

50 Tanner Street
Haddonfield,
New Jersey 08033
May 23, 1972

Audubon Magazine
1130 Fifth Avenue
New York, N.Y. 10028

Ms. Ann Guilfoyle
Senior Editor

Dear Ms. Guilfoyle:

On December 5th of 1969 you contacted me for some photographs depicting the open-pit mining activity of the Callahan Mining Corporation on Cape Rosier, Maine.

At the time I declined your request on advice of counsel, the legal problems that could have occurred I'm sure you are aware of; a secondary reason did enter into the matter in that friends as well as myself are neighbors in close proximity to the mining activity and we were (and still are) trying to make the best of the rather unnatural experience of living next to an open-pit heavy metal mining operation.

My reason for writing is in looking over your reply to me of February 3rd 1970 and its necessarily brief handling of a complicated situation I felt the urge to write to you concerning a story of unusual cooperation that has the potential for constructive reclamation of a mine-site.

Attached are copies of articles from this past weeks, ELLSWORTH AMERICAN, ISLAND ADVANTAGES and the WEEKLY PACKET all weekly papers in Hancock County. They will I believe explain all that is necessary.

I would like to add one thing. In the years I have subscribed to your magazine there has been a noticeable lack of reporting this kind of corporate consideration for not only the environment but the people affected.

I think you and your magazine should consider a study of this unique situation for the good that it might promote on behalf of others towards the national environmental problems we all face.

Sincerely,

Albert E. Sandecki

Tel No. 609 429 1310

MAY 21ST.

SHERM GREEN CALLED 7:15 pm - 7:30.

- FENTON - AMBIGUOUS ON ONE REASON FOR NOT ASSOCIATING CALLAHAN'S PENOBSCOT UNIT WITH CERT. OF INCORPORATION.
- ASSOCIATION WITH CALLAHAN MNG. MIGHT PREVENT OBTAINING FEDERAL FUNDS FOR RECLAMATION.
- 2ND PARAGRAPH. (MGT. GARNING) THIS IS AN OUT OF THE BOOK TECHNICALLY - S.O.P.

QUESTIONS ON BY LAWS TO BE PRESENTED AT FIRST MTG OF G.P.R.S. FIRST WEEK OF JUNE.

CAN BRING UP. QUERRIES CONCERNING GRRFOF.ORG.

- 1/ WHAT IS DISPOSITION OF LIABILITY - G.P.R.S OR CALLAHAN?
(OPEN SHAFT, OTHER WORKINGS, ACCIDENTS AT RECLAMATION SITE OR SITE)
- 2/ ENLARGING - NUMBER OF DIRECTORS?

50 Tanner Street
Haddonfield,
New Jersey 08033
May 17, 1972

Mr. William Sherman Greene, Jr.
Attorney & Counsellor at Law
Sunset, Maine 04683

Dear Sherm:

Enclosed is a copy of the Certificate of Organization with my penciled comments to avoid misunderstandings, also the original as per your instructions today via telephone.

Also sending your copy of the bylaws with my lightly penciled in (laymans) suggestions. I realize that this is something that can be hashed out at the first meeting of the G.P.R.S. I think Mr. Fenton should have numbered the pages of the proposed bylaws. John Gray is preparing copies of the Bylaws to be sent to the members of the committee so they may also look them over for any changes.

I have enclosed a zerox copy of the page in the Certificate of Organization with my name blanked out in the chance that this could be substituted into the original form with either Mr. Leach or Mr. Howard's name typed in ? (don't know if this is proper) but thought it worth a try to unsnarl the situation. (?)

THURSDAY MAY 18th. Not having heard from you yesterday when I started this letter I have gone ahead as you instructed and signed both as treasurer and director. I would appreciate your including the original of my letter to John Gray along with the Certificate of Organization when you forward the certificate to him. I hope the letter reaffirms the understanding I have with John on the telephone in regard to the appointment of a new treasurer at the first meeting of the G.P.R.S.

I hope all goes smoothly with the Governors conference today.

Sincerely,

Albert Sandeck

cc: CMF

50 Tanner Street
Haddonfield,
New Jersey 08033
May 17, 1972

Mr. John H. Gray
Chairman G.P.R.S.
Brooksville,
Maine 04617

Dear John:

Enclosed is the signed Certificate of Organization. I have filled in the blank opposite the position of treasurer with the understanding we discussed last night that at the first meeting of the G.P.R.S. the members will consider the practicalities of having a treasurer more experienced and accessible to the main body of the committee.

I feel rather strongly that the officers of the committee should be local, readily available and accessible for committee business to avoid possible delays and loss of important papers through the mails, which has occurred to me on occasion.

One point I meant to bring up last night concerned the first paragraph of the Certificate of Organization. I feel the outline of purpose should clarify the "area disturbed by mining operations" by reading (area disturbed by the Callahan Mining Corporation's, Penobscot Unit mining operations). My reason for this is that it is too broad a statement as it stands now if you consider the possibility of another mining operation coming to Brooksville in the future. Existing legislation should apply to a new mining operation and I do not think that the committee should leave itself open to added burdens.

The second paragraph in stipulating the protection of net earnings from "any member, officer or individual" might also consider the addition of (privately owned entity).

I hope to attend the first meeting of the G.P.R.S. barring any unforeseen developments here I should be at Harborside the first of June for a few days and then returning by the 20th until September.

Hope all went well at the meeting with Governor Curtis.

Sincerely,

cc:

Albert Sandecki

CERT. ORG. AMEND CALL TO GREENE - MAY 16TH 6PM
" " GRAY - " " 10PM
SIGNATURE WITH CALL TO GREENE - MAY 17. 10AM
AMEND - NO WITHOUT CALL
WILL CALL - SIGN & SEND
TO GREENE IF NO CALL

Wm. Sherman Greene, Jr.
Attorney and Counsellor at Law
Sunset, Maine 04683

207-348-2881

May 15, 1972

Mr. Albert E. Sandecki
50 Tanner Street
Haddonfield, N J 08033

Dear Albert:

Thank you for your letter of May 11, 1972 and enclosures. You have now received my later report on the Boring's conference.

I assume you have the minutes of the Reclamation Meeting which Fred Beck prepared.

Finally, I shall await your report as to the corporation matters which I sent you. Best regards.

Sincerely,


Wm. Sherman Greene, Jr.

WSG:RL

May 12, 1972

William Fenton, Esq.,
109 Main Street
Bar Harbor, Maine 04609

Dear Bill:

Thank you for your letter of May 9, 1972.

The Certificate of Organization for the Goose Pond Reclamation Society, which you enclosed, appears in order, but I must tell you that I have not been close to the Committee organizing this group and will be guided by Albert Sandecki's recommendations. The Certificate does set up a non-profit organization and should qualify for exemption.

The purposes appear to me to be in order. The reclamation, under the language in the Certificate of Organization, would be broad enough to take care of a water area in Penobscot Bay, as well as in the mine area on land, which is important.

The language as to the exercise of the purposes and powers solely for the benefit of all of the residents of the Town of Brooksville, Maine, is intended, I am sure, to be read in conjunction with the rest of the fifth paragraph and would not limit the corporate powers which benefit adjacent areas. I have gone over the By-Laws. My comments are subject to Albert Sandecki's consideration as well as the entire Committee.

