Heritage Minerals, Inc.

ONE HOVCHILD PLAZA
4000 ROUTE 66
TINTON FALLS, NJ 07753
(732) 922-6100 · FAX (732) 922-9544

August 17, 1999

Mr. Craig Z. Gordon
Sr. Health Physicist
U. S. Nuclear Regulatory Commission
Region 1
475 Allendale Road
King of Prussia, PA 19406-1415

Re: License #SMB-1541

Dear Craig:

In accordance with your request and upon advice from counsel, the answers to your questions, submitted in the fax dated July 21, 1999, are included in the enclosed copy of a letter, dated August 16, 1999, from R.S.I. to A. J. Thompson, Esq.

Also, for your information, I am enclosing a copy of the resumes for Tom Bracke, P.E. and Scott W. Dennerlein, principals of Radiation Science, Inc., the firm which produced the FSSP.

If any clarification is required, please advise.

Sincerely,

John F. Lord

John F. Lord, P.E.

JFL:sae

Enclosures

cc Tom Bracke, R.S.I.
A. J. Thompson, Esq.

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Radiation Science Inc.
10 South River Road
Cranbury, NJ 08512

August 16, 1999

Anthony J. Thompson
Shaw Pittman
2300 N Street, NW
Washington, DC 20037-1128

Dear Mr. Thompson:

Enclosed please find our responses to the NRC's questions regarding the FSSP for Heritage Minerals. The responses are necessarily general, as we do not have a detailed work plan, Health and Safety Plan, or destination for the material. All of these would greatly impact the potential public exposure during transportation. In a similar manner, the emergency response procedures are dependent on the destination and mode of transport.

Q1. Please provide an estimated dose calculation of worker and public exposure from the planned activities. Be sure to consider average thorium concentrations in the pile and assume all soil will be excavated and packaged.

A1. Worker dose due to penetrating radiation is estimated based on eight hours per day, five days per week, for eight weeks. Using an average exposure rate of the monazite pile, 1 mR/hr, the estimated dose would then be 320 millirem.

Worker exposure due to inhalation is estimated based on NUREG-1400, "Air Sampling in the Workplace" It is estimated to be less than 10% of the Annual Limit of Intake, specified in 10 CFR 20, for Th-232. The calculations are on an attached sheet. Although the potential exposure is estimated to be quite low, the respiratory protection program outlined in the "Project plan for Decommissioning of NRC License #SMB-1541" will be instituted.

Public exposure due to the planned activity is estimated to be below the sensitivities of any monitoring system. There is no discernable increase in dose rate above background at any publicly accessible area due to the monazite pile. A dust suppression program will be in place during excavation activities, and the monazite pile is approximately one mile from the nearest public access road. Therefore public exposure due to airborne radioactivity will be nonexistent.

Phone: 609 395-1996 email: staff@radsci.com fax: 609 395-1178

RSI

Q2. Please explain the organizational relationship (reporting chain) between HMI staff, including the radiation safety officer and the decommissioning contractor.

A2. John Lord will be the administrative contact for Heritage Minerals (HMI). The Radiation Safety Officer (RSO) will be Adrian E. Albrethsen Ph.D. Dr. Albrethsen is the RSO on HMI's Materials License and will advise Mr. Lord on all matters regarding radiation safety. The contractor, to be appointed by HMI, will report directly to Mr. John Lord. The decommissioning contractor will appoint a qualified Health and Safety Manager, and Project Manager to report to John Lord.

Q3. Please describe the type of dosimetry worn by workers.

A3. Workers will be provided with TLD's to be worn on-site during the course of the project. These TLD's will be collected at the end of the project, to record dose from this project only. In addition, the workers will continue to wear the TLDs issued as part of their routine radiation worker monitoring. In this way the dose from the decommissioning activites will be known, as well as being recorded on the workers annual dose record.

Q4. Please explain the notification or response procedure used to handle incidents and emergencies.

A4. A 24-hour hot line will be established by HMI during the course of the project. All incident and emergency notification will be made to Dr. Albrethsen through this number.

If you have any other questions do not hesitate to contact us.

Sincerely,

Scott W. Dennerlein

cc. John Lord

Airborne Hazards Determination for Excavation and Packaging of the Monazite Pile.

Calculations assume maximum activity allowed by the NRC license is being handled at one time. All confinement factors, release fractions, modifying factors, and the following equation are taken from NUREG-1400 "Air Sampling in the Workplace"

$$I = \frac{Q \times R \times F}{10^4 \times ALI \times C}$$

where; I = expected intake as a percent of the ALI
Q = source term in Ci *
R = release fraction (nonvolatile powders = 0.001)
F = other modifying factors (0.1)**
C = confinement factor (normal = 0.1)
ALI = 10CFR20, App. B, Table 1, Col. 2
For Th-232 1×10^{-9} Curies

$$\frac{(0.06\ Ci)(0.001)(0.1)}{(10^4)\ (1 \times 10^{-9} Ci)\ (0.1)} = 6\%$$

Therefore the expected intake would be 6% of the Annual Limit of Intake.

