U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No.	040-08805
License No.	SMB-1402
Report No.	040-08805/96001(DNMS)
Licensee:	CERAC, Inc.
Location:	407 N. 13th Street Milwaukee, Wisconsin
Dates of Inspection:	December 18 and 20, 1996, with continuing NRC review through January 23, 1997
NRC Representatives:	John Madera, Chief, Nuclear Materials Inspection Branch 1 Michael LaFranzo, Radiation Specialist Peter Lee, Licensing Reviewer
Approved By:	John R. Madera, Chief Nuclear Materials Inspection Branch 1 Division of Nuclear Materials Safety

Executive Summary

CERAC, Inc.
NRC Inspection Report No. 040-08805/96001(DNMS)

This routine, unannounced safety inspection was conducted to assess the overall adequacy of the licensee's NRC-licensed operations. The inspection focused on: (1) radioactive liquid and air effluent releases from the licensee's facility; (2) licensed material security at the licensee's facility; (3) implementation of the licensee's internal and external dosimetry programs; and (4) review of the licensee's instrument calibration procedures.

Seven apparent violations were identified in the overall implementation of the licensee's radiation safety program, including several examples of the licensee's failure to make proper evaluations regarding: (1) activity of licensed material discharged to the sewerage system; (2) solubility of licensed material discharged to the sewerage system; and (3) demonstration of compliance with dose limits to occupational workers. Other violations included the licensee's discharging of licensed material that was insoluble in water; failure to conduct quarterly bioassay analysis on occupational workers who may have received greater than 10% of the Annual Limit of Intake (ALI), failure to sum external and internal doses to demonstrate compliance with 10 CFR Part 20, failure to secure licensed material from unauthorized access, and failure to calibrate a radiation detection instrument on a semi-annual basis.

In addition, the NRC identified two concerns regarding the licensee's failure to: (1) identify and perform a root cause analysis of significantly increased air effluent discharges after the Dry Torit system was cleaned; and (2) identify that the program was not authorized to use respiratory protection factors to determine internal doses to occupational workers. Consequently, the second concern resulted in a calculated committed effective dose equivalent to an occupational worker in excess of 2000 DAC-hours which is above the NRC's regulatory dose limits. However after further review by the licensee and NRC, it was determined that the occupational worker in question did not receive a dose greater than NRC's regulatory dose limits.

Report Details

1. Summary of Licensed Activities

CERAC, Inc. operates a thorium reprocessing and uranium repackaging facility under the authority of NRC Source Material License No. SMB-1402.

2. Inspection History and Purpose

2.1 Inspection History

On January 1, 1994, new radioactive air effluent release limits were implemented by the NRC. Specifically, 10 CFR Part 20 reduced the air effluent release limits for thorium-232 approximately one order of magnitude from the limits subsequent to January 1, 1994. In 1993, the licensee determined that the new air effluent release limits were unattainable under their 1993 operating procedures. Therefore, the licensee voluntarily shut down their licensed operations at the Milwaukee facility in December 1993 until approximately August 1994 to add new air filters and radioactive effluent monitoring equipment. In addition, the licensee added a new Radioactive Material Room (RMR) and removed several temporary rooms built inside the facility where licensed material was formally handled and processed.

On October 19, 1994, a routine safety inspection was conducted at the licensee's facility to review licensed activities as they related to NRC regulations. Two violations were identified and consisted of: (1) failure to conduct radiation surveys where radioactive material is used; and (2) failure to calibrate portable survey instruments every six months.

2.2 Purpose of Inspection

This routine, unannounced safety inspection was conducted to assess the overall adequacy of the licensee's NRC-licensed operations. The inspection focused on: (1) radioactive liquid and air effluent releases from the licensee's facility; (2) implementation of the licensee's internal and external dosimetry programs; (3) security of licensed material at the licensee's facility; and (4) review of the licensee's instrument calibration procedures.

