UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

APR 11 1994

URFO:CDMC
Docket No. 40-6659
SUA-551. Amendment No. 42
04006659110R
X61207

MEMORANDUM FOR: Docket File No. 40-6659

FROM: Cynthia D. Miller-Corbett, Project Manager

SUBJECT: PETROTOMICS COMPANY, SHIRLEY BASIN MILL: REQUEST TO AMEND SOURCE MATERIAL LICENSE SUA-551

By letters dated November 29, and December 23, 1993, Petrotomics Company (Petrotomics) submitted requests to amend License Condition Nos. 11, 28, 41, and 47 of Source Material License SUA-551. Revisions to the original requests were submitted by letters dated January 19, and February 10, 1994. Proposed amendments to SUA-551 include (a) update of licensee commitments for waste management and operations, (b) modification of the environmental monitoring program, and (c) modification of the ground-water sampling and corrective action program (CAP).

PROPOSED AMENDMENTS TO SUA-551

1. License Condition No. 11: Revisions to update commitments for waste management and operations.

Petrotomics has proposed to update the licensee's November 17, 1987, submittal entitled "License Condition 11 Summary" (Summary). The revised Summary, dated February 10, 1994, is included as Attachment 1 to this memorandum. The objective in updating the Summary is to (a) incorporate a reference to the frequency for changing thermoluminescent dosimeter (TLD) film badges, (b) make the conditions of SUA-551 commensurate with existing site activities, and (c) delete references to the radiation safety program which are listed in 10 CFR 20. The proposed changes to the Summary are as follows:

a. Section 4.0: Delete this section which describes wastes and waste systems associated with the mill which has been decommissioned. This section was not deleted. Instead, Section 4.2 was revised to reflect the current program for the tailings impoundment quarterly

inspection. The proposed revision is included as part of the February 10, 1994, submittal.

b. Section 5.1-1: Amend the last sentence of the first paragraph to reflect a change in the parent company location to Denver, Colorado.

c. Section 5.3-4: Delete the reference to "milling process" for the reason previously noted.

d. Section 5.4: Revise section to remove the requirement to furnish security guards. Justification for the removal of security personnel is based on the fact that the site is in reclamation status, and all but 6 acres of the tailings impoundment system is covered to meet the less than 20 pCi/l radon emission criteria (See Item 7 below). The only ongoing activities at the site are those associated with the reclamation program. Therefore, there is a minimal chance for human exposure to radionuclides. The licensee's proposed revision is as follows:

Access to the restricted area is controlled by a locked gate at the entrance when company personnel are not on the property. The restricted area is surrounded by fence, either four-strand barbed wire, or combination woven wire and barbed wire. The restricted area is posted in accordance with 10 CFR 20.203(e). Also, the entrance is posted with the sign, "CAUTION - ANY BUILDING OR CONTAINER WITHIN THIS AREA MAY CONTAIN RADIOACTIVE MATERIAL."

All visitors are required to register at the site office, and are not permitted to tour the area without appropriate authorization. When necessary, visitors are escorted while within the secured areas.

Contractors having work assignments, such as equipment repair, will be given appropriate security, safety, and radiation protection orientation commensurate with their duties while in the restricted area.

e. Section 5.5-1: Incorporate a commitment to change out TLD badges on a quarterly basis. Currently, there is no specified change-out frequency. The quarterly exchange frequency is considered adequate for operational monitoring (Regulatory Guide 4.14) and should, therefore, be acceptable for the Shirley Basin mill site which is in reclamation status.

f. Section(s) 5.5-3 and 5.5-4: Delete these sections which describe the requirements for occupational exposure (internal and bioassay) calculations. These programs are incorporated in 10 CFR Part 20.

2. License Condition No. 28: Deletion of reference to requirement for implementation of interim stabilization program.

The licensee requests deletion of this license condition because the entire tailings area has been covered with 2 feet of compacted clay, except for 6 acres which were covered to approximately 6-feet depth with soils from windblown tailings cleanup. The 6-acre area remains open for disposal of onsite cleanup materials.

