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We are convinced that a direct energy conversion system, such as MHD, holds considerable promise for the development of the vast energy resources of the Northern Great Plains.

On August 22, 1968, I wrote to the President urging him to include \$10 million in the fiscal 1970 budget request to be utilized during a 4-year period for construction of a pilot plant to be in operation by 1975. I also asked that he consider Montana as the most logical site for such a plant.

On September 20, 1968, Senator METCALF and I wrote to the Secretary of the Interior Stewart Udall urging him to give serious consideration to the construction of an MHD pilot project near the vast coal fields in Montana. Secretary Udall responded and stated—

I am personally sold on the MHD research project and I agree with you that it would make sense to have such a project based in Montana. Further, the several hours I have spent inquiring into this subject have convinced me that our country must undertake a major MHD research project within the next few years.

Note, this was September 1968.

On May 8, 1969, James R. Smith, Assistant Secretary of the Interior, informed me that fiscal constraints under the fiscal year 1970 budget were not conducive to the undertaking of a new MHD pilot plant.

On May 23, 1969, I called the attention of the Senate to an article by Mr. Gene Smith entitled, "The United States Trails Soviet in Exotic Power." I pointed out that it was a sad commentary on the attention this Nation is giving to advanced power generator techniques especially since it was an American scientist who developed the Nation's first MHD generator 10 years before. Senator METCALF and I again urged an immediate initiation of plans for a pilot plant in Montana to bring low-cost power to our growing population and to industry without the side effects of air and water pollution.

On November 6, 1969, Senator METCALF and I wrote to Secretary of the Interior Hickel again asking that funds be requested to get underway with an MHD research program. Secretary Hickel replied on December 18, 1969, stating—

We are as enthusiastic as you are about this program and we, too, are aware of its great promise for eliminating thermal pollution.

But he also pointed out that no decision had been reached concerning MHD and the Office of Coal Research budget.

On April 1, 1970, I appeared before the Subcommittee on Interior Appropriations again asking for funds for this important project. Only \$400,000 was included in the budget that year for MHD, and this committee increased that amount by \$200,000 for a total of \$600,000 in fiscal year 1971. This was the first significant step in providing impetus to this important research.

On July 22, 1970, I asked the distinguished manager of the bill whether it was the intent of this committee that the Department should initiate research in the immediate future on MHD even in advance of a final report of an electric

Mr. MANSFIELD. Mr. President, MHD electric power generation, which was first developed in the United States, promises operating efficiency 50 percent better—60 to 40 percent—than the most advanced steam turbine plants, and a greater increase—60 to 32 percent—over that of nuclear plants. It will burn coal, our most abundant domestic fuel resource. It will operate with greatly reduced stack emissions, well within the specified limits for pollution control. And it will require much less, or no, cooling water, thus greatly decreasing or eliminating thermal pollution.

MHD is currently under development in other countries besides the United States, particularly the Soviet Union, which has built and operates an experimental 25 MW MHD powerplant. We are falling behind. If MHD is to play its role in solving the Nation's energy crisis by 1990, and if the United States is to maintain its technological leadership in the field and establish itself as a principal world supplier of MHD systems, an aggressive national MHD development program is needed.

Since 1968, Senator METCALF and I have been urging a national program to develop MHD power generation. I believe that the distinguished manager of the bill, chairman of the Appropriations Subcommittee on Interior and Related Affairs, will attest that Senator METCALF and I have been the principal proponents for funding MHD in the Interior Department's Office of Coal Research's budget every year, including fiscal year 1970 when the first funds were provided.

On August 9, 1968, Mr. Cordell Moore, Assistant Secretary of the Interior, wrote me—

research council task force. He assured me that was the intent.

Nothing significant was achieved by the Office of Coal Research in this area, and, again, on May 9, 1973, after the onset of the worldwide energy crisis, I appeared before this committee asking that the request of the administration for \$3 million for MHD research be increased to \$8 million. I pointed out that MHD technology had not gone along as far as I had hoped due to the inadequate interest and support of the administration.

Again, in 1974, I requested consideration for an appropriation of \$2.5 million in fiscal year 1975 to further develop MHD techniques and applications within the State of Montana. This resulted in the following language being adopted in the report supporting Public Law 93-322, the energy research and development appropriations bill:

The net decrease below the amount proposed by the House includes an addition of \$5,000,000 for MHD (magnetohydrodynamics) to initiate design and planning work on an engineering test facility and to provide for additional research on MHD techniques and applications at the Montana College of Mineral Science and Technology and other units of the Montana University System . . .

The Office of Coal Research has spent only a fraction of the monies appropriated and has consistently ignored the intent of the Congress that MHD development should be accelerated. Indeed, not only has OCR failed to properly use the general funds provided for this purpose, but has to date even refused to use any of the funds specifically designated at the initiation of the distinguished Chairman of the Appropriations Committee, Senator McCLELLAN, for use at the University of Tennessee.

