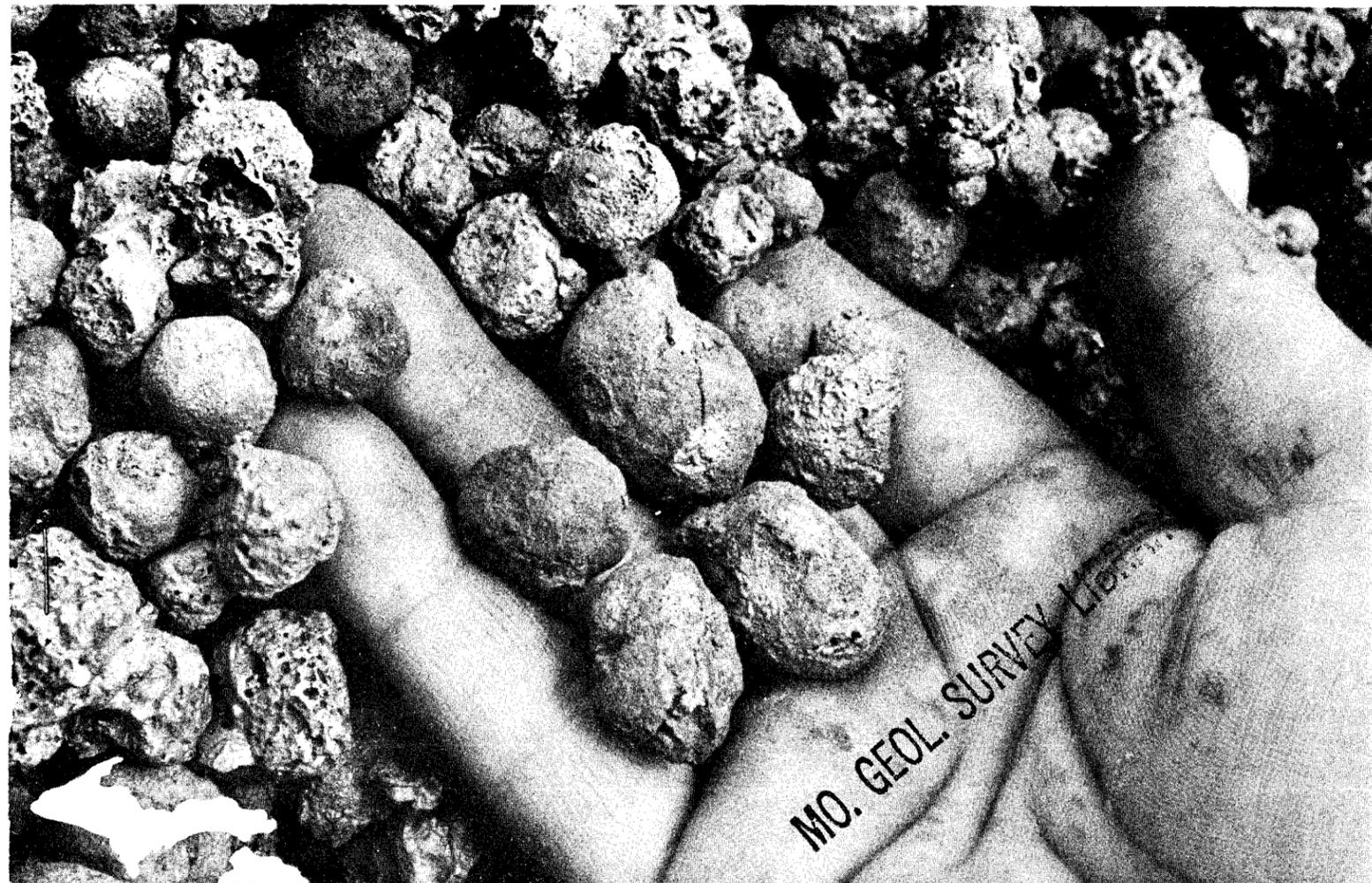


IRON AND COPPER IN MICHIGAN'S ECONOMY



6th

ANNUAL CONFERENCE MICHIGAN NATURAL RESOURCES COUNCIL

PAPERS AND DISCUSSIONS PRESENTED ON
OCTOBER 25, 1961

JACK TAR HOTEL, LANSING, MICHIGAN

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In addition to the papers and discussions presented at the annual conferences, the Council also publishes annually the reports of its various technical committees. Address all communications to: William H. Colburn, Secretary, Michigan Natural Resources Council, Room 432, Stevens T. Mason Building, Lansing 26, Michigan.

IRON AND COPPER IN MICHIGAN'S ECONOMY

Papers and Discussions Presented at the
6th Annual Conference, 1961

Morning session chairman: Walfrid Been, Michigan
College of Mining and Technology

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IRON AND COPPER IN MICHIGAN'S ECONOMY
6th Annual Conference
MNRC

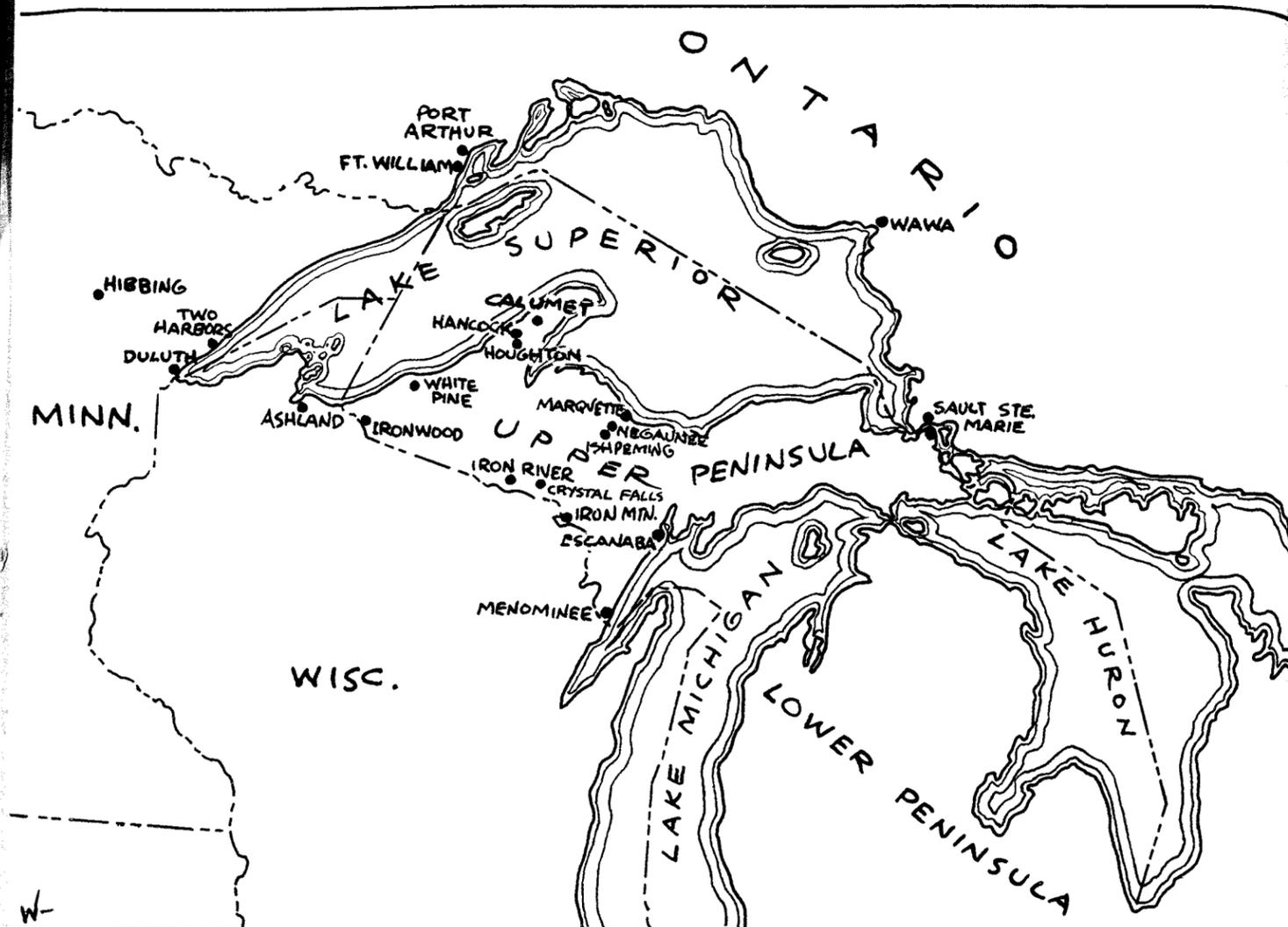
MORNING SESSION
Opening Remarks

HILL - I would like to read a statement from the Congressional Record which expresses my beliefs in the industry about which we are talking today:

"Men of daring, courage and initiative over the years built the great mining industry of America within the private enterprise system. Without the mining industry and the production of metals, minerals and fuels in abundance, this nation could not have survived the major wars of the century. Without a strong stable economy in which our industry plays such a vital role, this country with its high standards of living, will be unable to survive in a world of conflicting ideologies. Today America needs a healthy mining industry more than ever before. Continued neglect of our problems will have the greater consequences in the future."

We know that mining, and especially the copper and iron industries, is playing a significant role in the economy of this state and nation. I note that some 10,000 people were actually engaged in Michigan's copper and iron mining industry in 1960, and that they sold some 130,000,000 dollars worth of iron and copper. This income, of course, does not include returns of railroads, local business and other industries which are associated with mining. It means a great deal directly to the economy of the Upper Peninsula and certainly indirectly to the economy of all of us. The Michigan Natural Resources Council, therefore, is happy to sponsor the review, and evaluation of, possible solutions to some of the problems besetting the iron and copper industry at this time. To head up your meeting this morning is the chairman of our program committee, Walfrid Been, head of the Department of Mining Engineering, Michigan College of Mining and Technology.

BEEN - What I have to say may sound fatuous to the minerals folks, but I would just like to point out that I believe there are two ways in which we can approach a study of minerals resource problems. First is to assume that we already know what constitutes a mineral resource -- that is, we know what grades they ought to be, what attitudes they ought to have and all that sort of thing. Having made up our mind that much, it's only a matter of arithmetic then to make estimates of these quantities, to determine the



ACKNOWLEDGEMENTS

Front Cover: "Iron ore concentrate pellets containing more than 60 percent iron." Designed by Ozz Warbach. Photo by Russ McKee.

Other Photos: Pages 17, 25, Michigan Department of Conservation; 25, Cleveland-Cliffs Iron Company; 17, White Pine Copper Company; 17, H. O. Sorensen. Back Cover, Ed Kirkby.

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probable role of use, and put our finger on the day when we as an area or a state will be without this resource. The other attitude assumes minerals are a valuable resource only to the extent that our intellectual resources make them so, and I think that you will find a few examples in the papers this morning where some of today's resources were not actually in the picture a few years ago. What I have to say applies equally well to iron and to copper.

The program committee thought the best way to start would be with a rather broad treatment setting the stage for more intensive looks at copper and iron separately. We all felt that the man to get this Conference under way was Elmer Pehrson. Mr. Pehrson has made mineral economics his career. He is well known among all of the mining men in the minerals industry and is the author of numerous works on minerals economics. Knowledge alone is a sterile thing unless it sparks an idea once in a while -- and Mr. Pehrson has some ideas he wishes to express. He has journeyed from Washington, D.C. to address this meeting. It gives me a good deal of pleasure to present this very eminent mining engineer, Elmer Pehrson.



Russell G. Hill



Elmer W. Pehrson

SOME WORLDWIDE ASPECTS OF COPPER AND IRON ORE

Elmer W. Pehrson
Mining Engineer and Minerals Economist
Columbia University

When Professor Been first asked me to give some general background information on the subject of this meeting, he warned me that the audience would be made up largely of non-mineral experts. Being a loyal member of the mineral profession, I thought this would be another good opportunity to propagandize a little on how important we mineral engineers are. Much to my pleasant surprise, however, I find that the chairman of your council, Mr. Hill, a professional conservationist, understands this problem thoroughly.

The state of Michigan, in 1960, according to U.S. Bureau of Mines data, produced about \$429,000,000 worth of minerals, including iron ore and copper. I don't know what proportion of your total economy this represents, but chances are it is not an overwhelming proportion. Now I ask you: How much of your industrial activity in this state -- and Michigan is a great industrial state -- would be possible if it were not for the mineral resources found in this community?

From a national point of view, Michigan perhaps cannot be described as a giant among the mineral producing states because the \$429,000,000 must be compared with the enormous wealth produced in the oil and coal areas of our country. Even so, with 2.4 percent of the total value of mineral production in the United States, Michigan ranked 13th among the 50 states. More important, of course, is Michigan's position in iron ore. It ranks second among the states, and in 1960 accounted for 15 percent of the nation's total. This outstanding production, however, was 18 percent below the peak shipment recorded in 1942. Michigan ranks sixth in production of copper, and in 1960 contributed 5 percent of the national total. Fifteen percent and 5 percent are decidedly significant factors in the iron ore and copper economies of the United States. In copper, the Michigan performance in 1960 was 41 percent below the record established in 1916 when Michigan contributed 14 percent of the national total and ranked third among the producing states.

My remarks shall be confined to rather broad national and international aspects of the mineral economy. My views are based on 35 years of observation from the vantage point of Washington. The views to be expressed are my own and do not necessarily reflect the opinions of my associates.

The decline in Michigan's production of iron ore and copper in recent years is part of a general downward trend evident in United States metal mining since World War II.

With requirements constantly increasing, the adverse trend in production has caused a serious decline in the nation's ability to supply its own strategic mineral needs. In 1960, domestic iron ore production failed to meet demand by 18 percent. A Bureau of Mines projection indicates that by 1975 the deficit may be 40 percent. Fifteen years ago production almost equaled consumption and there was a large potential production capacity that could be utilized on short notice in an emergency.

A similar, though less acute situation prevails in copper. Before World War II, the United States was a substantial net exporter. During the war, demand far exceeded production and self-sufficiency in new copper dropped to 60 percent despite record production at the mines. Since World War II, dependence on foreign sources has lessened. Stimulated by emergency measures taken during the Korean War, domestic mine output of copper reached a new peak in 1956 which was slightly above that recorded during World War II. Consumption, however, was substantially lower and as a consequence, self-sufficiency rose to 81 percent, a deficit of 19 percent. During the first 8 months of 1961, the deficit was only 8 percent. Available information offers little hope that the United States can regain and maintain its net export position in copper in the foreseeable future.

The long term downward trends in iron ore and copper self-sufficiency likewise apply to bauxite, lead, and zinc. Dependence on foreign sources also is increasing for tin, manganese, chromite and other minerals which traditionally the United States has not produced in important quantities. The growing metal deficit is further revealed by the fact that between 1950 and 1960, the physical volume of metal mine output declined 4 percent, whereas industrial production advanced 45 percent.

Deterioration of the nation's security in strategic metals has been accompanied by declining prestige of the United States in the mineral world and Communist gains in mineral strength. While the United States still ranks first in mineral output, its share of the world total has declined from 38 percent in 1950 to 27 percent in 1958.

For individual commodities the pattern of change is even more dramatic. In coal, for example, often regarded as the most important of all mineral resources, the United States led the world in production for a long time. In 1958 we yielded first place in coal to Russia, and in 1960 we were shoved into third place by the expanding production of Red China. Certainly to people living in Michigan, we do not have to emphasize the tremendous impact of coal deposits south of the Great Lakes, and Lake Superior iron ores, on the industrial development of our country.

The United States has lost first place in iron ore to the U.S.S.R. and its share of world output dropped from 55 to 18 percent since 1945. The United States leads in world copper but its output has declined from 60 percent of the total in 1916 to 23 percent in 1960. The Sino-Soviet Bloc trails far behind the Free World in total mineral output, but it is gaining. The Red proportion of world production advanced from 17 to 28 percent between 1950 and 1958.

More significant are the Sino-Soviet gains in minerals for heavy industry. The Communist Bloc accounted for over half of the world's coal in 1960, compared to less than a third a decade ago. During the same period its share of iron ore rose from a fifth to about a third, steel from 19 to 30 percent, and petroleum from 8 to 16 percent. Planned expansion of Soviet oil production and exports are a serious threat to Free World markets. The rapidly growing industrial strength of Red China has been a feature of the Communist advance in recent years.

It should be noted that the Sino-Soviet Bloc enjoys virtual self-sufficiency in minerals which are derived from a contiguous land area which is more or less invulnerable to enemy attack, except through long range bombing. In contrast, all the great industrial powers of the Free World are heavily dependent on distant sources of supply, many of which are vulnerable to political and military blockade.

Mineral consumption is perhaps a better measure of industrial strength than mineral production. Geographic highlights of world population and mineral consumption in 1959 were as follows:

	<u>World Total</u>	<u>Free World</u>	<u>Sino-Soviet Bloc</u>	<u>U.S.A.</u>	<u>U.S.S.R.</u>	<u>Red China</u>
<u>Percent of World Total</u>						
Population		65	35	6.1	7.2	23
Steel consumption		70	30	29	19	5
Copper consumption		82	18	30	14	1
Energy* consumption		68	32	35	16	9
<u>Per Capita Consumption (kilograms per person)</u>						
Steel	105	113	90	491	276	20
Copper	1.2	1.6	0.6	6.1	2.4	0.1
Energy**	1,360	1,432	1,229	7,834	2,942	510

*Fossil fuels and hydro electricity.

**Coal equivalent of all forms of energy.

The data shown above reveal the wide lead the United States has over the Soviet Union in mineral consumption. This in turn

reflects the superior overall industrial strength in the United States. It should be noted, however, that the U.S.S.R. is devoting a much larger proportion of its industrial production to military build-up than the United States. The disparity in industrial strength, therefore, does not necessarily connote a similar disparity in military power. The Free World also has a modest advantage over the Sino-Soviet Bloc in mineral consumption. Red China's industrial growth is advancing rapidly but its share of mineral consumption is far below its share of world population.

Per capita comparisons reveal the great disparities in standards of living in various parts of the world. The contrast in per capita use of steel, copper, and energy in the United States and the U.S.S.R. is particularly significant. The very low consumption of copper in the Communist countries as compared with that in the United States and Western Europe (the latter 4.1 pounds per capita) indicates that the Reds lag far behind in the development of a sophisticated affluent society. Russia's relatively more favorable position in steel and energy compared to copper again reflects the emphasis on heavy industry rather than consumer products that would improve the lot of the citizenry. Judged by world standards of mineral consumption the level of life in Red China is indeed very low. However, as in mineral production, mineral consumption is advancing more rapidly in the Communist World than in the non-Communist World.