3. License Condition No. 41: Revisions to the Environmental and Effluent Monitoring Program.

In the November 29, 1993, submittal, the licensee requested the reference to the Environmental and Effluent Monitoring Program described in the October 26, 1987, submittal be deleted from License Condition No. 41. By letter dated February 10, 1994, the licensee modified this request and submitted an updated program (Attachment 2) with the following changes:

a. Deletion of the requirement to monitor ground water for Lead-210 (Pb-210), Polonium-210 (Po-210), arsenic, and barium. The levels of Pb-210 and Po-210 in ground water have been less than 10 percent of the release limit cited in 10 CFR 20, Appendix B, Table II, Column 2, since 1987. Levels of arsenic and barium in ground water reported since 1987, are almost consistently less than the lower level of detection. Since 1987, the levels of these constituents have been less than the ground-water protection standard.

b. Change the quarterly sample analyses requirement for U-natural, Thorium-230, and Radium-226 to semiannual. This conforms to the requirement for analyses of these constituents specified in License Condition No. 47(A). In keeping with requirements of License Condition No. 47(A), the licensee also revised the Summary to include selenium analyses in the semiannual suite. Previously, the Summary required only annual analysis.

c. Update the reference to ground-water monitor wells included in the Environmental and Effluent Monitoring Program. Wells to be sampled would be noted by reference to License Condition No. 47 which lists the compliance program monitor wells. Analytical requirements may vary, but the monitor wells for both programs are the same. By referencing the cited license condition, the licensee avoids the need to revise the Summary when monitor wells are deleted or added to the ground-water sampling network.

d. Deletion of the requirement for analysis of Pb-210 for the air sampling program. The maximum level recorded since 1987, is 0.11 percent or less, of the Maximum Permissible Concentration.

e. Delete the reference to the requirement to sample surface water at the "Sand Draw." This ephemeral stream has been dry since 1987.

4. License Condition No. 47: Modification to ground-water sampling and Corrective Action Program (CAP).

a. License Condition No. 47(A): For the reasons noted above, the licensee requests deletion of the requirement to analyze ground-water samples for arsenic and barium.

b. License Condition No. 47(A): The licensee proposes deletion of the requirement to sample monitor well 67-SC. This well is not yet constructed, and the licensee has been authorized to reconsider modifications to enhance the CAP.

During a previous license amendment, the reference to monitor well (MW) 39-SC was inadvertently changed to 29-SC. The NRC is correcting this error by reincorporating MW 39-SC into the ground-water sampling program.

c. License Condition No. 47(B): As for the ground-water sampling requirements in the Summary, the licensee requests omission of the requirement to analyze ground-water samples for arsenic and barium. Justification for the omission is as noted above (Item 8(a)).

d. License Condition No. 47(C): As described in the January 19, 1994, submittal, the licensee proposes to modify this license condition by adding language to revise the commitment for pumping effluent recovery wells. The proposed language addresses the need for interruption of pumping for periodic construction, maintenance of the system, well redevelopment, seasonal conditions, and low or no production. The licensee defines low production as when the average production from well drops below 0.25 gpm. Currently, one of the nine CAP wells produces at this low rate. The average pump rate is 0.92 gpm. Production from the low producing wells accounts for less than 3 percent of the current total effluent recovery rate of 8.25 gpm. The conditions requiring interruption of pumping and the licensee's commitment to document such adverse events is described in the referenced submittal.

The proposed revisions to License Condition No.(s) 11 and 41 of SUA-551, submitted by letter dated February 10, 1994, are consistent with NRC guidance. Additionally, the request submitted by letter dated December 23, 1993, to delete License Condition No. 28, is consistent with NRC guidance. The

proposed revisions to License Condition Nos. 47(A) (submittal dated November 29, 1993), 47(B), and 47(C) (submittal dated January 19, 1994) of SUA-551 are also consistent with NRC guidance. Therefore, it is recommended that SUA-551 be amended by revising License Condition Nos. 11, 28, 41, 47(A), 47(B), and 47(C) to read as follows:

11. For use in accordance with statements, representations, and conditions contained in the License Condition 11 Summary submitted by letter dated February 10, 1994, except where superseded by license conditions below.

    Whenever the word "will" is used in the above referenced sections it shall denote a requirement.

    [Applicable Amendments: 8, 9, 10, 21, 35, 42]

28. Deleted by Amendment No. 42.

41. The license shall implement the revised environmental and effluent monitoring program dated February 10, 1994.

    A. DELETED by Amendment No. 21.

    B. DELETED by Amendment No. 26.

    C. DELETED by Amendment No. 26.

    D. DELETED by Amendment No. 26.

    [Applicable Amendments: 9, 11, 14, 15, 16, 17, 21, 23, 25, 26, 42]

47. The licensee shall implement a compliance monitoring program containing the following:

    A. Sample wells 7-DC, 1-SC, 3-SC, 4-SC, 5-SC, 39-SC, 40-SC, 41-SC, 42-SC, 43-SC, 44-SC, 45-SC, 49-SC, 50-SC, 51-SC, 52-SC, 53-SC, 54-SC, 55-SC, 56-SC, 57-SC, 58-SC, 66-SC, and the mine shop well on a quarterly frequency for chloride, nitrate, sulfate, pH, TDS, and water level, and on a semiannual frequency for cadmium, chromium, lead, nickel, radium-226, radium-228, combined radium-226 and 228, selenium, thorium-230, and uranium.

