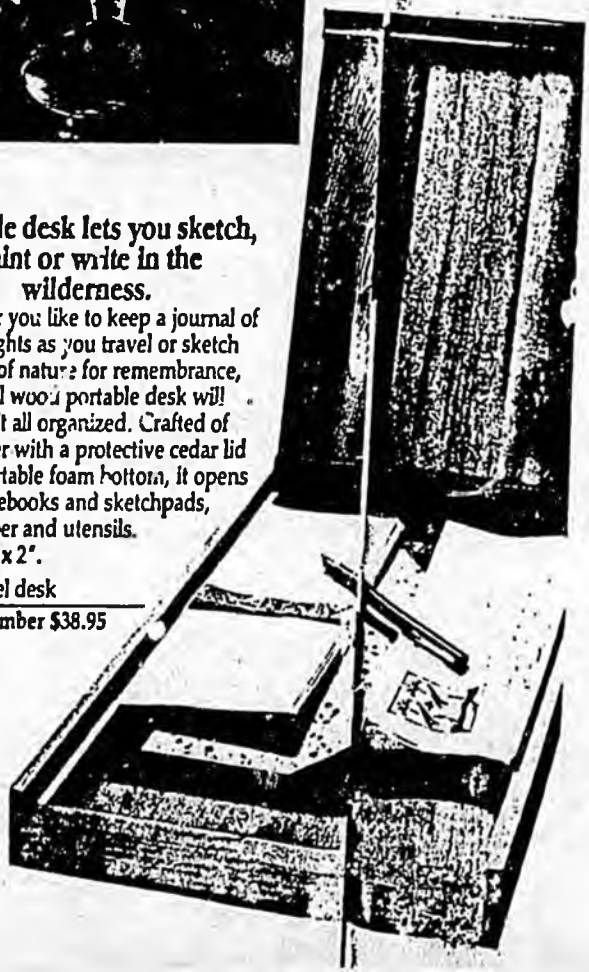

Official Business

Alaska State Legislature

House of Representatives

Pouch V
Juneau, Alaska 99811

Phone:
(907) 465-4924

Special Committee on Fisheries

April 19, 1986

Mr. Ralph R. Bauer
Acting Region 10 Administrator
Environmental Protection Agency
100 Sixth Street
Seattle, WA 98101

Dear Mr. Bauer:

The House Special Committee on Fisheries currently is considering the enclosed legislation (Senate Bill 460) which would affect the state's regulation of water quality in placer mining operations.

During the committee's initial hearing on the measure, several questions were raised regarding the effect of the legislation upon the relationship between the Alaska Department of Environmental Conservation (ADEC) and the Environmental Protection Agency (EPA).

Before posing the questions for your consideration, it may be helpful to explain the intent behind the legislation. According to testimony before the committee, the Senate Resources Committee intends for the bill to prohibit ADEC from requiring placer miners to treat discharges to higher quality levels than water initially taken into the mining operations, regardless of natural background conditions.

In other words, if the settleable solid measurement of water taken into mining operation "B" is .7 ml/l because of sediment-laden discharges from upstream mining operation "A", miner "B" could not be required to treat discharges to the federal permit limitation of .2 ml/l. This standard would apply despite the fact that a properly designed settling pond would lower the settleable solids measurement to .2 ml/l regardless of whether the incoming water was .7 ml/l or .2 ml/l.

Would you please furnish the committee a copy of written responses to the following questions at your earliest possible opportunity:

1. Would incorporation of the language in SB 460 in Alaska statute affect ADEC's ability to certify federal NPDES permits for placer mining? Specifically, do you foresee

circumstances under which ADEC would be forced to forego its right to certify the federal permits?

2. Would passage of this legislation affect possible assumption by the state of the NPDES permitting program?

3. Would this legislation in any way effect federal funding of the state's water pollution control program or other projects, such as municipal water and sewer construction grant funds?

I also have enclosed a copy of an attorney general's opinion on the issue and a letter from ADEC outlining some concerns.

The legislature is entering its final three weeks so a quick response would be greatly appreciated. Please call me at (907) 465-4925 for further information. Thank you very much for your prompt attention to this important issue.

Sincerely,

Representative Peter Goll
Chairman

c.c. Mr. Al Ewing, EPA
Commissioner Bill Ross, ADEC
Senator Arliss Sturgulewski
Representative Dick Schultz
Rose Rybacuk, Alaska Miners Association

[redacted] - NEW STATUTORY LANGUAGE

- EXISTING STATUTE

[redacted] - TECHNICAL LANGUAGE CHANGE

Offered: 4/7/86
Referred: Rules

Original sponsor: M.W.Miller by request

IN THE HOUSE BY THE RULES COMMITTEE

CS FOR HOUSE BILL NO. 627 (Rules)(title am)

IN THE LEGISLATURE OF THE STATE OF ALASKA

FOURTEENTH LEGISLATURE - SECOND SESSION

A BILL

For an Act entitled: "An Act relating to the appropriation of water."

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

* Section 1. AS 46.15 is amended by adding a new section to read:

Sec. 46.15.045. SMALL SCALE USE OF WATER. A person may use less than a significant amount of water without a permit unless the commissioner determines under AS 46.15.080(b) that the use of less than a significant amount of water without a permit is not in the public interest. A person using less than a significant amount of water without a permit acquires no water right or priority unless an application is filed and a permit or certificate is issued under AS 46.15.030 - 46.15.185.

11 AAC 93.920

* Sec. 2. AS 46.15.133(f) is amended to read:

(f) The commissioner may, by regulation, designate additional types of appropriations that [WHICH] are exempt from this section and provide simplified procedures for ruling on the applications.

* Sec. 3. AS 46.15.133 is amended by adding a new subsection to read:

(g) An application to appropriate not more than 1,000 gallons of water a day is exempt from the notice provisions of this section except that the commissioner shall notify the Department of Fish and Game of each application to appropriate water from a stream designated under AS 16.05.870. Notwithstanding this subsection, the commissioner may require public notice under this section

11 AAC 93.100

(1) on a determination that the total amount of water available in an area is limited considering the number of potential

users from the source of the water; or

(2) on request of the municipality in which the area is located.

* Sec. 4. AS 46.15.260 is amended to read:

Sec. 46.15.260. DEFINITIONS. In this chapter, unless the context otherwise requires,

(1) "appropriate" means

(A) to divert, impound, or withdraw a quantity of water from a source of water, for a beneficial use; or

(B) to reserve water under [IN ACCORDANCE WITH] AS 46.15.145;

(2) "appropriation" means

(A) the diversion, impounding, or withdrawal of a quantity of water from a source of water for a beneficial use; or

(B) the reservation of water under [IN ACCORDANCE WITH] AS 46.15.145;

(3) "beneficial use" means a use of water for the benefit of the appropriator, other persons or the public, that is reasonable and consistent with the public interest, including, but not limited to, domestic, agricultural, irrigation, industrial, manufacturing, fish and shellfish processing, navigation and transportation, mining, power, public, sanitary, fish and wildlife, recreational uses, and maintenance of water quality;

(4) "source of water" means a substantial quantity of water capable of being put to beneficial use;

(5) "water" means all water of the state, surface and subsurface, occurring in a natural state, except mineral and medicinal water;

(6) "commissioner" means the commissioner of natural

resources;

(7) "director" means the director of land and water management [THE DIVISION OF LANDS], Department of Natural Resources;

(8) "person" includes an individual, partnership, association, public or private corporation, state agency, municipality [POLITICAL SUBDIVISION] of the state, and the United States [.]

(9) "mineral and medicinal water" means

(A) water of a hot spring or spring with curative properties that [WHICH] has been reserved by the federal government under Public Land Order No. 399; and

(B) geothermal fluid, as [THE TERM IS] defined in AS 41.06.060;

(10) "significant amount of water" means

(A) a use of more than 5,000 gallons of water in a single day from a single source; or

(B) the regular daily or recurring seasonal use of more than 500 gallons of water a day for 10 days or more a year from a single source; or

(C) a water use that may adversely affect the water rights of another appropriator or the public interest.

11 AAC 93.970. (14)

Alaska State Legislature

ARLISS STURGULEWSKI, Chairman
BETTYE FAHRENKAMP, Vice Chairman
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FRED ZHAROFF

POUCH V
JUNEAU, ALASKA. 99811
(907) 465-4907

Senate
Committee on Resources

TO: Senate Resource Committee Members April 2, 1985

FROM: Senate Resource Committee Staff

RE: Senate Bill No. 460
"An Act relating to regulation of water quality in placer mining."

SB 460 is a simple bill that says that placer miners do not have to discharge cleaner water than they receive.

