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MINING AND MINERAL RESOURCES RESEARCH INSTITUTE

July 30, 1979



Mr. Hub Miller  
Waste Management Division  
U.S. Nuclear Regulatory Commission  
7915 Eastern Avenue  
Silver Springs, Maryland 20555

Dear Hub:

I received on July 23rd the following documents from Everest Minerals' Corporation, P. O. Box 1339, Corpus Christi, Texas:

1. Texas Department of Water Resources Permit No. 02208, Hobson Mining Project, in-situ Uranium Mining & Processing;
2. A report entitled "Hobson Project of Everest Minerals' Corporation, Application for Production Area 1 Authorization" dated May 23, 1979;
3. Texas Department of Water Resources Permit No. 02208, Hobson Mine, Application for Production Area Authorization;
4. Permit Application for Everest Exploration Company's Hobson Mining Project to the Texas Air Control Board dated November 28, 1978;
5. Texas Air Control Board Permit No. C-7209, A Construction Permit for New Facility, in-situ Uranium Mining Operation, Hobson;
6. Engineering report Waste Disposal Well, prepared for Everest Exploration Company by E. L. Reed and Associates, Inc., Consulting Hydrologists, Midland and San Angelo, Texas, dated October, 1978;
7. A document entitled "Hobson Project of Everest Exploration Company, Application to the Texas Department of Water Resources" dated September, 1978;
8. A copy of E. L. Reed and Associates' report on "Hydrologic Testing of Uranium Ore Zone at the Hobson Uranium Project";
9. An updated drawing of the temporary solid waste disposal pit including the leak detection system;
10. Two cross-sections in a well log from the waste disposal well application;

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11. Texas Department of Water Resources' Permit WDW-168, Hobson Mining Project, well No. 1;
12. Various letters pertaining to this waste disposal well from Everest Exploration to E. L. Reed and Associates.

My comments in this letter are directed at material pertinent to the injection well which the Texas Department of Water Resources has permitted under Permit No. WDW-168.

I would preface my remarks by noting that Mr. Tom Buckingham in his letter of July 10, 1979, to Everest Minerals' Corporation instructed the Company to contact the Solid Waste and Underground Injection Section of the Texas Department of Water Resources to arrange for a pre-drilling conference prior to initiation of construction of the disposal well. In that letter he informed Everest Minerals' Corporation that at that time the conditions of the permit, reporting requirements and well operation will be discussed by officials from the Underground Injection Section. I observed personally that the Underground Injection Section of the Department had a geologist (Mr. Charles Greene) on site to ascertain that the proposed finishing procedures were implemented properly. I make this remark at the outset because I believe it is important that the State regulatory agency plays a prominent role in the installation of an injection well for uranium processing wastes. The permit specifies the critical factors for well construction and installation with respect to protection of fresh-water strata. For example, the permittee is required to set and cement surface casing to a minimum subsurface depth of 600 feet. This cementing method is specified to be by the pump-and-plug technique which requires the complete filling of the annular space between the hole and casing to the surface of the ground.

The permit requires that all phases of well construction shall be supervised by a person knowledgeable and experienced in practical drilling engineering who is familiar with the special conditions and requirements of injection well construction. The Everest Minerals' Corporation hired E. L. Reed and Associates to accomplish this objective. A person from that consulting firm was on the well during our visit to the site.

The permit specifies the borehole geophysical logs which are to be run during the drilling and completion of the well. It requires that all logs be interpreted by the logs' service company which processed the logs or other qualified persons and a descriptive report prepared and submitted to the executive director of the Department of Water Resources.

The permit requires that spontaneous potential resistivity and caliper logs be conducted for the surface casing hole. For the long string casing hole . . . and resistivity logs along with gamma ray logs, caliper logs, cement bond logs, and inclination surveys be conducted. The cement bond log is designed to ascertain that the long string is effectively cemented without flaws to the top of the injection horizon. This procedure is designed to prevent leakage of waste water into the overlying aquifers.

These logs, other than the cement bond logs, are designed to identify the horizons having highest salinity and highest permeability. This objective could have been accomplished more definitively if porosity variations had been recorded.

Neutron logs are used principally for the delineation of porous formations and determination of their porosity. A neutron epithermal neutron tool would better assess porosity variations in this borehole. The presentation of a gamma gamma log as a porosity log is stretching the use of this log because the borehole diameter in quite a few instances exceeds the effective radius of inversion of the tool. The gamma gamma tool is a density tool and useful only in small diameter holes which have little borehole rugosity. The caliper logs in this hole indicate that there is extensive borehole rugosity with borehole diameter changes from six inches all the way up to sixteen inches. Consequently, the gamma gamma log is not the best choice for determining porosity variations in this borehole.

To delineate zones of saline water, the best tools to run are electrical tools which delineate changes in formation resistivities and conductivities. This borehole had a very complete array of electrical logs presented which allows for the interpretation of variations in formation resistivity. Nowhere on the logs is there an indication of the logging speed. This parameter is quite important because logs taken at high logging speeds tend to be average and do not delineate thin beds which may be pertinent to a ground-water contamination assessment. If geophysical logs are to be used for the delineation of hydrostratigraphic units for determination of ground-water contamination potential near waste-water injection zones, then the logging speed should not exceed 25 feet per minute. This speed allows for high resolution logs which describe the subsurface hydrostratigraphy in detail.

The suite of logs run in this borehole is generally very complete and is only lacking a neutron log for porosity interpretations. An additional neutron log which may be useful in this environment is the neutron gamma log. This tool responds to porosity variations and water quality changes in the borehole. It is used to define salt-water intrusion interfaces and would be useful in this hole to delineate hydrostratigraphic units containing saline formation waters.

The permit specifies a variety of testing, treatment, pre-treatment, and reporting requirements. Instructions are also provided for completing work-overs of the well. Abandonment procedures are described in the permit under the heading entitled "Plugging". Monitoring and record-keeping specifications are delineated precisely and concisely in the permit. Sixty precautionary measures are specified to determine leakage out of the injection string.

Careful study and consideration of the report's leading up to the issuance of this permit and of the permit itself including the specific requirements pertaining to well construction, well injection, monitoring and abandonment along with the fact that a representative of the Department was present during the finishing of the well has led me to the conclusion that the Texas Department of

Water Resources has developed an effective, successful regulatory program for the injection of uranium in-situ leach process waters into saline aquifers. About the only improvement I can see that we might suggest is that the previously described additional borehole geophysical log would enable the Department to better delineate the saline hydrostratigraphic unit into which injection is most desirable. The NRC might make the suggestion for the Department's consideration. However, I can see that the logs currently required would be adequate in many or possibly even most cases.

For these reasons, I suggest that the NRC consider entering into some type of mutual agreement with the Texas Department of Water Resources to license the injection of uranium process waste waters in Texas. It is my opinion that the risk of such an agreement would be minimal.

I will withhold comments pertaining to the Uranium Resources Inc.'s waste disposal scheme which I understand NRC must act upon. My reason for this stance consists of the fact that URI was unable to provide us with any information on the waste disposal well during our visit. Apparently this well was designed and developed for a purpose other than the disposal of uranium process waste waters and I do not wish to comment on it until I obtain more information pertinent to the design and purpose of the disposal well.

Sincerely,

*Roy E. Williams*

Roy E. Williams, Ph.D.  
Hydrogeology,  
Registered in Idaho

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