    B. Comply with the following ground-water protection standards at point of compliance well Nos. 5-SC and 42-SC, with background being recognized as the average of well Nos. 39-SC and 41-SC:

    cadmium = 0.014 mg/l, chromium = 0.05 mg/l, lead = 0.05 mg/l, nickel = 0.22 mg/l, radium-226 = 1.8 pCi/l, radium-228 = 1.7 pCi/l, combined radium-226 and 228 = 5.0 pCi/l, seleniur = 0.01 mg/l, thorium = 3.94 pCi/l and uranium = 0.16 mg/l.

C. Implement a corrective action program as described in the submittal dated July 6, 1988, and modified by submittals dated July 26, and October 30, 1989, including, in part, construction of the proposed evaporation pond system described in submittals dated April 6, 1987, and July 26, 1989. Submit an enhanced corrective action program for the upper wind river sand no later than August 1, 1994. The objective of the corrective action program is to return the concentrations of cadmium, chromium, lead, nickel, radium-226, radium-228, combined radium-226 and -228, thorium-230, and uranium to the concentration limits specified in Subsection (b).

Pumping of wells included in the corrective action program may be interrupted and restarted in conformance with conditions described in the submittal dated January 19, 1994.

D. Submit, by June 15 of each year, a review of the corrective action program and its effect on the aquifer. In addition, submit in the form of a license modification, the results of any corrective action program modifications along with or prior to the next June 15 submittal.

E. The licensee shall submit the proposal described in the June 28, 1993, submittal for establishing background monitor wells, a list of ground-water constituents to be monitored, and concentration limits for identified hazardous constituents residing in the Main Wind River sand, by April 1, 1994. The licensee shall submit a proposal for a corrective action program for the Main Wind River sand by August 1, 1994.

[Applicable Amendments: 19, 22, 25, 26, 28, 30, 33, 33a, 36, 37, 38, 40, 41, 42]

In accordance with the categorical exclusion contained in paragraph (c)(11) of 10 CFR 51.22, an environmental assessment is not required for this licensing action. That paragraph states that the categorical exclusion applies to the issuance of amendments to licenses for uranium mills provided that (1) there is no significant change in the types or significant increase in the amounts of any effluents that may be released offsite, (2) there is no significant increase in individual or cumulative occupational radiation exposure, (3) there is no significant construction impact, and (4) there is no significant increase in the potential for or consequences from radiological accidents.

The licensing action discussed in this memorandum meets these criteria as the proposed amendment involves (a) update of licensee commitments for waste management and operations, (b) modification of the environmental monitoring

program, and (c) modification of the ground-water sampling and corrective action program. An environmental report is not required from the licensee because the amendment does not meet the criteria of 10 CFR 51.60(b)(2).

Cynthia D. Miller-Corbett
Project Manager

Case Closed: 04006659110R
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Docket No. 40-6659
PDR/DCS
URFO r/f
SJCollins, RIV
DBSpitzberg, RIV
RAScarano, RIV
LLUR Branch, LLWM, 5E2
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PM:URFO CMC	DD:URFO EFH	D:URFO:RIV		
CDMiller/lv	EFHawkins	REHall		
3/31/94	4/1/94	4/4/94		

ATTACHMENT 1

LICENSE CONDITION NO. 11
SUMMARY

Revised: February 1994

3.4 DELETED by Amendment No. 21

3.5 DELETED by Amendment No. 21

3.6 DELETED by Amendment No. 21

4.0 Waste Management System

4.1 DELETED by Amendment No. 21

4.2 Liquids and Solids

The solid and liquid wastes from the milling process were placed in the tailings impoundment area. A brief description of the waste management program is presented below:

The tailings from the milling operation were deposited in an impoundment area west of the mill site. The tailings ponds were dry in 1987. The tailings were shaped and covered with a two foot thick cover layer of compacted clay in 1990, except for a six acre depressed area, in accordance with the reclamation plan. Two small evaporation ponds (total area approximately 37 acres) were constructed on the clay cover layer to receive corrective action pumpback water for evaporation.