In this packet is a letter from DEC opposing the bill, a zero fiscal note, a copy of the Placer Mining Position Paper from the Alaska Miner's Association and the Administration's Progress Report To The Legislature On Placer Mining and Water Quality. Both of these longer documents have been previously provided to committee members.

STATE OF ALASKA

BILL SHEFFIELD, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION

OFFICE OF THE COMMISSIONER
P.O. BOX O, JUNEAU, ALASKA 99811-1800

Telephone: (907)
Address:

(907) 465-2600

APR 2 1986

April 1, 1986

The Honorable Arliss Sturgulewski
Alaska State Senate
P.O. Box V
Juneau, AK 99811-3100

Dear Senator Sturgulewski:

SB 460 would prevent the Departments of Natural Resources (DNR), Fish and Game (DF&G), and Environmental Conservation (DEC) from requiring a person engaged in placer mining to discharge water that is of a higher quality than that person's intake water. DEC believes the bill to be counterproductive to the efforts to both responsibly regulate the impacts from placer mining and to ease the regulatory burden on the placer mining industry.

The bill appears to be aimed at assuring that enforcement efforts do not require miners to either a) make placer discharges cleaner than the stream from which the water came; or b) treat the discharges of miners upstream from them. I believe that current agency authority and practice have already taken care of these two issues.

With respect to the concern that miners might be required to make water cleaner than the natural water source, this should not be a real concern. Alaska's water quality standards make reference to the natural background condition of the receiving waters into which a miner discharges. For both settleable solids and turbidity, the two parameters of greatest interest in placer mining, the water quality standards set limits on increases above background levels. Hence, the water quality standards do not require discharges that are cleaner than existing streams.

With respect to whether miners are required to treat discharges from upstream users, there have been no instances of enforcement actions to date which have required a downstream miner to treat the discharge from an upstream miner. Passage of SB 460 could force DEC to use a "linear" enforcement process of securing injunctions against all miners downstream of any miner who was polluting in order to make sure we were not causing downstream miners to treat the effluent of upstream miners. We would then need to work with the sole remaining miner on each stream to address his or her pollutant load. Once that person was in

compliance, we could allow one additional downstream miner, get that person in compliance, and then allow one more, etc. This is obviously an awkward method at best for working with the industry to install methods to reduce pollution in discharges.

In order to understand the impact of the proposed legislation upon current enforcement efforts, it is again necessary to refer to settleable solids and turbidity. Well-sited, designed, and maintained settling ponds are necessary to remove settleable solids to acceptable levels. Such ponds are capable of reducing the settleable solids in placer discharges to 0.2 ml/l, which is the legally permitted discharge, or better. This level can be achieved no matter what the quality of the water going into the pond is. For example, sluice box effluents generally range from 50-250 ml/l, and settling ponds are capable of reducing settleable solids to the legally permitted 0.2 ml/l. DEC requires all miners to use settling ponds or other means of reducing settleable solids. The effect of the amendment could be to preclude DEC from taking enforcement action against a miner for failing to install a settling pond, if indeed an upstream miner did not also install a pond. The fact that an upstream miner fails to install a pond should not become an excuse for a downstream miner not to have one. If it were the case that two miners on the same stream did not have ponds, DEC would enforce against them simultaneously.

The treatment of turbidity is in its beginning stages in the placer mining industry. Most mine sites do not currently employ techniques to deal expressly with turbidity. Approximately a dozen mine sites were successful this summer in developing and employing techniques which greatly reduced turbidity. DEC has worked with the industry as a whole to develop these new techniques. We will continue to concentrate individual technical assistance and enforcement efforts on those areas of user conflict. It is this process that will best assist the industry in developing the tools to address turbidity. SB 460 could preclude this approach.

The legislation also could interfere with other efforts to assist the industry. DEC is interested in exploring the benefits of assuming the federal water pollution permit process for placer mining under section 402 of the federal Clean Water Act. The permit is based on the technological treatment capabilities of the industry, not on the quality of the intake water. Failure to have the capability to enforce permit limitations such as the settleable solids limit of 0.2 ml/l could provide a legal impediment to the State's assumption of the 402 permit process. All other things being equal, it could be in the State's interest to assume this permit program and reduce the paperwork burden on the industry.

It is for these major reasons that DEC must oppose this legislation. I would be glad to discuss these and other issues that the bill raises with you or members of the Legislature at your convenience.

Sincerely,

Bill Ross
Commissioner

STATE OF ALASKA 1986 LEGISLATIVE SESSION
FISCAL NOTE

Revision Date : _____

REQUEST

Bill/Resolution No. : SB 460
Title : An Act relating to regulation of water quality in placer mining.

Sponsor : Senate Resources
Requestor : Senate Resources
Date of Request : 4/1/86

FISCAL DETAIL

Agency Affected : Environmental Conservation
BRU : _____

Components : _____

EXPENDITURES/REVENUES : (Thousands of Dollars)

OPERATING	FY 86	FY 87	FY 88	FY 89	FY 90	FY 91
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-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						
FEDERAL FUNDS						
OTHER						
TOTAL	-0-	-0-	-0-	-0-	-0-	-0-

POSITIONS : None

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS : Attach a separate page if necessary

Prepared by : Amy D. Kyle, Deputy Commissioner
Phone : 465-2600
Division : Office of the Commissioner
Date : 4/01/86

Approved by Commissioner : Bill Ross
Date : 4/01/86
Agency : Environmental Conservation

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

10/25/85

PLACER MINING--
AN ALASKA MINERS ASSOCIATION POSITION PAPER

January 1, 1986

Since territorial days, the Alaska Miners Association has represented a diverse group of individuals, families, and companies that are dedicated to a viable mining industry for Alaska. The Association and its members share with a vast majority of Alaskans a concern with water quality and with the land and wildlife resources of the state. As an association, we have worked with the Federal and State agencies charged with the protection of these resources. We, with others concerned about environmental quality, agree that those miners who ignore laws, refuse to obtain permits, and make no effort at water protection should not be mining.

On the other hand, we as an industry cannot work under regulations which, from inception, have clearly not been attainable, are not based on scientific criteria, but which require inflexible enforcement. This is particularly true for the state turbidity requirements to be enforced under amended EPA placer discharge permits.

This position paper presents reasonable views on six controversial issues of Alaska placer mining, first in summary then expanded and supported with technical data:

I. TURBIDITY

To impose an end-of-the-pipe turbidity limit of 5 NTU or 25 NTU without mixing is unreasonable and arbitrary for the following reasons:

- These limits cannot be measured accurately and consistently relative to any specific parameter such as suspended solids.
- No scientific evidence justifies the limits, unless the immediate downstream use is municipal water supply.
- The limits cannot be met by any technology, including recycle for more than 95% of all placer operations.

II. RECYCLING

Partial recycling of process water is practical at many operations and can lead to improvement in discharge.

Total recycling or zero discharge is, however, physically impossible in Alaska (and other areas) where precipitation exceeds evaporation.

To be feasible, partial recycle must be done in conjunction with bypassing excess water around settling ponds; otherwise, it will result in worse downstream water quality than with no recycle.

III. TOXIC METALS

As a class, Alaska's placer mines do not introduce significant amounts of toxic metals, acids, or organic pollutants into state waters.

In those mines where heavy metals exist in above normal concentrations, simple treatment in settling ponds removes most metals.

Mercury and arsenic have been the metals most mentioned as toxic pollutants, but mercury has not been found in detectable amounts in the effluent of the great majority of mines and is in extremely small concentration in the rest. Arsenic is generally detectable in the 0.2 to 0.3 part per million range as total, mostly undissolved metal, but is not appreciably enriched by sluicing over its local geochemical background. At worst, arsenic is a local problem.

IV. WILDLIFE

Prior to the development of the petroleum industry, mining and the fishery supported Alaska f[illegible]ost 100 years.

In effect, we have a 100-year field test that says mining and wildlife, including salmon, are compatible.

Mining has temporarily impacted some streams, but it has also created habitat for rearing and spawning of salmon and locally resulted in increased populations of beaver, waterfowl, and moose.

In future large-scale operations, rehabilitation to enhance the fishery can be part of the mining plans.

V. ECONOMIC BENEFITS TO ALASKANS

Placer mining forms a significant percentage of the seasonal non-governmental work opportunities in rural Alaska, and is a mainstay for some rural communities, such as McGrath, Manley, Central, Chicken, Ruby, and Nome. It also forms a large part of the base of the rural air taxi and fuel distribution system and for heavy equipment dealers in urban Alaska.

According to statistics compiled by the Department of Commerce and Economic Development, about as many dollars are put into placer mining as is taken out in gold, and a significant portion of the input dollars are of non-Alaskan origin.