* Source term (Q) is based on 15,000 kilograms of material at a concentration of 4,000 pCi/g.
** The monazite sand is very heavy and will be wetted during excavation. Therefore the value of R for powders is overly conservative, and so is corrected for with this factor.

EMPLOYMENT EXPERIENCE

7/92 - Present **RADIATION SCIENCE INC.**

President, Radiation Safety Officer, and Senior Staff Engineer: Responsible for; design and sale of radiological characterization, decontamination, and decommissioning projects by RSI; development of the scope of work, planning, scheduling, and work-plan execution for these projects; generation of analytical, managerial, and regulatory compliance reports in support of all company activities. Supervises the job performance and worker safety of Health Physics personnel during site survey and decontamination work. Generally responsible for management and operation of a $800,000 Health Physics services company. RSO for the company's radioactive materials license for the performance of instrument calibration and sealed source leak checks. General license including any isotope with atomic number from 1 to 83.

Work on decontamination projects includes handling radioactive materials, packaging, and conducting release surveys. Materials handled include C-14, H-3, Gd-153, U and Th nat., Ra-226, Tc-99, K-40, and Cs-137 in micro curie amounts.

6/87 - 7/88 **S.M. STOLLER CORPORATION, INC.**

Manager - Sales and Marketing: Completed a major review and assessment of this nuclear fuels and engineering consulting firms' business. The resulting analysis helped initiate the process of focusing the company's objectives and led to the sell-off of related businesses. As a result of these activities, the company now has a significant position in the large market for radiological characterization and remediation of former DOE weapons sites.

9/77 - 6/87 **COMBUSTION ENGINEERING, INC.**

Sales engineer: Responsible for promoting the sale of the companies engineering services and products to the Nuclear Power Industry. Personal accounts were the largest single nuclear utility base assigned by the company, representing 10% of the installed U.S. nuclear generating capacity. Assisted a project team in developing these non-OEM clients and was directly involved in contract negotiations and selling of engineering service contracts in excess of $10 million.

Marketing and Strategic Planning: Participated in company-wide business planning cycles and also lead the marketing plan development for a segment of the company's nuclear services group. Additionally, coordinated the "due-diligence" review for the acquisition of a $2 million equipment manufacturing company.

Manager- Information Resource Center: Decreased the operating budget of this vital corporate resource significantly while enhancing the services provided by introduction of computer technology and greater utilization of available on-line databases. Responsible for the implementation of the plan, personally attending to staff reductions and hiring replacement.

Engineering Analyst and Designer: Participated in all aspects of the engineering design process including concept , analysis, testing, fabrication and field installation of nuclear plant components. Major accomplishments were design completion and analysis of fuel arrangement for re-load reactor cores and design and installation of plant equipment.

Physics Department: Responsible for analysis and design of shielding materials using radiation transport calculation codes and computer simulations.

Thomas P. Bracke, P.E. RESUME

EDUCATION & CERTIFICATIONS

University of Connecticut
Hartford, CT
MBA Marketing & Finance
May 1983

University of Virginia
Charlottesville, VA
MS Nuclear Engineering
January 1978

University of Virginia
Charlottesville, VA
BS Engineering & Applied Science
May 1975

Registered Professional Engineer # 12754 CT

PROFESSIONAL AFFILIATIONS

American Society of Professional Engineers
American Nuclear Society - Vice Chairman/NJ chapter 1991
American Health Physics Society

PROJECT EXPERIENCE

Founder of Radiation Science, Inc. and development of the company from its beginning in 1992 to address the provision of Health Physics Services. Supervision of Health Physics professionals in the development of radiation programs for worker protection and facility decommissioning.

Marketing and Sales
Performed market research and development of a business plan for entry of a radiochemistry laboratory into the area of mixed waste analysis and environmental sampling at major DOE cleanup sites. Subsequently responsible for implementing the plan, making customer contacts, preparing proposals, and participated in the negotiation of contracts worth over $200 million.

Decontamination & Decommissioning of Rare Earth Processing Facility
Currently directing the decontamination and decommissioning of 40,000 ft^3 of warehouse, contaminated with uranium and thorium. The project involves the planning, and execution of heavy equipment removal and dismantling. Aggressive cleaning involving high pressure water and steam were employed. Soil contamination along a railroad spur was evaluated with specially designed radiation detection equipment. The site contained mixed waste, that is both RCRA hazardous and radioactive.

Laboratory Decommissioning
Planning and execution of the decontamination of a laboratory used for Tritium and C14 compound synthesis for a major pharmaceutical facility. Involved cleaning and dismantling of fume hoods and ductwork. Waste packaging including large contaminated metal components.

Site Characterization
Planning, supervision, and data analysis for multiple projects involving radiological characterization at large outdoor facilities. Soil sampling and dose rate measurements were used to determine remedial planning and background characterization.