In addition to frequent inspections of the corrective action systems by the Maintenance Coordinator, a quarterly inspection of the impoundment retention system is conducted and documented by the Radiation Coordinator. This inspection entails, but is not limited to the following:

1. Embankment settlement. The top of the embankment and downstream toe areas are examined for any evidence of unusual localized or overall settlement or depressions.

2. Embankment slope conditions. Embankment slopes are examined for irregularities in alignment and variance from originally constructed slopes, unusual changes from original crest alignment and elevation, evidence of movement at or beyond the toe, erosions, and surface cracks that indicate movement.

3. Seepage. The downstream face of embankment slopes and toes, and the downstream valley areas are examined for evidence of existing or past seepage, springs, and wet or boggy areas.

4. Slope protection. The slope protection is examined for erosion-formed gullies and wave-formed notches and benches. The adequacy of slope protection against waves and surface runoff that may occur at the site is evaluated. The condition of vegetative cover is evaluated.

5. Emergency containment facility. The emergency containment facility examination covers the inspection of culverts and gates for any conditions that may impose operational constraints on their functioning.

6. Inspection of diversion channels for channel bank erosion, bed aggradation or degradation and siltation, obstruction to flow, undesirable vegetation, or any unusual or inadequate operational behavior.

7. Groundwater. Groundwater is examined in accordance with License Condition 41, Environmental and Effluent monitoring program.

8. Post-construction changes. Data is collected on any changes that have occurred since the project construction which might influence the safety of the project.

Special inspections would be performed after the occurrence of significant earthquakes, tornadoes, floods, intense local rainfall or other unusual events. If unusual conditions, or signs of distress are noted in an inspection, additional technical evaluation of the retention system or problem area will be performed.

The employee performing inspections of the impoundment retention system will have training by an experienced dam stability inspector. Training will be repeated at least once every two years or whenever a change in inspectors occurs.

5.0 OPERATIONS

Operations are limited to reclamation, corrective action and related activities. All operations will be conducted in conformance with applicable laws and regulations of the various governmental agencies involved. In order to assure compliance and further implement Petrotomics Company's policy of providing a safe working environment with implementation of the philosophy of maintaining radiation exposures as low as is reasonably achievable, the following programs have been initiated and maintained.

5.1 PROJECT ORGANIZATION

An organizational chart of individuals responsible for the development, review, approval, implementation and adherence to operating procedures and radiation safety programs is presented in Figure 5.1-1.

5.1-1 MANAGEMENT RESPONSIBILITIES

1. SITE SUPERVISOR: The Site Supervisor is responsible for the reclamation of the mine and mill, and all related facilities and activities associated with the Petrotomics Site. The Site Supervisor develops and maintains a plan of action to safely ensure the best possible reclamation at the lowest possible cost. The Site Supervisor reports to the Manager, Resources, Alternate Energy and Resources Department, Texaco Inc., Denver, Colorado.

2. RADIATION COORDINATOR: The Radiation Coordinator is responsible for establishing and conducting monitoring and control procedures in accordance with State and Federal Government regulations. He ensures that necessary tests are performed to obtain data for radiological monitoring and maintains all records in connection with these tests. He works with State and Federal officials in matters pertaining to radiation control and assures compliance with provisions of the United States Nuclear Regulatory Commission license. The Radiation Coordinator reports directly to the Site Supervisor.

5.1-2 REQUIRED APPROVALS

Non-routine maintenance, cleanup and equipment modification and any remedial or corrective actions are initiated by any level of management with the appropriate action channeled through the Site Supervisor. Activities involving possible radiation exposure are monitored by the Radiation Department to assure the established limits are not exceeded.

In addition to the required approvals discussed above, if it has been determined that any process or operation proves an immediate radiation hazard to employees, the Radiation Coordinator has the authority to stop the operation until the hazard has been mitigated.

In the case of non-routine maintenance where employee exposure limits are approached, the Radiation Coordinator will remove affected employees from the designated work areas.

5.1-3 DELETED by Amendment No. 21.