3. Radioactive Material Liquid Effluent Releases

3.1 Inspection Scope

The NRC reviewed the licensee's implementation of the requirements regarding radioactive liquid effluents released outside the licensee's facility.

3.2 Observations and Findings

3.2.1 Radioactive Material Room (RMR)

During certain types of thorium processing, the licensee generates, on a monthly basis, approximately 2,400 liters of water contaminated with radioactive material. The licensee has been performing "wet thorium processing," which generates the contaminated water, since approximately October 1994. According to the licensee, no significant changes in the processing methods have occurred since October 1994.

According to the licensee, the contaminated water, hereafter known as process water, is generated in the licensee's RMR. If process water is generated during a wet thorium processing procedure, the liquid is normally discharged out of the RMR after each procedure into a 55-gallon plastic container. The 55-gallon container has an overflow exit port at approximately the 30-gallon level. When the 55-gallon drum is filled to approximately 30-gallons, the overflow exit port allows any additional process water to be discharged into a 1000 gallon holding tank located below ground level near the RMR. This 1,000 gallon holding tank is designed with a similar overflow exit port as the 55-gallon container noted above. The 55-gallon container and the 1,000 gallon holding tank are not routinely drained of all water and, therefore, water added to the 55-gallon plastic container can be immediately released to the 1,000 gallon holding tank which, in turn, can simultaneously release a portion of its contents to the sewerage system.

In addition to the process water discharge into the 1,000 gallon holding tank, the holding tank also accepts discharges of chemical liquid wastes from throughout the facility which includes the RMR's wet scrubber (see section 3.2.2).

According to the licensee, from approximately October 1994 to August 1996, the licensee was looking for a facility which could analyze the licensee's process water for radioactive material content and solubility. In August 1996, the licensee retained the services of Heritage Environmental Services, Inc., a commercial laboratory, to analyze the licensee's process water discharges. The commercial laboratory's analysis of the licensee's process water on October 9, 1996, identified approximately 1.95E-5 microcuries per milliliter (721 Bq per liter) of alpha emitting activity. According to the commercial laboratory's report, the majority of radioactive material identified in the sample as a result of a gamma spectrum analysis was radium-228 and actinium-228 which are daughter products of thorium-232. However, the laboratory did not perform a test to determine if the radioactive material in the process water was soluble in water. A copy of the commercial laboratory's certificate of analysis is enclosed in Attachment A. According to the licensee, no other process water samples have been taken since October 1994.

On December 20, 1996, the licensee supplied the NRC with a water sample of the process water prior to discharge into the sewerage system. The sample was analyzed by the NRC during the week of December 23, 1996, using a gamma

spectral analysis system. The NRC's analysis of the process water sample indicated the presence of 1.0E-5 microcuries per milliliter (370 Bq per liter) of radium-228 and actinium-228. A test to determine solubility of the radioactive material present in the sample was also performed by the NRC. As recommended in NRC Information Notice 94-07 as a method to determine solubility, the NRC filtered the process water through a 0.45 micron filter. The results of the filtered process water indicated approximately 53% of the total activity of the water sample was present on the filter. The NRC determined the majority of the activity present in the process water sample was radium-228 and actinium-228 which are daughter products of thorium-232.

In a letter dated May 10, 1995, referenced in License Condition 15, the licensee submitted procedures which were designed to insure the thorium in the process water was soluble in water. However, the licensee did not address the solubility for the daughter products which are removed during the thorium processing procedures and deposited in the process water. Thorium daughter products are considered licensed material pursuant to the License No. SMB-1402.

In a letter dated January 8, 1997 (Attachment B), the licensee stated they would hold all process water at the licensee's facility until such time as the licensee is able to determine that process water containing licensed material is soluble in water. In order to determine future solubility of radioactive material in process water, the licensee intends to use a series of 10 micron, 1 micron and 0.45 micron filters to filter the process water generated from the RMR. The licensee believes this series of filters will prevent the discharge of insoluble licensed materials into the sewerage system. However, the licensee stated they will not discharge process water until the filtered process water is analyzed for licensed material concentration and solubility and the results reported to the NRC.