VI. ENFORCEMENT

Enforcement should be applied to all industries equally. At present, however, with at least the majority of operations unable to comply with turbidity limitations, we submit that (presuming the State's objective really is a viable industry operating within reasonable environmental limits) most of the near-term effort should be applied toward the development of advanced mining practice and practical assistance to miners rather than on punitive enforcement.

We believe that a careful review of the detailed information presented here to support these conclusions will show that it is factual and reasonable. Much of placer mining's poor image stems from views held and disseminated by those with a dedicated opposition to mining. The views of a few raise fears that are not justified or even demonstrated out by a century of placer mining in Alaska. During much of the past century, placer mining activity was of a magnitude several times that of the present. Few significant long-term problems resulted, and there were general benefits in relation to the development of the Territory and State of Alaska.

We are aware that simple answers do not exist that are applicable for all situations. Even in the cases where controversy exists, these statements could form the basis of rational discussion, and development of a general position which would be acceptable to reasonable people.

Partly because of the increased level of placer mining in Alaska since the mid-1970's, there is a significant amount of new information available on placer mining, in general, and on the issues of specific concern to regulatory agencies and the public at large that were presented in summary form above. Further, known mining technologies are being developed and applied to placer mining that give the promise of alleviating remaining problem areas.

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EXPANSION OF SUMMARY MATERIAL

Turbidity, Suspended, Settleable and Dissolved Solids

Two criteria, turbidity and settleable solids, are currently used to measure water quality and, in effect, regulate effluent discharge from Alaska's placer mines. For turbidity, the general limits have been 5 and 25 NTU's above ambient levels of the receiving waters; for settleable solids, the current limit is 0.2 ml/l. The standards for settleable solids have changed, and these changes have been confusing to the miners. For example, in February, 1985, the EPA announced a limit of 0.7 ml/l with a maximum daily limit of 1.5 ml/l. However, the limit was changed to 0.2 ml/l before the mining season started. In past seasons, tight turbidity limits have been tempered by a 500-foot mixing zone. However, the EPA currently holds that, in order to comply with a Ninth Circuit Court of Appeals decision, the limits must be applied to the end of the pipe and EPA has tentatively set 5 NTU's as the limit at the end of the pipe. A mixing zone may be reallowed "upon receipt of information demonstrating that the dilution effect on the receiving water justifies a less stringent limit . . ." (EPA M/S 521, 1-31-85).

Of the two parameters, settleable solids, are relative coarse materials and will settle out in a short time; as a standard, they are measured by volume in a calibrated cone after one hour settling time. Turbidity, or cloudiness, is caused by fine particles that do not settle rapidly and is measured by the amount of light transmitted (Jackson units) or scattered (Nephelometric units) in the water. Both settleable solids and turbidity are included in Total Suspended Solids measured at any place in the process stream. There are three main problems with using a low limit of turbidity as an effluent guideline: (1) questionable significance of turbidity as a definitive parameter, (2) lack of scientific basis, and (3) difficulty of attainment.

The use of turbidity as measured by nephelometer as standard has been attacked and supported in recent years, apparently dependant upon who was calling the shots. In 1976, Pickering (U.S. Geol. Survey) wrote:

> "Few water-quality measurements of natural water are more difficult to explain quantitatively than is the phenomenon of turbidity. Confusion that exists today . . . leads to the conclusion that it would be best to treat the term 'turbidity' as a non-quantitative term."

Pickering goes on to state that:

> Perhaps the most widespread misuse of turbidity measurement data is as an indicator of the concentration of suspended

sediment. Within certain size and concentration ranges, and with certain types of suspended material, it is possible to estimate sediment concentration based upon turbidity or optical measurements. However, it is almost impossible to transfer the relationships between sediment concentrations and optical characteristics from one environment or type of sediment to another. Since the various optical techniques used to measure turbidity are all calibrated with the same standard and yield the same units of measurements, i.e., FTU's or NTU's, it would seem to many data users that the measurements are comparable, and correlations between unrelated numbers are often made unwittingly."

Notwithstanding the conclusions of the U.S. Geological Survey, turbidity measured in NTU's by the nephelometer has been accepted by the EPA (1979) and by the American Public Health Association (1980) as standard measurement techniques and has been supported by biologists, including Lloyd (1985) whose report is being used by Alaska Department of Fish & Game as the basis for their position on turbidity.

Unfortunately, Lloyd's data does not support the significance and biological basis for regulation in the 5 to 25 NTU range in Alaskan streams. Recent work by Renshaw (1985) shows an extremely poor correlation between turbidity and suspended sediments in Alaskan streams. In discussion and figures, Lloyd (1985, page 42-46, figures 9-10) argues for a general correlation between turbidity and suspended sediment concentration (SSC). Using the entire range of turbidities sampled, from 1 to 10,000, the two figures cited above show an overall correlation of turbidity and SSC of, respectively, $r^2=0.83$ and 0.92. However, in the area proposed for regulation and up to 50 NTU, the correlation is extremely poor. Turbidity in this region can just as easily be due to color, dissolved solids, plankton, and organic debris as it is to suspended inorganic solids.

Renshaw (1985, Table A) shows that deviations from the average of turbidity compared with suspended solids are extreme. The main correlations between NTU's and suspended solids range, as examples, from -52% to +721% at 1 NTU, to -87% to +178% in the range of 50 to 75 NTU. The values show extreme variation to even higher concentration, although there is an overall positive correlation. In comparing suspended solids with turbidity in the typical placer discharge range of +2,000 NTU (FTA and KRE, 1985, Appendix VI-2), extreme variations exist, and these authors note that dilution had to be used to even obtain some turbidity readings. In general, Renshaw's conclusions seem completely valid, namely:

"The proper application of the nephelometer is for simple repetition testing of specification water from a single source where physical characteristics are within relatively narrow and predictable ranges. Examples are municipal water treatment plants, industrial process make-up water, fish

> hatchery habitat supply, and other stationary locations requiring systematic routine monitoring for quality control within close specification ranges. Under such applications comparison calibration is a routine procedure and reasonably accurate nephelometer readings may be expected. The nephelometer was never intended as a mobile reconnaissance monitoring instrument."

The scientific basis for proposed low limits of turbidity on a biological basis is likewise on uncertain ground. In the paper previously cited by Lloyd (1985), 25 NTU is upheld as a biologically significant limit, but the paper implies 5 NTU is also significant. Critical examination of the paper yields little support for the this position. The Lloyd review, essentially a literature review, is based mainly on lakes rather than Alaskan streams, uses erroneous equations, and draws conclusions not warranted by the data cited.

Most of the discussion by Lloyd is based on the biological impact of turbidity in lakes even though no lakes are involved in the 446 mining claims under consideration in the EPA permits. This paucity of information is recognized and acknowledged by Lloyd (1985) starting on page 71 wherein he emphasizes four areas of limited data: (1) the relation of turbidity to sediment loading, (2) changes in the relationship of turbidity and SSC along the stream course, (3) the presence of settleable as well as suspended solids as a cause of measured turbidity, (4) the ability of different streams to accommodate different levels of sediment in the support of biologic productivity. Lloyd also recognized needs for further research (page 73) which would include population and community structures in various aquatic systems; i.e., basic data required by management prior to even a consideration, much less a decision, on effluent turbidity standards.

Lloyd also notes that: "Other topics for study may include . . . the threshold level of adverse effects of turbidity and sediment on benthic invertebrates, (and) similar thresholds for fish in their various life stages . . . ". In the next paragraph, Lloyd (1985) states: "Regarding the use of turbidity to estimate suspended sediment concentration, it may be necessary to establish detailed relationships for specific drainage types, account for variability caused by temporal factors . . . and consider the change in those relationships downstream from a point source of sediment."

There are numerous questions generated by, and confusing points contained in, this literature review of turbidity which involve both biological, geological, and limnological aspects of the problem. On the biological side of the discussion, Lloyd (op. cit.) points out that populations of Cladocera are highly favored food organisms by salmonoids in Alaska, but fails to note that such organisms: (a) feed primarily on bacteria and organic detritus versus phytoplankton, or (b) that these organisms do not inhabit rapid streams (Pennak, 1953).

The graph presented in Figure 3 (page 21) shows lower than expected chlorophyll concentrations in Alaska's turbid lakes, but the model upon which the expected values are based was developed for clear, not turbid, lakes. It also cites turbid Tustemena Lake as an example of a poorly productive lake, but another division of ADF&G (FRED) has recently publicly stated that productivity of Tustemena is also limited by the spawning capability of the Kasilof system and have proposed enhancement. The difficulties with the stream turbidity are more profound. As examples:

1) Using the same data on mined streams (Van Nieuwenhuyse, 1983) as LaPerriere (1984) to derive equation 6, we find that r^2, which essentially measures degree of correlation, should be 0.67 instead of 0.80.