In Article III, the number of members of the Corporation is limited to fifteen. I do not know if the Committee planned to make this a Town or area group. Perhaps fifteen would be sufficient for desired representation.

The powers of the Board of Directors are such that they will have control of the Organization. I would have no objection to this, if it is clearly understood.

These comments may be of help in considering the Certificate and By-Laws.

I have forwarded a copy of this letter to Albert Sandecki with the Certificate and requested that he sign it as Treasurer and Director, if he approves it. He can send it directly to John Gray thereafter.

I have also sent the By-Laws to Albert for his consideration.

Very truly yours,

WSG:RL

Wm. Sherman Greene, Jr.

Wm. Sherman Greene, Jr.
Attorney and Counsellor at Law
Sunset, Maine 04683
207-348-2881

May 12, 1972

Mr. Albert E. Sandecki
50 Tanner Street
Haddonfield, N J 08033

Dear Albert:

Bill Fenton sent me the re-written Certificate of Organization of Goose Pond and the proposed By-Laws. They are enclosed.

I have sent him my comments and enclose a copy of my letter.

Please look them over and you may want to discuss them with me on the telephone.

Marian phoned this morning to inquire about the Borings' conference. I telephoned Fred Beck. Fred tells me that they had a long meeting with Mr. and Mrs. Boring and she suggested that instead of a grant of any land, there be a lease and license for them to moor their boat in the Pond. This was agreed to and the papers are now being drafted. In return the Borings will permit a well to be drilled opposite Col. Greene's driveway. Hopefully the work can start soon.

Charles Snead, Mr. Hall and Fred Beck will be at the mine next week and I hope can wind these things up then.

We can discuss this when you telephone me about the incorporation.

Sincerely yours,



Wm. Sherman Greene, Jr.

WSG:RL
(encl)

Bylaws of Goose Pond Reclamation Society

ARTICLE I - Name and Location

The name of this corporation shall be GOOSE POND RECLAMATION SOCIETY and its location and principal office shall be in Harborside, Town of Brooksville, Hancock County, Maine.

ARTICLE II - Purposes

The corporation is organized exclusively to improve the ecology, scenery and the general environment of the Town of Brooksville, Maine, by working for, encouraging, assisting and stimulating the reclamation of areas disturbed by mining operations and for the above purposes, to acquire by gift, purchase, lease, devise and bequest and to hold, improve, ^{restore,} maintain and manage, and to lease, sell and exchange real and personal property.

All of the foregoing purposes and powers are to be exercised solely for the benefit of all of the residents of the Town of Brooksville, Maine, and this corporation is one which does not contemplate pecuniary gain or profit to the members thereof and is organized for non-profit purposes and no part of any net earnings thereof shall inure to the benefit of any member, officer or other ~~individual~~ ^{person or corporation}

No substantial part of the activities of the corporation shall be the carrying on of propaganda, or otherwise attempting, to influence legislation and the corporation shall not participate in, or intervene in (including the publishing

or distribution of statements) any political campaign on behalf of any candidate for public office.

In the event the corporation should be dissolved, all of the assets of the corporation, after payment of its liabilities, shall be transferred, assigned and conveyed to such organization or organizations organized and operated exclusively for charitable, educational, religious or scientific purposes as shall at the time qualify as an exempt organization or organizations under Section 501(c)(3) of the Internal Revenue Code of 1954 or the corresponding provision of any future United States Internal Revenue Law as the Board of Directors shall determine.

ARTICLE III - Membership

The members of this corporation shall be the signers of the Articles of Association and such other members as may be elected at any meeting of the corporation or of the Board of Directors, but any member may resign by giving written notice of his resignation to the President. The number of members shall be not less than seven (7), nor more than fifteen (15).

ARTICLE IV - Directors

All powers of the corporation, except those required by law to be exercised by the members, shall be vested in a Board of eight (8) Directors, each of whom shall be a member of the corporation at the time of his election to the Board.

The first Directors shall be elected at the meeting of organization by the signers of the Articles of Association; thereafter the Directors shall be elected at the annual meeting of the corporation.

Each Director shall hold office until the next annual meeting of the corporation and until his successor shall be elected; provided, however, that no person shall continue to be a Director after he ceases to be a member of the corporation and provided further that any Director may resign at any time by tendering his resignation to the Board of Directors. The Board of Directors shall have power to fill any vacancy in the Board.

At each annual meeting of the corporation, the Board of Directors shall present a report of the affairs of the corporation and of the business transacted since the previous annual meeting.

ARTICLE V - Officers and Committees

The officers of the corporation shall be a President, a Treasurer and a Clerk, and such other officers or committees as the Board of Directors shall deem advisable. The President and the Treasurer shall be members of the Board of Directors.

The first officers shall be elected at the meeting of organization by the signers of the Articles of Association. Thereafter, the President and Treasurer shall be elected each year at the first meeting of the Board of Directors held after the annual meeting of the corporation, and the Clerk shall be elected at the annual meeting of the corporation. Other officers and committees shall be designated as the Board of Directors shall determine.

All officers shall hold office from the time of their election until the next annual meeting of the corporation or

until their successors are elected; but no person shall continue as an officer after he ceases to be a member of the corporation. Any officer may resign at any time by tendering his resignation to the Board of Directors. Vacancies in any office shall be filled by the Board of Directors.

The officers shall have all the powers and perform all the duties usually appertaining to their respective offices, and such other duties as the Board of Directors may direct. The Clerk of the corporation shall also be Clerk of the Board of Directors.

ARTICLE VI - Annual Meeting of the Corporation

The annual meeting of the corporation shall be held in the Town of Brooksville, Hancock County, Maine, ~~on the second~~

~~Monday in the~~ ^{during} month of July of each year, ^{the time to be determined} Special meetings ^{by the Board}

shall be held upon the written order of the President or of a majority of the Board of Directors to the Clerk.

ARTICLE VII - Meetings of the Board of Directors

The first meeting of the Board of Directors shall be held without notice immediately after the meeting of organization; and thereafter, a stated meeting of the Board shall be held immediately following each annual meeting of the corporation.

Special meetings of the Board shall be held upon the written order of the President or of a majority of the Board of Directors to the Clerk. Reasonable notice of any meeting of the Board of Directors shall be given by the Clerk by mail, telegram, telephone or in person.

The Clerk shall give written notice of each meeting of

the corporation at least seven days before the date thereof. The notice of any special meeting shall specify the business to be transacted at such meeting. Notice of any meeting of the corporation or of the Board may be waived in writing by any member thereof.

ARTICLE VIII - Quorum

Five members of the corporation entitled to vote, present in person or by written proxy, shall constitute a quorum for the transaction of business at any meeting of the corporation, but in the absence of a quorum, a majority of those present at the time and place set for a meeting may adjourn the meeting from time to time until a quorum shall be present.

A majority of the Board of Directors shall constitute a quorum for the transaction of business at any meeting of the Board, but in the absence of a quorum, a majority of those present at any time and place set for the meeting may adjourn the meeting from time to time until a quorum shall be present.

ARTICLE IX - Proxies

Each member shall be entitled to one vote at any meeting of the corporation. Any member entitled to vote at a meeting of the corporation may appoint another member or members to act as his proxy at such meeting. Such appointment shall be made by an instrument in writing specifying the meeting for which authority is granted, and shall be executed not more than thirty (30) days before the meeting.