The foregoing disparities in trends of mineral production and consumption should not cause hysteria. No one should complain about advancing standards of living for people any place in the world. Since we are so far ahead, it is only to be expected others will catch up with us to some extent. As they do, their production and consumption will grow faster than ours. We must not lose sight of the fact, however, that in the Communist regime the dictators have the advantage of being able to direct more easily the products made from minerals into military and international political channels. Therefore, as long as the cold war persists, the growing mineral strength of the Red nations has ominous overtones that cannot be ignored.

The problem of maintaining mineral supply for our own country is complicated greatly by the tremendous population explosion we have on our hands. In 1945 the experts predicted that the United States would reach a saturation point of approximately 185,000,000 inhabitants in about 1980. Thereafter the population was supposed to stabilize or even decline a little. In the post-war period population actually has gone up by leaps and bounds. We already have 180,000,000 people. By 1980, it is predicted that we will be a nation of 261,000,000 people and by 2000 A.D., 383,000,000. To be happy these people will require enormous quantities of minerals. Can you imagine what we're going to do with automobiles on the highways under these conditions?

World population, similarly, is mushrooming at a terrific rate, and if you apply even the per capita consumption figures of today to this growing horde of humanity, the potential demand for minerals in the future staggers the imagination. If you speculate on what might happen if the whole world reached a living standard equal to the average of Western Europe, the problem of mineral supply becomes almost insurmountable.

United States' loss of self-sufficiency in mineral raw materials and its declining position in world production may be ascribed in part to limitations imposed by nature which cannot be changed. I'll have to take slight exception to what Professor Been said earlier about applying intellect to the solution of our mineral problems. I would ask him what he would do with fine intellect to improve the tin situation in the United States. We simply do not have tin resources, and man cannot alter this fact.

There are conditions imposed by man which can be changed. Among these is the failure of the United States to come to grips with its mineral problem and reach a firm decision on whether or not the situation is a threat to our security. As a consequence, the Nation has been drifting on a course that is forcing greater dependence on imports. Congress and the executive branch of the government seem to be at odds on what to do. Under present international tensions it should not be difficult to reach a decision to make every reasonable effort to shore up the nation's mineral base. In these circumstances, relative costs of production at home and abroad become less important and injection of more tangible self-interest objectives into foreign affairs become more important.

Among the problems requiring review and reform are the need for expanding exploration and technical research to improve our resource position -- as Professor Been has stated -- and to counteract depletion of our richer mineral deposits, the spiraling cost of labor, taxation, foreign trade policies, and the waning virility of what was once a dynamic and highly productive capitalistic system.

This group needs no sales talk on the importance of exploration research. Exploration is the life blood of the mineral industry. Our major need in this field is fundamental research directed toward finding new methods of discovering hidden deposits which lie at depths beneath the reach of geology, or even geophysics. Geophysics has had some success in the metal field, but its application is limited to rather shallow depths. I am quite sure that in the United States we have not taken full advantage of the contributions that geophysics can make to improve our mineral economy. Last February, I was in Missouri and much to my surprise, I discovered there is a first-class mining boom going on in that area. Many of our major companies have set up explor-

ation offices and there is a real atmosphere of prospector's fever in the state. This has resulted in large part from the fact that extensive geophysical work had been done in the area. Success was achieved in the follow-up on some of the anomalies discovered during the mapping, and mining has taken on new life in the state of Missouri.

Technical research should be directed toward improving recoveries. This should not be difficult to sell to this conservation-minded group. Other research objectives should include reduction in costs, conversion of marginal deposits into commercial resources, and, in cases like tin, to find substitutes for products which we cannot mine at home. One major problem in the field of exploration and research is the reconciliation of the short-term approach that industry normally takes and the long-term approach that is necessary for the solution of the nation's mineral supply problem. We can well understand that in times like these, when we have burdensome surpluses in the basic nonferrous metals, why industry takes a dim view of spending money for finding more ores to add to the surplus. Nevertheless, if we take into account the potential requirements of our population in the not too distant future, it seems to me that there is a long-term objective that we should be working at constantly.

In pursuing these inquiries and in stimulating exploration and research, we should not delude ourselves by assuming that science and technology alone can provide all the remedies we need. One wage or tax increase can offset a lifetime of research. Removal of protective tariffs can wipe out significant segments of strategic strength. Reliance on politically unstable areas of the world -- there are plenty of them today -- for strategic supplies is fraught with danger. Political and economic reforms, therefore, are no less important than research in attaining the objectives we seek.

I realize that labor is a delicate subject that we have had a tendency to sweep under the carpet in the last 20 years or so. But rising wage scales and depletion are the two most serious factors adversely affecting our self-sufficiency in the mineral field. The problem of labor cost is real. The domestic mineral industry works in an environment dominated by large heavy industry. The wage scales in mining pattern after the wage scales in the heavy industries, and frequently they bear little relationship to the economics of mineral production. Let me cite a few revealing facts that can be found in Minerals Yearbook. Index numbers which show labor costs per unit of production from 1949 to 1959 reveal that, for copper there was a 17 percent increase. In lead-zinc the increase was 25 percent, and in iron ore, 103 percent. Translating these figures into labor costs per dollar of recoverable metal, we find an increase of 55 percent for lead and zinc and 31 percent for iron

ore. Copper prices have increased more than labor costs, so that there has been a decline of 27 percent in the labor cost per dollar of product.

We complain about the chronic unemployment in our country, yet we sit by complacently and watch foreign products displace jobs for American workers. The situation is acute in the steel industry at the present time. Invasion of foreign iron ores to markets formerly supplied by domestic ores is an inevitable consequence of rising costs at home. This is due, in part, to depletion of the easily-mined high grade ores. Most of the difficulty, however, stems from the marked increase in hourly wages which now bear little relation to the economics of iron ore production. We have reached a point in this country where organized labor assumes that wages can go only in one direction and that is skyward. At the expiration of every contract period, higher and higher demands are placed on the steel industry and management has yielded repeatedly. American steel is being priced out of markets at home and abroad. No one can quarrel with the desire of workers to improve their standard of living, but unreasonable wage increases far exceeding advances in the productivity of labor can only result in rising prices with their inevitable adverse effect on the nation's mineral economy and security.

Time does not permit a detailed discussion of the complicated subject of taxation. Over the years I have observed that the Lake Superior states are not blameless in the matter of the declining competitive position of their iron ores. In fact, taxation of iron ore in the Lake Superior district has been one of the reasons why iron ore consumers have been encouraged to look elsewhere for their supplies. It is encouraging to note, however, that in recent years there seems to be some recognition of this problem and modification of tax programs appears to be underway. The Assistant Secretary of the Interior for Mineral Resources recently promised a long overdue review of Federal income taxes which fail to recognize adequately the fundamental strategic importance of our domestic mineral industries. The Assistant Secretary also noted that state and local authorities might do likewise to the benefit of their respective communities.

Erudite groups have studied the raw material problem of the United States and have concluded that the best interest of the country would be served by obtaining raw materials from the cheapest sources. This seems to be the dominant note in current thinking on minerals, including iron ore and copper. There is an appalling lack of a sense of urgency in discussions of this subject. In recent hearings conducted before a Senate subcommittee, the need for cheap iron ore was mentioned over and over again. But the weakness in our national defense, inherent in the present state of iron ore affairs, scarcely was mentioned. Available evidence does not indicate that the business gains

from using high-grade foreign ores offset the possible public costs of maintaining communications with foreign sources in time of emergency or the catastrophe that could occur if we failed to maintain these lines of communication in time of war.

The time has come for the United States to adopt a more nationalistic attitude with regard to strategic raw materials. Just how this is to be done presents a problem. We are told by the powers that be that the good old protective tariff, under which the United States rose to industrial supremacy, is out of bounds these days. We have been operating under reciprocal trade agreement programs designed to establish free world trade. For 20 years, progressive reduction of United States import duties has been of academic interest only, because depression, wars, and the unprecedented post-war boom disrupted normal competitive relationships. In recent years, however, we have returned to markets that are strongly competitive.

This is a situation made to order for tariff protection but something else has been added to the "cheapest source" argument. The State Department holds that foreign governments oppose imposition of U.S. tariffs and that such action on our part would prejudice United States diplomatic objectives. Tariff protection appears to be ruled out for the present. Direct subsidies to small mines, quotas, and the usual government aid to exploration and research are the order of the day. It remains to be seen whether or not these measures will arrest the downward trend in metal mining in the United States.

The State Department appears to accept the shift to foreign sources as inevitable. At a recent lead-zinc hearing in Washington, a witness from the Department of State stated the objections of Latin American governments to proposed tariff increases. He was asked if any effort had been made to learn the reaction of unemployed miners at home. He replied that other measures to relieve the miners' plight would be more suitable. A straw in the wind along this line recently was offered by Resources for the Future, Inc., a privately-endowed organization operating in Washington. In their analysis of U.S. trade policy for minerals, it was suggested that the government had decided against tariffs and in favor of "other measures." Regarding the rehabilitation of displaced workers, the Resources for the Future report made the following observation:

"The outdoor recreation industry has great potentiality for growth far beyond its present dimensions, particularly in the West, with its space and varied types of beauty, the grandeur in its landscapes. This, combined with the rapid increase in the demand for the many forms of outdoor recreation, provides an opportunity which, if carefully nurtured, can play a part in easing the problems caused by declining mining communities."

I see nothing in this philosophy that is going to protect us in the production of strategic minerals. The amazing thing about this is that the president of Resources for the Future formerly was president of one of our mining corporations that has large operations out west, and that a member of the board of directors of R.F.F. is the head of one of our important mining schools!

The waning virility of capitalism is the old story of creeping socialism and too much interference of government and labor in business management. As a consequence, the stern discipline of a dynamic capitalism motivated by the profit incentive does not exist to the extent that it should. Industry is not able to induce the kind of discipline on industrial production that we need to keep ourselves fundamentally strong. In the Communist area, however, discipline does exist and while we do not care to embrace their mode of life, the facts are that it is proving to be very successful in advancing the mineral strength of the Sino-Soviet Bloc. This boils down to the question: "Can the mixed economy that we are moving toward in our country effectively deal with the mineral problems confronting the United States, and can it meet the challenge of the Communist dictatorship?"

In the perilous times in which we live we no longer can afford to drift in evolving a realistic policy toward mineral supply. Perhaps we can learn a lesson in the strategy of minerals from the Soviet Union. Self sufficiency is a cardinal principle of Soviet policy. The U.S.S.R. goes even further in its plan for future production of iron ores. It provides for surpluses to be made available to the steel works of the satellite countries, thus assuring that the industrial strength of the satellite areas will be bound even more closely to the Soviet Union.

Russian iron ore resources are not unlike those of the United States. Reserves of high grade ores are insufficient to take care of mounting future requirements. Consequently the U.S.S.R. wisely is developing its lower grade ores, including ore similar to the taconites of the Lake Superior district. You can be sure that being a nation constantly concerned with the practical side of its security, the Soviet Union is not planning to expand steel production capacity in its coastal areas to be alimented by iron ores obtained from distant sources not under Communist political control.

A realistic United States policy for minerals requires a reversal of recent trends in metal production and a stimulation of the development of the mineral deposits of Michigan and all other states of the union, even though by conventional measures of today they may be classified as marginal resources.

BEEN - Thank you, Mr. Pehrson.

In the 1860's and 70's, mining copper from the sedimentary formations in Ontonagon County was tried for a short time only to be abandoned. Between 1910 and 1920 another attempt was made -- this time by directors of successful copper companies, having the best help and capital backing available at that time. But, after mining for awhile, they, too, failed. In the 1950's, a third attempt was made, now exemplified at the White Pine Mine, one of the largest underground mines, and a very active and healthy enterprise. The presence of this copper had been known for some time, yet could not be numbered among our copper resources. With the increase in knowledge, however, and the courage to put this knowledge to work, White Pine is now actively producing copper in an area that had been practically written off a good many years ago.

We are very fortunate to have as one of our speakers, the president of the Copper Range Company which is the parent company of the White Pine Copper Company. James Boyd was born in Australia. He came to the United States and has made three careers in minerals, any one of which would tempt most people to rest on their oars. First, he was in the academic field at the Colorado School of Mines; then in government, where he became chief of the United States Bureau of Mines; then in industry as vice president of Kennecott Copper Company and now as president of the Copper Range Company. I'm very proud to present to you now Dr. James Boyd.



James Boyd

THE ECONOMIC ENVIRONMENT OF THE MICHIGAN COPPER INDUSTRY

James Boyd, President
Copper Range Company

Michigan as a copper state, although the original home of the copper industry in America, began to attain real importance only when the electrical industry started its phenomenal growth in the early 1900's. Today copper production in the deep Michigan mines is operating with certain disadvantages in costs, but current developments in the world's copper production and markets give promise of more profitable operations for the industry in this state and consequently better times for the Upper Peninsula.

It is no coincidence that the development of mines in the Upper Peninsula came with the rapid expansion of the electrical industry. Indeed, it is unlikely that the one industry could have grown without the other.

In time, of course, the electrical industry's requirements, together with those of other copper consuming industries, outgrew the ability of the mines to satisfy them. The high-grade mines of the west began to overshadow the relatively low-grade deposits that remained in the area of the Keweenaw Peninsula. Eventually low-grade, open-pit mines of the west and South America dominated the copper supply. Underground mining, unless the grades were high, faced stiff competition. Because of the increasing depth of the ore, which means higher production costs, the deep mines of Michigan are facing difficult times. These mines are operating today with ores averaging less than one percent. The underground mines, such as Braden in Chile, have ores averaging almost two percent, and they have less expensive mining methods, and the African mines are working with grades in excess of three percent.

As the open-pit mines become deeper, their costs will rise. Future discoveries are more likely to result in underground operations, as the obvious surface indications of large low-grade deposits have been fairly well explored. Large copper deposits seem to be accompanied by massive changes in rock composition which are not readily hidden, so that the likelihood of finding many more large deposits close to the surface is not great. Hence, an era of underground mass production mining is probably just beginning, although it will be some time before we shall see the return to dependence upon underground mining for most of our supplies of copper.

The discovery of the Nonesuch deposits in Michigan, therefore, bodes well for the copper industry of the state. As the discoveries so far are running about one to one-and-a-half percent copper, it must be borne in mind continually that, for the

time being at least, they are low-grade as underground copper mines go, and cannot compete on an equal basis with the low-cost surface mines or the high-grade underground mines previously mentioned, which provide most of the copper today.

If the copper industry of the Upper Peninsula of Michigan is to survive, the mines must be operated with the highest order of efficiency, and they cannot be expected to provide bonanza-type dividends for their owners, or easy, highly paid jobs for their workers. It will take the kind of pioneer spirit that typifies the people of the Upper Peninsula to make these deposits pay enough to keep them in operation until the preponderance of production returns to the underground mines.

If, in fact, these higher cost underground mines cannot compete directly, why is it that they continue to operate more or less profitably? The answer lies in the total world market for copper. This has been in the past a fluctuating business with wild swings in consumption, accompanied by even more exaggerated swings in price. The lowest cost mines do not have today, nor are they projected to have, the total capacity to satisfy the needs of the market in periods of high demand. Therefore, if the consuming industries are to be provided with all the copper they need, the increment supplied by the higher cost producers must continue to be available. It is this factor that helps to maintain the price high enough to keep these mines in production, even in periods of poor business.

The history of the Michigan copper deposits is well known, and I shall not dwell on it except to place it in perspective. Michigan coppers have an important part to play in the copper industry of the Free World. Copper is indeed an international commodity. Except for that produced in the United States, most of the Free World's copper is produced in countries that currently consume only a small part of their production. Conversely, a large part of the consumption is in areas that produce little or no copper. Therefore, copper flows in international trade and is subject to the economic variations of such trade. Copper is also produced in large part from areas where it is the dominant factor in the economy. This is true in Chile, in Africa, in Arizona and in the Upper Peninsula of Michigan.

These are all elements that contribute to some of the copper industry's strength and some of its weakness. A stable market for copper is vital to Rhodesia, the Congo, Chile and Michigan. The wide fluctuations in price and demand in the past have had serious economic and even political implications in all of those areas. With the decline of industry derived from forest products, and other local industries, copper -- at least so far as White Pine contribution is concerned -- is of vital importance to the economy of the Upper Peninsula.

What, then, is the environment in which White Pine and the Keweenaw mines operate? As I have pointed out, it is affected by economic forces throughout the world. We in Michigan have very little control over world economic forces; we must study them and be prepared to live with them. In concert with other producers, however, we can, through research and promotion, do a great deal to improve the climate in which we operate. In the past two years companies representing 95 percent of the Free World's production have formed the Copper Products Development Association, through which they are combining their efforts toward developing stronger and more enduring markets. They are seeking ways to compete with substitute materials, which have encroached on the traditional copper markets in recent years.

In the meantime, however, there have been some marked changes in the industry, most of which tend to strengthen it and in so doing to strengthen the Michigan copper industry. In the past decade the center of gravity of consumption has moved from the United States to Europe. Ten years ago the U.S. consumed 51.6 percent of all copper used in the Free World; Europe consumed 37 percent. Today the U.S. consumes 31 percent and Europe 51 percent -- but the total market is one-third larger.

A similar change has come about in the extractive side of the industry. In the first place, total production has increased from 2,535,323 tons in 1950 to 3,932,719 tons in 1960, but whereas the U.S. produced 36 percent of the 1950 figure, she produced only 28 percent of the 1960 figure. The proportion produced in Chile now is about the same as in 1950 -- around 15 percent -- but Africa has increased its share of the production from 23 percent in 1950 to 27 percent in 1960, and the rest of the Free World from 26 percent to 30 percent. Although Europe and the United States together still consume 82 percent of all copper produced, both the sources of copper and the consumption of the metal have become more massive and more widely distributed.

The wide variations in market and price, which have proved to be so difficult for the higher cost producers and the economics of the areas in which they operate, have resulted from a combination of many factors. The history of these has a bearing on the Michigan copper environment. It is not necessary to go too far back. The inordinately high demands of the war period and the immediately post-war decade were almost impossible for the mines then in production to meet. As the reconversion requirements began to level off, they were replaced by those of the Korean War. Therefore, both open market and subsidized prices remained fairly high until 1956, and the high-cost, deep mines of the Peninsula were able to continue in production. White Pine, together with such western mines as San Manuel, Silver Bell, Yerington, etc., were Korean war

babies. They were put into production at the request of and with the aid of the Government, probably some years before they would have been under normal economic growth. Most of them, including White Pine, and excepting San Manuel, got into production in time to help meet the demands of the 1953-56 boom and to take advantage of the unusually high prices that prevailed from 1954 through 1956. During the following two years consumption dropped. The 1958 recession saw the price drop to 25 cents, a price at which the relatively young White Pine mine could not operate profitably without the floor price the Government contract provided. (The Keweenaw mines had similar difficulties.) These contracts have now expired, and the company is on its own to compete with all others.

