JOSEPH E. BRENNAN
GOVERNOR

STATE OF MAINE
DEPARTMENT OF CONSERVATION
STATE HOUSE STATION 22
AUGUSTA, MAINE 04333
TEL. 207-289-2212

RICHARD E. BARRINGER
COMMISSIONER

October 31, 1980

Governor Joseph E. Brennan
Executive Office
State House Station #1
Augusta, ME 04333

Dear Governor:

In June you asked the Department of Conservation to review current State law and policy relating to the development of Maine's mineral resources, and to make any recommendations respecting their needed improvement by October 31, 1980.

To assist the Department in this endeavor, I established a small advisory committee consisting of the State geologist, a member of my staff, and representatives of the mining industry, the University, environmental organizations, private mining consultants, and a regional planning agency. Linda Harvell of this Department was principal staff to the Committee, with notable assistance from Charles Colgan of the State Planning Office.

My request of the Committee was that it critically review State law and policies respecting mineral development and report its findings and recommendations to me. The Committee met five times between July and October. The result of their efforts is a report which is admirable in its quality and its comprehension of a number of complex issues.

With two exceptions, I am in full accord with the recommendations of the Committee. I am, therefore, transmitting the Committee's report to you intact. My exceptions to it are described later in this letter. Further, I have condensed the Committee's recommendations into an executive summary incorporating my exceptions.

Among the Committee's and my recommendations are two that require statutory change: the first is the creation of a severance tax on the extraction of certain nonrenewable minerals in Maine; the second involves a number of modifications to the current Maine Geological Survey statute. We are currently preparing draft legislation to this effect. It will be ready for your review at an early time.

The theory underlying a severance tax on the extraction of nonrenewable natural resources is that these resources are the common heritage of all citizens. Without a severance tax, the value of the common heritage is lost when the minerals are extracted. Most states with substantial mining operations have established a severance tax.

Few mines operate longer than a single generation. Some portion of the mining revenues must be converted to a permanent, renewable asset or its value will be forever lost to future generations. It is prudent that these revenues be assigned, in large measure, to the creation of permanent assets and benefits to all Maine citizens, present and future. The Committee recommends the creation of a severance tax on the extraction of all minerals, including peat, but excluding sand and gravel, the proceeds of which will become a perpetual endowment to the people of this State.

The exceptions I take to the Committee report relate to the particulars of the proposed severance tax. First, the Committee recommends that the specific tax rates be established by another committee representing the mining industry and others knowledgeable in the taxation and economics of mining. It is my feeling that the task of setting the tax rate is a complex technical question that may be best addressed by the staff of several State agencies. We are working with those individuals to formulate appropriate and responsible tax rates which will be transmitted to you in the draft legislation.

The second exception concerns the disposition of revenues from the severance tax. I strongly concur with the Committee's recommendation that the proceeds of the tax be dedicated to a trust fund, but it is my feeling that some portion of these proceeds should go to the General Fund as well. Further, I find the purposes the Committee recommends for the trust fund to be imprecise. I recommend that the revenues from the tax and the proceeds from the trust fund be allocated to the purposes outlined in the executive summary. Generally, one third of the net tax proceeds would go to the General Fund. The remaining two thirds would be dedicated to a perpetual trust fund, the proceeds of which will be distributed in support of natural resource-based industrial development, vocational education, acquisition of land by municipalities, continuing assessment of Maine's geologic resources, and reinvestment in the trust fund.

This report is the result of diligent work by and conciliation among the members of the advisory committee. They, as well as Walter Anderson, our State Geologist, Nancy Ross and Linda Harvell of this Department, and Charles Colgan of the State Planning Office, deserve great credit for a job in which your Administration may take great pride and satisfaction.

It has been an honor and a pleasure for us all to have been a service to the State of Maine in this matter. I am certain the members of the advisory committee join me in placing ourselves at your service in the effort to implement these recommendations.

Sincerely,

Richard E. Barringer
Commissioner

REB/ehp

Enclosures

cc: Members, Mineral Policy Advisory Committee
David Flanagan, Counsel to the Governor
Skip Greenlaw, Special Assistant
Connie Irland, Special Assistant
Larry Spiegel, Press Officer

DEPARTMENT OF CONSERVATION

MINERAL POLICY REVIEW

Executive Summary

Reason for the Review In 1977, Superior Mining and Louisiana Land and Exploration Company announced the discovery of a 36 million ton copper-zinc ore body in northern Aroostook County. The discovery brought several major mining companies to Maine to explore. In addition, Maine's large peat resource is under careful evaluation for both energy and agricultural uses. When State laws and policies which affect mining and mineral development were designed, few recognized the potential significance of mining activities in Maine.

Objective of the Review The purpose was to examine the laws and policies of the State which relate to mining and mineral development, assess their adequacy, and make recommendations for any changes needed to assure a reasoned and orderly State policy for mining in Maine.

The Review Process The Governor asked the Department of Conservation to conduct the mineral policy review. The Department, in turn, established a small advisory committee whose members included representatives of the mining industry, the University, environmental groups, private consultants, and a regional planning agency; the State Geologist; and a member of the Department's staff. The Commissioner of Conservation asked the Committee to review State law and policies and to recommend needed changes to him. The review included the areas of environmental regulation, taxation, exploration and mining on public land, assistance to affected communities or regions, and worker safety. With two exceptions, the Commissioner accepted the Committee's recommendations. The summary below highlights the final recommendations of this review.

Summary of Recommendations (The asterisk indicates Committee recommendations which were adopted by the Committee.)

*(1) The Department recommends that the State adopt as its official policy toward mineral development in Maine the following policy framework statement:

Whereas mineral resources are fundamental to modern civilization;

Whereas mineral resources have historically been a primary source of economic wealth;

Whereas development of this country's mineral resources has involved only a small portion of its land areas and may be expected to involve a similarly small land area in Maine;

Whereas mining has impacts on natural and cultural environments;

Whereas Maine's nonrenewable resources are part of a heritage shared by all of its citizens;

Whereas only a small portion of nonrenewable resources are currently reused;

Whereas mineral tax laws have a significant impact on the profitability of mining and the industry's ability to enter into and sustain production;

It shall be the policy of the State to encourage the sound and orderly development of Maine's mineral resources under reasonable constraints. The object of this policy is to assure that the actions associated with development of these resources will:

1. Encourage expansion and diversification of the Maine economy, and create new employment opportunities for Maine people;

2. Adhere to sound and effective land use, environmental, safety, and health regulations administered through appropriate public agencies;

3. Afford prior planning and development assistance to Maine communities and regions that will be significantly affected by mineral resources development; and

4. Share with the State through taxation a reasonable portion of revenues derived from the development of these resources, to be used to encourage the wise use, reuse, and conservation of Maine's remaining nonrenewable resources.

*(2) The Department recommends that a reasonable portion of revenues derived from the development of Maine's mineral resources be shared with the State through direct taxation. The Department further recommends:

*(a) That the State of Maine adopt a severance tax on the extraction of certain mineral resources in Maine.

*(b) That the severance tax apply to minerals, metallic and non-metallic, which are extracted in relatively large scale operations.

*(c) That the severance tax be assessed in lieu of property taxes.

*(d) That municipalities in which a mine is located be reimbursed fully from severance tax revenues for revenues lost from the property tax.

*(e) That the severance tax apply to gross revenues in a manner which varies positively with the level of net revenues.

*(f) That separate tax rates be determined for each taxable mineral, or for specified groupings of similar minerals.

(g) That the Department of Conservation consult with knowledgeable persons in the public and private sectors, and recommend to the Legislature the rate for the severance tax.

*(h) That the net revenues from the tax (after local reimbursement) be dedicated to a permanent trust fund established by the Legislature.

(i) That the proceeds from the trust fund be applied as follows:

Distribution of Net Revenues from the Severance Tax

(after municipal reimbursement)

33 1/3%	General Fund
66 2/3%	Trust Fund

Purposes of the Trust Fund

Development of natural resource-related industries
Vocational education
Public land acquisition at the municipal level
Reinvestment in the trust fund
Continued assessment of Maine's geologic resources

*(j) That the State enable mining companies to contribute funds for community assistance which will be deducted from future severance tax payments.

*(3) The present statutes pertaining to Class A waters may effectively prohibit most mining activity in large areas of the State. Mining will be possible only if legislative intent is clarified. The Department is opposed to mining activity which will adversely affect any surface waters of the State. The Department recommends that the Governor immediately appoint an ad hoc committee comprised of industry, environmental, and governmental representatives to review current water statutes and draft appropriate legislation to permit consideration of discharge alternatives which will

allow mining but not adversely affect the chemical, physical, or biological character of these waters.

*(4) After reviewing the adequacy of current mining regulations imposed by the Site Location Of Development Law, the Department recommends no changes in the law.

*(5) After reviewing the process for LURC review of major mining proposals in the unorganized territories, the Department recommends that the current two-step process of zoning and permitting be retained.

*(6) The Department has reviewed those portions of the LURC Comprehensive Land Use Plan which relate to development of mineral resources; and recommends that the Plan be revised to reflect new directions in mining policy, and to acknowledge the potential economic significance to the State of mining as a major land use in the unorganized townships. Further, the Department recommends that LURC devise a more specific formulation of the issues which should be addressed as part of rezoning proposals for major mining development.

*(7) The Department recommends a number of statutory and administrative changes, to clarify policy and improve procedures relating to exploration and mineral development on the State's public lands.

*(8) The Department recommends that the Department of Inland Fisheries and Wildlife, if it deems it necessary, seek statutory changes to adequately address problems which may be caused by mining for precious metals in, or adjacent to, Maine streams and rivers.

*(9) After reviewing existing federal and State laws regulating mining safety, the Department recommends no State action in this present regard. Existing federal and State laws appear adequate, and any new state level regulatory function would appear duplicative.