ARTICLE X - Transactions

All conveyances, deeds, mortgages, contracts, leases

or other agreements in furtherance of the purposes of this corporation shall be authorized by the Board of Directors, and all deeds, contracts and other instruments shall be executed on behalf of the corporation by the President or by any other officer or agent duly authorized to do so by the Board of Directors.

ARTICLE XI - Seal.

In lieu of an impression seal, the seal of the corporation shall be a wafer of colored paper affixed to any instrument signed on behalf of the corporation.

ARTICLE XII - Non-profit Corporation, Employees

No member, Director or officer of this corporation shall receive any pay, in money or otherwise, solely by reason of his status as such member, Director or officer; but the corporation may reimburse any person for reasonable expenses incurred on behalf of the corporation and the corporation may employ such person or persons, with such remuneration for services rendered, as the Board of Directors shall deem necessary and reasonable.

ARTICLE XIII - Power of Directors to Amend, etc.

The Board of Directors shall have power to make, amend and repeal the Bylaws of the corporation, by vote of a majority of all the Directors at any regular or special meeting of the Board.

ARTICLE XIV - Power of Members to Amend, etc.

The members may make, alter, amend and repeal the Bylaws of the corporation, at any annual meeting or at a special meeting called for the purpose, and all Bylaws made by the Directors

may be altered or repealed by the members.

After acceptance of the foregoing Bylaws, upon motion duly made and seconded, it was unanimously VOTED that the associates, all of whom are members, proceed to the election of a President, a Treasurer, a Clerk and eight ⁹/~~8~~ Directors. Thereupon, motions having been duly made and seconded, a ballot was taken for the said election, and the Chairman reported that the following named persons had been unanimously elected to their respective offices:

President - John H. Gray
Treasurer - Albert Sandecki
Clerk - Frederick Beck
Directors - Charles Shannon Blodgett
Robert Dow
Robert Doyle
Frederick M. Beck
John H. Gray
Albert Sandecki
Robert Howard
Clifford Leach
Florine M Black

The Clerk was duly sworn according to the following original record of his oath:

STATE OF MAINE
HANCOCK, ss.

, 1972.

Personally appeared Frederick Beck and made oath that he would faithfully and impartially perform the duties required of him as Clerk of Goose Pond Reclamation Society.
Before me,

Notary Public

Upon motion duly made and seconded, it was unanimously

VOTED that the President, the Treasurer and a majority of the Board of Directors prepare and verify the certificate of organization setting forth the name and purposes of this corporation, and other particulars required by the laws of the State of Maine, and cause the same to be examined, certified and approved by the Attorney General and recorded with the Registrar of Deeds of Hancock County and with the Secretary of State in the manner required by law.

The Chairman reported that no further corporate business could be transacted until said certificate of organization had been approved by the Attorney General and recorded as required by law.

Thereupon, the meeting adjourned.

A true record, attest

Notary Public

We, the undersigned associates of Goose Pond Reclamation Society, declare that we consent to the doings of this organization meeting and to the foregoing Articles of Association.

John Hurst Jr. of the Me. Dept. of Sea and Shore Fisheries, and there is uncertainty that attempts at restoring the area will be successful.

Mining is nothing new to Cape Rosier, especially Harborside, where the first excavations of the

(Continued on page 24-A)

•••

By Robert L. Dow
and
John W. Hurst Jr.

Reputedly the only intertidal heavy metal mine in the world, the open pit on Cape Rosier at Harborside where Goose Pond was a tidal cove before a dam was built to exclude sea water, is also unique in other respects.

Except for copper it has established in clams record Atlantic coast highs of such toxic

amounts of zinc, copper, lead, cadmium and nickel in sea water, bottom sediments and rockweeds in addition to clams.

All these metals are, in varying degree, poisonous to humans and to marine worms, fish, shellfish and plants, although several of them are essential in trace amounts to human as well as to other animal life.

FOOD DESTROYED

Water samples contaminated by mine effluent discharge and collected for a mile outside Goose Cove were toxic to one-cell algae, an important part of the food base of commercial species; therefore, shellfish which manage to survive the effects of heavy metals may very well starve to death because of the damage done to their food sources by these same metals.

each of post-milling iron, cobalt and manganese samples exceeded the maximum background. Two-thirds of all Goose Cove cadmium samples exceeded the maximum background. Only chromium and nickel varied little from background.

A study of tidal flow and toxic metal contaminated clams showed that water-borne mine and mill wastes moved closely along the mainland shore east of Holbrook and Ram islands (Fig. 2).

Results of the hydrographic study were later confirmed by the analysis of sediments, rockweeds and soft clams collected at stations established to monitor the environmental impact of heavy metal mining and ore separation.

The relative stability of metal

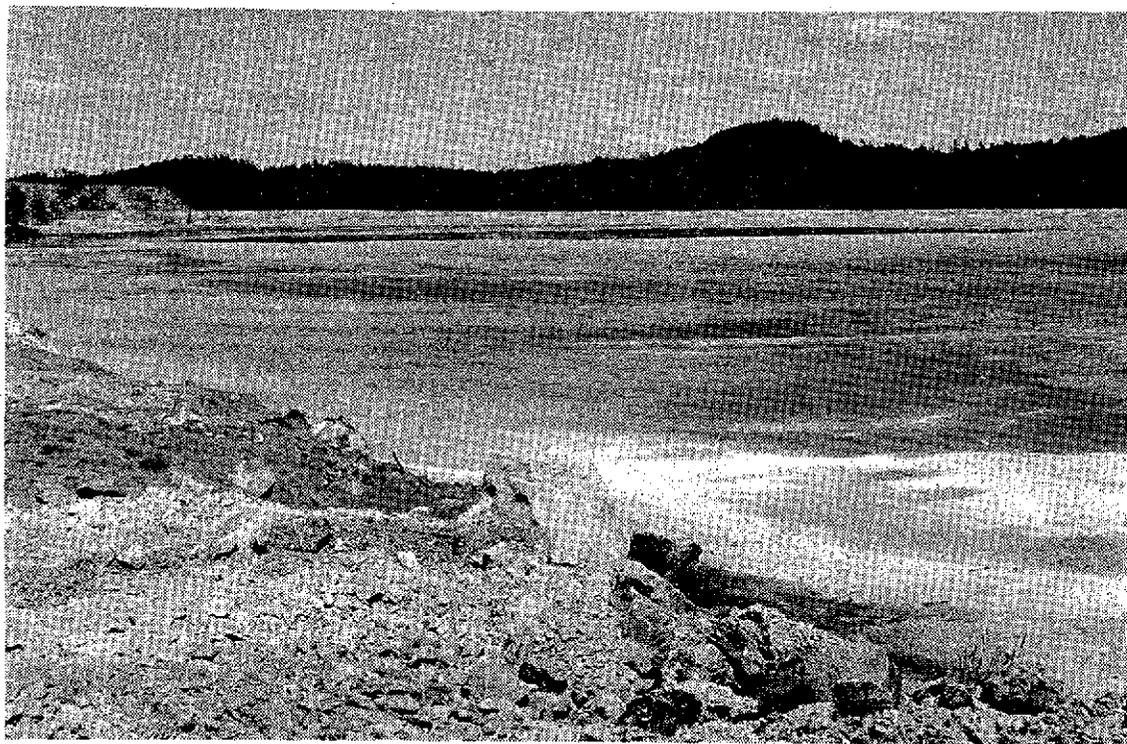
On the east side, lead scores increased from less than 5 parts per million (ppm) in December 1967, before ore milling operations, to 55 ppm by February 1972, but on the other side at Station No. 9 lead increased from 2 to 17 ppm immediately after the mill began ore processing but has declined since to 2 ppm and has remained relatively steady at that level. Increases in heavy metals at Station No. 8 on the east side of Goose Cove since 1967 are shown in Table 2.