The prolonged strikes of the 1959-60 period did immeasurable damage to the White Pine operations. This type of operation requires large numbers of skilled workers, many of whom were lost during the strike, and it took months to train new crews. Despite this difficulty and the low ebb of the copper consuming industry in the United States, the mines were kept in production throughout the remainder of 1960 and early 1961, but inventories accumulated. Production is now 30 percent higher than it was during most of this period, but the total output is being sold and the inventories have been liquidated. It was not without trepidation that the mines were kept in production while inventories accumulated. Many of the larger companies curtailed production in order to avoid inordinately large industrial stock accumulation. This restraint was a major factor in preventing a drastic drop in price which could have been disastrous to the Michigan copper industry.

There are a number of factors involved in the economic environment which are helpful to the new Michigan mines. Once considered the standard grade of copper, the Lake Coppers lost their place when they were available in only relatively small quantities. The higher silver content of the Lake Coppers imparts some desirable qualities for a number of important uses. Once Lake Copper became available in steady supply and in larger quantities, these qualities began to be recognized, and it is again in demand from widely scattered areas. Lake Copper is being sold on its own merits from India to Japan, and in both the domestic and European markets. Its specific physical properties have been scientifically determined and made available to designing engineers and purchasing agents.

The Michigan copper mines have again become regarded as a reliable source of supply in appreciable quantities, since operations have been uninterrupted for nineteen months. Although our labor contracts expire in ten months, we see no reason for further interruptions. Continuing supply is a vital factor in marketing and it is also a vital factor in job security. It is most important to both management and labor that long interruptions do not occur again.

The current political unrest in Africa and Chile, the other two important producing areas, encourages European and domestic customers to turn to the United States, including Michigan, for assurance of a steady supply.

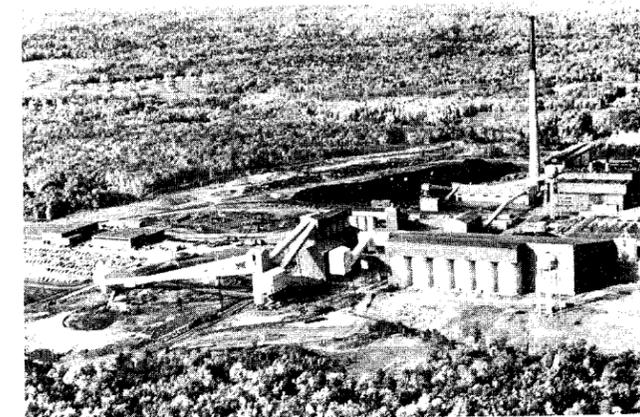
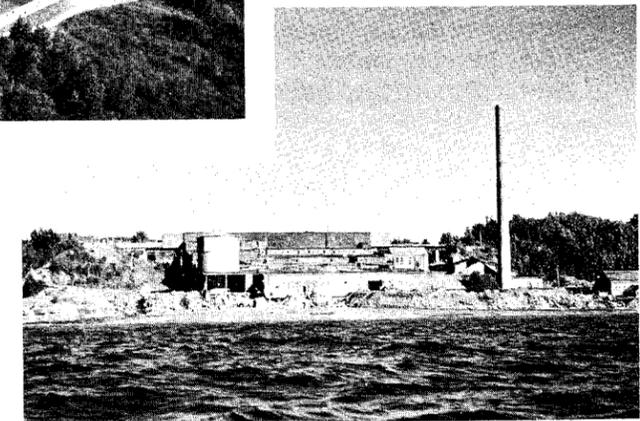
All of these factors combine to give strength to a burgeoning resurgence of the copper industry in Michigan. It is perhaps too much to hope for that efforts of the entire industry to stabilize its activities will be wholly effective for a few years yet and that there will be no more difficult periods for the copper industry in Michigan. The industry is gaining strength with time, however, and many factors are working in its favor.



At left, townsite of White Pine, Michigan. Below, reclamation and concentration mill of Copper Range Co. on L. Superior, Freda, Michigan.



Above, White Pine copper mine, Ontonagon County, Michigan. Tailings pond in right background. Lake Superior in distant background. Right, closeup of mill and smelter, townsite in left background.



BEEN - Thank you very much, Mr. Boyd.

It is apparent that one of the ways of approaching our problem is finding out just where we stand now.

I want to cite again, at the risk of being tiresome, another instance where a resource was created due to increased intellectual application. The Republic Mine operated from 1871 to 1926 producing some 8,000,000 tons of a very good grade of iron ore, after which time it was deemed to be worked out and abandoned. A very few years ago, Cleveland-Cliffs, as a result of applying the results of research, was able to build a new plant there which is now in production. When present additions are completed, this operation will produce the raw material for about 1,400,000 tons of metallic iron annually. The same rock was there all the time. It was not an ore in 1926, but it is an ore today. I know the problem, because I was in the mining business for a while and spent a good deal of hard work carting similar stuff away and putting it on dumps -- now the basis of a considerable mineral industry in Minnesota.

One of the men who took a large part in furnishing the intellectual resource that makes this low grade iron formation a mineral resource was Mr. Stanley Sundeen. I'm a bit chagrined to admit that a man who has done so much for the Michigan mineral economy came from a rival school over in Minnesota, but the truth must be admitted and I'm very happy to present to you now, Dr. Sundeen.



Stanley W. Sundeen

THE ECONOMIC ROLE OF MICHIGAN IRON ORES

Stanley W. Sundeen
Manager, Research and Ore Development
The Cleveland-Cliffs Iron Company

I stand before you pleased at the opportunity to fill a role as historian, economic analyst and importunist. My qualifications may be marginal for all but the last of these roles. Having spent 25 years of my life in the iron mining industry, I assume the qualifications to importune you for your understanding of, for a continuing interest in, and for your dedication to, a solution of the economic illness of the iron mining industry of Michigan.

The Michigan iron ranges are the oldest of the major Lake Superior district iron ore producing ranges. Production from the Marquette Range started in the early 1850's prior to the development of the Sault Ste. Marie canal and locks. It was followed by the Menominee Range in the 1870's and the Gogebic Range in the 1880's.

The earliest of the iron mining operations appear to us today to be almost ludicrous but you can be assured the problems besetting the industry then were, both in detail and in broad scope, very real. In the report of the Geological Survey of Michigan for 1873 Major Brooks wrote, "If ever there comes a period when our mines do not pay, it may be due largely to horses." (I will personally make mink food out of any remaining equine that might stand in the way of decent mine profits today.) Major Brooks referred, of course, to the uneconomic continued use of horsepower in mines that had outgrown the one-horse operation size. Why did such a situation arise? Because capital was lacking for transition to steam power. As you know, the capital was ultimately supplied by very earnest, hard-working, intelligent men engaged in a complex struggle to solve problems such as "too many horses" to bring about the development of the very appreciable iron mining industry in Michigan. I shall later recall for you this illustration of one early iron mining problem for we are plagued now by some very formidable modern problems.

To appreciate and understand these problems we need a little historic and world-wide perspective. Michigan iron mining developed into big business starting in the 1880's. As the steel industry burgeoned with the country's rapid industrialization, so Michigan mining prospered and grew. Most of Michigan's iron ore mines were underground and could only compete with the much more cheaply won Mesabi open pit ores, because furnace men considered it more desirable and because

of the transportation advantage. Carnegie and Schwab, great steel men of their day, opposed the use of the newly discovered Mesabi ores because of the undesirable fineness of the Mesabi ores. Use it they did, however, because its abundance and low cost constituted a tremendous economic incentive for its utilization. It took furnace men 15 years to learn how to use these different ores. There is, in this history, a lesson to remember and it is this: Furnace men have firm convictions about what constitutes a good furnace ore and these convictions can be and are molded by the cost of the ore.

Starting after World War I and becoming full blown after World War II, there was steel company alarm that the vast Lake Superior district ore deposits would become exhausted in the foreseeable future. There was, in addition, change in market area demand such as expansion of steelmaking at the coast plants. Rising costs were also a stimulus to the search for better ore to raise furnace efficiency. In the year 1948, 100,700,000 tons* of iron ore were consumed in the United States. The production to supply this tonnage came from the geographic iron areas in the amounts set forth as follows:

Lake Superior District -	83,723,000
Southeastern District -	8,362,000
Northeastern District -	4,422,000
Western States -	5,104,000
Total	101,611,000**
Imports	6,109,000

Unquestionably there was need for concern in light of this big annual exhaustion of U.S. ore reserves. To assure a continuing supply of iron ore for the furnaces as a replacement for the rapidly depleting Lake Superior district ores, steel companies and iron mining companies instituted a world-wide investigation of iron ore deposits. These were examined in a new framework of reference -- the air transport age, the age of new geophysical tools of prospecting, the age of bigness in machines and ships, the age of growing automation and mechanization. The search and examination that was made was too successful from the standpoint of the Michigan iron mining industry. We knew iron was the fourth most abundant element on the earth but we now really had it hammered home that iron ore is abundant to the point of profligacy. From a famine of ore the world suddenly went to a feast. The ample supply is shown by the following table of estimated world reserves taken from the Engineering and Mining Journal of February, 1960:

	<u>World Reserves (Million Metric Tons)</u>		
	<u>World Total</u>	<u>Free World Total</u>	<u>U.S.A. Total</u>
+50% Fe	34,000	31,444	986
25 to 50% Fe	88,000	70,302	20,416

* - Source - American Iron and Steel Institute reports

** - Source - U.S. Bureau of Mines Minerals Yearbook

At a consumption rate of 100,000,000 tons or more per year, there is obviously enough ore available.

In addition to the finding, exploring and developing of high grade iron ore bodies in Canada, South America, and Africa, there was carried out at the same time a very formidable research program on the domestic and foreign low grade ores. Again, success in terms of techniques and available tons of high grade product was phenomenal. You are familiar with the roster of low grade developments or projected developments -- Reserve, Erie and Pilotac in Minnesota; Humboldt, Republic, Empire, Groveland in Michigan; Grace Mine in Pennsylvania; Pea Ridge in Missouri; and Atlantic City in Wyoming. Across the border there are Hilton, Marmora, Moose Mountain, Wabush, Quebec Cartier, Carol Lake and many others that are being studied. Collectively, these are good for hundreds of millions of tons in their life spans. To say that the shortage of iron ore is now an over-supply is an understatement.

In the year 1948 which was prior to any big-scale fruition of development of foreign ore deposits and prior to the beneficiation plants for low grade ores, imports amounted to 6,109,000 tons. In 1960 we imported 34,600,000 tons out of a total consumption of 102,200,000 tons. This trend is going to continue upward for imports. Mr. H. S. Harrison, President of The Cleveland-Cliffs Iron Company, predicts 85 million tons of iron ore imports out of 190 million tons total consumption by 1980. In a talk to the New York Society of Security Analysts, April 12, 1960, Mr. Harrison clearly outlined the dilemma of the domestic iron ore industry as dependent on three major problems, viz.:

1. Foreign competition
2. The change in character of the iron and steel business
3. Over-supply of iron ore

Paraphrasing his comments: "The key is the growth of high grade ore usage either from foreign direct shipping or beneficiation sources." This points up problem No. 2 -- the changing character of the steel and iron business where high capital replacement or expansion costs (from 7½ million to 25 or 40 million for a blast furnace) and increased labor costs (from 65¢ an hour in 1927 to \$3.45 an hour in 1961) has provided the powerful stimulus that sent the steelmen out into the market places for a better ore raw material. A 62% iron ore will put production up 20% over a 52% iron ore with substantial cost saving.

To illustrate more precisely what is meant, I quote Mr. Carl Jacobs of Inland Steel in a paper he gave before the American Mining Congress in Seattle this past month. "What do these improved products mean to the blast furnaces? ----

Inland's eight blast furnaces in 1947 were rated at 7350 tons of pig iron per day. Today, with only minor mechanical improvements and enlargements, the same furnaces can produce 10,500 tons per day. The increase is more than 1.1 million tons of pig iron production each year, mostly from improved iron ore. This is more than the capacity of the largest U.S. blast furnace costing \$60,000,000 to build. To avoid this capital expenditure, Inland, like all other steel companies, will continue to push for ever better raw materials, including iron ore."

Mr. Harrison sounds some note of optimism concerning the over-supply of iron ore given time for steel capacity to expand and assuming some stabilization of iron ore property development. This, however, will take a fairly long time.

Now, we should put Michigan in this picture. I could almost do so parenthetically because I'm sure you have gathered by this time that the underground iron mining picture is painted in grays while the future of open pit products in the form of beneficiated ores is brighter. In 1948, the first year I quoted for production, Michigan ranges produced almost entirely from underground mines 13% of 100 million tons consumed, or 13,100,000 tons. In 1960 they produced 11,800,000 tons or 13.5% of 87,300,000 tons consumed. You may wonder what I am trying to establish in a comparison that shows Michigan's percentage share increasing. But to understand my point you must appreciate that underground mines, by their very nature, do not lend themselves to on and off production schedules. For this reason operators are reluctant to take the decision to close an underground property because it is so difficult and expensive to reopen an underground property. In 1960 Michigan's underground mines did work but in 1961 it is sadly true many have closed and probably for keeps in some cases. The basic reasons are that their ore is not as desirable as foreign higher grade ores or as high grade pellets and only the most efficient mines enjoy costs low enough to compete.

Iron ore has become a world commodity and its price results from a balance between costs of delivered product and the urge of competition. Michigan underground iron ore is not particularly high grade. The old standard for these ores was 51.50% Fe natural. Foreign ores are 60% Fe natural ranging to 68% Fe natural as in Liberia and Brazil. This means less slag volume, less coke consumption, and more iron with the same labor and equipment for the furnace using the higher grade ores. The mining industry in Michigan has introduced such measures as more selective mining, drying, screening and heavy media beneficiation for the underground ores that has resulted in the improvement of natural iron content of the ore to approximately 55% iron. This sounds small but is no mean accomplishment. It is exasperatingly true that the

so-called high grade soft iron ores practically defy further beneficiation except through smelting or semi-reduction schemes. What can be achieved is at the cost of irrevocably lost reserves in the ground or process costs that are out of proportion to the degree of improvement achieved.

Michigan underground iron ores are expensive to produce. An underground mine utilizes up to five men for each one man engaged in an open pit operation producing equivalent tonnage. Almost without exception Nature blessed the foreign iron ore fields with exceptionally high grade ore and placed it at the surface. To further aggravate the disparity between Michigan underground ores and foreign open pit, there are very great differences in labor costs. These vary from country to country. For Venezuela, for example, the labor cost is not so disparate as for Chile, Liberia or Brazil, but it constitutes on the whole a large factor of cost difference in favor of the foreign ore.

Most foreign countries have less onerous local taxes on raw material extraction than Michigan. In addition, they may extend special considerations such as Canada's three-year income tax exemption. Many countries allow more liberal depreciation rates than the U.S.

A few years ago, all of the above mentioned factors were not enough to make foreign ore a serious competitor of Michigan ores in the Lake Erie, Ohio Valley and Chicago districts because foreign ore transportation costs were too high. There has been, however, a revolution in transportation and now all of the foreign ore cost advantages are cumulatively effective with a vengeance. Mr. Wilbur, Senior Vice President of The Cleveland-Cliffs Iron Company, in his presentation entitled "Lower Lake Railroads and the Iron Ore Industry" given before the University of Minnesota Symposium on Mining in January of this year, points out that the combination of greatly reduced ocean freight rates and lower eastern railroad rates for ore moving inland is a big factor in the reduction of Lake Superior ore usage in the Youngstown-Pittsburgh area. Huge ocean carriers, 40,000 tons and up, running under low wage foreign registries makes rates possible of \$4.25 from Brazil and \$2.95 from Liberia for distances of 3300 to 4500 miles, compared with \$1.80 from Marquette to Lower Lake ports, a distance of 500 to 800 miles.

I should like to summarize, then, what all of this has done to Michigan iron mining and give my prognosis of the future. Coming to a swift culmination in this year of 1961, the competitive impact of finding their ores unsalable at a profit has resulted in the closing of several underground mines -- the Morris, Champion, Sunday Lake, Cary, Peterson, Geneva-Newport, Mather A and Buck. Some may (or will be) reopened, but it is apparent that some of these are closed for

good and such final decision may be eventually extended to others. The obvious inference to take is that the more marginal mines are the first to succumb to the competition and with some exceptions this is likely the case. These are the mines that are probably down for good.

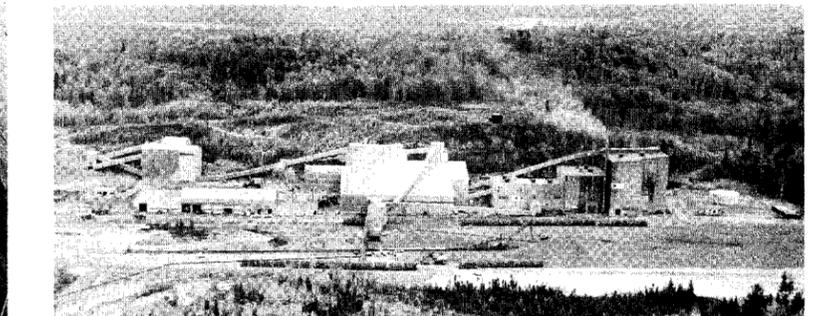
While the underground mining industry in Michigan is maimed, it is not yet dead. It is putting up a real fight for immediate survival and there are some helping hands. The companies are improving the grade of their product as best they can and offering several kinds of structures and combinations as inducement to steel users for individual customer needs and desires. The industry has made progress with the cooperation of fee owners in getting royalty costs reduced. The industry is working hard on mechanization and methods of improving labor efficiency. A constant effort is being directed toward creating an understanding in the mind of the public that taxes need to be equitably shared. The upper lake rail carriers have foregone rate increases and indeed lowered rates. You may well say - "If all of this has gone on and mines are closing, the case is hopeless and the patient is not only maimed but completely crushed." It is possible for this to happen, but I remind you of Major Brooks' prophecy that if the mines close it will be because of too many horses. The problem in 1873 and today are in essence the same -- too high costs. Hard working, earnest, intelligent men built changes into the industry then that kept it tough and vital until now. Today's problems are more complex and tougher but the seeds of a change are already growing. Low grade development, for example, is rapidly under way and much of the tonnage lost from closing of underground mines will be replaced by pellet tonnage. There are, at this time, three Michigan properties -- Groveland, Humboldt and Republic -- operating on low grade ores using fine grinding beneficiation schemes. A fourth, Empire, is being engineered. The agglomerated product from this type of plant is greatly desired by iron makers and costs for these developments are, as of now, competitive -- thanks to the fact the mines are open pit and thanks to an enlightened policy of state taxing for low grade mining.

Management, transportation agencies, fee owners, labor and you, the public, can collectively do much more than has been done to cut delivered cost of traditional Michigan underground iron ores. The better underground mines should, with such cooperation and understanding of needs, be able to survive. All segments of the industry economy have to want it, and want it enough, to submerge individual wishes.