ORGANIZATIONAL CHART

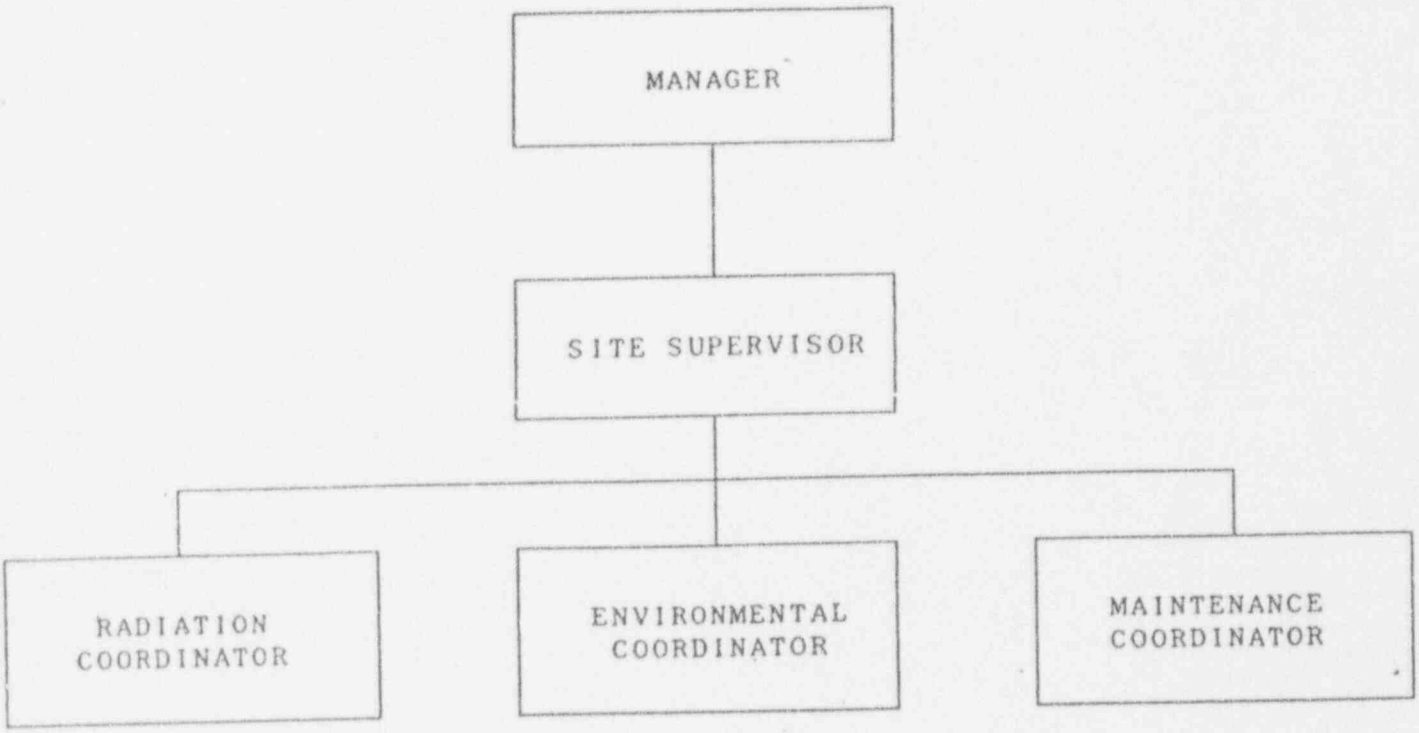

Figure 5.1-1

5.1-4 CORPORATE REVIEW AND ASSISTANCE

Corporate management and professional review, guidance and assistance from corporate management headquarters, Texaco Inc., is provided as needed. When necessary, outside consultants are brought in to review, evaluate and recommend remedial actions.

5.1-5 A.L.A.R.A. PROGRAMS

Mechanisms through which Petrotomics Company continues to assure that employee exposures and effluent releases are maintained as low as reasonably achievable are listed below:

1. Petrotomics Company has a commitment to its personnel to keep the occupational exposures as low as reasonably achievable. Workers will be made familiar with this policy upon employment. They will be told what radiation exposure means, and why they are required to implement Radiation Safety Rules and Regulations at all times on their jobs. Employees will be made aware of the importance and responsibility of their own actions in lowering the radiation exposure for all people in their work environment.

2. In addition to new employee training, Petrotomics Company maintains a continuing education program of all employees. Discussed during meetings are methods through which the Company can improve radiation safety of the operation in addition to the industrial safety aspects.

3. Where anomalous conditions may appear, specific employees are counseled on an individual basis with emphasis placed on maintaining optimal production in a safe manner.

4. It is a continuing policy of Petrotomics Company to review on a cost effective basis additional engineering controls to maintain exposure and effluent releases as low as reasonably achievable.