REPORT OF THE

MINERAL POLICY ADVISORY COMMITTEE

To

Commissioner Richard E. Barringer
Department of Conservation

October 1980

MEMBERS OF THE MINERAL POLICY ADVISORY COMMITTEE

Walter Anderson, Maine Geological Survey
Ken Arndt, Northern Maine Regional Planning Commission
Frederick M. Beck, F. M. Beck, Inc.
Kevin Burns, Blue Rock Industries
John S. Cummings, J. S. Cummings, Inc.
Dr. Thomas Eastler, Natural Resources Council of Maine
John Michael, State Representative
Elton Nason, Down East Peat Company
Dr. Steve Norton, University of Maine, Orono
Cheryl Ring, Maine Audubon Society
Nancy Ross, Department of Conservation
Bill C. Scott, Superior Mining
Frank Wood, State Representative

Linda Harvell, Department of Conservation, Staff to the Committee

REPORT OF THE MINERAL POLICY ADVISORY COMMITTEE

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Acknowledgements

The Mineral Policy Advisory Committee wishes to thank Linda Harvell, of the Department of Conservation, who served as staff to the Committee, and Craig Ten Broeck, who assisted her. The Committee also thanks Teco Brown, John Brochu, and Commissioner Henry Warren, of the Department of Environmental Protection, Lloyd Irland of the Bureau of Public Lands, Jeffrey Pidot of the Land Use Regulation Commission, Ed Wells and Norman Millard of the Mine Safety and Health Administration, Chuck Ritzi, formerly of the Department of Inland Fisheries and Wildlife, and Carolyn A. LePage of the Maine Geological Survey for their help with the project. The Committee gives special thanks to Charles Colgan of the Maine State Planning Office for his invaluable assistance with the taxation aspects of this report.

Thanks also go to Liz Pynchon of the Department of Conservation, who typed portions of the materials for this project. Special thanks go to Jan Leary of the Department of Conservation, who has cheerfully, energetically, and skillfully produced typewritten materials and arranged amenities for the Committee's meetings, and endured the meetings as well.

REPORT OF THE MINERAL POLICY ADVISORY COMMITTEE

Introduction

In June 1980, Governor Brennan asked the Department of Conservation to review existing State laws and policies regarding Maine's mineral resources and make recommendations for any changes which might be desirable. Commissioner Barringer then established an advisory committee to assist the Department of Conservation in this effort. He asked the Committee to review current state laws and policies and report to him their findings and recommendations. This document is the report to Commissioner Barringer of the findings and recommendations of the Mineral Policy Advisory Committee.

The Mineral Policy Advisory Committee met on five occasions between July and October 1980. In the course of these meetings, the Committee considered a number of policies and issues relevant to mining and mineral development. Although the Committee did not scrutinize every statute, regulation, and policy which relates to mining, it did deal in considerable detail with four major areas of concern. These major areas of concern are environmental and land use regulation, taxation, mining policy on public lands, and assistance to localities affected by mining activities.

This report summarizes the work of the Mineral Policy Advisory Committee. A discussion of each area of concern is followed by the Committee's findings and recommendations. In some cases, implementation of the Committee's recommendations requires executive action; in other cases, statutory changes must be made by the Legislature. The report identifies the nature of the action required to implement each recommendation.

A collection of the minutes of the five meetings of the Mineral Policy Advisory Committee is included as an appendix in this report to provide a record of the Committee's efforts in the course of this undertaking.

The report begins with the Committee's statement of overall state policy toward mining and mineral development in Maine. This policy statement is the framework for the Committee's recommendations. The Committee recommends that the Governor and Legislature adopt the statement as official state policy.

SUMMARY OF RECOMMENDATIONS

1. The Committee recommends that it be the policy of the State of Maine that a reasonable portion of revenues derived from the development of Maine's mineral resources be shared with the State through direct taxation.
   (a) The Committee recommends that there be a severance tax on the extraction of certain mineral resources in Maine.
   (b) The Committee recommends that the severance tax be applied to minerals, metallic and non-metallic, which are extracted by relatively large scale operations.
   (c) The Committee recommends that the severance tax be assessed in lieu of property tax.
   (d) The Committee recommends that municipalities in which a mine is located be reimbursed as fully as possible for revenues lost by the collection of a severance tax in lieu of property tax.
   (e) The Committee recommends that the severance tax be applied to gross revenues in a manner which varies positively with the level of net revenues.
   (f) The Committee recommends that separate tax rates be determined for each taxable mineral or for specified groupings of similar minerals. The Committee further recommends that a special purpose committee be established to recommend these tax rates.
   (g) The Committee recommends that the revenues from the tax be dedicated to a trust fund to be established by the Legislature. The Committee further recommends that the proceeds from the trust fund be used to support the wise use, reuse, or conservation of Maine's nonrenewable resources.
   (h) The Committee recommends that the State enable mining companies to contribute funds for community assistance which will be deducted from future severance tax payments.

2. The Committee recommends that the Governor immediately appoint an ad hoc committee comprised of industrial, environmental, and governmental representatives to review current water statutes and draft appropriate legislation to permit consideration of discharge alternatives which will allow mining but not adversely affect the chemical, physical, or biological character of these waters.

3. The Committee recommends no amendments to the Site Location of Development Law.

4. The Committee recommends retention of the two-step process for LURC review of major mining proposals in the unorganized territories.

5. The Committee recommends that the LURC Comprehensive Land Use Plan be revised to reflect new directions in mining policy and to acknowledge the newly recognized potential economic significance to the State of mining as a major land use, particularly in the unorganized townships.

6. The Committee recommends that LURC devise a more specific formulation of the issues which should be assessed as part of rezoning proposals for major mining development.

7. The Committee recommends a number of statutory and administrative changes to clarify policy and improve procedures relating to exploration and mineral development on the state's public lands.

8. The Committee recommends that the Department of Inland Fisheries and Wildlife, if it deems it necessary, seek statutory changes to adequately address problems which may be caused by mining for precious metals in, or adjacent to, Maine streams and rivers.

9. The Committee makes no recommendations for state action regarding safety of workers or the public at mining operations. The Committee feels that existing federal and state laws adequately regulate mining safety and that any new state level regulatory functions would be duplicative.

MINERAL DEVELOPMENT POLICY FRAMEWORK

Whereas mineral resources are fundamental to modern civilization;

Whereas mineral resources have historically been a primary source of economic wealth;

Whereas development of this country's mineral resources has involved only a small portion of its land area and may be expected to involve a similarly small land area in Maine;

Whereas mining has impacts on natural and cultural environments;

Whereas Maine's nonrenewable resources are part of a heritage shared by all of its citizens;

Whereas only a small portion of nonrenewable resources are currently reused;

Whereas mineral tax laws have a significant impact on the profitability of mining and the industry's ability to enter into and sustain production;

It shall be the policy of the State to encourage the sound and orderly development of Maine's mineral resources under reasonable constraints. The object of this policy is to assure that the actions associated with development of these resources will:

1. *Encourage expansion and diversification of the Maine economy, and create new employment opportunities for Maine people;*

2. *Adhere to sound and effective land use, environmental, safety, and health regulations administered through appropriate public agencies;*

3. *Afford prior planning and development assistance to Maine communities and regions that will be significantly affected by mineral resources development; and*

4. *Share with the State through taxation a reasonable portion of revenues derived from the development of these resources, to be used to encourage the wise use, reuse, and conservation of Maine's remaining nonrenewable resources.*

REGULATION OF MINING BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

The Committee considered the adequacy of current mining regulations administered by the Department of Environmental Protection (DEP) by reviewing the provisions of the Site Location of Development Act and by examining the current statute on discharge into Class A waters. Their findings and recommendations are described here.

THE SITE LOCATION OF DEVELOPMENT ACT

In 1979 the Legislature repealed the former "mining law" and added many of its provisions to the Site Location of Development Act. The purpose of the Site Law is to assure that certain "developments will be located in a manner which will have a minimal adverse impact on the natural environment of their surroundings and protect the health, safety, and general welfare of the people." Most mining activities are subject to the Site Law, which requires developers to obtain a permit from the Board of Environmental Protection.

Under the Site Law, developers must meet standards for financial capacity, traffic movement, environmental effect, and soil types. The "no adverse environmental effect" standard encompasses measures for assuring no unreasonable adverse effects on air quality, climate, natural drainage ways, runoff and infiltration relationships, erosion, surface water quality, and groundwater quality and quantity. The law also requires that the developer make provision for buffer strips, control of noise, preservation of historic sites and unusual natural areas, protection of the area's scenic character, and protection of fish and wildlife resources.

Areas of Concern

The Committee examined the Site Law's capacity to fulfill the objectives of the law regarding regulation of mining and found that the Site Law is generally adequate to regulate any mining which is likely to occur in Maine. Several specific areas of concern were identified by the DEP staff. First, sand and gravel pits under five acres in size, which are exempt from regulation under the Site Law, may be a source of sediment to nearby water bodies

or the cause of other problems. Second, the Site Law does not allow the Board of Environmental Protection to require developers to refill pits as a reclamation measure. The concern is that there may be instances in which this approach would be the best available. Third, there was concern that the Board's possible inability to require the sealing of abandoned mine shafts might allow public entry into a potentially dangerous area.

Recommendations

(1) The Committee recommends no amendments to the Site Law.

The Committee feels that gravel pits which are less than five acres in size probably do not constitute a significant problem. Undesirable discharges from such pits can now be regulated under the State's existing water quality laws.

The Committee feels that current or future mining technology may offer better techniques for containing tailings, which might leach to surrounding ground and surface waters, than returning the tailings to open pits or underground workings. Reclamation procedures for peat mining are being developed, but are not as advanced as those for metal mining.

The Committee determined that regulations of the federal Mine Safety and Health Administration require the precautionary sealing of abandoned mine shafts. In addition, it appears that DEP does have authority, under the Site Law, to require mining operators to provide for public safety, including the sealing of shafts and tunnels.

DISCHARGES INTO CLASS A WATERS

Areas of Concern

Water quality is likely to be the issue of greatest concern when the Board of Environmental Protection reviews a proposed metal or peat mining project. The Site Law requires that the Board find that the proposed mining activity

will have no unreasonable adverse effect on surface water quality or groundwater quality and quantity. No discharges to surface waters are allowed of any pollutants which will affect the state classification of a surface water body. The best practicable treatment for surface water discharges must be used.

In 1979, no discharges were allowed into Class A waters. The 108th Legislature amended the Classification of Surface Waters statute to allow discharges which are equal to or better than the receiving water quality in Class A waters. However, it now appears that the amendment will not achieve its intended purpose. Since the groundwater in the area of an ore body will likely contain naturally higher levels of metals than nearby surface water bodies, discharges from mines will exceed ambient receiving water parameters for metals. There may be ways to allow discharges from mines into surface water without degrading the quality of the receiving waters. However, the effect of the current statute is that most mining activity is prohibited in areas with Class A streams or rivers.

Recommendations

The Committee recognizes that the present statutes pertaining to Class A waters may effectively prohibit most mining activity in large areas of the State. Mining will be possible only if legislative intent is clarified. The Committee is opposed to mining activity which will adversely affect any surface waters of the State.

(2) The Committee recommends that the Governor immediately appoint an ad hoc committee comprised of industry, environmental, and governmental representatives to review current water statutes and draft appropriate legislation to permit consideration of discharge alternatives which will allow mining but not adversely affect the chemical, physical, or biological character of these waters.