Operation of a 2 Megawatt Research Reactor
While a research assistant at the University of Virginia operated a nuclear reactor in conjunction with undergraduate and graduate studies. Performed numerous studies regarding neutron activation and shielding experiments. Also conducted gamma irradiation experiments on biological materials using multi-Curie Co-60 irradiator.

Scott W. Dennerlein — RESUME

EMPLOYMENT EXPERIENCE

9/93 - Present — **RADIATION SCIENCE INC.**
Senior Health Physicist: Responsible for site health and safety on decontamination and decommissioning projects. Develop and present site specific training to contract workers. Generate reports, workplans and procedures for surveying and waste packaging. RSO for client radioactive materials license responsible for obtaining the license and overseeing program development and implementation. Directs technician level personnel during performance of routine license maintenance activities. Responsible for in-house instrument QA and program development.

2/90 - 9/93 — **TELEDYNE ISOTOPES**
Manager - Health Physics Department: Managed four to eight technicians that performed radiological surveys both in-house and commercially. Responsible for operational compliance of seven radioactive material licenses, including bioassay program, air and water effluent monitoring, and license amendments. Also managed laboratory decontamination's, instrument calibration service and review and distribution of reports.

1/89 - 2/90 — **APPLIED RADIOLOGICAL CONTROL**
Senior Health Physicist: Responsible for radiological surveys, job planning and supervision during refueling outages at several nuclear power plants in the U.S.. Operated a decontamination system to remove radioactive particles from used reactor coolant pump oil.

9/86 - 11/88 — **NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION**
Radiation Physicist: Major responsibility was the assessment of public health risk and environmental impact due to radiologically contaminated sites. Lead Health Physicist for emergency drills with nuclear power plants in NJ.. Provided technical review of documents to support siting efforts of a low level radioactive waste facility in the state.

1/85 - 9/86 — **TELEDYNE ISOTOPES**
Health Physics Technician: Initial duties were the calibration of instruments, monitoring of air and water effluents from a transuranic-contaminated metals recovery lab and preparation of radioactive waste shipments. Performed radiation safety surveys at pharmaceutical labs, including x-ray machines and sealed source monitoring. Radiation safety officer for radiotracer studies at various oil refineries operated by Exxon.

9/81 - 12/83 — **HYDRO NUCLEAR SERVICES**
Decontamination Specialist: Duties included decontamination of containment building, reactor cavity, steam generators and torus at several nuclear power plants. Operated 8,000 psi hydro-lasing decontamination tool and remote monitoring dosimeters. Prepared shipments of high activity resins for disposal.

EDUCATION & CERTIFICATIONS

Rutgers University
New Brunswick, New Jersey
M.Sc. Radiation Science
October 1991

University of Rhode Island
Kingston, Rhode Island
B.S. Zoology
May 1981

Currently enrolled at Columbia University as a candidate for a Doctorate in Public Health at the School of Public Health.
Registered Radiation Protection Technologist - 1990
American Board of Health Physics - Certified Part I - 1991

Scott W. Dennerlein — RESUME

PROFESSIONAL AFFILIATIONS

American Nuclear Society - member since 1987
American Public Health Association - member since 1990
National Health Physics Society - member since 1988
NJ Chapter of the Health Physics Society - member since 1989, President 1992

COMMUNICATION EXPERIENCE

Developed and presented specific radiation safety training at all levels, from tradesman to research scientist. As a member of the NJ Health Physics Society speakers bureau, presented demonstrations to high schools and the New Jersey Science Teachers Association. Former chairman of the public education committee of the radiological Health section of the American Public Health Association. Acted as a technical consultant to town mayors and citizen activist groups with regards to a local contaminated Dept. of Energy site. Provided hands- on training to many technicians in decontamination techniques, environmental sampling and measurements.

SPECIFIC PROJECT EXPERIENCE

Well Injection of Radioactive Tracers: Prudhoe Bay, Alaska

This ten day project was designed to model sub-surface flow of produced oil and injected brine solutions. Responsible for calculating expected exposure rates, disposal concentrations and developing specific health physics procedures to be employed in - 40^{o} temperatures. A total of 300 curies of tritium and 4 curies of cobalt - 60 were injected with a maximum individual dose of 100 millirem. Another 35 - 40 days were spent on projects of a similar nature at oil refineries in Louisiana and Montana.

D & D Project for a Pharmaceutical Research Lab: King of Prussia, PA

Supervised onsite five technicians to survey and decontaminate a 25,000 ft^2 complex of buildings in a two month project. Removed approximately 600 ft3 of radioactive waste including 240 linear feet of exhaust duct. Performed a complete demolition of a carbon - 14 synthesis lab. Sole author of the site specific HASP, decontamination plan and D & D report following NUREG/5849 recommendations. Decontamination equipment included cement scabblers, jack hammers and heavy gauge metal cutting shears.

Environmental Sampling and Assessments: Montclair, NJ

Surveyed, sampled and assessed contamination levels at over thirty homes constructed on radium contaminated fill. Much of the work involved informal discussion of the results with homeowners, as well as meetings with town officials and regulatory agencies.