Clams and rockweeds also appear to be selective in their concentration of metals. Zinc concentrations were five times as high in rockweeds as they were in sediments and 10 times as high in rockweeds as they were in soft clams. Copper was the same in sediments and in rockweeds, but only half as high in clams.

other metals appear to support the statement that there is a more direct influence of metals in sediments on levels of contamination in clams than there is of metals in water. The low solubility of copper (and other metals) may account for the lack of correlation between water and clam concentrations and the positive correlation between levels in sediments and clams.

Five of the six heavy metals under immediate consideration by the federal government for control purposes in food and water are present in the mine at Cape Rosier: zinc, copper, cadmium, lead and chromium. Of 397 clam samples from Cape Rosier, 88 samples or 22% contained levels of lead, zinc, copper, cadmium or chromium above the standards for heavy

(Continued on next page)



MOUNTAIN of tailings, above, and sea of mud in settling pond, at left, are remains of mining operation, the effects of which will be around for a long time. Not only are these residues new scenes on the Harborside surroundings, they will also continue to leach heavy metals for years to come.

THIS IS A PREPRINT --- SUBJECT TO CORRECTION

Marine Challenges Encountered by a Small Mine on the Maine Coast

By

Frederick M. Beck, Callahan Mining Corp.

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Offshore Technology Conference on behalf of American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., The American Association of Petroleum Geologists, American Institute of Chemical Engineers, American Society of Civil Engineers, The American Society of Mechanical Engineers, The Institute of Electrical and Electronics Engineers, Inc., Marine Technology Society, Society of Exploration Geophysicists, and Society of Naval Architects & Marine Engineers.

This paper was prepared for presentation at the Second Annual Offshore Technology Conference to be held in Houston, Tex., April 22-24, 1970. Permission to copy is restricted to an abstract of not more than 300 words. Illustrations may not be copied. Such use of an abstract should contain conspicuous acknowledgment of where and by whom the paper is presented.

ABSTRACT

Callahan Mining Corporation is currently mining copper and zinc ore from an open pit mine on the edge of Penobscot Bay in Maine. The open pit occupies an area once largely covered by a salt water pond. The mining operation utilizes conventional mining and milling techniques and in this respect perhaps could not be considered a true marine mining operation. However, many obstacles had to be overcome due to the proximity of the ocean before the mine could be brought into production. Problems with which inland mines do not have to contend are faced daily. These include effluent control, marine mud stability, salt water encroachment, reclamation, and exploration.

The ore deposit is a stratiform massive sulfide body in early Paleozoic volcanics. The principal ore minerals are sphalerite and chalcopyrite with minor galena. Associated minerals include chlorite, talc, and carbonate.

Illustrations at end of paper.

The deposit was discovered in 1880 at low tide by a clam digger. Surface ore outcrops were entirely below high tide. The mine was developed and mined from three shafts. Apparently the deposit became unprofitable in about 1887. A re-evaluation in 1964 by the Callahan staff prompted the present open pit operation. Production is currently at the rate of 700 tons per day.

Exploration for additional ore deposits is complicated by the presence of salt-saturated mud in estuaries and salt water covering geologically favorable prospecting ground. Many conventional inland exploration techniques are useless near these areas.

The ocean presence has added substantially to the mining costs, thus narrowing the profit margin. New techniques must be developed by the mining industry to cope with oceanographic problems. Some of these challenges are being met at Cape Rosier and can be applied to future mining ventures faced with similar marine problems.

INTRODUCTION

The Penobscot Mine on the Maine coast is not a "marine mining" operation in the strictest sense. For the most part, conventional techniques of mining and milling are in use and the ocean is a nuisance. However, by being located at the sea-land interface, there are a number of factors which influence the operation which would not be encountered inland. The engineering challenges of dealing with the shallow estuary were relatively easily mastered. The challenge to mineral exploration still exists and is a subject of continuing effort. The nation's sea-land interface is probably one of the most popular and valuable multiple use areas in the country. In Maine it has scenic beauty, is sought after for summer homes, provides food and shelter during parts of the life cycles of innumerable marine species, and is the basis for commercially important coastal fisheries. It is an area high on most lists for environmental protection. It is natural that the addition of another "user" to this area would be resisted, particularly when that user represents an industry which has a past record of environmental abuse. The greatest challenge to Callahan Mining Corporation has been to operate a mine in a way which does not pollute or otherwise adversely change the environment and yet returns a profit to the stockholders. This paper will describe some of the problems encountered and ways in which they were or are being solved.

HISTORY

Eastern coastal Maine (Figure 1) has had a long sporadic history of mineral exploration and minor metal production. During the 1880's there was a mining boom, complete with a stock exchange located in Blue Hill. Prospecting was intense during this period and the deeply incised coast provided a relatively high percentage of bedrock exposure in an area otherwise mostly covered with glacial till.

Production during this period was largely from the Douglas and Twin Lead Mines at Blue Hill (Figure 1). A smelter at Blue Hill reduced the copper ore and the product was shipped to the populated areas further south by coastal schooners.

About ten miles west of the Blue Hill

mining camp an outcrop of massive zinc and copper ore was discovered at low tide by a clam digger. This outcrop occurred in a tidal estuary known as Goose Falls Pond (Figure 2). Subsequently a shaft was sunk on the nearby shore and production of high grade zinc-copper ore commenced. The ore was taken from Goose Cove to Castine (Figure 2) by barge and piled on a dock. Periodically, coastal schooners would load the ore and deliver it to smelters in the south.

The ore at the Penobscot Mine was eventually mined from three shafts and production from 1881 to 1883 was about 10,000 tons. Apparently, low metal prices in 1887 forced the mine to close. It remained closed until 1914, at which time an attempt to reopen the mine proved unsuccessful.

In 1940 the St. Joseph Lead Company conducted a drilling program on the property. This was supplemented in 1942 by drilling conducted by the U.S. Bureau of Mines. Although numerous intersections of copper and zinc sulfides were encountered, apparently the property was considered uneconomic. Additional diamond drilling was done by the Bureau of Mines in 1950. The property was eventually optioned by the Penobscot Mining Company, Ltd., of Toronto in 1956.

This company drilled a few holes from the surface, cleaned out the old workings, and drilled from underground. The property was brought to the attention of Callahan Mining Corporation in 1964. Re-evaluation of all past work indicated that sufficient values might exist to warrant an open pit mining operation. A lease was negotiated with the Penobscot Mining Company and the property is currently being mined under the terms of this lease.

GEOLOGIC SETTING

The base metal mineral occurrences in eastern coastal Maine occur in early Paleozoic volcanic and sedimentary rocks. The volcanic rocks range in composition from mafic pillow lavas to felsic fragmentals. Rhyolite domes and rhyolites of probable tuffaceous origin are common. The sedimentary rocks are present as schist, gneiss, and quartzite, and may represent, in part at least, sedimentary accumulations derived

from and deposited during volcanism. The sediments and volcanics are intruded by igneous rocks, mostly of granitic composition.