5.2 QUALIFICATIONS

Qualifications of radiation protection personnel are enumerated below:

1. Radiation Coordinator

   A. Education: A bachelor's degree in the physical sciences or engineering from an accredited college or university.

B. General: One year of supervisory experience and one year of experience in a uranium mill or related industry.

C. Health Physics Experience: One year of work experience in applied health physics, radiation protection, industrial hygiene or similar work.

D. Specialized Training: A formalized intensive course in health physics. At least one week of the course should be specifically applicable to health physics for uranium milling and mining. Refresher training - DELETED by Amendment No. 35.

E. Specialized Knowledge: A thorough knowledge of the proper applications and use of all health physics equipment used at the site, the chemical and analytical sampling and monitoring, and methodologies used to calculate personnel exposure to uranium and its daughters.

2. DELETED by Amendment No. 35

5.3 TRAINING

The purpose of the in-house radiation safety program is:

1. To place in proper perspective for the employee the short and long-term radiation hazards associated with the job;

2. To instruct and train employees in practices instituted by management to keep occupational exposures as low as reasonably achievable;

3. To assure each employee has an understanding (both initially and over the duration of his employment) of the radiation safety procedures which should be followed;

4. To stress most safety radiation procedures are "common sense" procedures, just as are occupational safety procedures, that have been implemented to protect the employee, and;

5. To emphasize the employee's personal responsibility to protect himself and others by adhering to all safety procedures.

All new employees receive instructions in plant and personal safety, including radiation safety procedures taken to minimize radiation exposure.

Repeated violations of safety practices will result in disciplinary action, up to and including dismissal. A system of Safety Warning Letters are used to properly document safety violations.

5.3-1 EMPLOYEE RADIATION SAFETY TRAINING

Basic indoctrination in radiation protection is given to all employees assigned to work in the tailings area. The training is given prior to an employee's commencement of work activities. The new employee will sign a statement indicating he/she has read and is familiar with the safety procedures and understands such procedures prior to commencement of work. The signed statement will be included in the employee's exposure file.

Formal retraining, which addresses essentially the same material as is presented to new employees, is given to employees annually. The basic employee indoctrination training includes the following:

1. Introduction. Included is a brief review of the historic milling process and the hazards associated with the milling of uranium ore.

2. Description of Radiation. Included is an explanation and definition of radiation and explanation of the associated health protection problems, and an explanation of terms, i.e., half-life, rem, mrem, maximum permissible exposure.

3. Types of Radiation. A discussion of the types of radiation and their characteristics is presented. Emphasis is placed on alpha, beta and gamma radiation.

4. Biological Effects of Radiation. The effects of radiation on the body is discussed along with the exposure limits which have been established.

5. Radioactive Minerals in Mining. A look at U-238 and the products of its decay. Chemical characteristics, half-life and hazards are covered for these elements.

6. Health Hazards. Specific hazards of exposure to beta and gamma radiation and the ingestion or inhalation of radioactive dust is covered. Internal and external hazards are discussed, as well as protective measures.

7. Monitoring Programs. Addressed are the basic detection methods and instrumentation used for detection of radiation to determine employee exposure. Employees are instructed as to purposes and functions of equipment and the importance of monitoring programs.

8. Principles of ALARA. Management's position in support of the ALARA principles is stated and an explanation of the ALARA program is provided.

9. Employees Rights Under Federal Laws. Instruction is given in accordance with 10 CFR 19, "Instructions to Workers" commensurate with the potential radiological health protection problems in the restricted areas.

   All female employees working in the tailings area will be instructed in the potential health protection problems associated with prenatal radiation exposures outlined in Regulatory Guide 8.13, "Instructions Concerning Prenatal Radiation Exposure". Signed acknowledgments of the instruction and understanding of such instructions from each female employee will be maintained in the employee's exposure file.

   Also reviewed are allowable exposure limits in accordance with 10 CFR 20 and general operating procedures to maintain exposures ALARA. Also reviewed are required notification and posting requirements in accordance with 10 CFR 19 as well as the radiation exposure reports which workers may request pursuant to 10 CFR 19.13. 10 CFR 21, "Notification of Defects or Noncompliance" is also reviewed.

10. Radiation Safety Rules. Rules established to provide a safe working area are reviewed. Since protection from radiation safety hazards is commensurate with good industrial and good personal hygiene, emphasis is placed on the responsibility of the employee to maintain safe working conditions and abide by established safety rules. In accordance with general safety practices, repeated violations of the safety rules will result in disciplinary action, up to and including dismissal.