2) This fairly weak equation is then used to assess stream productivity. The equation predicts a productivity reduction of over 90% at an average depth of about 1 foot at an average turbidity of 170 NTU, but only a 50% reduction in productivity was actually observed by Van Nieuwenhuyse. On some days Van Nieuwenhuyse (1983) found the same primary production rates in the turbid as well as in the control stream.

Basically, the amount of data available now in Alaska's streams does not justify either 5 or 25 NTU as a limit on a biological basis. In addition to problems related to measurement and biological effect, aesthetics and ability to count fish have been raised as turbidity related issues. It cannot be accepted without qualification that ability to count fish in shallow streams is impaired at 10 NTU. The reference in Lloyd is an internal memo. Measurements near 10 NTU are not reproducible in natural systems. The question must be asked: How did the fish surveyors determine the turbidity?

The third area of problems with turbidity and suspended solids is in attainment of limits. The most recent EPA (FTA and KRE, 1985) sponsored study of end-of-pipe discharges at Alaska placer mines indicates discharges from mines with working settling systems would average:

0.2 ml/l settleable solids, 2,400 mg/l total suspended solids, and 2,600 NTU's.

Actually, these results were on ideal mines. These conclusions and attainability are also backed up by the recently concluded Shannon and Wilson, Inc. (1984) study: "Placer Mine Wastewater Treatment Technology Project", where they conclude: "Alaska and EPA water quality standards regarding turbidity are not attainable by any demonstrated or widely used mining practice, except in unique

circumstances such as where large volumes of clear water are available for dilution. Attainable levels are at least two orders of magnitude above current standards."

The EPA sponsored work by FTA and KRE suggests that flocculants can significantly cut turbidity, but the tests have not been scaled up to actual operation, and there is a wide disparity indicated in the amount of flocculant needed. The FTA and KRE study suggests that, in general, treatment with flocculants would cost about twice as much as treatment with settling ponds. Uncertainty on quantity is suggested by the disparity between EPA and Canadian work: FTA and KRE (EPA) suggest dosage of 2.0 mg/l; Sigma Resources (Canadian DIAND) suggests a dosage of 10 mg/l would be necessary.

The FTA and KRE study suggests a dollar amount for flocculant treatment equal to about 10% of the contained gold in most placers; if their amount is off by a factor of 5, flocculant treatment would be precluded from almost all operations.

If a limit of 5 NTU, or even 25 NTU, at the end of the pipe is applied uniformly, it will not only kill placer mining but will inhibit such activities as logging, fish stocking, agriculture, construction, and even wading in Alaska's clear water streams.

Toxic Metals

By definition, placer deposits are formed from heavy relatively inert minerals, such as gold, platinum, cassiterite (tin oxide), and rutile (titanium oxide). Commonly associated are the minerals magnetite (iron oxide) and garnet, also heavy and essentially insoluble. The concentration of the valuable minerals in alluvial gravels ranges from a few thousandths of an ounce of gold or platinum to the cubic yard or several pounds/yard of cassiterite, rutile, or scheelite.

In beach or valley flat placers, no significant quantity of toxic metals exist, all soluble minerals and compounds having long ago been dissolved or broken up mechanically. In certain cases, placer deposits are followed into their bedrock source beds or veins. These placers and their sources may have significant quantities of less refractory sulfide and oxide minerals, including minerals of arsenic or mercury. However, even these minerals are not necessarily easily soluble or toxic in mineral form. Both the Fairbanks and Kantishna districts are examples of where some placer deposits have been mined into their source beds which contain anomalous amounts of arsenic sulfides.

In recent years, there has been quite a bit of study of heavy metals in the placer environment. Chronologically, these studies include:

NEIC Study, 1977--In a study of eight placer mines with working settling ponds, arsenic (Tot) was detected in six, not analyzed for in two; mercury was not detected in any of the mines.

Calspan Study, 1979--Of 10 mines with operating settling ponds, mercury was detected in two with a maximum concentration of 0.0005 mg/l (total); arsenic was detected in eight, with four being less than the state water quality standard.

FTA-KRE, 1985--This examination was much more extensive. Of potentially toxic metals, five (silver, beryllium, selenium, antimony, and thallium) were at or below detection levels; mercury was below detection or at low level; arsenic (total) was most frequently about 0.X mg/l or .X parts per million at the end of the pipe.

West and Deschu, 1984--A group of 12 metals were routinely determined on a <u>total</u> and <u>dissolved</u> basis in mine and control streams in Kantishna. The highest value of mercury determined was 0.0006 mg/l; of 63 samples, 45 had mercury below detection or <0.0002 mg/l. Arsenic was found in most samples, but even where measured in total solid and dissolved form, only 3 of 63 exceeded state water quality standards.

In certain situations, as at Fairbanks, mines have encountered soluble arsenic in groundwater; the arsenic, however, tends to oxidize to an insoluble iron arsenate and precipitate with iron hydroxides.

Essentially, all authors have agreed that, even in metalliferous effluents found in a few mines, reduction of total suspended solids effectively knocks down all metals.

It is difficult, if not impossible, to conceive of a placer mine that removes most of the settleable solids, giving rise to a significant toxic metal problem. In certain cases, analyses have been misstated accidentally then the erroneous results used in political statements. For example, there is continued reference to arsenic and mercury at Nyac, but in reference to a thousand-fold error in an EPA filing, when the corrected EPA analyses show discharges well below State discharge limits. Such sensationalism is hardly conducive of reasonable or accurate perception of the industry by the general public and elected public officials.

Recycling

Zero discharge has been proposed to be attainable by the use of a pump at the discharge end of a settling pond which would recirculate the effluent back to the sluice head. Both the Shannon & Wilson study and a recent Canadian study deny this simplistic view.

Even if an operation could be designed to fully exclude ground infiltration and rainfall runoff, total recycling could only theoretically work in an area of net evaporative equilibrium or loss. In practice, neither ground or surface water can be practically eliminated, so a continual and variable excess of water must be tolerated.

In an operation approximating total recycling solids buildup will tend to fill the settling ponds, and it will reduce fine gold recovery. To be feasible, partial recycle must be done along with bypassing excess water flows around settling ponds. As noted by Shannon & Wilson (1985): "With no bypass, partial recycle will result in worse downstream water quality than no recycle", and "With respect to reducing effluent settleable solids levels, it appears that proper settling ponds are more effective than the use of recycle."

It is clear that partial recycling will help many operations; it is also clear that recycle costs more than settling ponds.

In the FTA and KRE (1985) study, recycling approaching zero discharge was the most expensive control option found, exceeding the use of flocculants.

Miners have claimed--with good reason--that high solids content of recycled water decreases fine gold recovery. FTA and KRE (1985) and Shannon & Wilson (1985) conducted experiments which they say generally deny this claim. Their experiments were not properly designed.

Basically, the recycle studies used gold of -30 to +60 mesh, or in one series of experiments from -50 to +80 mesh in a sluice test. Gold in these size ranges is not considered to be fine gold (Conwell, 1981; Cook and Rao, 1973; Wills, 1979). Well designed sluices effectively recover gold down to about +65 mesh. With undercurrent and astroturf, good sluice recoveries can be made in ideal conditions probably to +100 mesh.

The important gold to study is that of less than 100 mesh, which is recoverable in jigs, cones, spirals, flotation, and tables but not generally in sluices. A breakthrough in the recovery of this material in dense effluents could result in making it worthwhile to both recover gold and further treat the fine silt and clay--the main cause of suspended solids.

Fisheries

Very extensive placer mining has co-existed with Alaska's fishing industry since the late 1890's, and there is no known evidence of placer mining influencing the available salmon catch (See enclosure). Conversely, while perhaps coincidental, since 1880 the production of Alaska's gold correlates almost directly with Alaska's salmon production.

Placer mining has made a number of Alaska's streams better salmon habitat. Examples are on the Seward Peninsula and throughout interior Alaska where stream beds were largely covered by fine grain silt and ice before mining. In many of these streams, the amount of potential spawning habitat was limited by available gravel. In earlier mining, the silt and ice was removed, flushed out of the system leaving gravel beds for spawning. Particularly in interior and northern streams, gradual reworking of tailings by ice and glaciering has distributed gravel into usable spawning habitat.

In other cases, abundant waterways established by dredging are suitable habitat in unmodified form for grayling, trout, rearing of salmon and, especially where beaver exist, have been dammed to create extensive habitat for waterfowl. By locally increasing velocity and opening up packed gravel beds as rehabilitation measures, suitable salmon spawning habitat can be created locally.

It has been long recognized (Coady, 1976) that the surface disturbance caused by agriculture and mining contributed to the rapid increase of the moose population which took place in Alaska from about 1940 to the early 1960's, due to more rapid growth of more favorable browse.

