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ENVIRONMENTAL QUALITY
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February 28, 1980

TO: MEMBERS OF THE MONTANA LEGISLATURE
and INTERESTED PERSONS

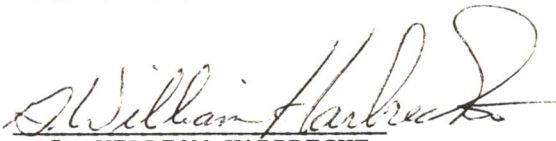
RE: Final Report on House Joint Resolution 51

Enclosed for your review is a copy of our final report on "The
Problems and Benefits of Mining Bentonite in Montana - House
Joint Resolution 51."

If you have any questions concerning the contents of this report
or desire any additional information, please feel free to contact
our office.

Sincerely,

TERRENCE D. CARMODY
Executive Director

By 
G. WILLIAM HARBRECHT
Ecology Researcher

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Enclosure

February, 1980

FINAL REPORT
THE PROBLEMS AND BENEFITS OF MINING
BENTONITE IN MONTANA
HOUSE JOINT RESOLUTION 51
PREPARED FOR THE ENVIRONMENTAL QUALITY COUNCIL

I. INTRODUCTION

Bentonite is the clay of 1,000 uses. It exists in many parts of the world in varying degrees of quality and quantity. The clay that exists in the states of Wyoming, Montana, and South Dakota is known as sodium, western, or swelling bentonite. This is because of the high percentage of sodium in the material. The three state area has between 90-95% of the world's known reserves of this type of bentonite. In the southern United States, there exists calcium or nonswelling bentonite.

Several sources claim that Wyoming and South Dakota have 78% of the sodium bentonite reserves, with Montana having only 22%. The U. S. Bureau of Mines in their July, 1979 publication on "Clays" estimates that Montana has 300 million short tons of identified resources while Wyoming has only 200 million short tons. The largest areas of reserves are located in the following areas:

- (1) Big Horn Basin
- (2) Northern Black Hills
- (3) Malta-Glasgow

The companies which have reserves in Montana and the percentage of the companies total reserves are estimated as follows:

(1) American Colloid	50%
(2) Federal Bentonite	30%
(3) N L Baroid	14%
(4) International Mineral and Chemicals	30%
(5) Wyo Ben	10%
(6) U. S. Steel	100%

Most bentonites contain a mixture of the two types described above, depending on quality. Wyoming reportedly has the highest quality of sodium bentonite. Montana's bentonite contains some calcium and is therefore not as high a quality as Wyoming's. With enough additives, most bentonites can be brought up to a satisfactory quality for some end uses.

Reclamation laws were passed in Wyoming in 1973 and in Montana in 1974. Everything before these dates is known as "Pre-Act." Prior to the reclamation laws very little, if anything, was done to restore the land. This fact is quite evident if one is to drive around parts of South Dakota and Wyoming. Large piles of material are to be found with no vegetative growth what-so-ever. Some areas have natural bentonite outcroppings and this also accounts for no growth. Pre-Act reclamation practices consisted of burying the topsoil and subsoil and leaving the "cleanings," the material highest in sodium, on top. Reclamation laws now require that the soil and topsoil both be stripped off the mine site and stockpiled separately for later use. That material nearest the bentonite layer is the first to be placed in another mine pit, with the subsoil second and the topsoil last.

II. MINING

The first step in the mining process is to determine the size, thickness and quality of the bentonite. Normally companies do not like to exceed a stripping ratio of 10:1, that is to say there should not be more than ten feet of overburden for every foot of bentonite in the deposit.

A drilling rig is used to plot the size of the mine site and collect core samples for quality determination. Once the quality and the need are determined the site is ready to mine. Large scrapers are used to remove and stockpile the topsoil and subsoil. The scrapers are also used to remove the overburden. This is taken to a nearby finished mine or stockpiled also. Once the bentonite is exposed a front end loader is used for removal. If a private company owned road is used between the mine site and the processing plant, haul wagons with a capacity of 70 and 100 tons may be used. Otherwise over the road trucks are used with a capacity of 20 tons.

The bentonite, when mined, has a moisture content of approximately 30%. The material is air dried at the mine site or at the processing site down to approximately 20% moisture. Bull dozers or tractors with discs are used to continually turn the clay. Drying usually takes two days depending on the weather and the amount of discing.