The base metal deposits in eastern coastal Maine occur in volcanic rocks and associated sediments. Metamorphism due to subsequent igneous activity has in places affected both the metal deposits and the enclosing rocks.

PRESENT OPERATION

At present, the mine consists of an open pit, roughly circular in shape, which will have an ultimate depth of 340 feet below sea level (Figure 3). The present depth is 150 feet below sea level. The pit covers about 9.4 acres and when "mined out" will have produced over seven million tons of ore and waste. Mining and milling began early in 1968.

The ore occurs as lenticular pods of massive zinc and copper sulfide ore. It is a stratiform deposit in a sequence of fragmental volcanic rocks. Associated chlorite, talc, and carbonate rock is either barren or, particularly in the deeper levels, contains finely disseminated sulfides. The ore is trucked to a nearby mill. Approximately 700 tons of ore with an approximate grade of 6% zinc and 1% copper are processed daily. The mill is a conventional flotation mill with one exception; it was designed to operate with salt water rather than fresh water.

Consideration was given to the feasibility of loading the metallic concentrate onto barges, or other vessels, for cheap transport to a smelter. However, due to the relatively small size of the mine, trucking to the railhead 30 miles away in Bucksport and shipment to smelters in Quebec and Pennsylvania by rail proved to be the more economic.

LEGAL CONSIDERATIONS

In order to mine the deposit with an open pit, it was necessary to drain a salt water estuary. This estuary, named Goose Falls Pond, covered 90 acres. The name is derived from the falls created during ebb tide (Figure 3).

The normal tides for this portion of the Maine coast range from a 0.0 foot low to a

+8.5 foot high, with extremes ranging from -1.9 foot low to +11.5 foot high. The restricted rocky entrance allowed water to flow into the pond only during the high portion of the tidal cycle. This resulted in an average water level fluctuation within the pond of approximately three feet.

Briefly, the plan was to build one dam at the mouth of the estuary to prevent the tide from entering the pond and to build another dam at the head of the estuary to divert the fresh water drainage from 1600 acres of adjacent forest land to another drainage area. The pond could then be pumped dry and inflow would be minimal (Figure 3).

Goose Falls Pond was bordered on the east by a privately owned wildlife sanctuary and on the west by land owned or leased by Callahan Mining Corporation. The pond waters, land below low tide, and the mineral rights below low tide are owned by the State of Maine. The intertidal land is owned by the adjacent landowners. In order to drain the pond, the riparian rights of the adjacent landowners would have to be temporarily taken and held by the State. The owners of the wildlife sanctuary objected to this seizure. The Maine Mining Bureau, administrator of the State's mining rights, questioned whether it had the authority to authorize draining of the pond under these circumstances; an act of the legislature was considered necessary.

Accordingly, a bill was introduced to a special session of the legislature in 1966 which would allow the State, through the Mining Bureau, to authorize drainage of the pond and temporary taking and holding of the adjacent landowners' riparian rights. It should be noted that before the Governor would support the bill and submit it to the legislature, four State agencies had to submit their recommendations to him. These were the Departments of Sea and Shore Fisheries, Forestry, Inland Fish & Game, and Water Improvement Commission. An ecologist was retained by the Company to make independent studies and to assist in operational planning. Understandably, there was considerable lobbying in opposition but the local residents generally supported the planned operation. The legislature referred the bill to the State Supreme Court for a decision on its constitutionality. The Supreme Court ruled in

favor of the bill and it was subsequently passed by the legislature and signed into law.

The Mining Bureau issued a mining lease to the Company shortly after the legislative action was taken. Concurrently, permission was sought from the U.S. Corps of Engineers to construct a dam at the tidal mouth of Goose Falls Pond, which was considered a navigable waterway. The U.S. Fish and Wildlife Service was consulted by the Corps of Engineers and conducted studies with the assistance of the State agencies mentioned earlier. The Fish and Wildlife Service eventually recommended that if a dam was built, the pond should be kept full of fresh water and a coffer dam be built around the perimeter of the pit. This plan was considered unsafe and impractical by the Company. The Corps of Engineers finally approved building the dam according to the plan recommended by the Company. The last authorization required for the project was a permit from the State Water Improvement Commission to pump the pond and discharge the water into Penobscot Bay. This permit also provided for effluent quality standards and monitoring of effluents discharged during mining and milling. The monitoring is currently supervised by the State Department of Sea & Shore Fisheries. This agency has worked closely with the Company, with other interested agencies, and with concerned conservation groups to assure that the living resources of this portion of Penobscot Bay are not adversely affected.

CONTINUING PROBLEMS

Current mining problems which can be related to proximity to the ocean can be grouped into four categories; pollution, salt water encroachment, marine sediments, and rehabilitation. These problems are especially "visible", principally because the ocean-land interface is a high multiple-use area where conflicts of use are bound to be at a maximum.

Pollution

Four types of pollution pose problems for the mining operation. These are noise, silting, heavy metal, and scenic.

The noise pollution is a factor due to the proximity of numerous residences. Heavy trucking, drilling, and blasting are the principal contributors. The noise is minimized as

much as possible by (1) only day shift drilling, (2) no graveyard mining shift, (3) carefully controlled pit blasting, (4) no secondary blasting of oversize boulders, and (5) careful maintenance of equipment to minimize muffler noise. Despite these efforts occasional complaints are received.

Silting is taking place in Goose Cove (Figure 3). Early in the operation this was partly due to the effluent from the mining operation. This has been largely cured with the use of several settling ponds. After heavy rain storms the effluent contains silt, just as do all natural fresh water runoffs into the ocean. In addition to the settling ponds, a 16" pipeline has been extended 400 feet from shore to the mouth of Goose Cove to help disperse any silt. The principal cause of silting in Goose Cove, however, is probably natural silting which would be expected in a cove which no longer has a tidal current to keep the cove scoured.

The continuously monitored effluent from the mining and milling operation contains trace amounts of heavy metals. These amounts are higher than found in raw sea water. Periodic testing of clams and other invertebrates in the vicinity has indicated a higher than normal heavy metal content, and this apparently has increased since startup of the mine. Unfortunately, there were insufficient studies conducted prior to mine startup to establish a normal background for the area. Although there are probably a number of factors contributing to the buildup of heavy metals in shellfish, it can only be assumed that the mine is one of the contributors. Other possibilities include continuing erosion of previously operated sulfide occurrences, disturbance of metalliferous bottom sediments due to storms, pollution from the Penobscot River, or pollution from toxic paints used on the 10,000 Ton maritime training ship "State of Maine" which is docked in nearby Castine (Figure 3). There are probably physical and chemical variations of the sea water such as temperature, organic content, etc., which also contribute to the concentration of heavy metals in shellfish. Insufficient sampling has been conducted to date to establish any valid relationships.

Recently, the Company performed tests in which the effluent was recycled and used instead of raw sea water in the mill feed.

Preliminary tests have been encouraging and although no benefits are derived metallurgically, the concept of a closed system is particularly attractive to a company management concerned with pollution as well as to governmental agencies. It is highly probable that systems developed by Callahan on Cape Rosier in cooperation with governmental agencies will become the basis for regulations under which future mining operations on the Maine coast and possibly other coasts will have to operate.