REGULATION OF MINING BY THE LAND USE REGULATION COMMISSION

Introduction

Eleven years ago, the Maine Legislature created the Maine Land Use Regulation Commission as the entity responsible for planning, zoning, and subdivision control in the unorganized townships of the State. The Legislature gave LURC the powers and responsibilities which normally attend planning and zoning functions at the municipal level. LURC review and approval is required for any major development in an unorganized territory. This occurs through a two-step process: 1) a rezoning of the area proposed for development to a development zone (unless the proposed development is already in such a zone), and 2) site specific development review and permitting, which, where appropriate, is conducted jointly with DEP's review under its Site Location of Development Law.

Areas of Concern

The Mineral Policy Advisory Committee reviewed the two-step LURC process as it relates to major mining activities. The Committee had two major areas of concern with respect to this process.

The first concern is that the LURC Comprehensive Plan does not give adequate recognition to the potential for major mining development in Maine. The LURC Plan was developed at a time when the likelihood of major mining activities was not foreseen. There have been no recent major mining activities in Maine.

The second concern is that the criteria LURC uses to evaluate the merits of a proposal at the rezoning stage are unclear and may result in misunderstandings between developers and the State.

Initially, some members of the Committee felt that rezoning, the first step of the LURC process, presents serious, unwarranted obstacles to mining in the unorganized townships. The majority of the Committee did not share this concern.

Recommendations

(3) The Committee recommends retention of the two-step process for LURC

review of major mining proposals in the unorganized territories.

The two-phase LURC zoning and development review process is a statutorily established procedure that has, over the years, proven to provide an effective means of handling large scale development proposals in the unorganized territories. The process is fundamentally no different from that used in any organized city or town with comprehensive zoning. In the unorganized territory, LURC serves the function of a municipal planning board in handling all land use matters.

To alter this process, one that is based on the traditionally accepted concept of zoning, to serve a particular kind of land use would be inconsistent with the original intent of the Legislature in establishing LURC. Moreover, given the way in which the process can be improved without legislative action, seeking such a fundamental change in the LURC law would be both politically inappropriate and unnecessary.

Because of the nature of major mining proposals and the nature of zoning itself, it is important to all that some flexibility be maintained in the timing of the zoning process. By retaining (and perhaps refining) the two-step rezoning/development review process, that process can allow developers to get an early reading, before full investment has been made in making a site proposal, as to how a proposal is likely to be ultimately viewed by the LURC Commission. The issues involved in rezoning normally will not require the same levels of informational detail as full site development review.

The zoning process is not intended to be prohibitory, but rather evaluative. Rezoning is the only significant opportunity for providing a public forum to consider the overall, long term land use and community impacts of proposed major developments. (Under the LURC statute, rezoning involves a showing that (a) the change would be consistent with the current land use standards, the comprehensive land use plan, and the LURC statute, (b) the change will satisfy demonstrated needs, i.e., will have identifiable and significant benefits in the area or region, and (c) the change will not have undue adverse impacts

on existing uses or resources.) It is during the second stage, site review, that detailed evaluation of the particular and unique impacts of a proposal occurs. Therefore, rezoning itself is a useful tool in evaluating whether, as a general matter, a major development proposal is a suitable and beneficial type of land use activity in an area. The ability to obtain an early reading on such issues benefits both developer and public alike.

(4) The Committee recommends that the LURC Comprehensive Land Use Plan be revised to reflect new directions in mining policy and to acknowledge the newly recognized potential economic significance to the State of mining as a major land use, particularly in the unorganized townships. This action does not require a statutory change.

The LURC Comprehensive Land Use Plan should be changed to reflect new directions in mining policy. The Plan is now in the early stages of being revised, and the time is appropriate to make alterations concerning mining policy. Already the Plan recognizes mining as a potential use of the resources in the unorganized territory. However, much new information is now available that was not when the Plan was first written in the early 1970's.

The revised Plan should acknowledge the newly recognized potential economic significance to the State of mining as a major land use, particularly in the unorganized territory. Such a change can have far reaching importance because the LURC Comprehensive Plan constitutes the basis for all of the Commission's zoning decisions. All zoning and development review proposals, therefore, are evaluated in light of the provisions of the Plan. In short, such a change can shift the policy framework within which rezoning and development review decisions are made.

(5) The Committee recommends that LURC devise a more specific formulation of the issues which should be assessed as part of rezoning proposals for major mining development. This action does not require a statutory change.

Currently, LURC is undertaking a study of issues which will need to be addressed in connection with major mining proposals. As part of

this effort, LURC should specify in greater detail the issues likely to require attention during the rezoning process. This should be reflected in a rezoning application form which is tailored to mining, replacing the single all-purpose form now in use.

REGULATION OF MINING BY THE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE

Introduction

The Stream Alteration Act, administered by the Department of Inland Fisheries and Wildlife, requires permits for dredging, filling, or erection of permanent structures in or on rivers, streams, or adjacent lands where material or structures may fall into these waters. It is likely that any large-scale mining operation will require a Stream Alteration Permit. The installation of discharge pipes by dredging of a stream bottom or adjacent stream banks will require a permit, as will the crossing of any streams by bridging. The applicability of the Stream Alteration Act to peat mining operations is unclear.

Areas of Concern

The recent increase in mining for gold in some Maine streams, particularly the Swift River, has resulted in water quality problems due to sediment entering the stream. Hand panning in a stream causes minimal disturbance to bottom sediments, but sluice boxes and excavations into stream banks can cause significant sedimentation. Disturbed stream banks can erode severely in times of high stream flow. In areas of silt or clay, sediment discharges can have a serious impact on water quality and aquatic species because these finer soil particles remain suspended for long distances downstream. These activities are subject to regulation by the Stream Alteration Act.

The Committee learned that the Department of Inland Fisheries and Wildlife is considering addressing these problems with mining for gold by either issuing permits to control the timing and location of these activities or establishing minimal levels of activity below which a permit to excavate or scrape on land adjacent to any river, stream, or brook when soil material may be washed into nearby water.

Recommendation

(6) The Committee recommends that the Department of Inland Fisheries and Wildlife, if it deems it necessary, seek statutory changes to adequately address problems which may be caused by mining for precious metals in, or adjacent to, Maine streams and rivers.

SAFETY OF MINING OPERATIONS

Introduction

Regulation of mining activities to insure the safety of mine workers is the responsibility of the U. S. Department of Labor's Mine Safety and Health Administration (MSHA). MSHA's jurisdiction includes the safety and health aspects of most mining activities, such as underground mines, sand and gravel operations, and open pits, as well as associated activities such as use of explosives, machine guarding, electrical installations, and processing of the product. One exception is borrow pits, which are under the jurisdiction of the Occupational Safety and Health Administration (OSHA). Municipally owned and operated sand and gravel pits are exempt from both MSHA and OSHA, unless processing of materials is involved.

Areas of Concern

Initially, the Committee was concerned that the exemption from regulation of municipally owned and operated sand and gravel pits could result in safety problems which warrant their future regulation. The Committee decided that this is a matter for municipalities to address, rather than an issue of state level policy.

Another concern of the Committee was that the Board of Environmental Protection felt it could not require the filling of an abandoned mine shaft as a safety precaution. However, the Committee found that MSHA regulations require that, for mines closed after 1970, the entrance to mine shafts be sealed to prevent public access. In addition, it appears that DEP in fact does have authority, under the Site Law, to require adequate provisions to protect public safety, including the sealing of shafts and tunnels.

Recommendations

(7) The Committee makes no recommendations for state action regarding safety of workers or the public at mining operations. The Committee feels that existing Federal and State laws and agencies adequately regulate mining safety and that any new state level regulatory function would be duplicative.

EXPLORATION AND MINING ON PUBLIC LANDS

Introduction

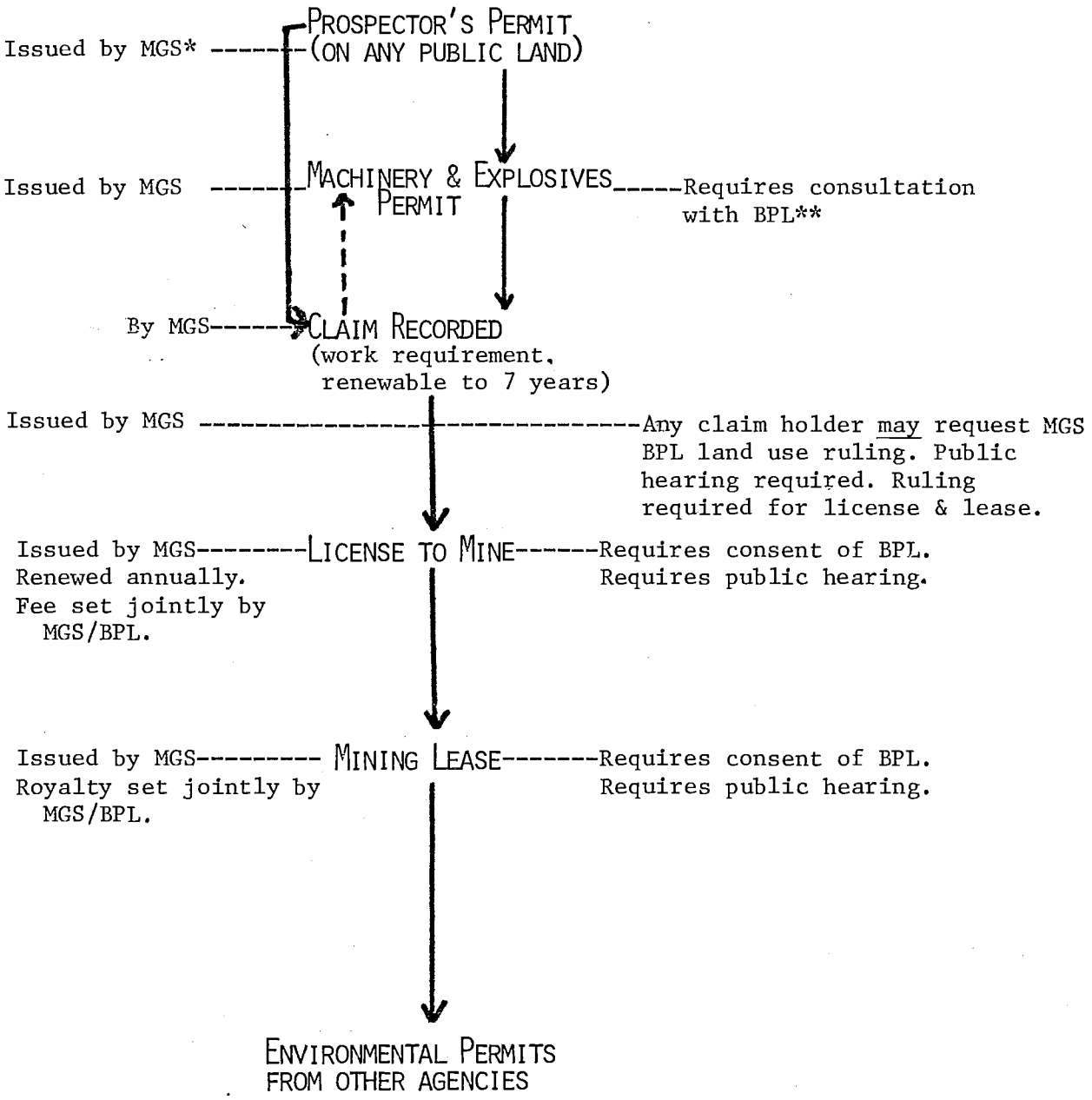
The Bureau of Public Lands in the Department of Conservation has heretofore had no policy for dealing with mining on public land, with the exception of the general policy directives given in the statutes of the Bureau and of the Maine Geological Survey. The Committee identified a number of problems which result from the lack of a policy for public lands and felt it necessary that such a policy be developed. This section of the Committee's report describes the major issues related to public lands and presents the Committee's recommendations in the form of a policy statement for exploration and mining on public lands.