Although it cannot be maintained overall that mining disturbance improves wildlife habitat, neither is mining disturbance the unmitigated disaster for wildlife as is sometimes proposed.

Economic Benefits

The Alaska mining industry is composed of three components: the hardrock exploration industry, coal mining, and placer mining. Together, the industry is currently producing over $100,000,000. Within the last few years, dollar volume has been about twice this amount at a maximum.

For a long period in the late sixties and early seventies, hardrock exploration was the dominant force; today placer gold mining has reestablished the leading position it held through 1960.

In 1977 in a study for the U.S. Congress, Hawley and Whitney (1978) estimated that placer mines directly employed about 1% of the non-governmental rural resident labor force. At that time, gold production was probably in the range of 25,000 to 50,000 ounces per

year. The industry expanded steadily from that time to the early 1980's. Judged from figures given by Louis Berger & Associates (1983), direct placer mining employment was about 4 to 5 percent of the non-government rural resident labor force. Production of gold at that time approximated 160,000 ounces or $80,000,000 gross at $400/ounce.

Expenditures by miners in the same period for equipment, development, and production also totaled about $80,000,000, perhaps slightly more. Taxes were minimal, but most operators would have been within the 3 1/2 year mining license tax holiday.

If significant scale corporate mines once again emerge for the Alaska placer mine industry, it can then be expected that more significant tax benefits to the state will result.

In the meantime, mining's main economic benefit will continue to be rural employment and support of rural industries supplying the mines.

Enforcement

The emphasis on the type of enforcement advocated by extremists is totally out of line unless the government does, in fact, want to kill an industry.

Enforcement is needed to force those individuals who make no valid efforts to improve practice or acquire permits to either get with it or get out of the business.

We do not infer, from any agency, that loss of the industry is an aim. Therefore, we propose long-term solutions can be attained by working to solve the particular problems of the industry. Two approaches seem to have particular merit:

1) A blue ribbon committee of reasonable people--technical and non-technical--dedicated to working toward a solution.

2) Additional staff positions in mining engineering in the Division of Mining who can assist in developing mining technology and assisting operators.

We feel confident that further improvements in operating practice, in effluent control, and fine gold recovery have enough chance of success that a real effort to encourage the industry is justified. Adoption of these recommendations would be widely perceived in the industry as a commitment of the state to assist instead of deter placer mining.

Certain things can be done quickly. For example, in contrast to turbidity, settleable solid limits can be reached by many operators by use of settling ponds and slight modification to mining practice.

As partial solutions to the difficult question of suspended solids and turbidity, a series of solutions would include:

1) Relaxed limits on turbidity and suspended solids where streams are naturally turbid or where downstream uses, if any, would not be unreasonably impacted.

2) Reclassification of other streams, not used for fish hatcheries or community drinking water, to a reasonable turbidity standard.

3) Further development of mining practice and technology to minimize fine sediment discharge, and

4) Allowance for high limits where reclamation plans would rehabilitate the stream after cessation of mining.

In addition to the data gaps noted by Lloyd, general questions or problem areas of significance to the placer mine controversy include:

1) Historic, recreational, or commercial fishing on the mining streams.

2) The economic tradeoffs of mining and fisheries in various effluent control scenarios.

3) Fishery rehabilitation and enhancement techniques for affected streams.

4) Natural recovery times for fisheries on mined streams or others affected by agriculture or forestry practices.

5) The status of streams previously mined in Alaska, especially those systems in the Interior of the state.

6) Historic aerial or other visual survey activity of the affected streams by fishery management biologists.

7) Other fishery management techniques for population estimates such as sonar units and weirs.

8) The economic tradeoffs of aerial surveys vs. other counting techniques or even the need to conduct such activities on streams with minimal populations.

9) The location of spawning grounds for any recreational or commercial fish species within the affected zones of the streams concerned.

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PLACER MINING POSITION PAPER

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Administration's Progress Report To The Legislature On Placer Mining and Water Quality

A Report

Coordinated by the Alaska Department of Environmental Conservation

with the

Alaska Departments of Fish and Game and Natural Resources

March 1986

Administration's Progress Report to the Legislature on Placer Mining and Water Quality

EXECUTIVE SUMMARY

This document serves as an interim progress report to provide a general overview of the progress made in 1984 and 1985 in reducing water use conflicts associated with placer mining.

This progress report to the Legislature and the public largely focuses on efforts during the 1985 field season and also summarizes the results of technical studies to date. Other documents will establish policy for the future and document past efforts in more detail. The triagency enforcement strategy, currently under development for field season 1986, will detail policy for the 1986 season. Development of a comprehensive policy for placer mining will be developed upon completion of the demonstration grant program and the "404" studies funded by the Legislature so that all available management alternatives are evaluated.

Several regulatory alternatives for managing water use conflicts are currently under review. The demonstration grants, flocculant studies, basin planning approaches, and best management practices to control water pollution are all key elements in this discussion. The goal of the agencies is to consider the alternatives and develop a comprehensive management strategy prior to the 1987 mining season.

The Administration's efforts in developing solutions to placer mining conflicts is detailed in the Governor's four point approach covering education, technical improvements in mining practices, clearer rules and enforcement.

Education and Improvements in Technology

Regular and effective communication between competing interest groups has helped identify approaches to resolve placer mining issues. The Placer Mining Advisory Group (PMAG) has assisted in developing an understanding of the various issues by competing interest groups. This forum is expected to continue through FY 87. A second major aspect of education, made possible by a program authorized by the Legislature in 1984, is providing agencies with technical information for use in reviewing water quality standards, best management practices for controlling nonpoint source pollution and rehabilitation of land and aquatic habitats, and water quality discharges of active mine sites. This educational process assists in rule making, leads to technological improvements and assists in developing a long term strategy.

Promising mining and pollution control technologies were field-tested in 1985. The Legislature established a demonstration grant program for miners to test innovative technologies to reduce water use, enhance gold recovery, control pollution and disposal of waste. Fifteen projects were completed during 1985. The 1986 mining season will see the completion of the remaining fifteen innovative demonstration grant projects. These projects demonstrate basic technology applied to the mining industry. Increased gold recovery, reduced water use and lower turbidity levels in wastewater discharges have been encouraging results at several grant sites. To complete the demonstration grants program, it will be necessary for the Legislature to extend appropriations for the grants, administered by DEC and DNR, through at least FY 1987. A project to compile and distribute the results of the grants has already begun and will continue through 1987.

An additional technology for reducing turbidity, the use of the flocculant polyethylene oxide (PEO), will be field tested at several different mine sites during the 1986 mining season. Thorough testing of its effectiveness under Alaska field conditions is needed to determine whether PEO is an affordable, environmentally safe technology that will enable miners to achieve acceptable turbidity levels in their effluents.

The "PEO Study," other new information, and the results of the demonstration grants program will be combined and carefully reviewed by the State in developing a position on proposed federal effluent limits for the placer mining industry. The information will be presented to EPA so that the federal rulemaking process, expected to be completed in 1987, will have the benefit of all available data.

Clearer Rules

During 1986, the Department of Environmental Conservation will propose revisions to its water quality standards to bring the stream reclassification process into compliance with federal regulations, which require the preparation of a use attainability analysis. DEC will conduct public hearings during spring 1986 to consider these changes and other issues as part of its triennial review of Alaska water quality standards. Some of the alternative management practices being considered may result in a change in the present regulations.

Enforcement

The State established a clear enforcement policy in 1985 that focused on miners who failed to obtain permits or who had inadequate settling ponds.

This enforcement policy was applicable to all streams, but focused enforcement effort on priority streams defined as those with high user conflicts. users were adversely affected by placer mining. This policy was explained early to miners and described in the "Enforcement Priorities 1985 Tri-Agency Placer Guidelines." The 1986 enforcement policy will be presented to the mining community prior to its April convention in Fairbanks. The State will work closely with federal agencies to ensure consistent and coordinated enforcement.

Much new information was gathered in 1984 and 1985 which will be used in resolving water quality problems with placer mining. This work will continue through 1986. By 1987, new federal effluent limits reflecting state input should be adopted, and a new EPA permit will be in effect. Also, revised state water quality standards will be in place and a technology base from the demonstration grants program will have been established. By the 1987 mining season, development of a comprehensive plan should be complete. Based on the results of studies and the grant program initiated by the Legislature, long-term implementation of a plan to reduce user conflicts can proceed.

# # #

ADMINISTRATION'S PROGRESS REPORT TO THE LEGISLATURE ON PLACER MINING AND WATER QUALITY

March 1986

In 1984, the Alaska Legislature recognized that conflicts between placer miners and competing downstream water users needed to be resolved. The goal was to reduce discharges into streams without unduly impacting the placer mining industry. To accomplish this goal, the Legislature initiated two simultaneous programs through the three resource agencies--the departments of Environmental Conservation (DEC), Fish and Game (DF&G), and Natural Resources (DNR).