Scenic pollution simply means that it is impossible to operate an open pit mine and not affect the traditional Maine coast scenery. In order to minimize the problem, all buildings are placed inconspicuously behind a hill and barren areas and dumps are being planted with grass and trees. A local artist has helped by painting a corrugated iron pump house on Goose Cove to resemble a lobster shack. The mine is, incidently, also a tourist attraction and draws crowds during the summer months for regular scheduled tours.

Ground Water

The ground water table in the vicinity of the mine is being lowered due to continuous pumping to keep the mine dry. Consequently, some of the neighbors' wells in the cone of influence have gone dry. Although under Maine law the Company is not liable, deeper wells were drilled for those affected. However, as might be expected, salt water encroachment into the ground water has become a problem. This is being relieved by providing those affected with water from Company wells away from the influence of the salt water. Salt water encroachment occurs when the load of fresh water is relieved by pumping or other causes from a coastal area thus causing the underlying salt water-fresh water interface to rise. This interface eventually intersects the drilled water wells. Raising the pump intakes above this interface is a temporary solution but doesn't solve the problem.

Clay and Mud

Goose Falls Pond was a shallow pond with up to 90 feet of mud and clay in the bottom. Three test borings were made to determine the nature of the bottom sediments. A typical boring encountered 33 feet of organic silt at the top, followed by 45 feet of gray silty clay, followed by 5 feet of gray gravelly silty sand.

Soil tests indicated that a maximum steepness of slope of 4:1 (14°) would be safe.

On June 29, 1968, the pit had reached a depth of 60 feet below sea level. There was a minor mud slide at the northeast side of the pit but this was not serious and the mud was quickly removed. On July 23, 1968, the mud again began moving at the northeast side of the pit. This time it did not stop as before, however, and within 8 hours it had filled the bottom of the pit to a depth of 25 feet. It is significant that when the mud came to rest the surface was essentially horizontal, indicating that once movement had started, the mud became fluid, much like molasses. It took approximately a month to remove the 225,000 tons of mud from the pit. One power shovel had been completely buried and required extensive repairs. A series of rock dikes with finger dikes were constructed to hold back the mud; so far these have been successful.

A subsequent boring and soil test into the mud indicated that only the organic silt was involved in the slide. There was little effect on the underlying clay. The shear strength of the organic silt was considerably reduced by the slide. The in-place water content of the organic silt did not change appreciably due to the slide (approximately 66% by weight).

The problem of where to put the mud from the pit was soon resolved when it became apparent that it could be used as topsoil on the dump rock and thus provide an ideal base for seeding and planting. The salt apparently leaches fairly quickly from this material.

Rehabilitation

Rehabilitation of the mine site is a continuing effort and involves recommendations from the Soil Conservation Service, the State Forestry Department, and local residents. The eventual decision of what to do with Goose Falls Pond when mining is completed will rest with the Town of Brooksville. Three options appear possible; it can be returned to its original state as a saltwater estuary with a tidal falls; it can become a fresh water lake (the deepest on the Maine coast); or a channel can be opened from the ocean and it can become a totally protected deep water harbor. In any case, the affected land portions will be landscaped and planted

as much as possible and could eventually benefit future recreational or residential use of the area.

EXPLORATION

The targets for mineral exploration in eastern coastal Maine are massive base-metal sulfide deposits containing zinc, copper, lead, and silver. These deposits are typically fairly good electrical conductors, although metamorphism and structural deformation often reduce their conductivity considerably. In addition, the sulfides and their enclosing host rocks are usually relatively soft and consequently occupy the topographic lows in the region. Hence, the deposits are often deeply buried with glacial till or marine clay or both and physical exploration for outcrops is useless. Recognizable alteration "halos" around these deposits do not exist. Therefore, exploration must be of a geochemical or geophysical type localized within areas of favorable volcanic stratigraphy.

Geochemical sampling is used extensively in Maine to locate general areas of highly metalliferous soil. However, pinpointing of drill targets with geochemistry is impossible due to local migration of metal ions and "masking" of targets by impervious clay. The clay along the coast is the product of a once higher sea level. The clay deposits are saline, have a low conductivity, and act as a very effective geochemical and geophysical shield.

So far, no systematic geochemical sampling of the ocean bottom has been attempted even near favorable areas such as the Penobscot Mine on Cape Rosier. The present state of the art is such that until geochemistry becomes more definitive for the land areas, its application to underwater areas near shore is not warranted.

Geophysical prospecting techniques offer the best chance for locating massive sulfide deposits under salt water along the Maine coast. Yet, the problems are formidable. Not only is it probable that the ore deposits are buried under highly conductive marine clays, but conductive sea water is also a hindrance to most geophysical techniques.

It is likely that both the saltwater and marine clays are more conductive than

possible ore bodies. These barriers would tend to negate any techniques which are designed to measure slight conductivity differences within the earth. It is possible that inductive techniques which could differentiate between horizontally and vertically oriented conductors would be useful. The ore deposits generally have a strong vertical component in an area of steeply dipping rock units.

The Penobscot Mine is not associated with any magnetic minerals — or lack of such minerals. Therefore, the use of a magnetometer would not be effective. Naturally, if deposits associated with magnetite or pyrrhotite were being sought the magnetometer would be very useful.

Since there is considerable mass associated with large massive sulfide deposits, gravity measurements may be useful. However, it would be difficult to justify the drilling of gravity "high" in the ocean without additional supporting geophysical data. There are many causes for gravity highs, very few of which are massive sulfide deposits.

The use of some of the more recently developed systems such as INPUT^R, AFMag, and VLF might have some application over salt water in highly favorable geologic environments. These have not yet been tried along the Maine coast but some testing is anticipated in the near future.

Exploration on land is costly. Exploration of the offshore would be prohibitively costly except perhaps in areas adjacent to known mineralization or along underwater strike extensions of favorable geologic units.

SUMMARY

The Penobscot Mine on the Maine coast has encountered many problems related to the proximity of the ocean. These problems are not insurmountable, but they add considerably to the cost of mining. As highly popular multiple-use areas, the coast will challenge the skills of mining companies to operate at a profit and yet co-exist with the environment. As exploration techniques improve and deposits are located further from shore, the challenges will become greater. Actual mining of the ore will be one of the lesser engineering problems. A major

challenge will be to develop a system which does not adversely affect the environment.

An example of concern for the environment was shown by the Maine legislature last year in passage of a bill which prohibits all offshore commercial sand and gravel mining. It was feared that the harmful side effects would outweigh the benefits. It is entirely possible that all offshore mining in Maine could be outlawed if the Penobscot Mine, which is a highly visible example, cannot operate in a way which does not abuse the environment. The challenges and responsibilities of this small mine are great and the

results will have far-reaching effect. So far, the results look promising.

ACKNOWLEDGEMENTS

The author would like to thank the management of Callahan Mining Corporation for permission to publish this paper. In particular, the assistance of John B. Malcolm, Penobscot Unit manager, is appreciated. Also, the author would like to acknowledge the cooperation and encouragement of the people of Brooksville, without which the mining operation would not have been possible.