Areas of Concern

The Committee felt that the absence of specific policy for exploration and mining on public lands creates uncertainty and potentially increased risks for mining interests. People who explore on public lands do not know in advance whether development of a discovery will be allowed. Although the recording of a claim conveys to the explorer only the exclusive right to further explore for minerals, some explorers may have the misimpression that a claim conveys development rights. Decisions regarding development of a discovery on public lands are not made until the Director of Public Lands has reviewed a general proposal, determined that mining is an appropriate activity on the parcel proposed for development (a land use ruling), and executed with the developer a lease which sets forth the terms and conditions of a development. The chart on the following page illustrates this process.

In addition to the lack of policy, there is also a lack of adequate information about the mineral resources of the State's public lands. As a result, the land management plans prepared by the Bureau of Public Lands have given little attention to mineral resources.

CURRENT PROCEDURE FOR MINING ON PUBLIC LANDS



* Maine Geological Survey

** Bureau of Public Lands

The Site Location of Development Law requires that, before prospective developers enter the DEP regulatory review process, they must demonstrate sufficient title, right, or interest in the property proposed for development. As a result, the Bureau of Public Lands must make decisions on whether or not to allow mining before the detailed technical and environmental information which is developed for the DEP process is available to it.

Another problem is that the Maine Geological Survey records all claims for exploration rights on public land and issues the permits required for both exploration and use of exploration equipment. As a result, the Bureau of Public Lands is usually unaware of these activities on lands under its jursidiction. In some cases these decisions could, without the Bureau's knowledge, permit activities in areas which are clearly unsuitable for mining, such as areas with unusual significance or environmental sensitivity. Similarly, decisions regarding land use rulings, licenses to mine, and mining leases are also the responsibility of the Maine Geological Survey, even though it is the Bureau of Public Lands which is responsible for overall management of public lands.

In addition, some of the current procedures required for exploration and mining are unnecessarily cumbersome. The current statute limits to 20 acres the size of parcels on which exclusive exploration rights can be claimed, but does not limit the number of such parcels. Extensive on-the-ground marking of the boundaries of these small parcels is required. Another problem is that the statute does not provide sufficient incentive for the timely conduct of serious exploration work on public land. Further, the statutory requirements for a license to mine and a mining lease are duplicative, as both call for submission of the same information and both require a public hearing. The chart on the previous page illustrates this.

Recommendations

(8) The Committee, the Bureau of Public Lands, and the Maine Geological Survey have developed a number of recommendations which could serve as the Bureau's first policy framework for exploration and mining on public lands. These recommendations are presented here in the form of a policy statement. Implementation of some of the recommendations requires a statutory change. These instances are noted in the recommended policy statement.

Recommended Mineral Exploration and Development Policy Framework for Public Lands

A. General

The Bureau of Public Lands was established under the provisions of MRSA Title 12, Chapter 202, Subsection 551, as the agency which "shall carry out the responsibilities of State Government relating to public lands planning and management." The statute further states that the Bureau will conduct its activities in a manner "consistent with the principles of multiple use management." Mining is a legitimate component of multiple use, but development of economic mineral discoveries is not mandatory. As with any major development proposed on public land, decisions regarding development will follow multiple use guidelines, give consideration to special natural values, and involve public participation. The law requires and the public expects that strictly financial values will not dominate decision-making on the public lands.

Public Reserved lands potentially available for mining comprise less than 250,000 acres, or about 1%, of the State's land area. These lands are managed for multiple uses and for the benefit of all citizens of the State, within which context mineral development may be accommodated. Many of the larger tracts managed by the Bureau are of strikingly high scenic and natural value and evidence high water quality. The State will not actively encourage mineral exploration and development on these particular tracts. Other lands managed by the Bureau of Public Lands include submerged coastal lands and the bottoms of great ponds.

B. Development Policy for the Various Categories of Lands Under the Bureau's Jurisdiction

The Committee recommends the following development policies for lands under the jurisdiction of the Bureau of Public Lands.

1. Unlocated public lots: (On unlocated public lots, the State's interest is common and undivided, shared with other landowners.) Mineral development in such areas will be governed by the discretion of the major landowner or through the consensus of all interests involved.

2. Located public lots in the unorganized territory: Development in such areas will be permitted generally, except that certain additional considerations may be involved in areas with outstanding recreational opportunities, rare or endangered species of wildlife, or other significant factors.

3. Located public lots in organized townships and plantations: Same as #2 above, except that local interests will be consulted as a normal part of the decision-making process.

4. Consolidated lots: (Consolidated lots are those large parcels of land which the State has acquired through trades of small, scattered lots with large, industrial landowners. Many consolidated parcels have special values.) Development in such areas will be considered on a case-by-case basis, weighing the values of competing uses to best serve the public interest.

5. Great Ponds: (The Bureau manages the land under the great ponds.) The Bureau will consider developments under great ponds on a case-by-case basis with a general inclination toward not disturbing natural conditions.

The adoption of this development policy requires administrative action (no statutory changes).

C. Exploration Policies

1. The Committee recommends the following statutory changes to clarify and simplify the procedures and requirements for exploration on public lands:

a) Replace the term "unit value" with the term "quality" in the definition of exploration.

b) Replace the terms "prospect," "prospecting," and "prospector" with the terms "explore," "exploring," and "exploration" throughout the statute. Combine the definitions of "exploration" and "prospecting."

c) Provide simplified procedures for claiming exploration rights, with the following features:

1) Replace the term "claim" with the term "exploration claim."

2) Establish a minimum acreage on exploration leases of 20 acres. No maximum acreage will be imposed on the size of an exploration lease. Currently, claims are restricted to a maximum of 1500 feet by 600 feet (about 20 acres). The boundaries of an exploration claim will still be required to be located on the ground, in a fashion similar to current practice. However, much less of this boundary marking will be required with the elimination of the 20 acre maximum claim size.

3) Assess a $100 fee for recording, transferring, or reducing the size of an original exploration lease. The current fee is $10 for each 20 acre claim.

4) Establish a graduated, annual, per-acre rental fee for an exploration lease with the following rates:

1st year	-	$ .25 per acre
2nd year	-	.75 per acre
3rd year	-	1.50 per acre
4th year	-	2.50 per acre
5th year	-	5.00 per acre

5) Require an annual affidavit of investigatory work, but eliminate the current expenditure requirement of $250 or 50-hour/claim/year. The affidavit should be exempt from the State's Freedom of Information Act so as to protect proprietary information. To assure that serious exploration work is being performed, the Maine Geological Survey should have statutory authority to adopt regulations which require progressively detailed work products at reasonable intervals over the life of an exploration claim. Examples of such work product requirements are preliminary geologic maps and detailed geophysical or geochemical information.

2. The Committee recommends that the Maine Geological Survey send to the Bureau of Public Lands a copy of all exploration permits issued. The two agencies should develop jointly the administrative procedures necessary to accomplish this efficiently. This change requires administrative action (no statutory change).

3. The statute currently requires that the Maine Geological Survey consult with the Bureau of Public Lands prior to issuing a permit for the use of machinery or explosives in exploration on public lands.

This provision of the statute has not been observed in the past. The Committee recommends that the two agencies develop the administrative procedures necessary to provide consultation.

The adoption of this policy requires administrative action (no statutory change).

4. The Committee recommends that the Maine Geological Survey inform the Bureau of Public Lands of the location of all recorded claims, as they occur on lands under the Bureau's jurisdiction. The two agencies should develop appropriate administrative procedures to accomplish this. This requires administrative action (no statutory change).

5. The Committee recommends that the Maine Geological Survey and the Bureau of Public Lands jointly develop an informational statement for people who explore for minerals on public lands. The statement should be provided at the time of application for an exploration permit, at the time of application for a machinery permit, and again at the time a claim is recorded. The statement should make clear that the recording of a claim in no way constitutes a determination that mining will be allowed. This policy requires administrative action (no statutory change).

D. Policy on Royalties

The Committee recommends that the Bureau adopt no royalty schedule at this time. As the staff resources of the Bureau may allow in the future, the Bureau should study the relative merits of either pre-setting royalties or establishing them on a case-by-case basis. In any event, as a crude guideline, the Committee recommends that royalties be set at levels comparable to those of private landowners.

E. Policy on the Land Use Ruling

The statute requires that proposals for mining developments be reviewed to determine the appropriateness of the activity proposed for a specific site. The Committee recommends that the Bureau's decisions on these land use rulings be made as multiple-use decisions in light of all relevant information available to it. The Bureau should not rely exclusively

on the decisions of other agencies whose mandates differ from its own. The Committee recommends that in responding to petitions for land use rulings, the Bureau of Public Lands consider, without limitations:

1) alternative mining methods;
2) net economic benefits to the Bureau and the State from developing the deposit;
3) scenic, recreational, and natural character of the area;
4) impact of the development on offsite resources; and
5) extent and seriousness of long-term modifications to vegetation, wildlife habitat, and water quality.

The Committee recommends a statutory change to transfer from the Maine Geological Survey to the Bureau of Public Lands the responsibility for issuing the land use ruling. Consultation with the Maine Geological Survey should be required. This is illustrated on the following page.