The first program appropriated funds to each of the three agencies to conduct various studies of the effects of placer mining on water quality and fish and wildlife habitat, evaluate existing water quality standards, conduct a use inventory study of selected drainages, develop best management practices for placer mining and summarize the requirements of the federal Clean Water Act.

The second program authorized the DEC and DNR to establish a demonstration grant program to help miners study and test new ideas to improve gold recovery, reduce water usage, control pollutant discharges, and develop innovative methods of tailings disposal. These grants were designed to take advantage of the field experience and creativity of Alaska's miners.

The executive branch also recognized that the quality of water for downstream users was being impaired. In February 1985, Governor Sheffield told the Alaska Environmental Assembly that water quality was a high priority: "There's a place for responsible mining in Alaska, but downstream uses will have to be protected." The miners were given the same message during the annual Placer Mining Conference in March. The Administration stressed that enforcement of flagrant violations of water quality standards would be increased. To accomplish this, the 1985 Legislature authorized additional enforcement positions within DEC.

With these concepts in hand, the administration developed an interim four point approach for dealing with placer mining; elements of the approach are:

1. Education;
2. Technical Improvements in Mining Practices;
3. Clearer Rules; and
4. Enforcement.

The following is a discussion of the progress made in 1985 by government and industry. Planned accomplishments for 1986 are also discussed.

Education of Agency Personnel and the Public

Education is critical to instill a better appreciation of the various points of view in the debate about placer mining discharges and to develop an accurate understanding of the problems and limits of the available solutions.

Education is as crucial to the state agencies as it is to industry. The process of understanding different points of view, and the varying needs of different users, has increased dialogue between the various concerns. To help develop this dialogue, a public forum where these interest groups could meet to express and discuss possible approaches to ensure clean water for all users was created by DEC in 1984.

The Placer Mining Advisory Group (PMAG) was formed for this purpose. This group is composed of twelve members representing government, mining, environmental, and public interests. The operational expenses of the PMAG are supported by grant funds from the U.S. Environmental Protection Agency (EPA). In addition to serving as a forum for exchange of information, the group is charged with advising the State and the EPA on placer mining policy development. In 1985, the PMAG supplemented its regular meetings in Fairbanks with successful meetings in Central and Birch Creek Village to explain problems and provide for an exchange of views between villagers and miners. Several members of the Legislature participated in these meetings. Subject to continued federal funding of the PMAG, there will be more meetings of this nature in 1986.

Education is also occurring through a technical assistance effort begun by the second of the two programs authorized by the Legislature in 1985-the innovative technology demonstration grants program. This program, discussed more fully below, has resulted in information on gold recovery methods and pollution abatement techniques that need to be analyzed, compiled and shared. The consulting firm of L.A. Peterson & Associates was selected to prepare a

report on the results of the demonstration grants program. The final report of those demonstration projects completed during 1985 will be presented at the Alaska Placer Mining Convention in Fairbanks early April.

Technical Improvements in Mining Practices

To reduce pollution from discharges and to reduce the resulting downstream user conflicts, some past mining practices need to be altered. In the past, most miners have used high-energy, low-efficiency methods of separating gold from pay dirt. Many of these processes required large volumes of water and resulted in high turbidity and suspended solids discharges to the receiving waters. New mining technologies that use less water, discharge less waste and increase recovery of fine gold will be required if conflicts between miners and other water users are to be resolved.

The Legislature recognized the need to test new concepts and, in 1985, it funded an innovative technology grants program. Provided with funding in the form of grants, Alaska's miners were challenged to design and demonstrate innovative technologies to control pollution and improve recovery of fine gold.

During 1985, DEC and DNR implemented the demonstration grants program by first requesting applications from the mining community. The agencies received 82 grant applications from 56 miners. After review of all projects by a selection committee formed of mining and environmental representatives, 30

projects were awarded a total of $2,700,000 to test the following technologies:

- eight high efficiency jig gold recovery configurations;
- three hydrocyclone devices to reduce discharge volume;
- three recycling and tailings filtration processes;
- two zero discharge approaches using tundra or other vegetative filters;
- two underground mining methods that do not disturb the ground surface;
- two tailings management techniques which enhance rehabilitation;
- two projects to find costs of settling pond construction and maintenance, as affected by reduced water use;
- five assorted gold recovery devices never before tested in Alaska; and
- three prototype mobile gold recovery devices, which would facilitate rehabilitation.

At the close of 1985, 15 of the 30 grants were complete. Some of the ideas tested show great promise. To date, two characterizations can be made regarding water quality aspects of the grant projects: 1) the volume of water used can be reduced, and 2) turbidity of placer mine discharges can be successfully reduced at some sites. While written results are not yet available on most of the projects, at least three grantees were able to comply with the 5 nephelometric turbidity unit (NTU) limit for turbidity, while another came close with 11 NTUs. Complete information on the 1985 demonstration grants program will be available for presentation to the Legislature later in the session, should it be desired. These results will also be presented at the 1986 Placer Mining Conference in Fairbanks.

The remaining 15 grant projects are not yet complete. Successful completion

of these remaining projects will depend upon legislative action to extend the use of the funds. The legislative appropriation to the agencies for this program was non-continuing, and authorization to expend funds will cease at the close of FY 86. Several of the 15 grantees had anticipated and planned on a two-year project. Several other grantees experienced delays beyond their control in completing projects which were intended to be one-year efforts. In order to complete testing of the remainder of these projects, legislative action will be necessary to extend the existing appropriation through FY 87. The Administration strongly supports this extension.

An additional area of technical assistance deals specifically with turbidity reduction in mining discharges. The federal government, with assistance from the State, will initiate a study in Alaska during the 1986 mining season that could demonstrate an economic treatment process for reducing turbidity to acceptable levels. The study involves the use of a flocculant called polyethylene oxide, or "PEO." This inexpensive and environmentally-safe chemical when added to wastewater discharges, collects and combines with small sediment particles to form much larger aggregate particulates that readily settle out of suspension in settling ponds. The PEO study will be supported by funding from the EPA and the U.S. Bureau of Mines.

PEO testing is proposed at up to eight mine sites to determine its effectiveness under different soil types and mining practices. Results from other types of mines in the Lower 48 show that PEO can remove turbidity from those particular discharges simply and cheaply. However, it is not

yet known how it will work under placer mining conditions in Alaska. PEO is receiving cautious optimism in many quarters of the Alaskan mining community. The results of the 1986 PEO Study will be used by the EPA as it develops its final effluent limits for the placer mining industry.

Enforcement

The State has committed itself to better enforcement of water quality standards to protect those users and uses downstream from and adjacent to placer mining operations, including recreation, water supply and fish habitat. Better enforcement is defined as fair, consistent and comprehensive enforcement, designed to achieve measurable improvement in water quality at points where competing uses occur. Informing miners early and before the mining season of rules and policies is emphasized.

This policy was reflected in "Enforcement Priorities, 1985 Tri-Agency Placer Guidelines" to provide consistent and uniform direction to field staff of the resource agencies. This enforcement policy directed that enforcement actions begin with those miners flagrantly exceeding the 0.2 ml/l permit limitation for settleable solids. The policy also contained a list of priority streams of high anadromous fish value and where the greatest conflicts occurred between user groups. Enforcement efforts were to be first directed at these priority streams. A third priority was followup to those areas that were the subject of public complaint. The State's enforcement efforts were closely coordinated with EPA to ensure uniformity and consistency.

In 1985, DEC was granted funding by the Legislature to increase its placer mining enforcement staff from three to five persons statewide. This provided the support to develop a strong state field effort. State and federal resource agency field personnel in 1985 completed the following:

- 104 on-the-ground inspections of mine sites and accompanying trip reports
- 370 mine site inspections through aircraft overflights
- thirteen enforcement actions in the form of Notices of Violations or referrals to the Attorney General's office,
- Three legal actions filed in Superior Court with three preliminary injunctions issued to date.
- One legal action by the Attorney General's office enforcing a 1984 judgment which resulted in assessment of a $10,000 fine.

In 1983 and all prior years, DEC initiated no court actions and issued only one administrative compliance order for restoration of stream damages. One case was initiated by resource agencies in 1984.

Clearer Rules

The development of clear rules based on results from the two programs initiated by the Legislature in 1985 is imperative in guiding industry practices. In 1984, the Legislature directed the State agencies to review several aspects of the water quality standards and examine a basin planning approach that includes:

1) water quality standards for turbidity;

2) stream reclassification and use attainability analysis procedures required by federal regulations under the Clean Water Act; and

3) mixing zones, treatment methods, and variances.