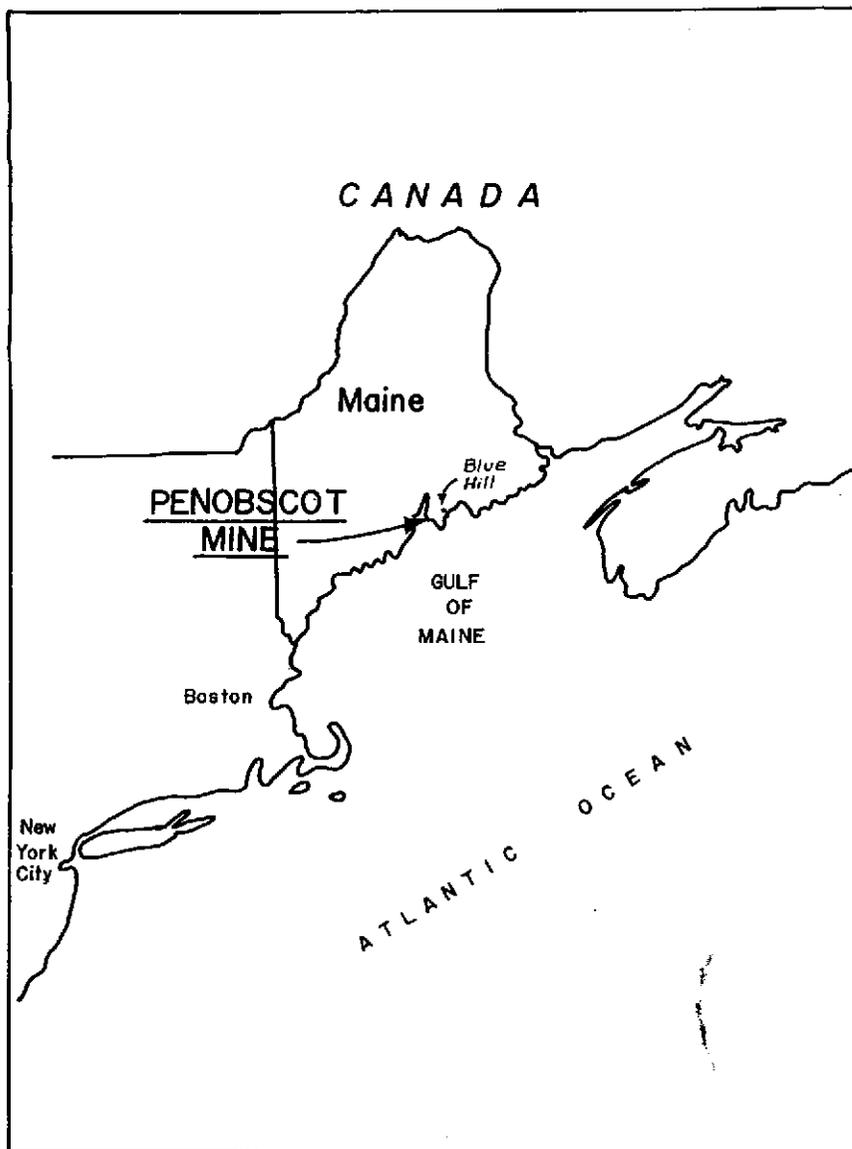


Fig. 1 - Index map, scale 1 in. = 75 miles.

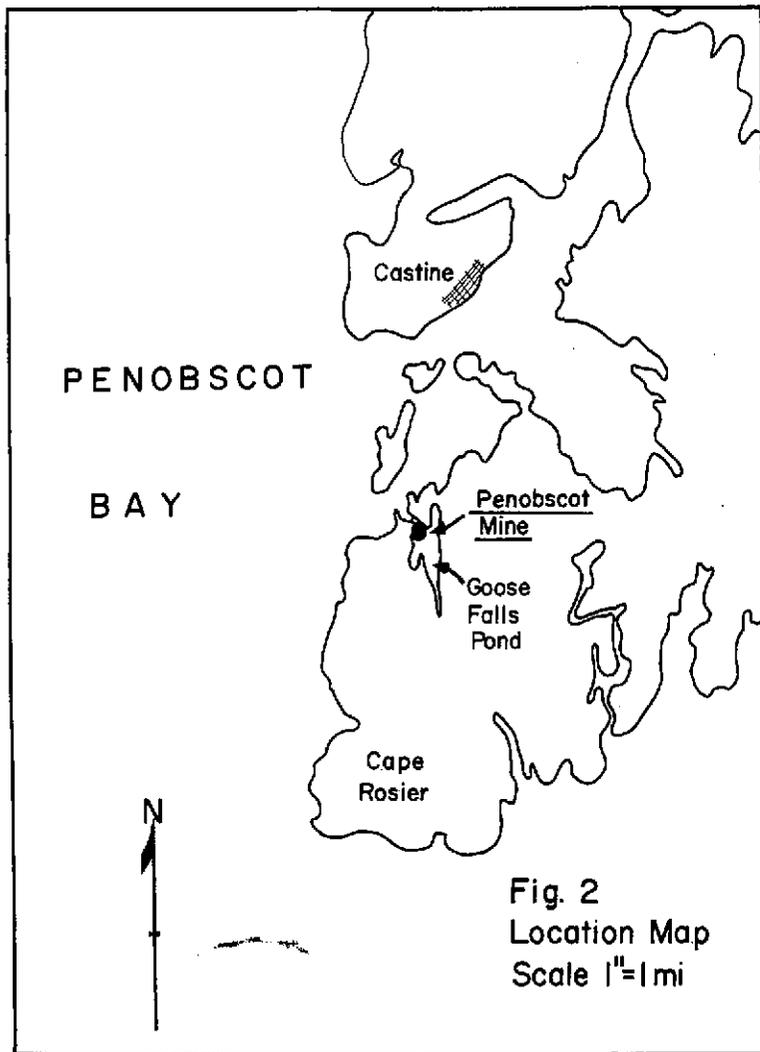


Fig. 2 - Location map, scale 1 in. = 1 mile.