Because of the many uses of bentonite, many different qualities are needed to meet contract obligations. This fact explains the reason for having so many different sites open at the same time. With the nature of bentonite formations, deposits vary greatly from mine site to mine site and even within the same pit.

III. PROCESSING

After the bentonite has air dried down to 20-30% it is ready for processing. The processing consists of determining the exact

mixture of clays needed and the amount of additives required to meet a given contractual obligation or general industry specification. After the mixture is determined, it is placed in a drying device to lower the moisture content to 7%. Of the six plants visited, one uses a fluid bed dryer, four use a horizontal rotary kiln, and the last one has a new type of unit which feeds the clay at the top and it is dried as it falls to the bottom. The drying devices are fired by coal, oil, or natural gas. Coal appears to be the choice with Montana coal even finding its way to one of the Colony, Wyoming facilities.

The dried clay is then reduced in size and either shipped in bulk or placed in bags. Some material, to take advantage of lower rail rates, is shipped in open top hopper cars without being ground. This material will be ground when it reaches its final destination.

IV. TRANSPORTATION

As is the same with farming and other industries in our area, there appears to be a shortage of rail cars to move bentonite. Railroads move 80-90% of the material, while trucks move 10-20% depending on the facility. Trucks are competitive in moving bentonite, both bulk and bags, up to 1,000 miles. After that distance, they can not match the rates charged by the railroads.

Following is a chart showing the charges to move bentonite to the various markets.

COST TO SHIP BENTONITE
PRICE PER TON *

F R O M

T O

	CHICAGO	SUPERIOR WISCONSIN	MICHIGAN	MICHIGAN WISCONSIN	SEATTLE	PORTLAND	SHREVEPORT LOUISIANA	CLAYTON NEW MEXICO	TULSA OKLAHOMA	DALLAS TEXAS
MALTA - in box cars 80,000 lbs.	45.60									
Open cars - unprotected	44.20									
MALTA - in open top hopper 700 ton minimum to one place on one day		23.78								
MALTA - 100,000 lbs. minimum			40.80							
MALTA - in covered hopper for taconite only 100,000 lbs. per car minimum				29.75						
MALTA - domestic use 80,000 lbs. minimum					57.40	57.40				
MALTA - export 80,000 lbs. minimum					50.00	50.00				
MALTA - in box cars 100,000 minimum for export					46.80	46.80				
MALTA - for export 1,400 ton minimum on one day to one place - 140,000 lbs/car	21.70	20.47			20.52	20.52				
MALTA - in box cars 60,000 lbs. minimum Other than box cars 80,000 minimum							45.60	44.80	42.40	44.80

F R O M

T O

	CHICAGO	SUPERIOR WISCONSIN	MICHIGAN UPPER PENIN	MICHIGAN WISCONSIN	SEATTLE	PORTLAND	SHREVEPORT LOUISIANA	CLAYTON NEW MEXICO	TULSA OKLAHOMA	DALLAS TEXAS
LOVELL, WYOMING - not ground minimum 140,000 lbs/car in 1,400 ton lot	37.40									
Volume rate - both above for export	21.62									
UPTON, WYOMING Same terms as from Lovell	39.60									
Volume rate - both above for export	19.18									
LOVELL & UPTON - 80,000 lbs. minimum					57.40	57.40				
LOVELL & UPTON - crude in open cars on one day 140,000 lbs/car 1,400 ton minimum		20.47				20.17				
LOVELL - crude 60,000 lbs. minimum							44.40	44.20	44.60	44.20
UPTON - crude 60,000 lbs. minimum							43.20	43.00	39.60	43.00
COLONY, WYOMING	40.20						43.20	43.00	39.60	43.00
COLONY - dried - not ground for export out of U. S.	21.70	21.70								
MALTA - by truck					33.00	34.60				
COLONY - by rail					57.40	57.40				
LOVELL - by truck					33.00	34.60				

* Expect a 7% increase in December

As can be seen from the chart, there exists a variety of ways to move bentonite if the company is willing to pay the charges. In some instances they are not.

The Chicago and North Western Railroad serves Colony, Wyoming and Belle Fourche, South Dakota. The other plants in Wyoming and those in Montana are served by the Burlington Northern. It would cost about \$3.85 more per ton to ship from Malta by Burlington Northern, with transfer at Chicago to another carrier to reach the foundry industry east of Chicago, than from Upton, Wyoming, because the connecting carriers feel their share of the existing revenue from Malta would be inadequate if the rate from Malta were equalized with the rail rates from Eastern Wyoming origins. The bentonite companies and the foundry industry do not feel they can absorb this additional expense.