F. Policy on Issuance of the License to Mine and the Mining Lease

Both a license to mine and a mining lease are now required before mining can occur on public land. The Maine Geological Survey statute stipulates that the Maine Geological Survey issue both the license and the lease, with the consent of the Bureau of Public Lands, for lands under the jurisdiction of the Bureau of Public Lands. The license and the lease each require a public hearing. License fees and royalties are set jointly by the two agencies. The Committee recommends the following statutory changes:

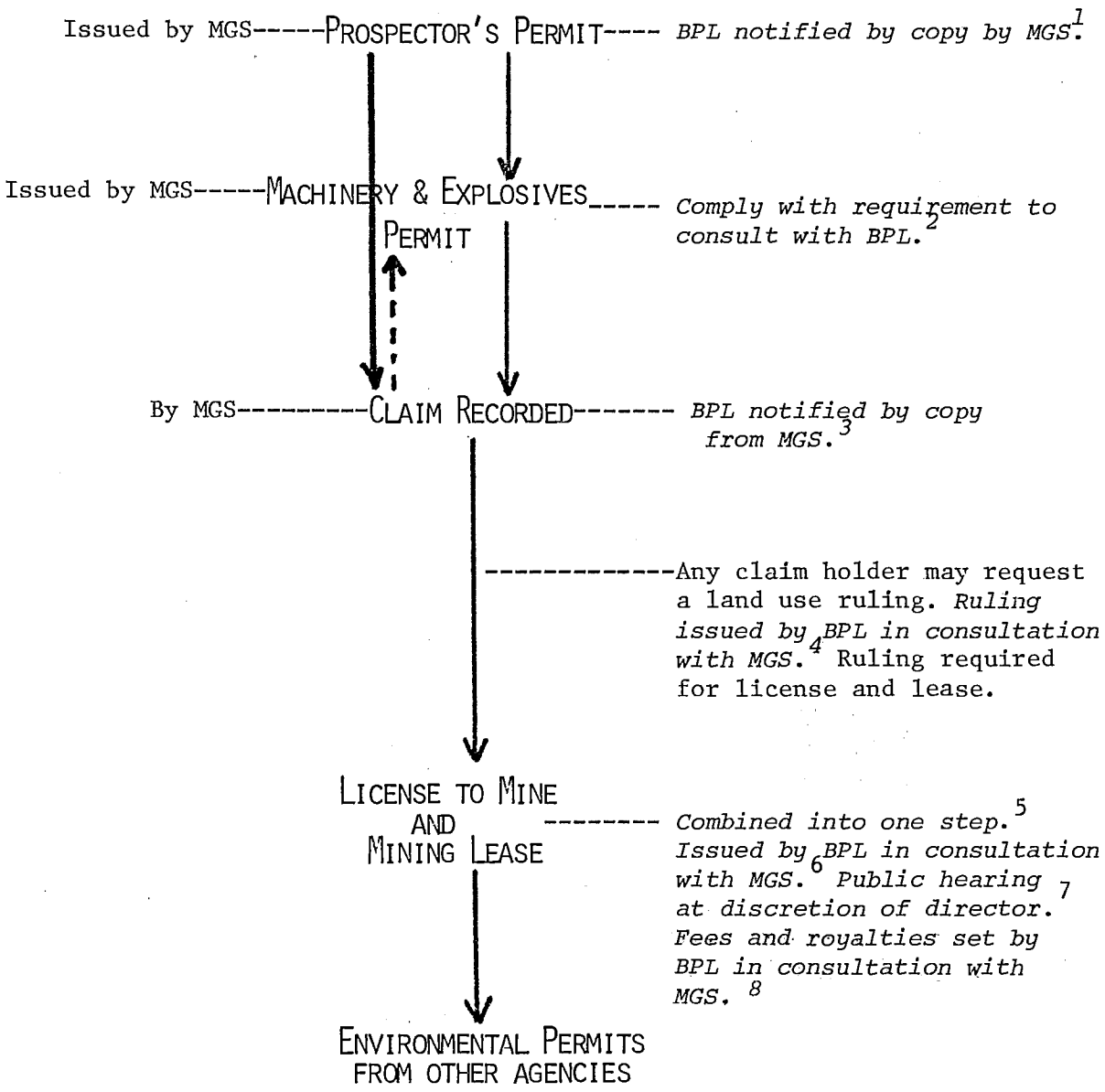
1. Combine into a single mining lease procedure the existing two step procedure for issuing a license to mine and a mining lease.

2. Stipulate that, for proposals involving land under the jurisdiction of the Bureau of Public Lands, the mining lease will be issued by the Bureau of Public Lands, with the consent of the Maine Geological Survey. (The current process calls for issuance by the Maine Geological Survey, with consultation with the Bureau of Public Lands.)

3. Require a public hearing upon request by the applicant, an interested party, or the Director of Public Lands. The statute currently requires three public hearings for all proposed mining.

PROPOSED CHANGES IN PROCEDURES FOR MINING ON PUBLIC LANDS

(CHANGES IN ITALICS)



[1]Each superscript identifies a proposed change. Each change is discussed in the text. Some changes require statutory change, others require only administrative action. Each change can be made independent of other changes.

4. Provide that fees and royalties be set by the Bureau of Public Lands, with the consent of the Maine Geological Survey, for lands under the jurisdiction of the Bureau of Public Lands. (The current statute requires that the Director of the Maine Geological Survey establish the license fee and royalty rates with the consent of the Director of the Bureau of Public Lands.)

G. Policy on Reclamation

The Bureau of Public Lands may, as may any landowner, elect to require standards for reclamation that are higher than would be generally in use or required by regulatory agencies. Similarly, the Bureau may elect to require a performance bond for reclamation which supplements the requirements of bonds required by other agencies.

H. Occupancy Uses Related to Mining

The Committee recommends that occupancy uses such as transportation corridors, structures, or tailings ponds be considered on a case-by-case basis, in light of costs, alternative locations for such facilities, and the natural values of the area involved. The Bureau should consider using land trades as an alternative to locating occupancy uses on public lands.

I. Policy on Gravel

Gravel is a limited and important resource in Maine. The Bureau of Public Lands currently sells gravel from its lands to commercial users, consistent with recommendations from the Land Use Regulation Commission and the Department of Inland Fisheries and Wildlife. Traditionally, the Bureau has allowed free use of gravel by logging contractors operating on public land for roads on that land, and for organized towns and camplot lessees. Proposals for gravel extraction are considered on a case-by-case basis. The Committee recommends that the Bureau's limited, free use policy be reconsidered periodically.

J. Policy on Management Plans

Land management plans prepared by the Bureau of Public Lands to date have given little attention to mineral resources. This is due in part to the lack of major mining proposals on public lands and in part to lack of knowledge of the specific mineral resources which may be located on

public lands. The Committee recommends that in its future land management plans, the Bureau: (1) identify existing valid claims on a parcel, (2) indicate whether the parcel is located in a region which shows particularly promising geologic trends, and (3) identify those public lands on which mining is considered inappropriate at the time of plan development. This requires administrative action (no statutory change).

TAXATION OF MINING

Introduction

Legislative Document No. 1942, "An Act to Create a Severance Tax on Minerals to Help Finance the Department of Inland Fisheries and Wildlife," was introduced to the second regular session of the 109th Maine Legislature. The bill proposed a severance tax on all minerals extracted in Maine, except sand and gravel. The tax to be levied was "2% of the value at the point of severance of the identifiable minerals severed." All proceeds of the tax were to be credited to the Department of Inland Fisheries and Wildlife.

The proposed tax was badly conceived and LD 1942 was not enacted into law. While the bill failed of passage, it did make clear that such a potential source of new revenues would not go unnoticed. It is probable that legislation to tax mineral extraction will be passed in the near future.

There are three basic types of taxes which can apply to mining in Maine: the severance tax, the property tax, and the income tax. Income and property taxes apply under current Maine law; creation of a severance tax requires legislative action. The choice of the forms of taxation and the rates to be applied to mineral mining in Maine have significant effects on the investment and production decisions of the industry and, in turn, on the amount of tax which is ultimately collected.

The tax which is most often associated with the minerals mining industry is the severance tax. The severance tax is essentially a royalty payment to the government is circumstances where the minerals are not found on public land. The tax is usually set at different rates for different minerals and is usually applied to units of gross output, gross value, or net value. Both large oil producing states such as Texas and Louisiana and some coal states such as Montana, Wyoming, and Colorado impose some form of severance tax.

The major problem with the establishment of a severance tax is to find the proper form and rate of the tax so that it returns to the state a fair share of the value of the mineral but does not cause the mining of the mineral

deposit to be shut down prematurely. As the quality of a mineral deposit declines and the marginal cost of extracting it increases over the life of the mine, at some point it is no longer economical to continue mining. Since the severance tax is another cost to the firm, this tax affects the decision to shut down. The higher the tax, or the less flexible the tax rate, the sooner will come the time when the marginal cost will exceed the marginal revenue and the mine will close. Once closed, most mining operations are never reopened because of the expense involved. The minerals left in the ground when the mine is closed are lost forever. The revenues which could be generated from those resources are also lost.

Thus a severance tax where the rate is set solely to maximize revenues will achieve that objective in the early years of mining, but will eventually bring about a premature mine closing, and will probably have the effect of yielding less revenue over the long run. A severance tax which is established on a sliding scale basis, with the tax rate declining as the value or profitability of the mine declines, minimizes this effect.

The Committee carefully considered the subject of state taxation of mining in Maine. Through computer analysis, they examined the effect of current Maine taxes (income and property) on a hypothetical metal mining operation. They compared Maine's current mining tax levels to those in other states which have mining industries. They surveyed the types of taxes other states levy on mining and they analyzed the effects of various new taxes on the hypothetical Maine mine. This part of the Committee's report presents their particular concerns and recommendations for state taxation of mining in Maine.

Areas of Concern

The Mineral Policy Advisory Committee identified a number of concerns relating to taxation. All of these concerns must be addressed in the final design of a taxation structure for mining in Maine, whether or not a new tax is created.

Most of the major mineral deposits to be mined in Maine probably will be found in the unorganized townships of the state. Property taxes in that area are paid to the State. The amount of money which can be raised by property taxes in the unorganized areas is constitutionally limited to the cost

of services provided to that area. Under current law, the effect of a major new taxable property, such as a large mining operation, will be to decrease substantially the tax paid by the other landowners in the unorganized area. The State will receive no additional revenues. In addition, the mining industry will enjoy a significant property tax break relative to industries in municipalities where there is no tax limitation. In an organized municipality of the State, on the other hand, that municipality will want to receive the maximum income possible from property taxation of that industry.