Recently, the members of the Appropriations Committee discussed the need for accelerating MHD research and development and the immediate beginning of the design and planning for an MHD engineering test facility as provided in the Special Energy Appropriations Act referred to above. That legislation, as you will recall, specifies that MHD research and development will be done at the Montana College of Mineral Science and Technology at Butte, in cooperation with the Montana University system and in collaboration with existing MHD expertise in the private sector.

In past years, the MHD appropriations amendments which Senator METCALF and I authored were general in nature. Given the urgency of the current energy crisis and the attitude of OCR, I believe it is now incumbent upon the Congress to strengthen MHD research and development activities and to leave no doubt in the minds of the Secretary of the Interior and the Director of the Office of Coal Research, that Congress does not intend to be ignored and that an accelerated program will be initiated so as to make MHD commercially available in the 1985-1990 period.

The Office of Coal Research is leaning heavily on a so-called national plan which envisions a demonstration of engineering feasibility of MHD by 1984

with a commercial application near the year 2000.

Given the facts available and the time already wasted, I believe that this time schedule is much too conservative. For example, the OCR plan states that—

Past research and development efforts have not disclosed any fundamental technical barriers requiring major scientific discoveries or break-throughs.

Recently, John C. Sawhill, the Federal Energy Administrator, reported in connection with the signing of the U.S./U.S.S.R. Energy Cooperation Agreement in Moscow by Presidents Nixon and Podgorny, that the Soviet Union has planned a 1,000 megawatt electric powerplant using an MHD generator.

Various distinguished scientists and engineers, representing universities and industry, have repeatedly testified before the Appropriations Subcommittee on the Interior and Related Affairs that the technology is on hand to design and build the large scale MHD generator. Further, that given the will to do so, MHD can be commercially available before 1990. Incidentally, in his statement, Mr. Sawhill said that—

The United States can learn a great deal about magnetohydrodynamics from the Soviets and could improve U.S. efficiency in that area.

That this statement was made is a sad commentary since the first successful MHD generator was developed in the United States and most of the theoretical work has been done here.

Given this background, I am convinced that the United States can recapture its lead in this new technology and make MHD commercially available well in advance of the OCR timetable. To do so requires determination, and a willingness to spend the money to accomplish this goal.

Since Public Law 93-322, the Energy Research and Development Appropriations Act, was signed, my office has been informed by the Director of the Office of Coal Research that that agency is unable to comply with the language outlined in the report. Dr. William Gouse, has indicated that he needs specific legislative authority to proceed with an experimental test facility in Montana as directed and appropriated for by the Congress. He and his advisers take the position that his office does not have grant authority, which is true, and must pursue a lengthy and cumbersome contractual and site selection procedure unless specifically directed otherwise.

In my view of the history of this important project, I feel it is incumbent upon the Congress to direct the executive branch, specifically the Office of Coal Research, under the Department of the Interior, to move aggressively in this field and to carry out the intent of Public Law 93-322.

With respect to establishing the engineering test facility, let me say that I am convinced that all the resources of the Nation should be brought to bear on this technology. I support the work going on in Tennessee, Massachusetts, California, Ohio, and elsewhere, and I believe it should be expanded. Hopefully, OCR will cease its delay in funding the University

of Tennessee with the moneys appropriated for that institution.

MHD is a technology particularly suited to the western coal States and it is appropriate that a significant portion of the research and development effort should take place there. The Montana College of Mineral Science and Technology is one of the leading schools in its field in the country and the Montana State University at Bozeman has outstanding faculty and facilities. The two schools are in the process of completing a cooperative effort with the AVCO Everett Research Laboratory. AVCO developed the first operating generator, has designed and built every large MHD generator that has operated in the United States and is currently involved in designing the channel for the Soviet Union's 25 megawatt MHD plant. The laboratory is internationally recognized as the leader in the field of MHD.

By placing the engineering test facility in Montana and combining the MHD expertise at AVCO with the resources and capabilities at Montana Tech and the Montana University, system we will have created a most powerful national team to conduct MHD development.

This brings me to the purpose of my amendment included in the bill. Given the history of OCR's attitude, we cannot reasonably expect it to respond to the will of the Congress. I believe that this amendment will demonstrate with the force of law that it is national policy that MHD is to be commercialized in the 1980's unless some now unforeseen, fundamental, technical barrier should arise.

The language will also demonstrate that the Congress has the will to provide OCR with both the direction and the funds necessary to expand MHD research and development and to get on immediately with the engineering test facility in Montana.

Mr. BIBLE. Mr. President, I commend the Senator from Montana, our most distinguished and lovable and expert majority leader.

The speech he has just made sounds familiar to me. I have heard it many times on the floor of the Senate. We have tried to accommodate ourselves to his wishes in this matter, and in this particular bill I hope we are successful.

In order to get the power of his office and his feeling behind this matter, I am going to suggest that he be added as a conferee on this bill. I am sure that his position will prevail. I think he is right. I know his position will prevail in the Senate. I would like to have the added weight of his prestige, of his office, and of his great State behind us when we go to conference, which I hope will be sometime next week.