Half of the oil well markets in Texas, Oklahoma, Arkansas, Louisiana and the eastern half of New Mexico can be served from Malta for about \$2.20 per ton higher than eastern Wyoming and about \$.80 per ton higher than western Wyoming. The other half of the Southwest destinations are not reachable from Malta because the Southern Pacific and Sante Fe Railroads have declined to participate in the rates from Montana origins. Again, these two railroads feel their share of the total rate would not be adequate. Mr. David McLaughlin, Financial Manager for American Colloid Company, has stated, "Northern Montana will have an advantage on truck rates to the small market in Alberta, but there are no rail rates to over 70% of the geographical area of the 48 states where about 90% of the large foundry and industrial markets exist. The users of bentonite in the areas with no rates simply would not pay the freight rates which the railroads feel they would need to charge to deliver bentonite from Northern Montana."

In addition, Mr. David Auer, Executive Vice President of Wyo-Ben in Billings, has stated that because of the railroad rates, bentonite can be bulk shipped from the Greek Island of Milos by ocean carrier to the taconite production facilities of eastern Canada. The bentonite is first beneficiated chemically with soda ash to produce an acceptable product.

It would appear, when only considering transportation charges, that the market for bentonite from Wyoming and Montana could be eroded by overseas shipments. The quality of foreign bentonite may be less, but with chemical additives, the quality may be competitive.

IV. RECLAMATION

The most single important factor for a successful reclamation program is topsoil. If the topsoil is absent in the first place or improperly handled during the mining process, vegetation will not grow.

It is very important that both the topsoil and subsoil be removed and stockpiled separately.

Once the mining operation is completed, that material which was closest to the bentonite layer is placed at the toe of the head wall. The remainder of the material is contoured into the pit with the subsoil placed next and the top soil last. Both the removal of the various materials and the replacement is accomplished with scrapers.

In the reclamation process, the companies strive to achieve a slope of 4:1 or flatter. This allows for the use of regular farm equipment and minimizes erosion. The companies will either own the necessary equipment or lease it and the operator from the surrounding community. The seeding equipment consists of a tractor, disc, and drill.

The seeding rate is normally 12-15 pounds/acre of pure live seed. Depending on the area, the mixture may contain western wheat grass, crested wheat grass, green needle, blue gramma and salt bush. Others considered are fairway crested, sweet clover, pubescent wheatgrass and beardless wild rye.

It has been found that the best time to seed is in the fall. Usually extra water or fertilizer is not required. The problem encountered in Wyoming and South Dakota with reclamation was the land owner allowing sheep and cattle onto the plot too soon. It appears a minimum of two years is needed to ensure an adequate start before grazing is allowed. The company will not have its reclamation bond released until it can show an adequate stand of vegetation.

Water impoundments are not planned for any of the mining operations in the state of Montana. If the operation encounters an existing pond, it will be replaced when the mine is completed. However, if the land owner requests an impoundment, one will be constructed after the owner obtains all of the necessary permits.

VI. TAXES

The bentonite mined is subject to only two taxes in Montana. The first is the resource indemnity trust tax (RITT), which is 1/2 of 1% of the mine mouth value of the bentonite. The second tax is the net proceeds tax. This tax is centrally administered by the Property Assessment Division of the Department of Revenue, but the tax assessment and tax collection functions are accomplished by the county in which production occurs. The tax rate varies from year to year depending upon the property tax mill levy set by the county.

The net proceeds tax is calculated by multiplying the value of the bentonite at the mine by the total tonnage for the year. This figure is the gross value. From this is subtracted the total deductions. Allowable deductions include:

- (1) Cost of extracting or mining ore or deposit.
- (2) Cost of transporting crude ore or deposit from mine or deposit to reduction works.
- (3) Cost of reduction of crude ore or deposit.
- (4) Cost of marketing metals and minerals to conversion into money.
- (5) Cost of sale of crude ore or deposit.
- (6) Cost of construction, repairs and betterments of mines during year.
- (7) Cost of repairs and replacements of reduction works, mills and smelters during year.
- (8) Depreciation of reduction works, mills and smelters.

After subtracting the deductions from the gross value, the net proceeds are multiplied by the total county mill levy to give the tax due.