11. Methods of Controlling Contamination. Emphasis is placed on good personal hygiene through showering and change of clothing or monitoring prior to exiting property, and through washing prior to eating. Proper cleaning techniques are also stressed.

12. Protective Clothing. Included in the indoctrination are proper use and purpose of the appropriate protective equipment, including protective equipment, clothing, gloves, boots, coveralls, eyeglasses, hard hats and respirators.

5.3-2 DELETED by Amendment No. 21.

5.3-3 RADIATION SAFETY PERSONNEL

Personnel performing radiation protection duties receive additional training beyond the normal indoctrination training. Such training consists of special seminars and/or on-the-job training. Training from seminars will include, but is not limited to, basic radiation theory, biological effects of radiation on matter, radiation measurement (including survey techniques and methods, personnel monitoring methods, quantitative and qualitative measurements), control of radiation sources (including distance, time, geometry, shielding methods, contamination control, use of personal protective equipment, and first aid), implementation of the ALARA philosophy, decontamination techniques (for both personnel and equipment), regulations that are applicable and audit techniques necessary to verify conformance with applicable requirements for radiation protection.

5.3-4 INDUSTRIAL SAFETY TRAINING

New employees are instructed in basic safety rules and work procedures. Safety awareness is continually emphasized at the facility. On a job-specific basis, employees are advised of the precautionary measures necessary for the safe handling and operation of tools, chemicals, solvents, and equipment used at the site.

First aid equipment and facilities are provided at the main office.

5.3-5 DELETED by Amendment No. 21

5.4 SECURITY

Access to the restricted area is controlled by a locked gate at the entrance when Company personnel are not on the property. The restricted area is surrounded by fence, either four strand barbed wire, or combination woven wire and barbed wire. The restricted area is posted in accordance with 10 CFR 20.203 (e). Also, the entrance to the property is posted with the sign, "CAUTION - ANY BUILDING OR CONTAINER WITHIN THIS AREA MAY CONTAIN RADIOACTIVE MATERIAL."

All visitors are required to register at the site office and are not permitted to tour the area without appropriate authorization. When necessary, visitors are escorted while within the secured areas.

Contractors having work assignments, such as equipment repair, will be given appropriate security, safety, and radiation protection orientation commensurate with their duties while in the restricted area.

5.5 RADIATION SAFETY

To comply with the requirements of 10 CFR 19 and 10 CFR 20, Petrotomics maintains an employee radiation monitoring and protection program described briefly in the following subsections.

5.5-1 OCCUPATIONAL EXPOSURE - EXTERNAL

External whole body exposure to ionizing radiation is maintained as low as reasonably achievable. Historically, normal exposures to individual mill operators did not exceed 1 rem/year. However, all employees are badged as a precautionary measure.

External exposure to ionizing radiation will be determined from known dose rates and exposure times using personnel monitoring devices.

1. Personnel Dosimetry: Selected employees are issued personnel dosimeters which are worn on site and are changed out quarterly. The TLD badges are presently furnished and analyzed by Eberline of Santa Fe, New Mexico. In the future, any firm offering comparable design specifications for personnel dosimeters may be used.

2. Exposure Control Limits - Action Levels: In cases where personnel dosimeters reveal a gamma dose in excess of 25% of 1.25 rem in any calendar quarter, the following actions are implemented:

    a. The Radiation Coordinator conducts an investigation to determine where and how the exposure(s) occurred.

    b. A review of gamma survey results is conducted to verify that the work area has no unusual external radiation and, if necessary, additional surveys of the area are conducted to determine the potential cause of the elevated levels of external radiation. Results of readings from

other TLD badges for other employees working in the same area are reviewed to verify that there was no excessive exposure. In the case of contamination of TLD badge, the employee is counselled to prevent a recurrence of such contamination.

If a source of unusual external radiation is noted, appropriate corrective action will be taken to lower the level of radiation as far below limits as specified in 10 CFR 20 as is reasonably achievable and to ensure that no unnecessary exposure occurs in the future.

3. Exposure Records: All exposure records are kept in accordance with regulations set forth in 10 CFR 20.102. All exposure investigations are documented.

4. Exposure of Minors: Exposure of occasional visitors who are less than 18 years of age is automatically limited by the limited period of contact and by the controlled environment required in a restricted area. Any exposure, when evaluated over a calendar quarter, will result in far less than 10% of the levels specified in 10 CFR 20.1013.