Looking beyond Humboldt, Groveland, Republic and Empire to the more distant future, I hesitate to be a prophet but I can point to possibilities. There are some billions of tons of iron formation available to open pit mining on the Michigan

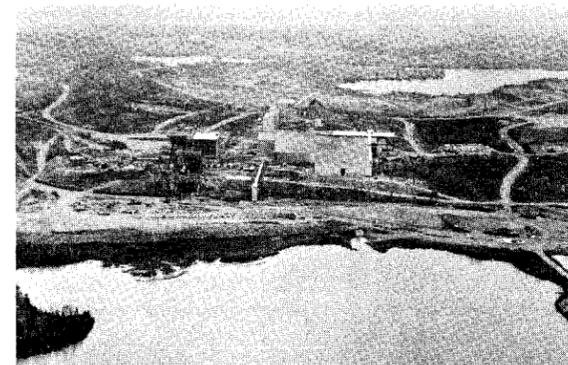
iron ranges. In a technical sense, we know of a way to win usable iron from this material by chemical and pyrometallurgical-mechanical beneficiation schemes. In an economic sense we have not yet been able to do this cheaply enough to have a substitute for our present mining and beneficiation. Here is a fertile, albeit expensive, field for public financed fundamental research into better use of Michigan iron resources.

For all these things I importune you -- for your understanding of, for a continuing interest in, and for your dedication to a solution of the problems of Michigan's iron mining economy.



Left, drilling blast holes in sublevel of soft iron mine. Above, iron ore concentrate plant operated for Humboldt Mining Co. by CCI at Humboldt, Mich. Tailings pond in foreground.

Below, iron ore concentrate plant and open pit operated for Marquette Iron Mining Co. by CCI at Republic, Mich. Right, pelletizing plant operated for MIMC by CCI at Eagle Mills.



BEEN - Thank you very much, Mr. Sundeen.

Consideration of the problem this morning has thrown some light on the subject and it has been indicated where we stand today -- the point of origin for any further planning.

If there are no further comments or questions, I will now turn the meeting back to Mr. Hill.

HILL - I want to personally thank Mr. Been and the other members of the program committee for planning today's program, and especially Messrs. Pehrson, Boyd, and Sundeen for their most excellent presentations from which we have gained a great deal of information.

We are now adjourned for lunch.



Walfrid Been

Afternoon panel discussions: Russell G. Hill,
Chairman of the Council, presiding

THE ROLE OF GOVERNMENT IN MINERAL RESOURCE DEVELOPMENT

HILL - Each of our panelists is well known and highly respected in his individual field so we will dispense with long introductions. The discussion leader of the first panel, which will deal with the role of government and mineral resource development, is Bennett Sandefur. Dr. Sandefur is Professor of Geology at Michigan State University and has been on our university staff since 1946. He is well known in his field and I'm sure he's well known to each of you.

SANDEFUR - We are fortunate to have on this panel Dr. Arthur Baker, Associate Director of the U.S. Geological Survey; Dr. Joseph Butler, Professor of Economic Geography at Michigan College of Mining and Technology; Dr. Gerald Eddy, Director of the Michigan Department of Conservation; Mr. William Kluender, Director of Agriculture and Resource Development, Chicago and North Western Railway, and Mr. Jack Powell, representative of the United Steel Workers of America, District 33, which encompasses the entire Lake Superior Iron Range including Minnesota, Wisconsin, and Michigan.

The subject of our discussion, The Role of Government in Mineral Resource Development, is not a new one. The Babylonians in 3000 B.C. had problems with their gold production and other mineral resources. Copper at that time was the most important mineral resource in world trade. The City of Babylon developed because its people traded copper from what was then the "west" for silks and spices from the "east." But Babylon became greedy over this trade, increasing the tariffs and taxes to such an extent that most of the trade shifted to routes north of Babylon. Thus Babylon died. This is the first case I find where government had something to do with mineral resources.

Let's go on a little further. The Phoenicians, a small group of people living on the eastern coast of the Mediterranean Sea 1000 to 1500 B.C., became very powerful for the size of their nation. The Phoenician government sent ships east through the Mediterranean to discover the copper and tin deposits of Cornwall and Spain. The Phoenician ships carried copper and tin back home to the eastern Mediterranean where these minerals were then sold to the Persians and Greeks. It is said that in the Battle of Troy the spears made from copper and bronze sold by the Phoenicians to both warring sides was probably the first known case of warmongering.

One thing we rarely credit is the part minerals played in the development of Europe. About 400 to 500 years B.C., silver was discovered north of Athens. The development of these mines was a government venture. The metal was mined and a certain amount of the profit was distributed to the people, causing the entire country to prosper. The Persians, at this time, were anxious to move westward. The leaders in Athens told their people that if they would contribute one half of their profits from the mines, an army and navy could be built to stop the invasion of the Persians--and the people agreed. This is the first incident I find where conscription of funds to build an army and navy was agreed upon by a nation --some historians claim that the success of this effort probably meant more to the development of Europe and the West than any other single phase in history. Had the Persians defeated the Greeks, what would have been the history of Europe and the West?

The Romans developed their high standard of living in several ways. For one thing, they were located in the "middle of the world" in those days. Also they found a way to mine gold and copper in Spain. As long as the mines of Spain produced these minerals, Rome flourished. Problems like these will be with us forever.

At this time I will call on Dr. Joseph Butler, Professor of Economic Geography at Michigan Tech to give us a general picture of the mining situation in the northern part of the state.

BUTLER - I am reminded of something Daniel Webster was supposed to have said one time. One of his friends asked him how long it would take him to prepare a 5-minute talk, and he answered about 2 days. The friend then inquired how long it would take him to prepare a 2-hour talk, and he said that he could start right now. The problem is, in 5 minutes, to say something useful and meaningful, and yet not over-simplify.

All 15 counties of the Upper Peninsula have been declared distress areas under criteria set up by the Area Redevelopment Administration in Washington. The Upper Peninsula makes up about one-third of the total area of Michigan, yet has only about 6 percent of the population. It has a strong tradition in mineral production, but as the mineral industries stabilized, or in some cases declined, there was little substitution of capital investment in other industries.

When we analyze the location of urban centers on a 1920 map of the U.S. and compare it with a more recent map we find there has been a rather consistent pattern in the development of urbanization in this country. The region from New York and

Boston west to Chicago, Milwaukee and St. Louis has been pretty much maintained as the dominant urban-industrial complex in this country. On the other hand, the Upper Peninsula is one of the few regions in the country that has undergone a prolonged decline in population. Out-migration has been taking place for generations. This is not a usual situation in the U.S. What is the explanation for this situation? I'm afraid I don't have the ultimate answer, but some of us at Tech are groping for answers.

I would like to take a moment here to put in a word for the social sciences. It seems to me - echoing the comments of Mssrs. Sundeen, Been, and others - we do need much more research. I would add, though, that we need more penetrating investigations of people as part of the resource complex. It is difficult to talk about one without the other. The theory of large numbers applies to large numbers of people as well as large numbers of molecules behaving randomly in a gas. This is why insurance companies can continue in business.

There are some economic geographers and other social scientists in the U.S. who are moving into this area now, analyzing the interplay of people and the physical resource base. This research may have implications for the Upper Peninsula. When we talk about the Upper Peninsula and economic development there are certain site factors which must be taken into consideration -- water availability, mineral deposits, forests, and so on. These are extremely important, especially for the extractive industries. However, there are also subtle underlying economic, geographic, and other forces which are operating. Not many people are investigating these areas -- not many people are making studies of this kind. I think that we should expand our research along these lines.

SANDEFUR - We are very fortunate in having with us the representative of the Steel Workers' Union, Mr. Jack Powell, who will now take the floor.

POWELL - I'm very much impressed with this entire meeting. First, the high degrees that are held by the other members of this panel -- doctors, most of them. I'm always very pleased to associate with them, because sometimes a little bit rubs off on me. And I couldn't help but react most favorably -- believe me, gentlemen -- to the addresses this morning. Mr. Pehrson, Mr. Sundeen, Mr. Boyd delivered tremendous messages and I do not disagree in every phase of their discussions. There's room for some disagreement, but we always finally wind up signing a contract, so we must be in agreement on most things. Aside from that, there's just this one remark to illustrate the fact that we do reach agreement. Something was said about unreasonable wage

demands. Well, a definition of something that is reasonable is something upon which parties can agree. We have never made an unreasonable wage demand because we've always finally wound up signing a contract -- which is an agreement.

The Steel Workers' Union, as does any other union representing employees of industry, represents a resource. It isn't a mineral resource. In this particular case, we're talking about minerals in the Upper Peninsula, and should include the people who work in those mines; with their skills, their history, and continuing loyalty to an industry. They have become a most valuable resource. When you relate the part government might have in the mineral industry of the Upper Peninsula, it's only through people that you can move a government to take any action. You can have millions of tons of iron ore stockpiled, yet that ore itself cannot exert pressure upon any governmental agency, whether it's local, state or federal. In the final analysis, the people who work in the mines and in the industries are the government. Through their desires and their needs, only these people can finally bring about a result. Whether that result pleases one, or whether it pleases another, it is an actuality.

I recall that somewhere around 1945 or 1946 one of the national magazines -- I believe it was the Saturday Evening Post -- had a very impressive and disturbing article relative to the iron ores of the Lake Superior region. Included were some very beautiful pictures of open pit and underground mines, as well as some distressing pictures of abandoned communities where the ores had been exhausted and the mining companies had moved to other fields. It is true that standard Michigan or Lake Superior 51½ percent ore is almost as outdated as the buggy whip. Also, with the national steel productive capacity limping along from 40 to 80 percent of capacity, much iron ore is going to lie in the stock piles, or be unmined and remain in the reserves. I'm indebted to my friends in the iron ore industry for the definition of iron ore. It is a ferric mineral which can be mined at a profit. Beyond that, regardless of its mineral content, it has no value.

We in the Upper Peninsula -- not only the union people, not only copper and iron mining people, but all thinking people in our communities -- are much disturbed by the fact that our unemployment picture is so very bad. Until this past week, about 24 percent of the work force in Gogebic County -- that's the western end of the iron ore range -- were unemployed. The Marquette Range has never been that bad, but 19 percent of our people are unemployed there. At least 14 percent of the people are located in this old range where iron ore first was discovered and developed to build the great steel industry of this country.

We're in trouble in the Marquette Range, too, except for one bright development on the horizon, and that is the beginning development and production of pelletized iron ore from low grade easily available deposits of jaspillite. We're very much encouraged on that. We know that when those pellets are produced -- because it takes more than just mining to produce them -- they will have a sale. Improving technology in the steel industry -- as pointed out by Mr. Sundeen -- and lower costs that are made possible by the use of these new pellets, are going to make them very desirable. And I'm not worried about the future of the iron products of the Lake Superior region. I'm not at all fearful that they won't continue to be developed and absorbed in the furnaces of America. I'm not worried about foreign competition -- except perhaps for Brazil and perhaps Liberia -- because the iron ores that are coming into this country are actually not directly in competition with Lake Superior ores. Lake Superior products would not go to the Fairless plant on Chesapeake Bay, nor would they likely go to the Sparrow Point plant. Those big furnaces were built on tidewater because of the market there for the products they will produce. Also, the iron ore can come up from the Caribbean, or down from the Seven Isles district of Labrador to those mills, and still not be competitive. It cannot be delivered very far west of tidewater at a cost comparable to the Lake Superior ores.

There's another facet to the so-called competition of foreign ores that often is not mentioned. Canada -- as a socialistic country, or an owning or operating country -- does not ship us any iron ore. Bethlehem Steel (Indiana) and U.S. Steel -- American steel companies -- are bringing it in for their own use. It's our own companies in this country that are competing with themselves in that way. The same thing is true in Venezuela with Bethlehem Steel and U.S. Steel. With a \$7,000 annual per man cost in Venezuela, by the time it is delivered -- as Mr. Sundeen said -- there is little difference between the price of Lake Superior ores and the total cost of Venezuela ores. This union which I'm privileged to represent, also represents the employees in the Quebec and Labrador areas -- and I assure you that we are diligent in our responsibilities to them. The wage structures in Canada are so very nearly similar to the U.S. as to be almost identical. So it is not a matter of competition, it's a matter of this entire nation's economic need for more steel.

As this population explosion, which we are warned to expect, continues, and if the per capita need for iron ore exceeds or continues to hold even with the 400 kilograms -- mentioned by Dr. Sundeen -- we will need all of the products which this country can obtain both domestically and from abroad. I'm very sure that Mr. Boyd of the Copper Range Company would look with considerable alarm toward any quotas for export or for any tariffs on imports of metals or metal

minerals to this country. What happens to our exports the moment a tariff wall is built prohibiting entry of materials upon a free trade basis? As Mr. MacDonald has said so forcefully, America is a country that does just two things: it buys, and it sells. The rest of the Free World must have the ability to buy our products, which will permit us to sell the things made by our labor.

Government, therefore, has a very definite responsibility. There hasn't been enough governmental assistance in the area of research and surveys of hidden mineral resources. Government should develop pure research in the sense of developing new processes which these companies could then use to make iron ore at a cheaper cost without wasting their own blood. It's tough trying to get a dollar out of a company from my side -- but at least they wouldn't have to waste their own substance making these pure research projects. It is a governmental responsibility, also, to make sure that we have a stockpile of strategic minerals for the future defense of this country. I hope that the great steel companies do not themselves develop a stockpile to the detriment of the people who want to work in this country by leaving our resources undeveloped and untouched while they go abroad to bring in natural resources. I don't think that is proper, or fair treatment of the people.

SANDEFUR - Rest assured of one thing, Mr. Powell, one of our guests at this meeting Dr. VanPelt, would be delighted to see several million dollars for research headed toward Michigan Tech. I am sure that the University of Michigan could use more in their metals research program. We could also stand a little money for research at Michigan State.

Now, let's call on Dr. Arthur Baker, Associate Director of the U.S. Geological Survey, to outline their program.

BAKER - Dr. Sandefur suggested that I might possibly outline some of the activities of the Survey as it relates to the role of government and mineral resource development, because he thought that this audience might not be too well acquainted with the work that the Survey is doing. As I look around through the audience and see so many familiar faces, I'm not sure but what that is a false assumption. I think that many of you here may know about as well as I do what the Survey is doing. Be that as it may, I'll briefly run through the functions of the Survey, all of which are related more or less closely to the mineral industry.

A principle function is the topographic mapping of the country. Almost 50 percent of the country now is covered by modern maps. A person now has a 50-50 chance of getting a reasonably satisfactory map of any area in the country in which he is interested. In contrast to the national average, the state of Michigan has about 73 percent coverage. I don't know how much credit the state should get for that coverage. I know the current program is very largely supported from federal funds through the map needs of the defense agencies, the Bureau of Public Roads, and other federal agencies. With priorities based upon federal needs, I suspect that many of the state needs are not being met because of the somewhat lessened support by Michigan.

The second major activity of the U.S. Geological Survey relates to water resources. Certainly, water is about as important to all of us as the air we breathe. We have a considerable cooperative water resources program in Michigan relating to surface water, including measurement of stream flow, determination of lake stages, base and flood flow characteristics of streams, as well as the study of ground water and the quality of available water. Much of the development of your industrial resources, of course, depends on the availability of water and a knowledge of the supplies that are available.

A third and somewhat smaller activity relates to the supervision of mineral development on federal lands. There's a small amount of that activity in Michigan.

I purposely left to the last a reference to our geologic work, which I think probably more closely relates to the subject of this program. The Survey is charged in its charter with responsibility for the mapping of the geology of the United States. Mineral resources, as the term is commonly used, are geologic entities. Knowledge of them is inseparably linked with our knowledge of the geology of the country. In developing this knowledge we work with the state surveys and try to make full use of data developed by the companies. We try not to duplicate the work of either. I would differ with Mr. Powell when he says that the companies shouldn't do any of this work -- that it should be left to the Federal Surveys. I think it's incumbent upon all of us to apply all the talents that we know how to apply, for a better understanding of the geology and mineral resources of the country. We need to apply just as vigorously as we can all the known techniques, and we need to spend every effort in the development of new techniques that will help us in unravelling the mysteries of geology and in finding additional mineral resources.

I'm one of those who believes that the future welfare of

this country depends upon an adequate resource base. Now, we've heard a lot this morning about the economic dislocations that exist in certain industries here in the state. That is the shorter range. Elmer Pehrson talked about the longer range. I don't think there can be any question that in the longer range our welfare is going to be dependent upon having an adequate mineral base -- which calls to mind the Governors' Conference of about 50 years ago. During Mr. Sundeen's talk this morning, I was reminded of a prediction another well-known leader in the steel industry, Andrew Carnegie, made at the time of the Governors' Conference. He predicted that Lake Superior iron ores would be exhausted by 1940. That's quite a different story than Mr. Sundeen gave us this morning when he was talking about the iron resources of that area. Another prediction at the Governors' Conference was that through the shortage of fertilizers in this country, the soils of the country were going to be exhausted and that we would become an importer of agriculture products instead of an exporter. Yet today, we have abundant supplies of fertilizers and grain surpluses.

This emphasizes to me the fact that research can and does develop resources. It not only develops those that we customarily need according to the practices that we've been following in the past, but new uses are developed for old resources, and new minerals are brought into uses that had never existed before. The mineral economy can be raised to higher levels through research, and I would like to join in what seems to be an underlying theme of most of the speakers here that we need more research in the mineral industry.

SANDEFUR - The next speaker on this panel is our well-known Dr. Gerald Eddy. I doubt if there is anyone in this room better prepared to discuss the role of government in mineral resource development as it applies to our own state of Michigan.

EDDY - To explain how the Conservation Department got into the geology business, I would like to go back a little into history. Michigan was created as a state about noon on January 26, 1837. About two hours later, a bill was introduced creating a geological survey and appointing the first State Geologist, and giving him the job of completing the geological survey of the state. We've been very slow and inefficient because the darn job isn't done yet. In fact, about 1869, they must have become a little impatient, because another statute was enacted which apparently spells things out in a little more detail. I would like to read from it so that you will have

an idea of the scope of our activity: "It shall be the duty of said board to make, or cause to be made, a thorough geological and mineralogical survey of the state, embracing a determination of the succession and arrangement, thickness and position of all strata and rocks, their mineral character and contents, and their economical uses; an investigation of soil and subsoils, and the determination of their character and agricultural adaptation; the investigations of all deposits of brines, coal, marl, clay, gypsum, lime, petroleum, and metals and metallic ores, building stone, marble, gritstone, materials for mortar and cement, mineral paint, and all other productions of the geological world within the limits of this state capable of being converted to the uses of man."