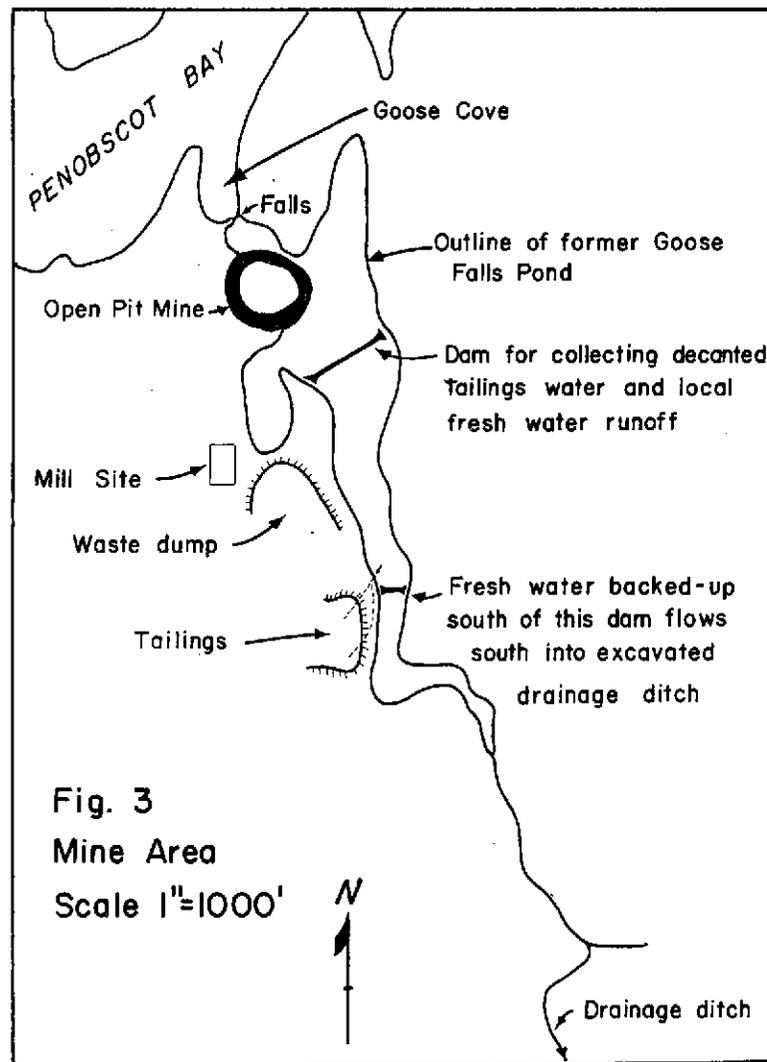


Fig. 3 - Mine area, scale 1 in. = 1,000 ft.

Warren A

Appendix "A"

TO: William Fenton, Justice of the Peace in and for the
County of Hancock, State of Maine;

We, the undersigned, desire to be incorporated as a
corporation without capital stock for the following purposes,
to wit:

The corporation is organized exclusively to improve
the ecology, scenery and the general environment of the Town
of Brooksville, Maine, by working for, encouraging, assisting
and stimulating the reclamation of areas disturbed by mining
operations and for the above purposes, to acquire by gift, pur-
chase, lease, devise and bequest and to hold, improve, ~~and~~ restore
and manage, and to lease, sell and exchange real and personal
property.

All of the foregoing purposes and powers are to be
exercised solely for the benefit of all of the residents of
the Town of Brooksville, Maine, and this corporation is one
which does not contemplate pecuniary gain or profit to the
members thereof and is organized for non-profit purposes and
no part of any net earnings thereof shall inure to the benefit
of any member, officer or other ~~individual~~ person or corporation.

No substantial part of the activities of the corpora-
tion shall be the carrying on of propoganda, or otherwise
attempting, to influence legislation and the corporation shall
not participate in, or intervene in (including the publishing
or distribution of statements) any political campaign on behalf

of any candidate for public office.

In the event the corporation should be dissolved, all of the assets of the corporation, after payment of its liabilities, shall be transferred, assigned and conveyed to such organization or organizations organized and operated exclusively for charitable, educational, religious or scientific purposes as shall at the time qualify as an exempt organization or organizations under Section 501(c)(3) of the Internal Revenue Code of 1954 or the corresponding provision of any future United States Internal Revenue Law as the Board of Directors shall determine.

The foregoing clauses shall be construed both as objects and powers; and it is hereby expressly provided that the foregoing enumeration of specific powers shall not be held to limit or restrict in any manner the powers of this corporation.

We, therefore, appeal in writing to you to issue your warrant to one of the applicants herein requiring him to call a meeting thereof, for organization and for all purposes specified in the Revised Statutes of Maine, Title 13, Chapter 81, and amendments thereof and additions thereto.

We do agree that such meeting shall be held at *Rosier*
the Grange
Hall, Brooksville, Hancock County, Maine, on the *6th* day of
A.D. 1972 at *1:00* o'clock in the *after* noon, and we acknowledge
that we and each of us have received due notice of the time and
place of meeting herein fixed, and we do expressly waive any
further notice.

TO: John Gray, one of the above-named applicants:

You are hereby authorized and directed to call a meeting of the above-named applicants to be held at Hancock County, Maine, on the day of _____ A.D. 1972 at 1:00 o'clock in the afternoon, for the purpose of organizing GOOSE POND RECLAMATION SOCIETY and for all purposes specified in the Revised Statutes of Maine, Title 13, Chapter 81, and amendments thereof and additions thereto.

William Lenton
Justice of the Peace

TO: The signers of the above application:

You are hereby notified and warned to meet at the time and place and for the purpose set forth in the above application and warrant, which are expressly referred to and made a part of this notice.

Articles of Association

Under the authority of the foregoing application and warrant and waiver of notice, and pursuant to said warrant, the applicants met at Rose Grange Hall in the Breadsville Hancock County, Maine, on the 6th day of June, A.D., 1972 at 1:00 o'clock in the Afternoon, for the purpose of organizing.

There were present in person: (7)

being all of said applicants.

called the meeting to order, and on motion duly seconded, was made temporary Chairman and presided.

On motion duly seconded, was made temporary Clerk and was duly sworn according to the following original record of oath:

STATE OF MAINE
HANCOCK, ss.

, 1972.

Personally appeared and made oath that he would faithfully and impartially perform the duties required of him as temporary Clerk of said meeting.

Before me,

Notary Public

Upon motion duly seconded, the following votes were unanimously adopted:

VOTED that the original application, waiver of notice

and warrant be filed with the Clerk and a copy thereof spread upon these records.

VOTED to proceed to organize a corporation without capital stock under Title 13, Chapter 81 of the 1964 Revised Statutes of Maine and amendments thereof and additions thereto.

VOTED that the name of the corporation shall be GOOSE POND RECLAMATION SOCIETY and that its location and principal office shall be in the Town of Brooksville, Hancock County, Maine.

VOTED that the corporate purposes as stated in the application be the corporate purposes of the corporation.

The Chairman presented a form of Bylaws for the regulation and government of the affairs of the corporation which were read article by article, unanimously adopted, and ordered to be inserted at length in the record as follows:

617 - 894 - 2400

JAN 17th BROOKSVILLE TOWN OFFICE
7 PM.

EXT 324 - I.P.M.

WILLIAM NUZZO OR MR. ANDRELIUNAS - CHIEF OPERATIONS

LATEST CORP SAMPLE DATA FROM GOOSE CREEK -
HAS JURISDICTION QUESTION BEEN RESOLVED AND
WHAT IS DECISION?

FRANK TRICONTI → NAV BRANCH 351
HAS MILITARY BRANCH

CORPS WILL NOT BE IN ATTENDANCE OF MEETING
ON 17th - NO JURISDICTION IN MATTER EXCEPT FOR
POSSIBLE NAVIGATIONAL DISRUPTION -

TOTAL OF

9 BOATS USE CREEK AS A MOORING AREA.

3 - APPROX 30' IN LENGTH ← # GENERAL NAVIGATION

6 - POWERBOATS - 10 TO 17 FT LENGTHS.

10 x 30' FLOAT & RAMP -

RAMP LAUNCHING FACILITY - USED BY OTHER BOATSMEN.

DOES CORPS HAVE A SPECIFIC FORM TO BE
FILED ON A COMPLAINT?

IF NOT GIVE ME NECESSARY INFORMATION FOR
FILING A COMPLAINT.

10 AM - 10:10 AM - CORPS OF ENGINEERS,

MR. CHARLES MILLER.

OPERATIONS ~~FROM~~ NAVIGATION BRANCH.

EXT 351.

HARBOR
MASTER