Severance taxes can be imposed on the gross revenues of a mine or on the net revenues, after certain allowable expenses are deducted. The majority of states which impose a severance tax base it on gross revenues. This approach is simpler to administer. However, when gross revenues are taxed at a fixed rate, the effect may be to cause an early shutdown of the mine when net revenues begin to drop below production costs. If a severance tax is imposed on net revenues, the tax will have less effect on the timing of decisions to terminate production at the mine; however, if the mine is not profitable for one reason or another, the State may receive little or no revenue. The most desirable arrangement is one which assures the state of some reasonable revenues but does not adversely affect the long term production decisions for an operation.

The value of minerals as they rest in the ground appears to be taxable under current Maine law. However, very difficult problems of assessment and valuation are encountered in attempting to tax mineral deposits. How much of the mineral exists in a deposit? What are the boundaries of the deposit? What is the actual value of the minerals in the ground? These questions cannot be answered accurately while the resource remains in the ground.

Communities in which a mining operation is located and other communities in the vicinity of a mine may experience difficulties in providing the services which normally attend a major new development. Classrooms may need to be added to the local school, water or sewer lines may need to be extended, new housing may be required, or additional police or fire protection needed. Municipalities will need assistance to plan efficiently for the timely provision of these services and to finance them. These needs are greatest at the earliest stages of the life of a mine, while the benefits of increased tax revenues and new jobs are more long term. Some mechanism

needs to be available to insure that municipalities are able to address these problems.

The revenues to the State generated by a severance tax can go directly to the State's General Fund or they can be allocated for specific purposes. The funds generated are likely to be difficult to predict, variable from one year to the next, and of relatively short duration for each mining operation. Montana is a state which, in recognition of these factors, has established a system to insure that the revenues from mineral taxation will continue to provide permanent benefits to the residents of that state. Montana has established a trust fund for the revenues of that state's severance tax on mining operations. The revenues from the trust fund are used for specified public purposes on a continuing basis.

Recommendations

A. Premise

(9a) The Committee recommends that it be the policy of the State of Maine that a reasonable portion of revenues derived from the development of Maine's mineral resources be shared with the State through direct taxation. The total effect of taxes on mineral development should function so as to maximize economic production of each mine, while providing reasonable compensation to the citizens of Maine for the loss of nonrenewable resources. State taxes on mineral development should place Maine mining enterprises in a competitive position with those in other states.

B. Form of the Tax

(9b) The Committee recommends that there be a severance tax on the extraction of certain mineral resources in Maine. The severance tax, which is a form of excise tax, is the tax traditionally used on natural resources. Most mineral-producing states use some form of this tax on minerals.

C. Resources to be Taxed

(9c) The Committee recommends that the severance tax be applied to minerals, metallic and non-metallic, which are extracted by relatively large scale operations. For the purposes of this tax, the Committee considers peat a

mineral. The Committee recommends that mineral resources which are commonly used by the construction industry, including sand and gravel, crushed rock, and limestone, be exempt from this tax.

D. Basis of the Tax

(9d) The Committee recommends that the severance tax be assessed in lieu of the property tax. The value of minerals in the ground should not be taxed. The tax should be assessed initially on the value of capital improvements, up to a specified maximum level of revenue, when the basis of the tax should become the value of the minerals extracted.

(9e) The Committee recommends that the severance tax be applied to gross revenues in a manner which varies positively with the level of net revenues. As net revenues increase, the tax rate applied to gross revenues should increase. Mining, milling, and operational costs, including royalties and the cost of reclamation bonds, should be allowable expenses in calculating the net. Mining operations where gross revenues are below a fixed annual minimum should be exempt from the severance tax, but not the property tax.

E. The Tax Rate

(9f) The Committee recommends that tax rates be determined for each taxable mineral or for specified groupings of similar minerals. The Committee further recommends that a special purpose committee be established to recommend these tax rates. This committee should be established at the earliest possible date and should include representatives of the mining industry and others knowledgeable in taxation and the economics of mining.

F. Allocation of Tax Revenues

(9g) The Committee recommends that municipalities in which a mine is located be reimbursed as fully as possible for revenues lost by the collection of a severance tax in lieu of property tax. The Committee recommends that the revenues which remain after municipal reimbursement be dedicated to a trust fund to be established by the Legislature for this purpose. The trust fund should be administered by a Board of Trustees composed of public and private sector members appointed by the Governor. Income from the trust fund should be devoted to projects which are related to the wise use, reuse, or conservation of Maine's nonrenewable resources or provide assistance to communities

affected by mining development. The Board of Trustees should recommend to the Legislature the specific annual disposition of the proceeds from the trust fund. The Board of Trustees should be authorized to use the fund's principal for impact assistance to communities. Impact assistance to communities should take the form of grants for planning and loans for public facilities and services. Loans should be repaid to the trust fund.

The trust fund will have no revenues until the first mining development is underway. Assistance to affected communities needs to be provided during the early stages of a mining operation, which, in the first case, will occur when the trust fund has no money.

(9h) The Committee recommends that the State enable mining companies to contribute funds for community assistance which will be deducted from future severance tax payments.

MINING IN MAINE: PAST, PRESENT, AND FUTURE

Written by
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Introduction

Mining in Maine has a long and varied history unknown to many Maine citizens. Many Mainers have seen the granite quarries which remain from an industry established more than 150 years ago. Gravel pits are a common sight and Maine limestone, slate, gems, and peat are familiar to many. The resources most familiar in the 1980's are but a few of many which have been sought and exploited in Maine. Economic conditions, technological developments, and world events influence the level of mining activity in Maine as elsewhere. The history and future prospects for mining in Maine are presented here in light of some of these influences.

The Early Years: Pre-Civil War

The first extensive evaluation of Maine's mineral resources was authorized by the state legislature in the spring of 1836. Recognizing that such a geologic survey would help Maine's agriculture, industry, and commerce, the Board of Internal Improvements hired Charles T. Jackson of Boston to conduct the survey. Jackson's field work was limited by funding, weather, and available transportation to coastal areas and major river and overland routes; however, in his third and final report submitted to the Governor and Council in February 1839, Jackson concluded that Maine had a wealth of mineral resources. Jackson felt that Maine could become self-sufficient in the production of peat, lime, roofing slate, granite, and some metals and should, indeed, be able to market these products in other states.

By 1836, when Charles Jackson began his geological survey of the state of Maine, mining in Maine, albeit at a small scale, was already well established. The commodity of greatest importance at that time was granite. Maine had several advantages that made it the principal supplier of granite to the rest of the Atlantic states and the West Indies. The greatest of these advantages was that many suitable granite bodies were readily accessible by navigable rivers, bays, or inlets. Thus the shipping costs for Maine granite were considerably less than for other types of building stone quarried elsewhere in the country. High quality granite was abundant and available in such a wide variety of color and texture

that virtually any demand could be met. Quarrying was concentrated around Penobscot Bay, eastern Washington County, Hallowell, Biddeford, and the Blue Hill area.

Maine was also well known for its limestone quarrying. Activity was concentrated then, as it is now, in the Thomaston, Rockland, and Rockport area. Jackson estimated that at least $14 million worth of limestone (in 1836 dollars) lay within 20 feet of the surface in Thomaston. The annual sale of lime products amounted to about one half million dollars. Fine-quality roofing slate, equal to that traditionally imported from Wales, was produced from several small operations northwest of Bangor. Other mineral materials exploited on a small scale include diatomite and soapstone. The only metal mines operating at the time were the Newfield Iron Works, which melted bog iron to be shipped to Boston, and the lead mines near Lubec.

The sixth and seventh Annual Reports of the Secretary of the Board of Agriculture published in 1861 and 1862 on the agriculture and geology of Maine contain another assessment of the status of mining in Maine and the potential for future exploitation of the state's mineral resources. Although perhaps not as optimistic as Jackson's earlier publication, the two reports supported the assumption that Maine was blessed with sizable reserves of certain commodities, particularly granite, limestone, peat, slate, and certain metals.

During the mid-1800's, Maine still supplied much of the rest of the country with granite. The coastal areas were literally dotted with granite quarries actively producing granite for both domestic use and export. The manufacture of lime products near Thomaston, Rockland, and Rockport remained Maine's other major mineral industry. Roofing slate continued to be quarried in the vicinity of Brownville, Barnard, and Williamsburg, but the full production potential was never realized. Metal mining continued locally at a small scale. The Newfield Iron Works was still in operation, while a new lead mine was opened near Lubec by the Maine Mining and Manufacturing Company. A new mining operation was begun at Katahdin Iron Works following the discovery of workable iron oxide ore by Moses Greenleaf (the first map maker in Maine) in 1848. The first charcoal furnace was built in the same year a mile from the workings to provide charcoal for the smelting of the ore and was enlarged several times in subsequent years to handle increased production. The

other new mining venture of the period was the beginning of feldspar mining in the Topsham area in 1852. As with most of the granite quarries, the pegmatites in Topsham were economic deposits because of their proximity to navigable tidal water. Transport of the milled feldspar to the ceramic plants on the Atlantic seaboard was relatively cheap.

The Civil War to World War II

In the years following the Civil War, limestone and granite continued to be quarried in large quantities. The greatest activity in Maine's mining history was the metal mining boom of 1878 to 1882. The presence of metallic deposits in Maine had been noted by Jackson and subsequent investigators, but development had been limited to the operations at Katahdin Iron Works and Lubec. When people returned to Maine after joining the gold and silver rushes in the western United States, they found a striking similarity between the metal-bearing rocks of their home state and the rocks from which various metals could successfully be extracted in the western states. There was a great deal of excitement generated as mining companies were organized and financed, buildings were erected, machinery was installed, and, in some cases mills, concentrators, and smelters were constructed. Activity was concentrated in the area around Blue Hill, Sullivan, Acton, and Lubec, and was of such a high level that a weekly industry newspaper, the "Maine Mining Journal", was published in Bangor beginning in 1880.

Prospecting and investment in and development of numerous metal mines continued until 1883, when copper prices dropped considerably. The mines in the Blue Hill area were the first to close, and were soon followed by the silver mines around Acton and Sullivan. The other newly opened metal mines soon followed suit. Katahdin Iron Works continued to produce despite having to rebuild the furnace that was almost completely destroyed by fire in 1882. Mining and smelting ceased in 1890 in the face of competition from the Lake Superior iron producers and depletion of workable iron oxide ore. Although prospecting continued and several metal mines reopened for a short time, no major activity took place after the early 1880's. The shipment of copper concentrate from the Douglas Mine in Blue Hill by American Smelting and Refining Company in 1918 marked the last production of base metals from Maine mines until the late 1960's.