In 1921, the Geological Survey Division -- for which I am very proud to have worked for some 20 years -- together with seven or eight other divisions of state activities were combined under one group and the present Conservation Department was formed. The act stated: "The powers and duties now vested by law in the Public Domain Commission, the State Game and Fish and Forest Fire Commissioner, the State Board of Fish Commissioners, the Geological Survey, and the Michigan State Park Commission are hereby transferred to and vested in the Conservation Department." In that bill, since amended, was this paragraph 2 which I think very definitely conveys our responsibilities in the field of the encouragement of mineral development. "The said commission (being the Conservation Commission) is hereby empowered to make contracts with persons, firms, associations and corporations for the taking of coal, oil, gas and other mineral products from any state-owned lands upon a royalty basis or upon such other basis and upon such terms as to said commission shall be deemed just and equitable: Provided, that said powers shall include, and shall be deemed to have included, the making of contracts as aforesaid for the storage of gas or other mineral products in or upon any state-owned lands." The latter, of course, is a more recent amendment to the statute.

Mr. Baker touched upon cooperatives and topographic mapping. I would like to point out for the benefit of legislators attending, that while Michigan has a 73 percent coverage in topographic maps, a great number are on the one inch to the mile scale which we do not believe sufficient for present needs. He didn't mention -- and I think with due modesty -- the cooperative work in which we've been engaged with the U.S. Geological Survey since 1943, namely, the remapping of the geology of the iron ore ranges and bringing up to date the old monographs prepared by Leith and VanHise. We started to do that work ourselves back in about 1923 or 1924, but with the combination of war and running out of funds, we had to quit in 1942, and entered into cooperative work with the U.S. Geological Survey. It has been in the neighborhood of a \$40,000 a year program,

fluctuating a little up and down from that. In the last few years the U.S. Geological Survey has absorbed the lion's share of the cost because of the inadequacy of state funds.

As a concise example of what that broad basic geologic study has accomplished -- I think we can take some of the credit for it -- is the discovery in the Iron River District of a new ore body at the Hiawatha Mine of about 1,650,000 tons in an area, which heretofore, was thought to contain only the foot wall of the iron ore formation. By the time that ore body is mined out, there will have been realized to the local community about \$6,075,000 in wages, \$2,250,000 in supplies, about \$255,000 in taxes to local government, making a total benefit to the community of \$8,600,000. Multiply a state annual expenditure of \$20,000 by a few years and I think we're pretty well in the black.

The Geological Survey Division is primarily based upon the concept of service to the public -- with the metallic mining industries, the oil industry, and others using our resources certainly included in that concept of cooperation. About two years ago, the Legislature enacted a law to provide for the diversion of water for the purpose of supplying water to iron ore beneficiation plants. The industry, the Water Resources Commission, and our department cooperated in getting that legislation. Since then, two mining companies have made use of it in diverting the water for this purpose. Our department certainly recognizes the future values of these iron ore beneficiation plants. At the same time, we recognize the values of water in those streams for other purposes, including fish, wildlife, and recreation. We have been able to reach agreements in the past to provide sufficient water for these new plants and at the same time preserve water for recreation purposes.

We recently completed an exchange with one iron mining company by which we acquired some key pieces of property within the limits of our Van Riper State Park in exchange for granting them mineral rights on other state land. It has been said in some quarters that perhaps we didn't drive as good a bargain as we might have, but I think we can put an intangible value on the lands within Van Riper State Park, which represents quite a lot of money. We are now engaged in negotiations with the Cleveland-Cliffs Iron Company for exchange of land on which they will be able to build new waste disposal areas for their new Empire property. We are currently negotiating with a cement company for exchange of lands in the Charlevoix area. The state holds lands there upon which limestone has been known for many years. It was test drilled back in the days of Governor Comstock when the state of Michigan didn't want to get held up in its highway road building program. If a commercial deposit is found there, we're going to enter into an exchange by which we will acquire, in value for the stone, other suitable lands for

our expanding park system -- which as most of you know is sadly over-crowded today.

I did want to comment briefly upon the remark made by Mr. Pehrson this morning. He attributed the difficult situation which many mines find themselves in Michigan to the taxation problem. I'd like to brag a little bit here -- I see one of the former mines appraisers sitting in the room. We have been appraising mines in Michigan on the so-called Finley method. I add the name "Pardee" system, because he modified it by providing for certain kinds of "fudge factors" which I used a little later on. Our iron mines are assessed on the basis of hundred percent of their true tax value. The problem does not come from the values which we put upon the mines, but the way in which they're equalized later on, because of the comparatively low rate of assessment of other than mining property in the mining districts.

I would like to mention, too, that with not too adequate funds, I think the Michigan College of Mining and Technology has made a very real contribution to the technology of beneficiation of our low grade ores.

SANDEFUR - At this time we will call on Mr. W. A. Kluender, director of agriculture and resource development for the Chicago and North Western Railway Company. Development of the mineral industry in the "north country" is very close to his heart. Mr. Kluender will tell us industry's viewpoint regarding the role of government in mineral development.

KLUENDER - From the time of our first Congress in 1776 it has been necessary to initiate many governmental actions in order that more and more Americans might effectively pursue happiness and consume and enjoy the material output of a constantly expanding industrial structure. In the complex economy that has since developed, governmental actions have increasingly been directed to controls and regulations at the expense of the more desirable function of providing a favorable climate that would encourage capital, management and labor to work in closer harmony for improved income earning opportunities.

A national public reluctance to recognize the need for a favorable "business climate" for many of our basic industries threatens the very existence of our private enterprise system.

If it is of consequence to contemplate the state of the economy's mineral raw material supply, particularly since a striking change in the domestic mineral situation has manifested itself in recent years, then what should be the government's

role in mineral resource development? I believe mineral self-sufficiency should be a matter of public concern only if the public is sufficiently enlightened to enable them to make soundly based decisions. It is the purpose of this panel to present views and opinions of the principal interests that currently influence mineral development.

As you know, I do not represent a mineral industry, but rather one closely associated with mining, namely transportation. I feel greatly handicapped in interpreting and presenting the attitudes and views of the mining industry but greatly pleased that I have the opportunity to do so.

So you might have the benefit of the mineral industry's own thinking and not the amateurish and possibly prejudiced attitude of a single individual, we contacted over 150 mineral and mining companies for their views on this subject. Every major mineral industry having some phase of their operation in the Lake Superior region responded to the inquiry. So there would be a professional interpretation of the poll, our geologist who before joining us spent almost a decade in iron mining, studied the returns. Without intending to pass the responsibilities of this presentation to another, I'm grateful for the assistance given me by our own Jim Aase.

Not all mineral industries look to government for the same thing.

Where there are differences they are basically due to the peculiarities of the different types of mineral enterprises and would cover such subjects as stockpiling, subsidies, tariffs, import quotas, barter programs, etc. Time will not permit discussing them here.

As a whole, industry is in agreement on what they consider to be the principal role of government in mineral development and it is along these avenues the presentation is made. In my desire to express industry's views exactly as given to us I have liberally borrowed from actual statements made by those polled. If I were to express to you my own enthusiasm for the mineral industry you would suspect me of having special interests. If, however, I emphasized the industry's current problems I run the risk of presenting views somewhat less than optimistic. I will not attempt to hide that the major mining industries in Michigan are currently beset with trouble. It is not, however, suffering from an incurable disease but is undergoing a shifting of emphasis in some of the phases which go to make up a successful and profitable industry. Most of these phases affect all of us to some degree. As citizens we need to be currently informed as to where we as individuals can participate and collectively what part our government should play.

How does the mineral industry feel about the role of government if we are to retain a self-sufficiency in our mineral resources?

As a whole the mineral industry feels that the government, with certain exceptions, should not, through its various agencies, actively engage in exploration activities. Exploration assistance along the present lines of the government's Defense Mineral Exploration Administration program has been helpful in furthering the nation's search for various domestic strategic minerals and should be continued.

In the field of exploration research government activities should be continued to test scientific hypotheses.

Government should principally concentrate the efforts of the United States Geological Survey and the Bureau of Mines along lines that would provide more of the basic tools essential to exploration. This includes geological maps, surveys, reports, statistical and research data that would help industry more effectively and efficiently carry out the important first preliminary phases of exploration. Government should serve as a clearing house for information regarding exploration techniques, operative techniques, and other basic research that do become a matter of public knowledge.

If an adequate domestic supply of mineral resources is to be kept on tap, the role of government should be focused on ways which would encourage and expand exploration activities. This might be in the form of a tax incentive by removal of present limitation on the deductibility of exploration expenses. Consideration might be given to exploration loan contracts for promotion of worthy exploration projects.

The government might even issue prospecting permits on public lands which would be renewable and uncancellable upon showing proof that exploration or development work is being progressed. Discovery would result in a guarantee that the property could be acquired and that the discoverer would be entitled to a finder's fee. In this manner the discoverer would be acting as an agent for himself and also for the government.

If private enterprise is to supply the needed risk capital that is required for carrying on mineral exploration work, there is need to liberalize the depletion allowance. In many cases the costs associated with exploration are never recaptured because mineral reserves are not always found, or when found are often not economically exploitable.

Some of the people in the mineral industry that we polled felt that government should approach with care the financing

of facilities in foreign countries for producing natural resources when the production from these resources will compete in our domestic economy. The financing of such developments for consumption in underdeveloped countries is certainly justified but some protection should be afforded domestic producers against this competition.

The mineral industry feels that government's role in research has contributed much to the development of our mineral resources. The United States Geological Survey, the Bureau of Mines, your State Geological Survey, the Institute of Mineral Research at the Michigan College of Mining and Technology, and the geology departments of your state universities have all contributed substantially to the mineral industry of the region.

Industry is quite definite in crediting the cooperative assistance received from State and Federal agencies in basic research. This is very true in the relatively new and expanding taconite development. Public institutions have contributed a great deal to working out feasible processes for the beneficiation of some of the low grade iron ores.

It is apparent, however, that closer cooperation is desirable between industry and government in coordinating research efforts so that the large sums of public funds are not used for projects that have little value to the mineral industry or which would constitute a duplication of investigations previously conducted by private enterprise.

It is felt that more usable and desirable information can be gained from governmental mineral research projects if an advisory group of people made up from the various mineral industries could actively participate in the selection and planning of research projects that are currently needed. A group of this type could more effectively guide publically supported efforts toward more constructive ventures. Finding new and wider uses for our presently produced mineral commodities as well as developing more economical methods of exploiting our sub-marginal mineral resources would be worthy of public support.

New approaches to mineral development, such as we have in low grade iron ore development, require a great deal of working cooperation between industry and governmental agencies in the acquisition of lands and permits for necessary large scale operations. In our region mineral resources are almost invariably confined to regions of forest, lake, and streams. Large scale mineral developments require land for the deposit of strippings, location of townsites, construction of railroads, concentration plants, etc., all of which must be in contiguous large blocks. One mining company in Minnesota had to acquire 40,000 acres for its operation and another company almost 13,000 acres.

Mineral development, because of its extractive nature, frequently changes the appearance of the landscape. There is a need for the public to better understand and the government to recognize the necessities of the mining industry in this respect.

There is obviously a need for re-evaluating the suggested withdrawal of large areas of public land as described in Senate Bill 174, the Wilderness Bill.

The issues of the wilderness controversy are varied and complex. Proponents of the legislation want the Congress to adopt a national policy on wilderness and to specify procedures for their establishment, modification, and permitted uses. Under the proposed legislation, certain determinations with respect to presently established wilderness areas, such as the final modification of boundaries and the elimination of portions, would be removed from the discretion and authority of those responsible for their administration. Instead, consideration by Congress would be required.

Opponents of the legislation object to the statutory fixing of boundaries and the impossibility of withdrawals, except following Congressional review. Increasing demand by an expanding population for our varied mineral commodities should be correlated, they say, with such demands and with the acreage of potential mineral lands available in each region. Many view the proposed wilderness preservation system as a "locking up" of vast areas for limited use, inconsistent with multiple-use management for the development of our natural resources.

Unless some better method is discovered than is now incorporated in this bill to permit prospecting and development within the proposed Wilderness Preservation System, thousands of square miles of public lands (14.6 million acres) will be frozen to future mineral use. The mining industry is not opposed to the concept of wilderness but it is evident that those responsible for making final decisions must strike a reasonable balance between the necessity for development of mineral resources and the desire of extreme conservation advocates. The bill in its present form abolishes mining's existing legal right to locate mining claims, explore, develop and mine mineral deposits in the national forest areas withdrawn for wilderness purposes. These areas are a potential source of mineral location but due to current inaccessibility remain undeveloped. The proposed legislation effectively precludes any future development. The mining industry subscribes to the concept of multiple use in the development of our public land resources and opposes a program which obviously devotes millions of unexplored acres to a single-use system without proper evaluation of their potentialities.

Probably the most beneficial role that local, state and federal governments can play in mineral resource development, especially here in Michigan, would be to re-evaluate and revise the tax laws to create a "business climate" that would induce industries to renew and expand their mining ventures.

In our poll the subject of taxes was brought forth more often than any other and was reported on at considerable length by the respondents. Taxing practices as employed by the governmental bodies are looked on by the mining industry as unfair and discriminatory and are getting so far out of hand that industry's very survival is being seriously threatened. It is felt that many state and local taxing statutes and practices which place a disproportionate share of the tax burden upon the mining industry, or which fail to provide an adequate allowance for depletion, are the greatest deterrents to the investment of capital for development of new revenue-producing properties needed to replace depleted or outmoded reserves.

The unanimity of the responses in regard to this particular subject indicates to me that something is in dire need of correction or adjustment. The public and the government at all levels must concern itself with this situation and take action to obtain a more equitable taxing policy.

There is undoubtedly some equitable solution to this problem. The various levels of government can improve this situation if they are approached on a non-political basis. It is my personal view that the unfortunate tax situation has the side effect of casting a veil of suspicion on many other governmental activities and contributes greatly to an unfavorable business climate.

A realistic view of "what can be done to help the mining industry rather than what can we extract from them" must be taken by our taxing bodies if we hope to preserve those industries we now have and hope to get.

We in the railroad business, although not actually in mining, are allied to the mineral industry through the role of transporting many of the mineral commodities. We, therefore, are very concerned in seeing that a healthy mineral industry is sustained and that further development of our mineral resources is progressed in a proper manner.

We believe that government has an important role in resource development. For government to effectively carry out their responsibilities, we suggest the following:

1. Make an appraisal of our mineral position. This would require a complete cataloging of the mineral resources. This could be done, to any degree of reliability,

only after a complete geological survey of the United States had been made. Many areas of the United States are still unmapped geologically.

2. More attention should be given in government's current research program to identify and find ways of economically developing submarginal mineral resources. Technological history, especially in the case of taconite, has proven the value of such efforts.

3. More attention should be directed in the government's current program toward market research and development. There is a great need to develop new and wider uses for our mineral resources. In the immediate past years magnesium has been developed from sea water brine, magnesite and dolomite. It appears similar opportunities exist for obtaining aluminum from high alumina clays and anorthosite.

The mineral industry has been one of the primary contributors to the economic development of Michigan.

We, the public, should be deeply concerned about its current situation and should do something about it. This can be done by making our thoughts known to our elected representatives who are responsible for the role government takes.

In June of this year a hearing was held before the Subcommittee of Minerals, Material and Fuel of the Committee on Interior and Insular Affairs of the United States Senate to investigate the Upper Great Lakes Iron Ore Industry Problems.

The proceedings of this hearing are available from U.S. Government printing office and some of you people here may wish to examine them, as they bring out many of the problems facing the industry today and give insight into the views of our legislators and the possible ways the legislation may be progressed.

It is necessary that we, the public, become aware of the thinking and type of action being taken by our elected representatives, so we can lend support or take action against any legislation not in the best interest of furthering our mineral resource development.

SANDEFUR - The meeting is now open for discussion. We don't have too much time since there is an interesting panel following us, but here is something that might interest you. This morning I was talking with one of our former State Geologists and he made this statement: "Only about 10 percent of the area of the Upper Peninsula is well known, whereas the other 90 percent is little known. The U.S. Geological Survey

would match funds with the Michigan Geological Survey to do some geological work. There is a billion tons of low-grade iron ore from Crystal Falls to Alpha. Whether or not it can be treated we don't know. But we believe that there are low grade ore deposits in many places, and they should be explored. In other words, only 10 percent of the Upper Peninsula has been mapped geologically."

Mr. Eddy indicated that for several years Michigan's contribution to the geologic mapping of the Upper Peninsula was \$20,000 per year. If you think this is a big sum, compare it to my home state of Kentucky which is putting \$600,000 a year into a crash program -- this is what Frank Pardee thinks should be done in Michigan. Iowa, a state not noted for its mineral wealth, is spending \$100,000 a year to find out what it may have. This merely gives you a bit of information for comparison.

I have one question in my mind -- it seems to me that the "root of all evil" is that we need more money for mapping and research. The federal and state surveys would like to promote a program of research and the universities would be delighted to assign graduate students to work on the geology of the Upper Peninsula, but where are the funds coming from? This concerns me. Michigan has the man-power but for one reason or the other we can't convince the right people that geological research and mapping is important.

If there are no questions at this time, speaking for all present, I wish to thank our panelists for their excellent presentations.



Jack Powell



B. T. Sandefur



W. A. Kluender



J. H. Butler



G. E. Eddy



A. A. Baker

MULTIPLE USE AND CONFLICTING INTERESTS IN MINERAL RESOURCE DEVELOPMENT

HILL - The next panel discussion deals with a subject that is controversial. Perhaps that will make it a good panel discussion. The topic is multiple use and conflicting interest in mineral resource development. The moderator is Dr. Frank Suggitt who for many years was a member of the Cooperative Extension Service at Michigan State University, head of Department of Resource Development, and currently a consultant in area analysis and development. His long years of working in this field of multiple use, and in evaluating multiple use and resource development eminently qualify him as this panel's discussion leader.

SUGGITT - I do not want to spend a great deal of time in introducing this distinguished panel, because it would deprive you of the privilege of hearing them. I should mention, at the outset, that I am here as a result of a typographical error. I can think of no other reason for my being in front of you discussing this very difficult topic. The Program Committee asked if I would be willing to moderate a panel which read as follows: "Multiple use and conflicting interest in resource development." The typographical error was the omission of the word "mineral." So I figured I could stumble through that in pretty good shape.

When I later discovered the word mineral, I began to wonder, and this caused me to look up the definitions of panel and moderator. A panel is: "A list or group of persons selected for a specific purpose, as for judging or discussing." When I got to the word moderator -- wondering what my role was to be here, since I'm not an authority on mineral resource development -- I ran into some interesting definitions. For example: "A moderator is a person or thing that moderates." That was the beginning. He may also be: "...a person who presides at a town meeting or a debate" and that could well ensue here! In nuclear physics, a moderator is "a substance such as graphite or heavy water used to slow down the neutrons in a reactor." A moderator is also that which "...causes to become moderate, makes less extreme or violent, or restrains." Looking up the word moderate, I found that it is "...of medium quality and mediocre." So this is going to be my role here!