5.5-2 DELETED by Amendment No. 21.

5.5-3 OCCUPATIONAL EXPOSURE - INTERNAL - DELETE

5.5-4 BIOASSAY - DELETE

5.5-5 DELETED by Amendment No. 21.

5.5-6 DECONTAMINATION PROCEDURES

Each employee is responsible for safety and quality in his work and for adherence to all safety and radiation protection rules as a condition of employment. Supervisors will ensure that all safety rules are adhered to.

1. Employees

A. All employees shall thoroughly wash hands and face prior to eating.

B. All workers working in the tailings area will monitor themselves prior to leaving the property.

2. Contamination Surveys

At least once per quarter, the Radiation Coordinator

will pull a spot check on employees with a survey instrument to verify that contaminated clothing is not removed from the property. An action level of 1,000 dpm alpha/100cm_2 is used. If results of the periodic monitoring exceed this action level, employees are required to return to the site for additional showering, and an investigation is conducted by the Radiation Coordinator as to the probable cause and remedial actions necessary to prevent recurrence. A record of the spot surveys as well as any corrective actions involved is maintained in the Radiation Department files.

Surveys of potentially contaminated equipment is conducted before the equipment is released to unrestricted areas. If contamination is detected, the equipment is decontaminated until additional efforts do not significantly reduce contamination levels. The surface contamination levels listed in U.S. NRC Regulatory Guide 1.86, "Termination of Operating Licenses for Nuclear Reactors" (June 1974), is used to establish release limits.

5.5-7 DELETED by Amendment No. 21.

5.5-7-1 SAMPLING METHODOLOGIES

All sampling methodologies for the environmental monitoring program are detailed in the Standard Operating Procedures.

General information regarding sampling methodologies include the following:

Sampling Locations;
Date and Time of Collection;
Sample Identification - i.e. air, vegetation, etc.;
Sample Type - i.e. grab, continuous;
Sample Preparation (if applicable);
Analysis Required;
Individual Collecting Sample.

5.6 EMERGENCY NOTIFICATION

In accordance with the conditions of 10 CFR 20.402, "Reports of Theft or Loss of Licensed Material"; 10 CFR 20.403, "Notifications of Incidents"; and 10 CFR 20.405, "Report of Overexposures and Excessive Levels and Concentrations", Petrotomics will take the appropriate actions immediately to notify the appropriate authorities. The management of Petrotomics will also be notified of any such instances.

Where indicated, an investigation shall be made of the instance and a written report shall be prepared. Reports submitted to the Nuclear Regulatory Commission shall be in accordance with Sections 20.402, 20.403, and 20.405 of 10 CFR 20.

In accordance with 10 CFR 21, notification of reportable incidents to NRC will be through the delegated Executive Officer. The Executive Officer is the Site Supervisor for Petrotomics.

5.7 DELETED by Amendment No. 21.

5.8 DELETED by Amendment No. 21.

ATTACHMENT 2

ENVIRONMENTAL & EFFLUENT

MONITORING PROGRAM

PETROTOMICS COMPANY

Revised: February 1994

1) AIR PARTICULATE SAMPLING

One sampler at or near downwind site boundary.

Continuous sampling.

Quarterly composite and analysis.

Analyze for U-natural, Th-230, and Ra-226.

2) RADON SAMPLING

Two locations - one upwind and one downwind.

Continuous sampling at each location.

3) GROUNDWATER

Sample wells used in compliance monitoring program, License Condition No. 47.A.

FOR EACH:

Quarterly sample and analysis.

pH
Chloride
Sulfate
Total Dissolved Solids

Semi-annually, the above parameters as well as:

Analyze for Selenium, dissolved U-natural, Th-230, and Ra-226, (include analysis for suspended fractions of radionuclides for mine shop well samples).

Annually, the above parameters as well as:

Aluminum	Iron
Ammonia	Lead
Bicarbonate	Magnesium
Calcium	Manganese
Carbonate	Molybdenum
Copper	Nitrate
Fluoride	Potassium
Hardness	Sodium

4) DIRECT RADIATION

Two locations near site boundary, same as for radon samples.

Quarterly change and reading of TLD's for each location.

5) The lower limits of detection for analysis of samples collected in this monitoring program shall meet the LLD's listed in Regulatory Guide 4.14, Revision 1, "Radiological Effluent and Environmental Monitoring at Uranium Mills," April, 1980.