Three other mineral products continued to be produced well into the twentieth century. Thomaston and Rockland remained the center of limestone development. The feldspar mining industry continued to be active around Topsham and some feldspar was produced from pegmatites in Oxford County. Production reached a yearly high of about 12,000 tons by the late 1920's, almost ceased during the depression, but recovered to about 5,000 tons per year in the late 1930's. Competition from feldspar producers with modern beneficiation facilities in the southeastern Atlantic states effectively killed the feldspar industry in Maine, which had not modernized to keep pace with the times.

The granite industry reached its high point in 1901, with at least 152 quarries employing at least 3,500 people. In terms of value of granite produced, Maine ranked first in the country. Maine granite was used for everything from bridge supports and piers to tombstones. Many public buildings, churches, and monuments, particularly in New York City, are constructed of Maine granite including the State House and State Office Building in Augusta; post offices in Philadelphia, Buffalo, Hartford, and Albany; Custom Houses in St. Louis, Boston, and Brooklyn; Grant's Tomb in New York City, paving stones in New York and Philadelphia; and the gatehouse in Central Park. The value of granite produced in Maine declined between 1911 and 1922, but recovered by the mid-1920's, when paving blocks accounted for more than half of the total amount of granite produced. However, the development of Portland cement as a building material in the early 1900's and the depression of the 1930's dealt Maine's granite industry a blow from which it never recovered. Production in the years to follow would never be more than sporadic and small in scale. During this several other mineral commodities continued to be produced. Slate and peat deposits were exploited, primarily for local use. Diatomite, which was used in polishing compounds, was produced sporadically from deposits scattered about the state. Numerous local brickyards thrived, particularly along the coast, where sufficient clay was found to support production of bricks not only for local use but also for shipping elsewhere along the Atlantic Seaboard.

The War Years of the 1940's

Two events in the early 1940's stimulated exploration for and exploitation of Maine's mineral resources. One was the legislative action placing the State Geological Survey under the Maine Development Commission; the other

was the outbreak of World War II.

In 1942, the Maine State Legislature enacted a bill placing the State Geological Survey under the jurisdiction of the Maine Development Commission. To carry out its part of the Commission's program, the Survey had a fourfold function:

"1) to give service to landowners and prospectors through the identification and examination of mineral and rock specimens and prospects;

2) the exploration and mapping of areas which appear to have economic prospects for mineral development;

3) laboratory research directed towards the discovery of new or improved techniques that may make possible economic advances in the commercial development of our mineral resources; and

4) the dissemination of information on the geology and mineral resources of Maine, through publication, correspondence, and talks before various groups."[1]

When World War II began, the Maine State Geologist, along with geologists throughout the country, became concerned with meeting the increased mineral requirements of the wartime economy. This meant searching for new deposits, re-examining old deposits, and developing the technology whereby previously uneconomic deposits could be made commercially exploitable. Of particular concern were those mineral materials on the War Department's "strategic list." The list was based on the country's experience during World War I and included those materials essential to national defense that came primarily from foreign sources. The precarious nature of shipping materials overseas, as well as the increased demands by a wartime economy stimulated the interest and the need to develop domestic mineral sources. During the war years the U.S. Bureau of Mines conducted an extensive drilling and sampling program to investigate the potential of Maine's metallic and pegmatitic deposits. The U.S. and Maine Geological Surveys also conducted field and laboratory investigations. Of the strategic mineral materials listed by the War Department, only manganese and mica occurred in sufficient apparent quantity and quality in Maine to warrant further exploration. Consequently, the mica and manganese investigations were given priority over other projects.

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[1]Joseph M. Trefethen, Report of the State Geologist, 1947-1948 (Augusta: Maine Development Commission, 1949).

Both scrap and higher grade mica were essential to the burgeoning electrical industries. As much of the better quality "punch" and "sheet" mica had been imported prior to the war, the Maine Geological Survey, in cooperation with the U.S. Geological Survey, concentrated on searching for deposits to replace the foreign supplies. The Surveys spent considerable time examining the many mines and prospects located in the mica-bearing pegmatites of western Maine. Reports and maps resulting from the field investigations were made available to interested parties either directly through the Maine Development Commission or as open file documents from the Maine Geological Survey at the University of Maine in Orono. The production of sheet mica in Maine was significant during the war years. However, despite government assistance and high wartime prices, most mica operations were barely able to break even. Mining for mica in Maine ceased when the war ended.

In view of the urgent need for manganese to meet the demands of the steel industry, work was initiated in the summer of 1941 to evaluate the manganese deposits in Aroostook County that had been discovered over 100 years before. The project was placed under the State Military Defense Commission; samples collected in the field were analyzed and various extraction methods were tested at the Massachusetts Institute of Technology laboratories. Mapping and additional studies of the deposits were conducted by both the State and U.S. Geological Surveys. The Manganese Ore Company, a subsidary of the M.A. Hanna Company, began prospecting in the larger, more promising deposits in 1942. Based on work conducted during the war years, the estimate of reserves of equivalent metallic manganese in Aroostook County was about 2,100,000 tons, the average manganese content of the ore being about 9 percent. At that time, however, a process by which manganese could be extracted efficiently and economically from the type of ore found in Aroostook County had not been developed.

In addition to those materials listed as strategic by the War Department, other mineral resources were explored for during the war years. These included limestone, peat, beryllium, graphite, clay, spodumene, sulfur, asbestos, feldspar, copper, zinc, and slate. Several of these materials were actively mined during the war.

Limestone production was Maine's most important extractive industry during the war years. It was produced by three major concerns, all operating in the Rockland area. The chief products were agricultural lime, burned lime, cement materials, and chemical limestone for use in

the paper industry. Further field and laboratory investigations indicated that Maine had enough dolomite to assure local production of magnesium lime for many years. This would be especially important to Maine's potato industry as much of the soil in Aroostook County is deficient in magnesium.

Peat was harvested in a number of towns in Maine during the early 1940's, including Centerville, Deblois, Franklin, Friendship, Jonesport, Penobscot, and Sullivan. The peat harvested in these operations was used exclusively for agricultural or horticultural purposes. Fuelwood shortages and rising costs of other fuels prompted the Maine Development Commission to investigate the use of peat as a fuel. Field work was conducted by the Maine Geological Survey and laboratory analysis by the University of Maine Technology Experiment Station. The results of the survey were published in Bulletin No. 1 of the Maine Geological Survey. The quality of Maine peat was found, in general, to be very good.

In addition to being investigated as a source of mica, pegmatites were also evaluated for their beryl, spodumene, and feldspar content. Beryl, the main ore of beryllium, and spodumene, the most common lithium ore, were important in the production of metal, particularly bronze. Unfortunately, both minerals occur only sporadically in pegmatites in Maine, and production was limited to that produced as a by-product of feldspar or mica mining. Feldspar, on the other hand, remained one of the more important mineral commodities in the state, with several large mines in production in Oxford and Sagadahoc counties. Slate, which was then used primarily as an insulator on electric switchboards, continued to be mined and milled in the Monson area. Reported occurrences of asbestos and graphite were investigated by the Maine Geological Survey, but the deposits were never developed commercially.

The Katahdin Iron Works pyrrhotite deposit was studied through a cooperative effort by the Maine Geological Survey and the U.S. Geological Survey as a possible source of sulfur. The results of the study were published in the Maine Geological Survey Bulletin No. 2. The deposit, whose oxidized gossan had been mined intermittently during the last century as a source of iron, was estimated to have about 5,800,000 tons or iron and 3,300,000 tons of sulfur for every hundred feet of depth. The Maine Geological Survey also conducted studies of clays for their potential for use, and possible beneficiation of local clay deposits.

The Second World War had both good and bad effects on exploration and exploitation of mineral resources in Maine. On the one hand, exploration for both strategic and non-strategic mineral materials previously supplied from overseas was stimulated. Much valuable geologic information was gathered. However, the mineral extraction industry as a whole, especially producers of construction materials such as crushed rock, sand and gravel, cement, slate, and structural clay products, were affected adversely, not only by market conditions, but also by manpower shortages and equipment procurement problems. Despite increased demand for some materials, output actually diminished.

The Post War Years: The Late 1940's to 1960

In the late 1940's and early 1950's, the Maine Geological Survey, along with other governmental agencies and mineral companies, continued to explore Maine's mineral potential. It was generally believed that, based on the geologic characteristics of the Appalachian region of which Maine is a part, the outlook for the discovery of economic deposits of metals in Maine was, with few exceptions, not very bright. Therefore, efforts were concentrated on non-metallic materials, particularly clay, limestone, and pegmatites. At that time, mineral production in Maine was limited to non-metallic and industrial minerals. Demand contined to grow for structural mineral materials such as crushed stone, cement from limestone, structural clay, and sand and gravel. Agricultural peat continued to be harvested from deposits primarily in eastern Maine. Feldspar, along with minor amounts of beryl, columbium-tantalum, quartz, and mica, was steadily produced from mines in the southern and west part of the state. Production of slate by the Portland-Monson Company and agricultural limestone also continued.

The value of mineral production in Maine increased steadily following the war, with the exception of a slight drop in 1949, from about $2.5 million in 1945 to $13 million in 1955. By that time cement from limestone, produced exclusively by the Dragon Cement Company in Thomaston, accounted for over half of the value of Maine's mineral products.

Because of the assumption that Maine was unlikely to have economic deposits of metals, exploration for metallic deposits in Maine during the big metal boom of 1947-1956 was sporadic. Exploration companies and federal agencies were more interested in investigating the more promising metals potential of the Colorado Plateau and other western areas. The U.S. Bureau of

Mines continued to explore the manganese ores in Aroostook County. The results of drilling and sampling at the base metal prospects in Blue Hill and Brooksville generated enough interest among exploration companies that the Texas Gulf Sulfur Company and several other major concerns conducted additional drilling and mapping studies.

The U.S. and Maine Geological Survey, in a cooperative venture, conducted aeromagnetic investigations in the Katahdin Iron Works area and the Dead River area in 1951 and 1952 respectively. The discovery of large base metal sulfides in the Bathurst, New Brunswick area prompted the Maine Geological Survey to conduct an aeromagnetic survey in a geologically similar region in Washington County. Although the data revealed only a few indications of mineralization, several companies conducted active investigations in the area.

It wasn't until 1956 that the mineral exploration companies, stimulated by the Bathurst ore discoveries, started full scale field investigations in Maine. These companies, including American Smelting and Refining, New Jersey Zinc, Ventures, Ltd., Texas Gulf Sulfur, American Metal Climax, The Anaconda Company, and Kennecott Copper, were looking primarily for copper, nickel, lead, and zinc. To further promote mineral exploration and exploitation, the Maine Geological Survey, beginning in 1956, compiled and published several maps and bulletins, including the Mineral Resource Reference Map series and the Mineral Resource Index series, to facilitate the location of mineral occurrences in Maine. Exploration activities continued with varying degrees of success, until the bottom dropped out of the metals market in 1958.