The topic is a serious one. The discussion should be most interesting and challenging. As we approach this topic, I would implore that we consider the mineral industry in Michigan and nationally as part of the total resource base with which we are concerned. I suggest that if we can think in this kind of a perspective, our discussion and questions from the floor will be more meaningful.

I want to indicate that we have no prepared speeches here.

We're going to discuss a group of questions. Altogether there were some 40 questions submitted by the members of our panel.

Inasmuch as Mr. Bodor is the only mineral expert on the panel, our first question will be directed to him. The question is: "How do land withdrawals and the creation of wilderness areas affect the mineral industry?"

BODOR - Being the first one on this panel, I'm leading with my chin, but I believe, from the mineral viewpoint, any kind of land withdrawal is highly objectionable.

This is a very popular subject. Sentimentally, I am for it myself. I have loved the outdoors as much as anyone, but mineral exploration is getting to be tougher and tougher. You heard some of these problems this morning. The surface has been scratched and surface indications have been pretty well surveyed; however, a lot remains to be done to uncover what is at depth. We have to enlarge our areas, our base of operations, by areal and large-area geologic work. To withdraw very extensive areas from mineral exploration as encompassed by the previously mentioned wilderness bill, I would consider disastrous. I have heard estimates of 14,000,000 acres and some as high as 60,000,000 acres. For comparison, the total land area of Michigan is about 37,000,000 acres.

The mineral industry is not opposed to multiple use -- that's our topic here. I do feel, however, that perhaps it should get a priority on the use of undeveloped areas. It has had it so traditionally.

Ironically, some of this agitation for withdrawal is prompted by tourist interests and the yearning of the people to get away from it all. Yet, some of our most popular western resort areas: Aspen, Colorado; Sun Valley, Idaho; Alta, Utah; -- just to mention a few -- are on the sites of abandoned mines. Even here in Michigan I think Isle Royale would be a great deal less interesting if the old mines wouldn't be there to explore and to poke around. Michigan's newest state park at Fayette is another relic of an early mineral preparation industry. I don't feel that mining and tourism would necessarily conflict. In Michigan, cooperation among the various interests has been quite outstanding.

I'm not quite clear what would be right and what wrong in this wilderness business, but one of the areas which is under consideration for some sort of withdrawal -- perhaps a national park -- is in the central part of the Upper Peninsula, which as mentioned in a previous talk, has never been really surveyed geologically. To blanket this off and exclude geological exploration, I think would be a fatal error.

SUGGITT - I'm wondering if there are other members of the panel who would like to react to that same question at this time. If there are not, I think that our one native Michigander should be the next speaker. He is going to speak on how natural gas provided to the Upper Peninsula of Michigan would benefit mineral development. Father Cippo, I would also appreciate your comments on the question of the withdrawal of lands from mineral development for wilderness.

CAPPO - I'm very happy to be the only native Michigander here on this panel and I hope that we have some other native Michiganders out in the audience so that they can back me up in some of these things that I want to propose to this group today. I believe that there is one aspect to this problem of iron ore and copper production in Michigan which over-rides all others in its importance, and that is natural gas. We know that the future life of the Marquette and Gogebic iron ore ranges depends on low grade ores and the ability of the mine operators to develop these ores into pelletizing operations. As the companies develop methods for pelletizing the low grade ores, the imperative need for natural gas is paramount. The proof of the value of natural gas may be seen in the experience of the Reserve Mining Company which is pelletizing low grade ore from the Mesabi Range at the Silver Bay and Two Harbors operations about 60 miles north of Duluth. Here, a tremendous investment in processing equipment has resulted from the use of low price natural gas in large industrial quantities. The savings resulting from the use of this natural gas has made the Mesabi Range so competitive with other domestic and foreign ores, that hundreds of new jobs have been created through the large increase of production of pelletized ores. These increased investments have become a source of additional tax revenue for the state of Minnesota, but even more important, are the new jobs provided for hundreds of people.

It is of the utmost urgency that the iron and the copper ranges of northern Michigan and northern Wisconsin be guaranteed the same benefits of a low cost natural gas supply for the processing of their low grade ores. I believe we should take a moment to review the history of conflicts of interest in the natural gas pipeline industry resulting in our mineral producing areas being booted about like a soccer ball. Time and time again in the past decade, we in the Upper Peninsula of Michigan thought that natural gas was within our grasp, but each time it was jerked away from us. The pattern is all too clear to anyone who has taken the trouble to follow this matter in the press and proceedings of the Federal Power Commission.

In 1955, natural gas was offered to the Cleveland-Cliffs Iron Company, our largest operator in the Marquette area, at a

very attractive price of 35 cents per thousand cubic feet. The same company which proposed to serve Cleveland-Cliffs also planned gas service for the pelletizing operations on the Mesabi Range in Minnesota. Now, through various manipulations, of which the general public is only vaguely aware, this original company, the Midwestern Gas Transmission Company, abandoned their plans for constructing a pipeline system which would have linked the Canadian gas supply and their American gas supply. They constructed a pipeline from the Canadian border only as far as Marshfield, Wisconsin, forgetting entirely the original proposal for extending that pipeline east to Marquette, Michigan, and south to Chicago. Midwestern Gas Transmission was followed by the Michigan-Wisconsin Pipeline Company and the Michigan Consolidated Gas Company -- subsidiaries of the American Natural Gas System -- with other deals and proposals. Now, the Michigan Gas and Electric Company, the firm authorized by the Federal Power Commission to buy gas from Michigan-Wisconsin Pipeline Company and to deliver it to the Upper Peninsula industrial and household users, has thus far been unable to carry out the terms of their certificate from the FPC.

We don't know who's right or who's wrong in the current squabble between Michigan Consolidated and Michigan Gas and Electric, but we do know that our mining industry is suffering because of it. While these companies fight amongst themselves and manipulate supplies of gas supposedly destined for the Upper Peninsula, the price of the gas has zoomed from 35 cents to 52 cents per thousand cubic feet, and the mining companies still do not have this one vital ingredient for a healthy and thriving mineral production. By contrast, the Reserve Mining Company, Minnesota, has been able to secure a large supply of gas in the Mesabi Range and at an average price of only 37 cents per thousand cubic feet. Their gas is supplied by the Northern Natural Gas Company. As we convene here today to explain the problems besetting our Michigan iron ore and copper industries, let us not forget to recognize the urgency of having low cost natural gas for industry in the Upper Peninsula.

Since last January 28, in the locale of my parish, three mines which gave work to the majority of our people in that area, have closed down. Just last week through the cooperation and the working together of the mining companies and the labor unions, these mines were opened giving employment again to 700 people. We hope this restoration of work is not only something temporary -- and this could be only temporary because of our failure to obtain the introduction of competitively priced natural gas into the Upper Peninsula.

In answer to Mr. Bodor's comments, I'd like to say something that I mentioned last week to the Michigan interim committee studying the iron ore industry. Going back to the year

1910, we find that Houghton County -- the county that I was born and went to school in -- had an assessed valuation of \$124,000,000. In that same year, Detroit, 555 miles to the south, had an assessed valuation, I believe, of \$180,000,000. Since that time, Detroit has grown. But what made Detroit grow? It was those dirty mines we here speak of. In Detroit, the electrical wiring that you have, came from the Copper Country -- 50,000 tons of it. Wasn't it Henry Ford who made Detroit? And where did he get much of his material? From Humboldt, from Big Bay, from L'Anse, Iron Mountain and all cities in the Upper Peninsula.

Making a comparison for 1947 -- the last year we could make a comparison because the Tax Commission made a complete revision of evaluations -- Houghton County was valued at \$24,000,000 -- \$100,000,000 less than 1910. Whereas Detroit, I believe, was about \$6,000,000,000. Upper Michigan ore -- that came from underground which my dad worked 51 years, and is still living today at the ripe age of 73 -- helped build that city. It also helped to make Detroit the arsenal of democracy, and I say we of the Upper Peninsula can pat ourselves on the back because I think our ores had much to do to help win the war. Five hundred million tons of iron ore came out of the Lake Superior area.

Those are the things that we have to be concerned with today, my dear people, in the nuclear age. The ore must be at hand today, because we can't develop a mine overnight. White Pine, for instance, started sinking a new shaft at their mine about a year and three months ago hoping that it would be finished within a year, but they have not even touched the ore yet. So we have to provide for the future of our country in seeing that the proper use is made of our natural resources -- not the preservation of them. Because one nuclear bomb can destroy all of our foreign imports, we should provide for our future in a very healthy way.

SUGGITT - This certainly opens up the area of discussion of multiple use, conflicting interests, and competition for resources. One comment I would like to make is that another resource the Upper Peninsula of Michigan has contributed to Detroit has been man-power and labor. I do not believe our southern Michigan metropolitan communities would be what they are had it not been for the export of this resource of northern Michigan.

Moving on now, we will continue with representatives of the Upper Peninsula. Gene Hesterberg of Michigan College of Mining and Technology would like to speak to the question he submitted: "What problems must be considered with the decision

to invite the public to use company lands in a broad multiple use concept?"

HESTERBERG -- I want to spend most of the time developing a theme which will have, I hope, an objective and realistic solution to some phase of this peculiar problem of limited land for recreation. Land is unique because the supply of it was more or less fixed when the earth took its shape. The basic law of supply and demand still holds. As a greater series of calls on this fixed land supply are made, the more precious the resource becomes. Land then, is limited in quantity. When I started thinking about a subject to discuss with you the thought that I had, as a forester, was to treat the subject of Michigan's forests and minerals as twin crops. Essentially they are just that.

I certainly feel that most foresters would agree with Mr. Bodor and share his same views with reference to the removal of lands from private into restricted public-use. Because of limited time I'm not going into the question of seashore recreation areas in great detail. I do want to mention one Upper Peninsula area which has long been a tract of privately-owned, managed, commercial forest land. This is the Lake Superior shoreline area which includes the Pictured Rocks and which is currently being considered as a dedicated seashore recreation area.

Time will not permit me to go into the mechanics of government functioning, but it is a fact that in the past five years the General Services Administration of the Federal government has been selling large areas of shoreline frontage on Lake Superior. I understand the light house and fog signal station at Big Bay Point in Marquette County is now being sold. During this very same period the United States National Park Service has asked for control of greatly increased areas for shoreline recreation as in the present instance along Lake Superior. I do not wish to elaborate on these facts but I do want to make the point clear that there is a great gap in the continuity of the Federal land management program for this type of recreation resources. Personal knowledge of a number of these exceptionally fine shoreline vistas causes me to raise a keen-edge question as to the prudence of selling these lands by one agency while, at the same moment, another agency develops its plans to buy shoreline areas from private ownership.

What I do want to do is to spend a few moments trying to illustrate how we may permit -- yes, even encourage -- our industrial mineral and forest lands to be utilized more fully in a multiple-use concept. The Upper Peninsula has about 10½ million acres in it and it is predominantly commercial forest land. Over four million acres are in public ownership -- about 43 percent of the Upper Peninsula. These public lands provide

a tremendous variety of still undeveloped recreation sites -- sparkling inland lakes, countless miles of chill-water trout streams, forest-game areas for hunting, trapping, hiking, camping. But the significant fact is that Michigan's large private industrial, mineral and forest properties also provide these facilities in like measure and amount. Indeed, the people of Michigan use these private lands extensively for recreation purposes. The primary difference, however, lies in the fact that the industrial forest land owner dare not seek public acclaim or credit for this use.

The large mining companies are industrial forest land-owners of the Upper Peninsula and have long recognized the needs of the people in the Upper Midwest -- Detroit, Lansing, Grand Rapids, Chicago, Milwaukee -- for recreation lands. Yet my claim is -- and I'm sure this is justified -- that their hands are literally tied for making it possible to invite the public to use these forests in accordance with the broad principles of multiple-use. One of the shortcomings of our present day democracy is that the industrial forest landowner becomes the target for liability wherever company lands may be involved.

The question has been asked: "What makes a company a good citizen?" Well, I'm sure one of the things that makes a company a good citizen is the manner in which it looks ahead to plan for all. Upper Michigan's mining company lands are, for the most part, available to the public for recreation. They have always been. People in the Upper Peninsula have always used these lands, almost without restriction, for hunting, trapping, fishing, agate picking, hiking and camping. But the company could never take credit for this cost-free facility -- to do so under present laws would invite potential legal action for every "accident" that may occur to the recreationist.

I am unable to speak firmly, of course, for each of these companies: Calumet and Hecla, Copper Range, M. A. Hanna, Cleveland-Cliffs, and all the others with mineral land ownership alone, representing 1,200,000 acres of timberland -- but I feel confident that each one of them would embrace a stronger recreation-use program for their lands. First, however, the State of Michigan must adopt legislation protecting the company against certain kinds of liability claims related to this type use of their land. Without some realistic legislative move to shield these companies from the more ridiculous type of liability charges, they cannot wisely subscribe their timberlands to be used by the increasing population of our upper Great Lakes region.

Here, then, in the very few moments at hand, is one thing I would like to propose. It is American tradition that people work together to solve a common community problem. I wouldn't suggest that legislators hasten into this theme and design

"any old law" that might accomplish the end. The printed act should have the approval stamp of Michigan's industrial foresters and of its mining companies.

The State of Maine has a recreation land liability law. A law passed earlier this year in Minnesota was, in the eyes of most industrial foresters, an improvement over the Maine act. Somewhere in the midst of our conservation-minded group, we can develop legislation that will allow the large industrial forest and mineral landowner to invite the public onto their lands, and thereby gain millions of acres of multiple-use forest lands for this pressing population which we are all glad to have with us.

SUGGITT - You have indicated that even though we may have conflicting and competing interests and values, we also have some common grounds. I mentioned at the outset that we didn't have any prepared speeches. You may be questioning that. We did not know until we had lunch together which one of about 20 questions we were going to point to. If what you have heard so far sounds like prepared speeches, they've got a lot more in their pockets. To show you that we are not a stereotyped and rigged panel with all the ducks lined up in order, I'm going to ask Mr. Bodor to comment -- he doesn't know I'm going to ask him, either -- on the concept that Dr. Hesterberg just advanced. We've heard from the college professor from Houghton Tech, now let's hear from a company representative.

BODOR - May I take the liberty of commenting on Father Cappo's remarks first. I was very impressed with his argument that natural gas, among other things, would be an important factor in promoting the Upper Peninsula economy. I'd go a step further. There were remarks about the complexity of the geology of the Upper Peninsula and the difficulty of getting out a mineral product which will meet foreign competition. Let me inject that last year it was possible to buy Chilean and Peruvian ores delivered to our steel mill at the Rouge for the same price as Upper Peninsula ores.

Now, this pelletized iron ore which is such a wonderful product -- and I think it is superior to any imported ore -- is very difficult to produce. It takes tremendous capital -- about 30 to 40 dollars per annual ton. In other words, if you are building a 2,000,000 ton operation, you have to put down 60 to 80 million dollars at the start. Now, the margin is not very rich. Therefore, to get water -- which might get into conflicting interests -- to get power, to get gas are all most important. Across the border, the Canadians literally throw these things at you for a price that is ridiculous in comparison with the costs encountered in Michigan. Michigan has limited hydropower

resources that are fairly well developed. There is not much left. To produce a ton of pellets would take about 100 kilowatt hours. In Michigan, that would cost \$1.50 per ton. Pellets are a ten dollar product -- worth about that much at the mine. In Canada, the needed electricity is 50 cents. A dollar difference might determine whether or not a mining enterprise will be ventured.

Regarding the problem of recreation on forest land, Ford Motor Company, too, has substantial forest interests in northern Michigan. These are always wide open to anybody -- hunters, picnickers. We never discourage such, or have posted a single acre. We, too, are quite disturbed about this liability angle, and I think it's an excellent idea to suggest that some move be made so that the landowner or the forest owner would be relieved of responsibility. There are lakes and abandoned mines that are excellent for picnics, swimming, fishing, but the owners dread to admit people because of liability.

SUGGITT - Dr. Cain, would you like to react here?

CAIN - As long as this matter has been opened, let me reinforce what Mr. Bodor just said. Some recent studies showed that the large property holdings of mining, lumber, and pulp companies in the United States have been and are now about 93 percent open to the public for hunting, camping, and some other kinds of recreation. The liability problem confronts the companies and there are also questions of development policies and regulation costs -- all these things that go with extensive public use. These large companies have traditionally given a very great service to the public.

Gordon Bonfield has been working on a national committee to see what some of the solutions of this problem are. There seems to be two or three on the horizon. One of the things that was worked out in the state of New Hampshire was the sale to the state of recreation rights, the companies retaining mineral and timber rights. The agreement of the sale includes clauses about recreational development and the manner in which the forest would be managed. Another system that's being worked out in Florida is long-term lease by the state of recreation rights that do not interfere with the further carrying on of forest practice. A third tool that can be used is that conservation easement which "freezes" present usage. All of these things suggest -- and I'm merely reinforcing what Dr. Hesterberg and Mr. Bodor have said -- that there are ways out that are satisfactory to private landowners and to the public interest in recreation.

Now in Michigan many of us are very much excited over three talked-about national recreational areas, two of which, the Sleeping Bear and the Pictured Rocks, have been presented in Congress as bills. In one case, commercial forest lands are not particularly important, but in the Pictured Rocks area, a majority of the land is now commercial forest. I would suggest that in this connection we're not talking now about national parks, so let's not confuse the policy for administration of parks with the new concept of national recreation areas. The policy for recreation areas is not fixed, and it's entirely possible to work out an arrangement whereby the forest industries, and even the mineral industries, can live with the recreation concept.

Let's don't get mad until we see what we've really got to get mad about. There'll be a hearing in Michigan on the 13th of November on the Sleeping Bear Dunes. Go to the hearing, and see that your point of view is represented. The bills have been introduced, but the history of all bills is that they get modified before they get passed. I would not speak for a change in philosophy about national parks or wilderness areas, but I'm suggesting that the recreation area idea is something that is yet to be fixed and there's still time to work out reasonable multiple-use operations on such areas.

SUGGITT - This is an appropriate time to ask Dr. Tack to react to this same concept and at the same time to lead him into a question he submitted. He wants to know, or he's going to tell us, or maybe he's going to ask you, "What steps should be taken to identify the possible uses for a given area or a given resource, to insure consideration, during planning, of uses which may not be sponsored by selfish interest groups?"

TACK - Up until today I've been a very firm believer in private enterprise accomplishing things. After the weeping that I've heard today, I think that I'll rush down and sell all my stocks. I think that the answer to many of our problems still may be in the realm of private enterprise.

I'd like to react to Dr. Hesterberg's proposal in a little different way. I have heard a good deal recently of the needs of parks in Michigan -- and with this I agree -- but I can't see, in view of the oncoming wave of population, any possibility that our public ownership can supply all of the individual recreational needs of the people coming along, who will in all probability have much greater demands for recreation than anything we have yet seen. Therefore, I would like to suggest that we consider leasing private lands to organized

groups, to the public agencies, or to relatively small groups of individuals for recreational purposes of one sort or another. A recent trip in the East showed me clearly that this is in the offing. It has the merit of stimulating production of some additional income from farm land or privately-owned land. It might also encourage the owners to do something by way of management to enhance its value for recreation.