In 1978, there were five separate mining operations in Montana. Of the five mining operations, only one paid any net proceeds tax. The other four declared a loss because of the allowable deductions in computing the tax. A rough estimate of the tax actually paid by the one company, not knowing the school district where the mine is located, amounts to 4.5% of gross value. This includes the \$4,201 paid for RITT.

In Wyoming, the bentonite at the mine is subject to a 2% severance tax and an ad valorem tax which averages approximately 6.5%. The ad valorem tax is computed by multiplying the value of the bentonite at the mine by the total county mill levy. In Big Horn County, those school districts which have bentonite mines have a total county mill levy of 63.50, 63.53, 64.04 and 77.64. The statewide average mill levy for bentonite in 1977 was 59.877 mills. With an average assessed value of \$2.40/ton in 1977, the ad valorem tax generated \$.14370/ton. The severance tax would generate an additional \$.048/ton for a total of \$.19170/ton. This figures to be a total tax of approximately 8% of gross value.

In South Dakota, the bentonite is subject to a privilege tax of 4% of market value. The state no longer has a personal property tax, and counties do not collect personal property taxes on equipment used in the mining operation.

VII. CONCLUSION

The main uses of bentonite are the oil and gas drilling industry, as a binder for sand molds in the foundry industry, for a pelletizing binder in the taconite industry, sealing lagoons, binder in cattle feeds, and the cosmetic industry. As bentonite is known as the "clay of 1,000 uses", the list is almost endless.

The industry in Wyoming, Montana, and South Dakota has access to 90-95% of the known reserves of sodium bentonite. However, if costs keep rising, i.e., labor, processing and transportation, bentonite from overseas could obtain more of the market in the eastern U. S. and eastern Canada. With the cost of bulk shipping by ocean carrier less than rail transportation, to the east coast, the foreign producers can afford to upgrade the quality of the bentonite by using chemicals.

The tax situation is very complex at best. The total mill levy in Wyoming counties with bentonite mines range from 60-78 mills. In Montana, those counties with bentonite mines have total mill levies of 150-200 and possibly more. However, with the deductions allowed under the net proceeds tax, it would appear that the companies pay less tax on bentonite itself, based on the percentage of declared gross value, in Montana than in Wyoming.

During the early months of 1979 several newspaper articles and other reports were circulated commenting on the bentonite processing plants being built in the state and the amount of land which would be disturbed to allow mining. However, because of the slump in the economy, the bentonite industry has cut back on production. The Federal Bentonite plant south of Glasgow has closed and may not reopen for some time. The American Colloid plant in Malta, which was to have been the largest bentonite processing plant in the world, has eliminated construction phases 2 and 3 and now is content with operating under phase 1. Several plants in Wyoming are larger in capacity. Several reasons account for this production cut back. Other companies have opened new facilities and expanded production. The overall demand for steel (car manufacturing especially) is down which results in less bentonite being needed by the taconite industry. The continuing rise in transportation charges has further eroded Montana's ability to effectively compete in the market place. Several of the companies mining in Montana have stated that they do not foresee an increase in production until the economy in the United States improves.

A D D E N D U M

- ADDENDUM A - Taken from a letter from Donald H. Freas,
Vice President & General Manager,
Foundry Products, International Minerals
& Chemical Corporation, Des Plaines, Illinois
- ADDENDUM B - Taken from a letter from Howard G. Fleshman,
Vice President and General Manager,
Federal Bentonite, Aurora, Illinois

ADDENDUM A

5. "Taxes" page five.

In appraising the comparable state taxation of bentonite the total tax burden must be considered. Therefore, the following short summary is more to the issue.

STATE TAX COMPARISONS

	<u>MONTANA</u>	<u>S. DAKOTA</u>	<u>WYOMING</u>
INCOME TAXES			
Foreign Corporations	6 3/4%	None	None
Personal	Range 2 to 11%	None	None
SALES TAX RATE	N/A	4%	3%
SEVERANCE TAX			

- o Montana imposes two taxes on bentonite mined. The first is the Resource Indemnity Trust Tax (RITT), on the gross value of minerals produced at a rate of $\frac{1}{2}$ of 1% (.005). The second is the Assessment of Net Proceeds of Mines. The tax rate varies both by year and by county. The tonnage for the calendar year is multiplied by the value of the bentonite at the mine to determine gross value. Allowable deductions, which include various operating costs and de-

3.

preciation as outlined in the working paper, page 6, are subtracted to determine the net proceeds. The net proceeds figure is multiplied by the county millage rate to determine the tax due. The return for determination of net proceeds is submitted to the Montana Department of Revenue. The actual assessment of tax and collection are administered by the county in which the mine is located.