A number of studies conducted under these programs are summarized later in this section. The approach for accomplishing the goal of a comprehensive management plan is explained in the Management Stragegy Selection Schedule section at the end of this report.

° Reclassification of Streams

The federal Clean Water Act establishes certain requirements that limit the flexibility of states in addressing water quality issues. Federal regulations adopted pursuant to the Clean Water Act set out minimum requirements that must be met before a state can reclassify a water body to allow less stringent water quality standards. Simply stated, these federal regulations require that as a prerequisite to relaxing standards to a point where the quality of a water body is no longer protected for a certain use (for example, fish habitat) it must be demonstrated that 1) the use is not an existing use (defined as one attained on or after November 25, 1975) and 2) the use will never be made of the water body because it is not attainable. In addition, the federal regulations require that a "use attainability analysis" be performed to demonstrate that a use is not attainable before the use may be excluded from protection under the standards. Current state reclassification procedures require only that a use not be an existing use before it can be excluded from protection under the water quality standards. As a result, DEC's present regulations conflict with federal law. DEC is now under a court order to correct this discrepancy.

This order was issued by Judge Hodges in October 1985, resulting from an appeal alleging procedural errors in DEC's conduct of reclassification hearings on a portion of the Tolovana River and tributaries near Livengood. Judge Hodges stated that the alleged procedural errors were moot in light of the discrepancy between state and federal law and ordered that DEC first correct that conflict. The order also requires that DEC conduct a use attainability analysis of the Tolovana River and its tributaries near Livengood, that DEC hold a hearing on the proposed reclassification, and that the hearing be conducted no later than March 31, 1986.

Consequently, DEC will propose regulatory changes to reflect the federal requirements in the State's water quality standards early in 1986, to be followed shortly thereafter by hearings on reclassification of the Tolovana River. It should be noted that while DEC has been ordered to reconsider and hold hearings on reclassifying the Tolovana River in the vicinity of Livengood, no decision whether or not to reclassify has been made. That decision will be based on the results of the use attainability analysis and the public hearings.

° EPA Effluent Limits

On another topic, the EPA is in the process of developing effluent limits for the placer mining industry. These limits are used in conjunction with water quality standards to set permit requirements. The limits are derived from data gathered by EPA in Alaska on what treatment level miners can achieve

using the "Best Available Technology Economically Achievable" or BAT. EPA released a draft of the proposed effluent limits this fall for public comment.

This draft regulation proposes that:

- No NPDES permit is required for recreational miners -- those handling less than 20 cubic yards of material per day.
- "Small" placer miners--those handling less than 500 cubic yards of material per day (about 80% of Alaska's miners)--will have a technology-based limit of 0.2 ml/l settleable solids and 2000 mg/l total suspended solids. This limit can be achieved by properly designed, constructed and maintained settling ponds.
- "Large" placer miners--those handling more than 500, but less than 4,000, cubic yards of material per day--will have to recycle 100% of their process wastewater. Small amounts of drainage discharge will be allowed, but it must meet the 0.2 ml/l and 2000 mg/l limits.
- Dredges, of which there are a handful in Alaska, will be required to operate with no discharge.

Final EPA rulemaking for placer mining effluent limits will not be completed until 1987. The proposed regulation will be revised based upon data collected during the 1985 and 1986 field seasons and from public comment. The State will work closely with EPA during the next year to ensure that results of the demonstration grants program are available to EPA in developing the federal government's final regulation.

° Permits for Placer Miners

Permitting has been a major factor in negotiations between industry and government. The current EPA permit has evolved from 1976 when almost two hundred identical EPA discharge permits were issued to placer miners. A condition of these permits required less than 0.2 ml/l of settleable solids be discharged in the effluent. In 1982, when the 1976 permits expired, EPA failed to issue new federal permits, so DEC was required to issue identical state wastewater discharge permits to several hundred placer miners. DEC again issued permits with a 0.2 ml/l settleable solids limit. These permits were not challenged or appealed.

In its 1984 permit, EPA set the limit for settleable solids at 1.5 ml/l. The State waived certification of this federal permit due to uncertainties about whether State water quality standards could be met at that limit by permittees who achieved compliance with the EPA permit.

In 1985, DEC was again asked to certify EPA's NPDES permit for placer mining. DEC certified that a settleable solids limit of 0.2 ml/l in placer mining effluents would reasonably assure compliance with State water quality standards. In establishing this limit, the Department considered the following (among other factors):

- 0.2 ml/l is the largest effluent limit which can still give reasonable assurance that the water quality standard for sediment in the receiving water can be met; that is, there occurs "no increase in concentrations

of sediment, including settleable solids, above natural conditions" and

- the 0.2 ml/l settleable solids limit for effluent can be met by properly designed, constructed and maintained settling ponds.

In 1985, the Miners Advocacy Council (MAC) filed suit alleging, among other things, that DEC's certification of the 0.2 ml/l effluent limit was a regulation, and as such, it was not appropriately promulgated. Superior Court Judge Hodges ruled that DEC's certification of the EPA draft permit was not a regulation. MAC is now seeking review of that decision by the Alaska Supreme Court. A second issue was raised, which is whether agencies should process all permit applications uniformly (i.e. batch processing) rather than providing site-by-site analysis. This issue is awaiting a final decision before an independent hearing officer conducting an administrative adjudication for DEC. The MAC is a party to this adjudication.

A major aspect in developing a comprehensive placer mining policy includes providing agencies with technical information for use in reviewing regulations and developing more effective rules for placer mining. The complexities of the issues and the development of technologies to resolve conflicts were addressed through technical studies of the problem beginning in 1984, and the grant program started in 1985. As mentioned previously, one of the two simultaneous programs initiated by the Legislature provided funds to carry out such studies. The following technical placer mining studies have been conducted to date. Copies of the full reports are available from the respective agencies noted.

° Review of Turbidity Literature - DF&G

In response to the mining industry's criticisms of turbidity as a water quality parameter, the ADF&G conducted a review and interpretation of recent information on turbidity as it related to freshwater habitats in Alaska.

The result, Habitat Division Technical Report 85-1 Turbidity in Freshwater Habitats of Alaska - A Review of Published and Unpublished Literature Relevant to the Use of Turbidity as a Water Quality Standard (Lloyd 1985) was released in January 1985. The report showed that turbidity can be correlated to adverse effects of suspended sediments in water such as extinction of light, reduction or loss of primary (plant) and secondary (zooplankton and aquatic insect) production or fish production, and reduction in recreational fishing and efficiency of fishery management techniques. It also reported that turbidity can be directly related to suspended sediment concentration and that the state's existing turbidity criterion for the growth and propagation of fish and wildlife may provide a moderate level of protection. However, primary productivity may also be reduced significantly under such conditions. The report concluded that the existing drinking water turbidity criterion would provide a higher level of protection for fish and wildlife.

° Particulate Criteria Review - DEC

This study was undertaken to assess the water quality standards pertaining to placer mining in Alaska. The Fairbanks firm of L.A. Peterson & Associates was selected by a steering committee to perform the study. The study sought to review Alaska's water quality criteria for particulates (turbidity and sediment) in light of recent scientific literature, federal guidelines, and criteria used by other states and the Canadian provinces.

Work started in March 1985, a draft report was distributed for public review and comment in September and October, and the final report was distributed in November 1985. The study concluded that the existing water quality standards are supported by scientific literature. It also pointed out that the current standards are more lenient than those of most western states and provide only a moderate level of protection for propagation of fish and wildlife. The study provided recommendations on improvements that could be made to the turbidity and sediment criteria for the use categories specified in the Alaska water quality standards The Peterson report recommended strengthening the sediment criterion for fish spawning beds and a five-fold decrease in allowable turbidity (above background level) for streams that do not have high levels of naturally occurring turbidity.

° Use Inventory Study - DEC

This study was designed to assess the other uses made of streams in placer mining areas. The purpose of gathering this information was to provide a basis for making management decisions with respect to placer mining. Results would enable the agencies to quantify the degree of conflict between water uses and help direct enforcement efforts, help assess the feasibility for a drainage basin approach to water quality planning and treatment, and serve as the basis for making decisions as to how waters should be classified for purposes of setting water quality standards.

The consulting firm of Dames & Moore was selected by a steering committee to perform the study. Work started in May 1985. A draft is scheduled to be circulated for public review and comment by March 1986. The

contractor has assessed and summarized the uses of, and available data on, 19 streams in the Interior and one in Southcentral. In addition, one area--the Birch Creek drainage near Circle--was selected for detailed study. In this target area, field surveys were conducted to accurately ascertain the biological, physical and chemical characteristics of the drainages. Personal and telephone interviews were conducted to compile the uses of the waters. The report is expected to provide much new information on water uses in the Birch Creek drainage.