Now, for a few comments regarding the question Dr. Suggitt posed. Being a naive sort of individual, I supposed that when I got this plea for questions, this was one that I might get answered. I certainly can't answer it, because I asked it with the idea of getting an answer. But I'd like to tell you what I have in mind in asking it. I have a lot of confidence in Dr. Cain answering it, but he's the anchor man on this panel and may have some points of his own that he wants to make, so I'm going to launch into a very controversial area here and hope to get some sparks flying from the floor.

I had in mind in asking this question -- again in view of the oncoming wave of population -- that we're cast in a framework of some 30 years in conservation. I think that we have rested on our oars after having some initial accomplishments of note, and that the parade has passed us by. Right now, as of today, we're confronted with the need to erect leadership, or in lieu of leadership, a rallying point or a spokesman for this great area of multiple use and recreation, in such a way that all of these proposals, whether they're sponsored by a particular selfish interest group, such as the Wilderness Society, or the mining interests, might take into account the public interest in these problems. I have in mind here, withdrawing a few million acres of land for wilderness area, may be cast pretty much in the same light as withdrawing it for mineral use, by those not on one side or the other. Maybe wilderness people have something on their side also that ought to be considered.

I think even more, that the great nameless public has a big stake here that seems to be falling between the chairs for lack of an effort to identify this particular thing. I think we need, at this time, to think actively in terms of establishing some vigorous, bold, even tough, leadership, in this area of multiple use in order that we may consider all of these aspects and perhaps ask any one selfish interest group -- I don't like this term, but it is descriptive -- to back off a little from their excessive or extreme demands in the interest of the general public good. This is what I had in mind when I asked this question. I haven't answered the question. I don't know what the answer is.

SUGGITT - Dr. Tack said he wanted to get a few plugs in, because Dr. Cain is the last man in the line-up, but I want to

assure Cain that we're going to give the rest of the panel an opportunity for a rebuttal.

CAIN - I told your chairman I did have a brief prepared statement. Before I get into it, I want to point out one thing that has been stimulated in part by what has gone on before. This morning the discussion was from the point of view of the mineral industry -- quite properly since our central theme has to do with copper and iron. Then Father Cappo comes in with some remarks to suggest that there's another industry, the power industry that doesn't see eye to eye with Michigan's mineral industry. We could go down the line with a series of industries and find that one of the reasons that public regulations have been growing is that only some larger power than the interests of one industry, such as the government, seems to be able to resolve some of the conflicting interests of specific industries whose goals are not identical. Finally, over all of this, somebody has to look after the public interest, as distinct from the private interests. This isn't an argument against private enterprise, or the role that industries of various kinds play in the development of the country. It's just saying that they cannot completely solve their own problems, much less the total series of problems involved in the use of natural resources. It reminds me of the statement made about John D. Rockefeller. "He never broke the law in his development of oil and mineral industries, but he sure did cause a lot of laws to be passed."

Now the reason I came with a little speech was that in the title of this panel's subject, "multiple use and conflicting interests," there is perhaps an implication that in the concept of multiple use, we find an automatic resolution of conflicting interests. So I'm addressing myself to a definition of the meaning of multiple use. Multiple use has become an important catch word among conservationists. It is used by resource-use planners, by industries, by government agencies, and by individuals and groups which may have a single use in mind -- the use that is important to them. I believe that the multiple-use slogan, in some instances, has backfired on the conservationists. Let me be specific. If we think back on the Porcupine Mountains State Park mining issue of about three years ago -- as well as current interests in the development of the Porcupine Mountains State Park -- we will find that these interests used the multiple-use slogan as a justification for mining in the park, for cutting the virgin and over-aged timber, for extending the road system, and so on. Such developments would certainly increase the uses to which the collective resources of this park would be put. When persons with a vested interest add their special use to those of other interests under the umbrella of multiple use, it seems to me that many times it is implicit in their arguments that multiple use means any use is justified. Furthermore, one has reason to suspect

that some would go so far as to say any use, anywhere, anytime. This is the trap that the multiple use slogan has gotten some conservationists into, so I wish to attempt to clarify the multiple use concept, or at least to make an exposition of how I understand it.

The multiple use concept is really applicable to a tract of land of sufficient size to carry with it a variety of natural resources and, as a consequence, an array of potential resource uses. Some resources are simple and amenable to a single use. In one sense, this is true of an ore body. It can be mined and removed from its geological site. There are only two alternatives here. One is to mine and the other is not to mine. There are other resources that have more possibilities. Still speaking of mining, obviously this activity must go on where the ore body is, but a lot of other uses of land can go on in a great variety of places, e.g., hiking, camping, hunting and so on. Mining has to be where minerals are. Forests can be used in a variety of ways simultaneously. Water in a stream can be used for fishing, swimming, boating, domestic and industrial water supply, irrigation, waste disposal, hydropower development, and aesthetic enjoyment. Land, as space, is a complicated resource in contrast to an ore body. It can be kept natural for all the compatible uses of wild land, or it can be used for recreational developments, for residential and industrial building sites, for forestry, or as a city dump.

These remarks suggest two facts. Some uses of natural resources are compatible and can be concurrent in time and co-existent in space, whereas other uses are incompatible. In the latter case, the development of one use, either deteriorates or eliminates other possible uses. An example of the former case is found in the multiple use of managed forests for wood products, watershed protection, many forms of recreation, and even mining. Another case is the management of water for a variety of compatible uses. But it's equally true that a stream can't produce fish and provide aesthetic enjoyment, if it's strongly polluted. A white water stream can no longer provide its peculiar features and uses when it's dammed and turned into a slackwater pool. The problem of multiple use of an area and its natural resources seems to be that of separating incompatible uses either in space or in time by some plan for the use of the total resources. The decisions involved in multiple use planning have to do with that separation. Since a particular piece of land may be useable in several different ways, and since some possible uses may be conflicting, it becomes necessary to make decisions as to which uses shall take precedence over other uses. The planner, the land manager, the owner of large property must establish a hierarchy of potential resource uses that applies to a particular piece of land. He must say that at this point in space, one use will prevail or a group of compatible uses will prevail, and he's forced to decide

whether a certain use will not be allowed among the possible uses. In one situation, mining may head the top of the list of all possible uses. In another situation, mining may find itself so far down the list that it is excluded from the uses which will be allowed.

Since the interest of our panel discussion is focused on conflicting interest in mineral resource development in the frame of reference to multiple use, I'll return to Michigan's celebrated case of the proposal to mine for copper ore in the Porcupine Mountains State Park. Had the mining development been approved by the Conservation Commission, it certainly would have multiplied the resource uses of the park. But such an action in this case would have been contrary to the multiple use concept as I have just outlined it, being a concept of decisions as to where, when, and what will take place. The decision of the State, in this case, was clearly based on the fact that mining and wilderness are incompatible uses of this same land. Mining didn't have a sufficiently high priority. There seem to be two principle reasons for giving wilderness priority, in this case, over mining. First, the central part of the park, referred to as the legislative area, was established and purchased by a special act of the Legislature with a clear intent in the act that this would be a wilderness reserve. Second, in the state of Michigan, wilderness is the rarest of the state's natural resources, and it was deemed in this case to have more value than the mine seemed to offer under the conditions that existed at the time. Well, it isn't my intentions to argue the entire Porcupine Mountains case. I merely brought it up as an illustration of what the concept of multiple use is, and the fact that it can resolve conflicting interests. It can't resolve all conflicting interests, only some of them.

SUGGITT - Now, there is an opportunity to hear from anyone who would like further clarification, or would like to argue or make a point that has been missed in this discussion of multiple use.

JUSTIN LEONARD, Michigan Conservation Department - I have the feeling that there may exist some need for definition of what is actually meant by wilderness. Professor Cain's closing remarks about wilderness being one of the scarcest resources we have in Michigan, I think it might be helpful if he would go a little more into detail defining what wilderness is. I've heard that to many people, wilderness consists of any area not under significant development.

CAIN - When I came home this summer after being away for several weeks, and it had been raining a lot, my yard was a

wilderness. The word is lacking in concrete meaning. Yet there have been real efforts to place a specific meaning. I believe that the Forest Service's use of the term in classification of land under their jurisdiction is that a wilderness area has to be as big as 100,000 acres. They have other categories with different names. In the state of Michigan, we've got a Wilderness Park, by name, and it's pretty wild, but there's no virgin land there, that is, no forest land that hasn't been lumbered over in the past. Even the legislative area of the Porcupine Mountains, the undeveloped heart of the state park, isn't all a truly virgin area. So the wilderness concept doesn't completely apply to that. I think what people usually have in mind is, whatever the past use may be, a very definite restriction on present use. This usually goes to the point of excluding commercial development of any resource in the wilderness area. In other words, you simply let nature take its course and thereafter you call it a wilderness.

KENNETH DAVIS, University of Michigan - I have a suggestion that may have some bearing on the multiple use wilderness business. As you know, man is probably one of the most adaptable creatures on the face of the earth. In all this business of looking forward to changing patterns, I think there's one thing in which public agencies have considerable responsibilities for leadership, and that is in a certain degree of purposeful changing and developing public images that exist about wilderness, and a lot of other things. We often assume what the public wants and that is what we pander to. I think that you get into this business in the management of forests. A lot of public images probably can and should be changed. In this idea of purposeful change and direction of public images, conceptions, prejudices, and so forth, I think there is an underlying principle. Things will have to change in the future. No question about it. Many of these ideas of what constitutes wilderness, outdoor recreation, satisfying experiences, and compatible uses, will have to undergo modification. It won't come about automatically. I think it will come about through some purposeful leadership.

HEREFORD GARLAND, Michigan Tech. - As long as we could use a definition of wilderness, I might throw mine in. It might be colored because I'm living in the far north. My definition is that it is a place where you can get lost in the woods. We have plenty of this in the Upper Peninsula. I might say that whoever owns it and whatever government agency does about it, we'll have a lot of space.

SUGGITT - According to your definition, Mr. Garland, any large size bureaucracy, public or private, would qualify as a wilderness.

WILLIAM VEESER, Houghton-Hancock Chamber of Commerce - Dr. Cain made reference to the fact that with the proposed development of two areas in the Upper Peninsula, the Pictured Rocks and Huron Mountains, that the rules in connection with the use of timber and minerals would be somewhat different than they would be with our national parks, that something could be worked out. Would you say that this assurance for a plan would be developed prior to the dedication of these areas?

CAIN - Right now the National Parks Service, in consideration of the canyon lands in southeastern Utah where there's been study of a possible new national park, is accepting an area with mining in it, and in which mining will continue. Now, the park, from the point of view of some of the advisory board members, is the holy of holys in public land, so this is going pretty far. In other words, in some cases they will accept adverse uses in order to get potentially valuable national park land.

What you understood me to say was true insofar as I can describe this situation. The proposed seashores and other national recreation areas have yet to get a firm policy established. Senator Hart particularly has an open mind on a great many of these questions. For example, when these areas go out into the Great Lakes or the ocean, commercial fishing in the inshore waters is not precluded. Not only is fishing allowed, as it is in national parks, but hunting is to be allowed in some national recreation areas. In the proposed Sleeping Bear area, for example, residential use can continue in perpetuity as long as it remains as residential use, but it can't be changed over to a commercial use. So then we come to a question about lumbering. This is not an important matter in the Sleeping Bear region because there's little commercial forest in that particular area. It is an extremely important question in the Pictured Rocks region, and there's already good straws in the wind to indicate that it's very likely a large portion of that may be within the boundary of such a national recreation area and may still be used as a managed forest for logs and pulp.

The policy for what can go on is not firm or set. It can be set now, as these bills get modified in Congress. I can see tremendous economic advantages to the Upper Peninsula in continuing forestry in the Pictured Rocks region. You can see the advantages to the game management because a lot more game can be produced on a managed forest than on an unmanaged forest.

I personally would only plead for a natural vegetation screen -- I don't say what the width is -- around the Lake Superior shore, around the major inland lakes, and along the important rivers. This may leave 80 percent of the land that could be used for forestry. Furthermore, I don't see why, in a recreation area, you can't have mining where it is a demonstrably important matter. Obviously, I'm not the National Park Service, and I'm not Senator Hart, and I'm certainly not Congress. But I'm trying to describe what I think is the climate in which a reasonable multiple use program can be worked out now.

VEESER - I'll ask one more question. Do you know if industry will be called in to evolve that plan and to participate?

CAIN - There has been no hearing as yet on either of these bills. There was a meeting at Glen Arbor on the Sleeping Bear. The first hearing will be held by the Senate Internal Affairs subcommittee on Public Lands and Senator Moss of Utah will be chairman of that meeting. It will be held in Traverse City on the 13th of November and I understand that half of the hearing will be devoted to people for, and half the hearing to people against, the bill. Now, the people who are against it will undoubtedly select those who will speak for them. Ove Jensen leads the group which is organized to fight this national recreation area. I suspect that those who will speak from the public point of view will probably be more or less selected by Senator Hart and his office and other people that are for the bill. I understand the way these hearings go traditionally is that you don't simply get to speak because you want to say something from the audience. I think you have to get on the slate and be allotted time. I don't know how that works. But I do know that Senator Moss is to allow equal time for the two sides of this question. This is an official senate hearing and the results will be published in the usual way. Documents which are introduced into the record will be published. The normal procedure, when somebody wants to make a point is to introduce into the record a clinching document which he summarized in some kind of speech at the hearing.

ARTHUR ELMER, Parks Division, Michigan Department of Conservation - It might be well to point out that some of these concepts have already been satisfactorily worked out at Cape Hatteras and at Cape Cod, that are now nationally accepted seashore recreation areas and the people of North Carolina and Massachusetts are perfectly satisfied with them.

JOSEPH WILBUR, Michigan State Highway Department - At the risk of expanding the purpose of this panel, I'd like to ask this question: Are the problems of multiple use of land in the southern more heavily populated part of the state, the same as they are in the northern part?

SUGGITT - The basic principles certainly obtain and I think Dr. Cain's remarks point to the kinds of principles that must be considered whether we're talking about a southern Michigan lake or township, or a northern Michigan sparsely populated area. I would hesitate to comment any further than that, except to say that when you get down to the fundamentals, the solutions can be resolved in either case. The problems are just as intense.

HESTERBERG - In any discussion of minerals and forests one should stress the relative international significance of the commercial forest lands of our nation. Earlier this morning, very good evidence was presented on the significance of our mineral wealth and resources as they relate in an international vein. Last fall, I was a delegate to the Fifth World Congress of Forestry, and while in Seattle, I had an opportunity to browse through some foreign literature. I came upon a Russian text which gave some rather concise and interesting information that puts our commercial forest lands in a light which should not be confused as we approach recreational needs for these same lands. The total forest area under Russian control is 1,131 million hectares - one hectare is roughly 2.47 acres. This will give you some concept of the relative size of their forests. They embrace about 27 percent of the world's forest resources, certainly not an impressive volume. It represents 32 percent of the world's commercial forest land area. The total stock of wood is measured as about 80 million cubic meters, which represents only 31 percent of the world's total timber resource. But, there is a hidden value behind this figure which I think every conservationist should thoroughly understand.

Most of our valuable woods -- though they may not be valued as a prima donna by price, as for example, yellow birch -- are related to whether they are a softwood or a hardwood. Hardwoods are used to make fine furniture, flooring, bowling pins, and myriads of such diverse products. Softwoods are the raw materials for construction -- the materials for homes, framing, cement forms and the working wood for building an empire. Although the figures are not astounding proportionate to any of the other resources of the world, the coniferous, or softwood, forests under Russian control amount to about 78 percent of the forests of the world! These stands constitute 62 percent of the world's supply of softwoods.

These are data which I feel have keen significance to those of us interested in managing our nation's resources. We must be conscious of such facts as we consider withdrawing large areas of private commercial forest lands for restricted recreational uses. Managing our lands for tomorrow's timber is not at all inconsistent with producing needed areas for recreation, or wildlife, or watershed protection.

SUGGITT - That is a fitting note upon which to close. The suggestion has been made that we look at the mineral resource picture in state-wide, region-wide, or broader, prospective. The problems that were discussed here are of vital interest to everyone in the state of Michigan, and a great many people outside the state.

It has been indicated this afternoon that, as we anticipate continuing population growth and pressure, and continuing cold war situations, new priorities and new systems of management and ownership are going to have to be instituted. It seems to me that all the members of the discussion panels and the principle speakers have made a contribution to this end.

I was interested in the fact that many of the problems that seem to be enunciated relative to Michigan's mineral industry, also apply to just about every other line of economic activity; problems of taxes and labor, labor rates, labor productivity, inadequate capital or the difficulty of prying the capital loose, transportation costs, and the realm of inter-regional and international competition.

Part of this business of perspective is to consider the resource base of the state of Michigan as a whole. The Upper Peninsula, with about 30 percent of the state's surface area, has less than 4 percent of its population. Something under 300,000 people live in the Upper Peninsula of Michigan. There are five counties in southern Michigan, each of which has more population than the entire Upper Peninsula combined. This comment is not in way of disparagement, but rather the basis for state-wide perspective. It's interesting that Wayne County alone -- and I was interested in Father Capps's comparison of what has happened over the past 37 years in the relative growth of taxable property in Houghton County as compared to Wayne -- has nine times the population of the entire Upper Peninsula. Oakland County has 2½ times the population of the Upper Peninsula, Macomb 1½ times.

In considering the future of resource use and resource development here in the state of Michigan, some of these things become relevant. They call for different priorities upon resources than we have had in the past. I'm intrigued by the fact that in the past 20 years, Michigan as a whole has gained about

2½ million people and during the same 20-year period, the Upper Peninsula has lost 22,170 people.

As we look ahead another 10 or 20 years to the continuing growth of population in lower Michigan and in the general market region south of Michigan, and the continuing cold war and necessity for national survival, we have some very interesting and challenging problems. I think that the Michigan Natural Resources Council can make a real contribution.

HILL - I'm sure that the purpose of the Natural Resources Council has been carried out today. We take no official action. We pass no resolution and "we don't do any lobbying," but if we can push back the horizon of understanding a little bit, that's our aim. I'm sure that those of us who participated today certainly had some of our horizons of understanding extended. We have gained a great deal of additional information about some resources with which we ordinarily do not come in contact. We sincerely appreciate the part taken by the folks who appeared on the program. Also, I want to assure Walfrid Been, Robert Kelley, and Bennett Sandefur, as the architects of this program, that we are very pleased with what they came up with. In behalf of the executive committee, I want to thank our audience for coming. This meeting is successful only to the extent that you participate in it, and we are very pleased with today's turnout and participation. The conference stands adjourned.