- o Wyoming imposes two taxes. The larger tax is paid to the County Treasurer wherein the mining operations are located. The state collects a 2% excise tax for the privilege of engaging in mining and is credited to the general revenue fund.

NOTE: G. William Harbrecht, Ecology Researcher, in his Short Report on Bentonite stated that "Wyoming charges a 2 per cent excise tax which goes in the Mineral Trust Fund and a 2 per cent excise tax which is earmarked for the general fund." This statement is not correct in the case of bentonite.

- o South Dakota imposes a license tax at 4% of the net profit from minerals or mineral product extraction.

While I agree that Montana ranks third in taxation of bentonite per se, as compared with its neighbors, this single comparison is out of context from the total picture.

Referring to the above comparison table, note that Montana does not have a sales tax. While one might interpret this as a tax advantage it is, in fact, a disadvantage for this reason. Normally speaking, in those states which have enacted sales tax laws, approximately twenty-five per cent of the states' revenues are from sales tax collections. In states without sales tax such as Montana, this significant portion of the total revenue has to be collected in some other way, more specifically from another type of tax. In Montana the state income tax generates the needed revenue. The effect of the income tax as it relates to bentonite production on the total taxation picture, is that

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Montana already has a potentially higher rate of taxation on bentonite than do South Dakota and Wyoming, depending on the mining company. First of all, Montana imposes an income tax on both individuals and corporations whereas neither South Dakota or Wyoming imposes an income tax. Second, the Montana income tax law is very restrictive in the types of income of multi-state/multi-national corporations that can be allocated out of the taxable base. With such a broad tax base, the effect on multi-national firms such as IMC, U. S. Steel and possibly N. L. Baroid Minerals, Inc. is to tax earnings not at all associated with the bentonite operations in Montana. The income tax, as practiced by Montana, will be very effective in taxing the new and expanding industry. Therefore, with new bentonite companies being added to the income tax base, Montana should enjoy a healthy gain in the general revenue fund collections.

In summary, the income tax must be included in any comparison of bentonite taxation among the three states if the comparison is to be free of bias. By including the income tax, the picture is altogether different than as presented in the Council's report. Montana's taxation on bentonite is not as "inadequate" as the report implies.

I hope the Council will find these comments useful in preparation of its final report.

Sincerely yours,



Donald H. Freas
Vice President and General Manager
IMC Foundry Products

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ADDENDUM B

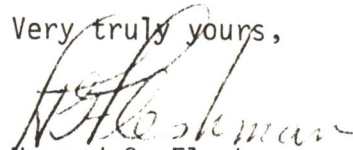
Pg. 4, paragraph 2 -- The Chicago & North Western Railroad also serves Casper, Wyoming.

Pg. 5, VI, TAXES -- The committee did address income to Montana through taxes. The committee attempted to compare the present tax structure with other states producing bentonite. It is felt that all taxes should be considered in this study since income taxes, property taxes, highway taxes, utility taxes, unemployment compensation, municipal taxes, income from state school leases, worker's compensation, taxes on royalties and sales taxes should also be considered in addition to severance taxes. Federal Bentonite agrees with the basic calculations for Wyoming severance tax totalling approximately \$0.19/ton. Obviously this amount varies from mine to mine and year to year. Federal has filed tax returns in Montana for several years, but has been assessed the minimum due to their development status. Since Federal has only been in the production phase of mining for one year, we do not have the exact tax comparisons of Montana versus Wyoming and South Dakota. Therefore, we regret that we cannot be more specific in helping the committee with a complete tax study and must respectfully request that this important issue be studied in depth.

It appears to us that the environmental impact of mining and reclamation and resulting land use is an important consideration to the State of Montana. Also, the impact of creating employment should be considered along with which industries are compatible with Montana's goals. Actually, the committee, did not address employment or types of industry in their paper. Perhaps the committee would care to add this consideration.

We have expressed our desire to cooperate with the committee study and would appreciate being kept informed of the status of the study, meetings, or any requests that the committee may have of us to present an accurate paper for HJR 51.

Very truly yours,


Howard G. Fleshman
VICE PRESIDENT & GENERAL MANAGER

HGF/sam

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