The 1960's

Despite continued field mapping and aerial reconnaissance of potential mineral deposits by state and federal agencies and members of the academic community, private companies were no longer interested in conducting large scale field investigation programs in Maine. To stimulate interest in continued exploration for metals, the Maine Geological Survey embarked on a five-year program to evaluate metal prospects using current exploration technology adapted to Maine's complex geology and terrain. During 1960, a geological-geophysical-geochemical study of a zone of magnetic anomolies in Penobscot County was completed, the results of which were published in 1961 in the Survey's first bulletin in their Special Economic Series. During the next three years, three other studies were completed

and published, two of which investigated portions of the coastal base metal province in Maine in the coastal areas of Hancock and Washington Counties. The Survey also stepped up its basic bedrock mapping program. The U.S. Geological Survey continued with its aeromagnetic surveys and geochemical field studies. The U.S. Bureau of Mines also conducted economic studies.

As metal prices began to rise in the early 1960's, exploration activities by private concerns were stepped up. This increase in activity was due in part to the working agreements reached by the large landowning paper companies and the mining companies to prospect and develop the mineral resources of paper company lands. Among the companies actively prospecting for metals at this time were Blackhawk Mining near Blue Hill, Penobscot Mining at Harborside, Yankee Canuck Oil and Mining in Hancock County, Roland F. Beers, Inc. in Union, and Anaconda Copper near Parmacheenee Lake.

Yearly mineral production values during the late 1950's and early 1960's leveled off to between $13 million and $14 million. Production of several non-metallic materials, such as cement, peat, and feldspar either declined, or remained at the same level, while production of commodities such as clay, gem stones, and sand and gravel increased. Production of feldspar reached its lowest level since 1906. When the General Services Administration ended its strategic minerals stockpile program in 1962, production of mica and beryl ceased in Maine. Small amounts of granite continued to be quarried in Cumberland, Kennebec, Knox, Hancock, Waldo, and York Counties.

It appeared that Maine's first metal mine in half a century would be opened by Black Hawk Mining near Blue Hill by 1966. Shafts and levels were developed during 1964 and 1965 in the ore body which had an estimated reserve of 4.5 million tons. However, work was suspended in 1966 due to unfavorable employment and economic conditions. In 1968, exactly 50 years after the last productive metal mine in Maine closed, a metal mine was opened in Brooksville by Callahan Mining. Mining was by both open pit and underground methods. A flotation mill, which utlized sea water, processed the ore to copper and zinc concentrates. The concentrates were shipped to out-of-state smelters.

Exploration for copper, lead, zinc, nickel, gold, and silver deposits by both domestic and foreign companies increased during the mid and late 1960's. Roland Beers, Inc. continued its geophysical exploration for nickel and copper in Union while James R. Dunn and Associates explored a former copper prospect near Appleton. Dolsan Mines of Montreal drilled a mineralized area near Pembroke. The northern mineral belt in the vicinity of Jackman was explored by Northern Canada Mines, Noranda Mines of Toronto through its subsidiary East Range, Spooner Mines and Oils of Toronto through North American Exploration, and Humble Oil and Refining of Houston. Their exploration efforts also extended northeastward along the trend of the mineral belt.

By 1969, the value of Maine's mineral production reached $20.2 million. This increase reflected the greater overall production and value for cement and dimension stone as well as the addition of mining and milling of copper and zinc at the Callahan Mining operation at Harborside. Production of peat reached its lowest level since 1961 due to the lack of sufficient personnel, while production of feldspar, except for 1968, also declined. Scrap mica was mined in 1969 for the first time since 1962. Production of sand and gravel showed a general decline following 1965. Figures for clay and gemstones remained constant between 1964 and 1969.

During this period, various state and federal agencies continued to support exploration of Maine's mineral resources through field studies, laboratory research, and publications. The Maine Geological Survey continued to publish the results of its work, including a statewide bedrock geology map that was completed in 1967. In 1969, the Mine Reclamation Law was passed. This legislation required that, prior to beginning mining operations, mining companies submit a mine plan, including a comprehensive plan of how areas disturbed would be rehabilitated. Companies were also required to post bond with the State to ensure reclamation would be carried out satisfactorily.

The 1970's

The value of mineral production in Maine increased steadily from $21.9 million to $43.2 million in 1977. This increase was due largely to increased production of copper, zinc, cement, clay, and sand and gravel,

and to inflation. During that period, Plumbago Mining explored actively in Oxford county for pegmatite minerals, particularly tourmaline, which was officially named by the State Legislature in 1971 as the Maine State Mineral. Several gem-quality localities were opened up in 1972 and 1973. No feldspar was produced between 1970 and 1975. Three granite quarries in York and Hancock Counties continued to produce dimension stone for architectural use. Underground production of slate at the Portland-Monson Slate facility in Monson was suspended from late 1973 to 1975 while a new shaft was sunk.

During the regular session of the 107th Legislature, changes effective November 1975, were made in the mining laws. The elimination of lease terms confined by statutes was the most significant change. The Bureau of Geology was given the authority to negotiate the terms of leases for mining on the State's public lands. The Bureau of Geology was also given the authority to oversee prospecting and staking of mining claims on state-owned lands. The makeup of the Mining Bureau and the structure of licensing and rental fees were also changed.

In 1972, after only five years of production, Callahan Mining closed down its copper-zinc mining and milling operation at Harborside due to depletion of reserves. Prior to its closing, the Goose Pond Reclamation Committee, which consisted of four residents of the town of Brooksville, two state representatives, and one mining company representative, was formed to advise and oversee the reclamation of the pit area. In a novel reclamation scheme, the open pit, which was actually a part of Goose Cove that had been drained and dammed to allow mining, was flooded by tidal water and a program of aquaculture of oysters and salmon was begun. Late in 1972, production at the Black Hawk mine in Blue Hill was begun by Kerr-American, Inc., a subsidiary of Kerr Addison, Ltd. of Toronto. The ore was processed on site for copper and zinc concentrates, which were shipped out of state for smelting. Production continued until the fall of 1977. After operations ceased, equipment was removed from the mine and the mine openings were sealed with concrete bulkheads. To prevent leaching of the sulfide tailings, the upraised portion was covered with glacial till and the lower portions were submerged in water.

During the early and mid-1970's, exploration, primarily for base metals, was continued by American and Canadian concerns. International Paper Company, along with its newly acquired subsidiary, General Crude Oil and Minerals, and Kerramerican conducted exploratory drilling on Inter-

national Paper land near Square Lake. Knox Mining continued investigation begun in the late 1950's of a copper-nickel deposit in Union. This effort was taken over late in 1971 by a joint agreement of Basic, Inc. and Hanna Mining of Cleveland and was dropped in 1975. Callahan Mining, New Jersey Zinc, and Superior Oil jointly conducted exploration for metallic deposits in several counties as part of a program begun in 1967. Louisiana Land and Exploration and Superior Oil continued the joint program after 1973.

Silver Stack Mining of Montreal completed its drilling program in Pembroke. Standard Metals Company explored for lead and zinc on Brown Company land in Maine. Kerr-McGee evaluated the uranium potential along the Maine-New Hampshire border, while Phelps Dodge Exploration East investigated the coastal volcanic belt. Superior Mining evaluated the nickel potential of the Katahdin massive sulfide deposit which had been held for many years by Allied Chemical as a potential sulfur reserve.

Mineral exploration has continued at an even greater pace in Maine since 1977. Prospects for developing several different types of mineral deposits are quite good. Perhaps one of the most significant economic events in recent years in Maine was the announcement in 1977 by Superior Oil and Louisiana Land and Exploration of a major copper-zinc deposit in T12 R8 in Aroostook County. The massive, rich, 36 million ton deposit, discovered by J.S. Cummings, Inc. of Bangor, is estimated to be the third most significant copper discovery on the North American continent since the 1950's. Utilizing innovative and very costly exploration techniques coupled with persistence, patience, and trial and error, the deposit was pinpointed by Mr. Cummings in an assemblage of volcanic rocks which extend for approximately 130 miles in a belt 50-60 miles wide across north central Maine.

Spurred on by this find, many other exploration firms have stepped up their activity. Exploration continues in this volcanic belt by Superior and numerous mining firms representing both American and foreign interests. Intensive mineral exploration is also underway along the Maine coast in a second and equally prospective suite of volcanic rocks extending from Penobscot Bay to Eastport. Newmont Exploration, Phelps Dodge Exploration East, and Superior Mining Company opened offices in Bangor from which exploration activities throughout the state were directed. Northgate Exploration of Toronto looked for uranium and molybdenum in

Hancock and Washington Counties. Chiasma Consultants of Portland evaluated the uranium potential in part of western Maine. Scintilore Exploration continued to prospect for copper, zinc, and silver in Pembroke. Houston Oil and Minerals was active in the Chain of Lakes area. Aquitaine Company of Canada, Ltd., continued their geophysical studies and drilling program in Bowman and Oxbow Townships. Other exploration firms active in the state include Rio Tinto, Allied Chemical, Kerr McGee, Bethleham Steel, and General Crude Oil.

Production of non-metallic mineral material remains high and accounts for the total value of mineral products produced in Maine since the closing of the Kerramerican copper-zinc mine in Blue Hill in 1977. Maine currently produces enough sand, gravel, cement, peat, gem tourmaline, and some varieties of stone and clay to be self-sufficient. Slate continues to be produced at the Portland-Monson Slate Company Mine in Monson. Peat production also continues with the Down East Peat Company of Deblois utilizing some of the largest peat harvesting machinery in the world.

Industrial Garnet Extractives developed the Wing Hill Mine in Rangeley for garnet-bearing diorite. The garnet is to be separated at the old Bell Mining Company feldspar mill in West Paris and will be used for a variety of industrial uses including water filters, abrasives, and packing media.

Various state and federal agencies continue with technical and evaluative programs. The Maine Geological Survey continues with its mapping and publication programs. A cooperative effort with the U.S. Geological Survey to investigate the peat resources of Aroostook, Washington, and Hancock Counties has been completed. This work is complemented by an ongoing study by the Maine Geological Survey and Office of Energy Resources, funded by the U.S. Department of Energy, to evaluate the fuel potential of Maine's peat resources. The U.S. Bureau of Mines assisted in an evaluation of waste slate produced by the Portland-Monson Slate Company to determine potential byproduct use. The U.S. Geological Survey, with the assistance of the Maine Geological Survey carried out its Conterminous United States Mineral Appraisal Program (CUSMAP) in western Maine.

The Future

The copper discovery in Aroostook County, the national energy crisis, the