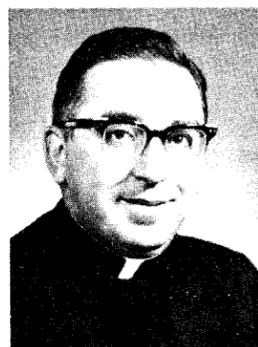
Frank Suggitt



R. L. Bodor



Peter Tack



Fr. L. C. Cappelletti



S. A. Cain



G. A. Hesterberg

(Recapitulation according to group affiliation follows list of names)

Aase, James H.	Chicago & North Western Railway, Chicago
Ash, A. D.	U. S. Geological Survey, Lansing
Baker, Arthur A.	U. S. Geological Survey, Washington, D. C.
Ball, Robert C.	MSU (Fish & Wildlife), East Lansing
Barlowe, Raleigh	MSU (Resource Development), East Lansing
Been, Walfrid	Mich. College of Mining & Tech., Houghton
Belcher, Robert O.	Eastern Michigan Univ. (Biology), Ypsilanti
Berg, Herb	MSU (Cooperative Ext. Service), East Lansing
Billings, Norman	Water Resources Commission, Lansing
Blank, Uel	MSU (Cooperative Ext. Serv.), Marquette
Bodor, Robert L.	Ford Motor Co., Dearborn
Bourquin, Jessie	Mich. Economic Development Dept., Lansing
Boyd, James	Copper Range Co., Boston, Mass.
Brake, W. J.	Mich. State Grange, Lansing
Brewer, Richard	Western Michigan Univ., Kalamazoo
Briggs, Maxine C.	Federated Garden Clubs of Michigan, Jackson
Brigham, E. M.	Kingman Museum, Battle Creek
Brueckheimer, Wm. R.	Western Michigan Univ., (Geography), Kalamazoo
Burroughs, R. D.	Mich. Dept. of Conservation (Educ.), Lansing
Burt, W. H.	U of M, Ann Arbor
Busby, Howard R.	Bestwall Gypsum Co., Grand Rapids
Butler, Joseph H.	Mich. College of Mining & Tech., Houghton
Cain, Stanley A.	U of M (Conservation), Ann Arbor
Callahan, William C.	Mich. State Chamber of Commerce, Lansing
Cappo, Rev. Louis C.	Diocese of Marquette, Marquette
Champion, Beverly L.	Mich. Basin Geological Soc., Lansing
Clark, O. H.	Mich. Dept. of Conservation (Fish), Lansing
Colburn, Wm. H.	Mich. Dept. of Conservation (Lands), Lansing
Conlin, Rollo	State House of Rep., Chm., Taxation Comm., Tipton
Cook, Ray L.	MSU (Soil Science), East Lansing
Cooper, Gerald P.	Mich. Dept. of Conservation (Fish), Ann Arbor
Daoust, W. L.	Mich. Dept. of Conservation (Geology), Lansing
Davis, Kenneth P.	U of M (Forestry), Ann Arbor
Daw, T. E.	Mich. Dept. of Conservation (Forestry), Lansing
Dayton, Laurence	Mich. Dept. of Conservation (Game), Lansing
DeCousser, Kurt	Oil & Gas Association of Michigan, Lansing
Dersnah, William R.	Dundee Cement Co., Dundee
Deutsch, Morris	U. S. Geological Survey, Lansing
Eddy, Gerald E.	Mich. Dept. of Conservation, Lansing
Ellis, John W.	U. S. Fish & Wildlife Service, Saginaw
Elmer, Arthur C.	Mich. Dept. of Conservation (Parks), Lansing
Ensign, Chester O., Jr.	Copper Range Co., White Pine
Erlandsen, Einar E.	State House of Representatives, Escanaba

Fauber, E. M.
Ferguson, H. W.
Folks, James N.
Foster, Richard G.
Furlong, Robert

Garland, Hereford
Gehrig, D. E.
George, Robert W.
Goulette, James
Granger, Dale W.
Grosh, Wesley
Guillaume, H. B.
Gustavson, Samuel A.

Halliwill, Gleason E.
Hanes, H. J.
Hannahs, Lyle W.
Harris, Charles D.
Harrison, Winfield
Hautau, Gordon
Hesterberg, Gene A.
Hill, Russell G.
Hood, John R.

Jacobetti, Dominic
Jenkins, David H.
Johnson, L. David
Jorgensen, Richard

Kelley, Robert W.
Kelly, William C.
Kimball, William J.
Kirkby, Edward
Kitchen, Margaret
Kluender, W. A.
Kooistra, George J.

LaCrosse, William
Laidlaw, David O.
Lentz, Ward J.
Leonard, Justin W.
Lindquist, Carl
Little, Gene

MacDonald, Robert
MacMullan, R. A.
McFadden, James T.
McKee, Russell P.
Mancuso, Joseph J.
Marks, W. D.
Millar, Charles E.

Sinclair Research, Whiting, Indiana
Mich. Limestone Div., U. S. Steel, Detroit
State House of Representatives, Horton
Mich. Dept. of Conservation (Eng.), Lansing
Mich. Tourist Council, Lansing

Mich. College of Mining & Tech., Houghton
Mich. Limestone Div., U. S. Steel, Detroit
MSU (Fish and Wildlife), East Lansing
Iron Mountain
Water Resources Commission, Lansing
U. S. Bureau of Mines, Minneapolis, Minnesota
Mich. Dept. of Conservation (Parks), Lansing
U. S. Bureau of Mines, Minneapolis, Minnesota

Michigan Farm Bureau, Gladwin
Mich. Dept. of Conservation (Eng.), Lansing
MSU (Resource Development), East Lansing
Mich. Dept. of Conservation (Parks), Lansing
MSU (Soil Conservation), East Lansing
Mich. Dept. of Conservation (Geology), Lansing
Mich. College of Mining & Tech., Houghton
State Soil Conservation Committee, East Lansing
Mich. Dept. of Conservation (Educ.), Roscommon

State House of Representatives, Negaunee
Mich. Dept. of Conservation (Game), Lansing
Mich. Dept. of Conservation (Geology), Lansing
MSU (Forest Products), East Lansing

Mich. Dept. of Conservation (Geology), Lansing
U of M (Geology and Mineralogy), Ann Arbor
MSU (Resource Development), East Lansing
Mich. Dept. of Conservation (Geology), Lansing
Mich. Basin Geological Society, Toledo, Ohio
Chicago & North Western Railway, Chicago
Mich. Tourist Council, Lansing

WJIM-TV, Lansing
Huron-Clinton Metro. Authority, Detroit
Mich. Dept. of Conservation (Eng.), Lansing
Mich. Dept. of Conservation, Lansing
Iron County Taxpayers Association, Iron River
Mich. United Conservation Clubs, Lansing

WILX-TV, Lansing
Mich. Dept. of Conservation (Game), Lansing
Mich. Dept. of Conservation (Fish), Ann Arbor
Mich. Dept. of Conservation (Education), Lansing
State University, Bowling Green, Ohio
Water Resources Commission, Lansing
Mich. Dept. of Conservation (Lands), Lansing

Miller, James
Mozola, Andrew J.
Myers, Stewart

Nicholls, W. P.
Nygren, Harold C.

O'Hara, Norbert

Palmer, Walter L.
Pardee, F. G.
Patterson, Russell
Pawling, John W.
Pehrson, E. W.
Petersen, R. W.
Pinaire, Robert K.
Powell, James
Prentice, Clarence E.

Quackenbush, S. R.

Raber, Merle D.
Reid, Leslie M.
Renner, Hack
Richards, Don J.
Rouman, James L.
Rulison, John G.

Sandefur, B. T.
Schmaltz, Lloyd
Schneider, Paul
Schwartz, Jack
Sharpe, Grant W.
Slaughter, Arthur
Sterling, William
Stevens, T. D.
Suggitt, Frank W.
Sundeen, Stanley W.
Svendsen, Walter
Swan, Ralph F.

Tack, Peter I.
Trow, James
Tubbs, F. F.
Turk, L. M.
Turneure, F. S.
Twardzik, Louis

Van Aken, Herbert
Van Buskirk, Paul
Van Pelt, J. R.
Veaser, William
Vogel, Robert S.

Detroit Regional Planning Comm., Detroit
Wayne State University (Geology), Detroit
Mich. United Conservation Clubs, Grand Rapids

Copper Range Co., White Pine
U. S. Forest Service, Escanaba

Eastern Michigan University, Ypsilanti

Mich. Dept. of Conservation (Game), Lansing
Consultant, Crystal Falls
Mich. Dept. of Conservation (Educ.), Lansing
Western Michigan University, Kalamazoo
Minerals Economist, Washington, D. C.
Mich. Soil Conserv. Districts, Inc., Lakeview
Sun Oil Co., Mt. Pleasant
United Steelworkers of America, Negaunee
Mich. Farm Bureau, Lansing

Mich. Dept. of Agriculture, Lansing

Soil Conservation Society, Stanton
MSU (Resource Development), East Lansing
No address given
Mich. Dept. of Conservation (Educ.), Lansing
Mich. United Conservation Clubs, Lansing
Mich. Dept. of Conservation (Geology), Lansing

MSU (Geology), East Lansing
Western Michigan Univ. (Geology), Kalamazoo
MSU (Resource Development), East Lansing
Chamber of Commerce, Escanaba
U of M (Parks & Recreation), Ann Arbor
Mich. Dept. of Conservation (Geology), Escanaba
State House of Representatives, Monroe
MSU (Forestry), East Lansing
Consultant, East Lansing
Cleveland-Cliffs Iron Co., Ishpeming
Odgers Drilling Inc., Iron River
Mich. Economic Development Dept., Lansing

MSU (Fish & Wildlife), East Lansing
MSU (Geology), East Lansing
Mich. Dept. of Conservation (Educ.), Lansing
MSU (Agricultural Exper. Sta.), East Lansing
U of M (Geology), Ann Arbor
MSU (Resource Development), East Lansing

Michigan Agriculture Conference, Eaton Rapids
Huron-Clinton Metro. Authority, Detroit
Mich. College of Mining & Tech., Houghton
Upper Peninsula Power Co. and Houghton-Hancock
Chamber of Commerce
Western Michigan University, Kalamazoo

Walker, Gaylord	Mich. Dept. of Conservation, Lansing
Walmsley, Thomas P.	MSU, East Lansing
Warda, E. B.	Sinclair Refining Co., Whiting, Indiana
Wilbur, Joseph E.	Mich. State Highway Dept., Lansing
Zimmer, Paul W.	M. A. Hanna Co., Iron River
Zinn, Justin	MSU (Geology), East Lansing

RECAPITULATION ACCORDING TO GROUP AFFILIATION

STATE AGENCIES (41)		MICHIGAN LEGISLATURE (5)	
Conservation	31	OTHER INDUSTRIES (5)	
Water Resources	3	Chicago & N.W. Railway	2
Economic Development	2	Ford Motor	1
Tourist	2	Odgers Drilling	1
Agriculture	1	Upper Peninsula Power	1
Highway	1	OTHER AGENCIES (3)	
Soil Conservation	1	Huron-Clinton Metro. Auth.	2
UNIVERSITIES (41)		Det. Regional Plan. Comm.	1
Mich. State	21	ORGANIZATIONS (16)	
Univ. of Michigan	6	MUCC	3
Mich. Coll. M. & T.	5	Mich. Farm Bureau	2
Western Mich.	5	Mich. Basin Geol. Soc.	2
Eastern Mich.	2	Escanaba C. of C.	1
Wayne State	1	Fed. Garden Clubs of Mich.	1
Bowling Green (Ohio)	1	Iron County Taxpayers Assoc.	1
MINERAL INDUSTRIES (13)		Kingman Museum	1
Copper Range	3	Mich. Agricul. Conf.	1
Michigan Limestone Div.	2	Mich. State C. of C.	1
Sinclair Refining	2	Mich. Soil Cons. Dist.	1
Cleveland-Cliffs	1	Mich. State Grange	1
M. A. Hanna	1	Soil Cons. Soc. of Amer.	1
Bestwall Gypsum	1	CONSULTANTS (3)	
Dundee Cement	1	TELEVISION (2)	
Sun Oil	1	LABOR (1)	
Oil & Gas Association	1	UNCLASSIFIED (3)	
FEDERAL AGENCIES (7)			
Geological Survey	3		
Bureau of Mines	2		
Fish & Wildlife	1		
Forest Service	1		

Report of the Secretary, October 25, 1961

Work of the Council continued its modest growth through 1961 under the able leadership of Chairman Russell Hill.

Papers of the 1960 Annual Meeting were given broad distribution, and somewhat more restricted distribution was given to the Reports of Technical Committees. Reports of state and federal legislation in progress were distributed to member organizations during the legislative session. At the suggestion of Mr. Hill, the executive committee undertook to hold a "legislative seminar" for members in early April. This new venture was designed as a means of enabling the organizations to obtain information.

The executive committee engaged the services of a communications and publicity assistant, a step contemplated by preceding executive committees. Mr. Russell McKee undertook this work (with a not overly-generous stipend attached), and in addition to other services has prepared three issues of the "Council Chronicle" for distribution to member organizations as the internal organ of the Council.

The membership rolls carry 37 organizations, agencies, educational institutions, and industries at the present time, including two or three which have not paid 1961 dues, we hope only through oversight. One member organization resigned during the year, and three or four new ones were added.

The six technical committees continue their work, and again this year have submitted reports on progress and problems in their respective fields. Interest in this committee work continues at a high level, and despite the fact that much of it must be done by correspondence, participation is good.

If there is any weak point in the structure of the Council, it may perhaps be found in lack of contact between the member representatives and the members of the executive committee. Communication is largely a one-way flow, by mail, to the representatives.

As a whole, however, the Council is in good health. There is every reason to believe that it is serving a needed function and will continue to flourish.

William H. Colburn
Secretary
October 25, 1961

MEMBERS

Of The

MICHIGAN NATURAL RESOURCES COUNCIL

Bestwall Gypsum Company
 Chicago & North Western Railway Company
 Cranbrook Institute of Science
 Detroit Metropolitan Area Regional
 Planning Commission
 Dundee Cement Company
 Eastern Michigan University
 Federated Garden Clubs of Michigan, Inc.
 Huron-Clinton Metropolitan Authority
 Kingman Museum (Battle Creek)
 Michigan Audubon Society
 Michigan Basin Geological Society
 Michigan Botanical Club
 Michigan College of Mining & Technology
 Michigan Department of Agriculture
 Michigan Department of Conservation
 Michigan Department of Economic Development
 Michigan Farm Bureau
 Michigan Forest Industries Information Committee
 Michigan Mining Association (iron ore)
 Michigan Natural Areas Council
 Michigan Parks Association
 Michigan State A.F.L.-C.I.O.
 Michigan Soil Conservation Districts, Inc.
 Michigan State Soil Conservation Committee
 Michigan State Highway Department
 Michigan State University
 Michigan Tourist Council
 Michigan United Conservation Clubs
 Michigan Water Resources Commission
 Michigan Water Well Drillers Association
 Packaging Corporation of America
 Soil Conservation Society of America,
 Michigan Chapter
 U.S. Fish and Wildlife Service
 University of Michigan
 Wayne State University
 Western Michigan University
 White Pine Copper Company
 Woman's National Farm and Garden Association,
 Michigan Division

THE MICHIGAN NATURAL RESOURCES COUNCIL

Constituted in 1956 as an outgrowth of the Michigan Natural Resources Conference that had been convened the previous year, the Council is an organization of organizations. Its purpose is to serve as a means of liaison between member organizations in fostering their common interests in Michigan's natural resources. The Council is a medium for the presentation and discussion of information and issues related to problems of resource use and management. It does not undertake to control the policies or actions of its members, nor does it lobby, or support political candidates. Six technical committees report annually: Lands, Minerals, Recreation, Water, Wildlife, and Wood.

ANNUAL CONFERENCES

- 1955 MICHIGAN NATURAL RESOURCES CONFERENCE. A meeting called to evaluate the major resource problems confronting Michigan. Supported by Michigan College of Mining & Technology, Michigan State University, The University of Michigan, and Resources for the Future, Inc., it followed the mid-century conference on the future of the nation's natural resources held in Washington, D.C., in 1954.
- 1956 1st Annual Meeting. Michigan Natural Resources Council. Topics presented: Minerals, water problems, parks, land use, and the Soil Bank.
- 1957 2nd Annual Meeting. Topics presented: Legislation, population, submerged lands, and water rights.
- 1958 3rd Annual Meeting. Water Resources.
- 1959 4th Annual Meeting. Recreation.
- 1960 *5th Annual Meeting. Relation of Timber and Game in Forest Land Management.
- 1961 *6th Annual Conference. Iron and Copper in Michigan's Economy.

*Publication available.

EXHIBITS

--Michigan Geological Survey

Production and value of Michigan minerals from 1870 to present. (Wall-size graphs.)

Large specimens of various economic rocks and minerals occurring in the Upper Peninsula.

Photo panels depicting diversified mineral operations throughout the state. (The Cleveland-Cliffs Iron Company cooperating.)

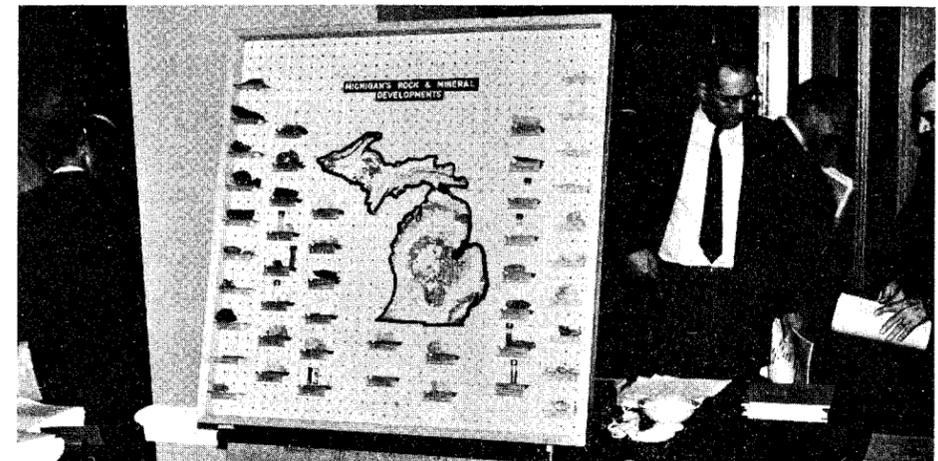
World and U.S. trends in production and consumption of metals (on placards).

Geologic map index of Michigan.

Status of bedrock geologic and topographic mapping in Michigan.

Recent literature on mineral resources. (Resources for the Future, Inc., cooperating.)

Hand-out materials, courtesy of the Cleveland-Cliffs Iron Company, American Mining Congress, Michigan Department of Conservation, and Michigan Natural Resources Council.



"MICHIGAN'S ROCK AND MINERAL DEVELOPMENTS"

A display exhibited at the 1961 Conference