° Water Quality Assessment - DEC

The resource agencies undertook efforts to gather and assess water quality in placer mining areas during both the summers of 1984 and 1985. Staff were stationed in the field to collect data to quantify the changes in water quality over time at stations downstream of placer mines.

In addition, the limits of detection for settleable solids, one measure of particulate pollution, were determined. This analysis quantified the lowest level of settleable solids that can be reliably measured using current field technology. The DEC report for 1984, Suspended Solids and Turbidity in Drainages Subjected to Impacts of Placer Mines, Interior Alaska, 1984, was published in October 1985. The second report for the 1985 field season will be completed by June 1, 1986. Results of these analyses quantified water quality and biological impacts as a function of downstream distance, type of mining operation and time.

° Placer Mining Wastewater Treatment Technology Project - DEC

In 1984, the DEC contracted Shannon and Wilson, Inc. to conduct a study of

placer mine wastewater recycling and alternatives. The study was published in March 1985. The intent of the study was to:

(1) Apply the technical and economic costs and benefits of sluice water recycling to placer mining in Alaska to determine its effect on fine gold recovery and pollution control.

(2) Evaluate alternatives to recycling to compare their cost effectiveness at increasing gold recovery and reducing water use and pollution.

(3) Determine the best achievable treatment processes at the three primary active placer mines studied.

(4) Determine whether Alaska and federal water quality standards can be attained by mining practices covered in the study.

(5) Recommend promising alternative technologies that warrant further study.

The study consisted of a literature review (Phase 1); laboratory testing of chemicals for effluent clarification, pilot scale testing of the effects of recycled water on fine gold recovery, and data gathering at active placer mines in Interior Alaska (Phase 2); and analysis (Phase 3). A report concluded each phase, with the Phase 3 report the final synthesis of knowledge gained during the study.

Based on the results of the study, the highest downstream water quality will be achieved by the use of well constructed and maintained settling ponds, minimizing the volume of effluent discharged from the pond system and bypassing all excess water flows. The use of recycle with as little makeup water as possible will reduce the volume of effluent more than many other water-reducing technologies.

With a recycle system, at least the recycle pond should be bypassed. Filtration through a properly graded tailings filter should be considered as a final polishing step for settling pond effluent. Ideally, settling ponds should not be cleaned during the summer because the disturbance creates an adverse impact on downstream water quality.

Optimizing the sluice and wash water characteristics will improve gold recovery. A lower water duty may offset higher viscosities and reducing the time between cleanups may minimize riffle packing and its effects on gold recovery.

The report concludes with a number of recommendations for further study in water quality and gold recovery.

° Water Use Management Alternatives Under the Clean Water Act - DNR

This study, conducted by Plangraphics, Inc., involved an analysis of the Clean Water Act and management alternatives for resolving placer mining water quality issues.

The report details a broad range of technical, legal and regulatory alternatives that have been utilized or considered by other states and which could be considered by Alaska. It provides a key information base for determining possible alternative courses of action. Some alternatives are relatively short-term, low-cost approaches. Others are relatively longer term, would require a high level of technical analysis, be expensive to implement, and may need a modification of federal law to succeed.

The information in the report is summarized in the form of flow charts or "pathways." One flow chart shows the alternatives grouped according to their applicability to placer mining. Another shows the relative cost, flexibility and time frame of implementing the various alternatives.

° Best Management Practices - DF&G

The DF&G contracted with Entrix, Inc. in mid-1985 for development of best management practices (BMPs) for placer mining. The BMPs were designed to control nonpoint source pollution associated with mine sites and to promote rapid rehabilitation of land and aquatic habitats following cessation of mining. Entrix extensively reviewed the erosion control and rehabilitation literature, particularly that related to northern environments, and developed site planning and site-design techniques that could be used by resource management agencies and the placer mining industry.

The BMP project was completed in January 1986 with the release of two documents, Best Management Practices for Placer Mining Technical Report and, Best Management Practices for Placer Mining Reference Manual. The latter presents step-by-step procedures for site-planning, operation, and rehabilitation that provide for control of nonpoint source pollution and rehabilitation of terrestrial and aquatic habitats.

° Aquatic Habitat Assessments - DF&G

During 1985, the ADF&G completed Habitat Division Technical Report No. 85-2 Aquatic Habitat Assessments in Mined and Unmined Portions of the Birch Creek Watershed based upon field work conducted in 1984. Mined and unmined portions of streams in the Birch Creek watershed were inven-

toried to collect data on fish presence, habitat quality, and the densities and community structure of bottom-dwelling invertebrate populations.

Placer mining in the Birch Creek watershed resulted in substantial adverse effects to stream vegetation, fish habitat, and fish and aquatic invertebrate populations. This documentation of the impact of placer mining on fish and wildlife habitats provides a scientific basis for management decisions concerning the placer mining industry.

° Review of Pertinent Flocculant Literature - DF&G

The DF&G initiated a literature review of chemical treatment methods for mine effluents in 1985 and completed a draft for peer review late in the year. Flocculants and other chemicals have been used successfully in the Lower 48 for clarifying industrial and mine process waters, but laboratory and field tests of chemical treatments for placer effluents in Alaska have shown mixed results. Therefore, the agencies determined that a review of available information on chemical treatments would be a useful guide to testing and potential future application of these treatments in Alaska. DF&G's review, tentatively entitled Chemical Treatments of Effluents with Application to Placer Mining: A Review of the Literature, will be released in early 1986.

° Aquatic Habitat Assessments (Koyukuk Mining District) - DF&G/EPA

During the summers of 1984 and 1985, the ADF&G and the Environmental Protection Agency conducted joint field studies of the physical and biological characteristics of mined and unmined streams in the Middle and South Fork Koyukuk River area with assistance from the U.S. Forest Service - Institute

of Northern Forestry and the U.S. Fish and Wildlife Service. Study methods closely paralleled those used in the ADF&G's Birch Creek work. The ADF&G is currently analyzing field data and will prepare a technical report Aquatic Habitat Assessments in Mined and Unmined portions of the Middle and South Fork Koyukuk River Watersheds during the remainder of FY 86.

The Koyukuk study area provided differing biological, geographical, and mining conditions from those occurring in the Circle Mining District and thus will broaden the information base for future management decisions.

° Downstream Impacts - DF&G

During the summer of 1985, the ADF&G carried out a biological sampling program for bottom-dwelling invertebrates in conjunction with Dames and Moore's use inventories in the Birch Creek watershed.
The ADF&G sampled a series of locations from headwater areas above mining to downstream areas many miles below mining. Data analysis is currently in progress, and a technical report Downstream Impacts of Placer Mining in the Birch Creek Watershed will be completed during the remainder of FY 86.

This study is expected to yield a better picture of how mining impacts extend to downstream areas and how such impacts are correlated with the sediment-loading and fisheries information collected by Dames and Moore.

Solutions to the conflicts between placer miners and other water users will be difficult to develop, may be expensive to implement, and may cause some deposits to become economically infeasible to mine. Thus, during the adoption of an overall management plan for placer mining, it is necessary to consider every feasible approach that will reduce conflict and result in a stable regulatory climate that allows the industry to remain viable while protecting other uses of the state's water.

The studies and other information discussed previously in this report will, when completed, provide an expanded data base for developing a comprehensive management strategy for the Birch-Crooked Creek drainage, the primary area of study. It is intended that the Birch-Crooked Creek drainage set the example for a statewide placer mining management plan.

The development of a strategy for the Birch-Crooked Creek drainage has already begun. Preliminary and partial compilations of data show some possibilities for resolving water use conflicts, such as through the use of flexible mixing zones. The three resource agencies are now in the process of tranferring the basic data to a common base map system as a useful way to evaluate the results from the studies. Other methods of synthesizing the data will also be explored. This information developed for the Birch-Crooked Creek Drainage System (Circle Mining District) will be sent out for public review prior to the 1986 field season for the purpose of filling data gaps. As a result of new information from the public, field work, and completion of the demonstration grant and "407" programs, a preliminary strategy will be developed this fall. The results will be used to develop a comprehensive management strategy which specifies policies and implementation

procedures. It must be recognized, however, that there are a limited number of options available which could provide solutions to the difficult issues associated with placer mining.

The tentative schedule for completion of this work on the Birch-Crooked Creek drainage is:

- April 15, 1986 - Birch Creek-Crooked Creek drainage data base compilation.
- May 15, 1986 - Identification of data collection needs for field season 1986.
- December 1, 1986 - Preliminary comprehensive management strategy selection.

The goal of this schedule is to enable the state to make available a firm and coordinated position on the EPA effluent limits and NPDES permits for the 1987 mining season and develop from solid technical information a comprehensive state strategy for resolving placer mining problems.