3.2.2 Wet Scrubber

During certain types of thorium processing, the licensee generates an air effluent which passes through a wet scrubber system. This system is designed to remove particulates from the air effluent generated in the RMR. The particulates are held in the scrubber water and the air effluent is released to the environment. The wet scrubber's water supply is held in a holding tank located on the wet scrubber which contains several hundred gallons of water. Once the water goes through the scrubber, the water is returned to the holding tank where it is reused. According to the licensee, the holding tank is normally discharged approximately once per week into a 1,000 gallon holding tank located on the ground floor (see section 3.2.1).

In August 1996, the licensee obtained a single water sample from the wet scrubber holding tank which was analyzed by the Heritage Environmental Services, Inc., a commercial laboratory, on October 8, 1996. The commercial laboratory's analysis of the water sample did not identify the presence of licensed material. According to the licensee, no other samples have been taken since October 1994.

On December 20, 1996, the licensee supplied the NRC a scrubber water discharge sample which was analyzed by the NRC during the week of December 23, 1996. The NRC's analysis of the water sample did not identify the presence of licensed material.

Although the scrubber water analysis by the NRC and commercial laboratory did not identify licensed material in the samples, the licensee believes the possibility exists to discharge licensed material to the sanitary sewer system through the scrubber water. Therefore, the licensee has informed the NRC in a letter dated January 8, 1997 (Attachment B), that all scrubber water discharges will be held at the licensee's facility until the licensee can assure that insoluble licensed material is not discharged to the sanitary sewerage system.

3.3 Conclusion

10 CFR 20.1501 requires that each licensee make or cause to be made surveys that may be necessary for the licensee to comply with 10 CFR 20.2003(a) which limits the disposal of licensed material into the sanitary sewerage system. 10 CFR 20.2003(a) also requires all discharges of licensed material into the sanitary sewerage system shall be soluble in water.

The licensee had been releasing thorium process water into the sanitary sewerage system on a routine basis from October 1994 to October 1996 without determining the concentration and the solubility in water of licensed material prior to discharge.

In addition, from October 1994 through December 1996, the licensee obtained and had analyzed one sample from the process water which indicated the presence of licensed material. However, the licensee did not have the sample analyzed to determine if the licensed material identified was soluble in water.

Failure to determine the quantity and solubility in water of licensed material discharged into the sewerage system is an apparent violation of 10 CFR 20.1501.

10 CFR 20.2003 requires that licensed material discharged into the sewerage system shall be readily soluble (or readily dispersible biological material) in water. On October 9, 1996, Heritage Environmental Services, Inc., a commercial laboratory, analyzed a sample of process water from the licensee's facility and determined that 1.95E-5 microcuries per milliliter (721 Bq per liter) of licensed material was present in the sample. However, the laboratory did not determine if the licensed material in the process water was soluble in water. During the week of December 23, 1996, the NRC analyzed a sample of process water from the licensee's facility and determined that 1.0E-5 microcuries per milliliter (370 Bq per liter) of licensed material was present in the sample. The NRC also performed a solubility test on the licensed material in the process water using a filtration method (section 3.2.1, paragraph 5) and determined that approximately 53% of the licensed material was retained on the filter which indicated that the process water contained insoluble licensed material. In addition, the licensee stated that the wet thorium processing procedures had not significantly changed since October 1994.

This would indicate that the analytical results obtained on the process water in December 1996 would be similar to the analytical results that would have been obtained if samples had been analyzed from October 1994 up to December 1996, for radioactive material concentration and solubility. Therefore, it appears from the analytical results of the process water and the licensee's statements that the wet thorium process procedures have not significantly changed since October 1994, that past discharges of process water contained insoluble licensed material.

Discharging licensed material into the sanitary sewerage system that is not readily soluble or dispersible biological material in water is an apparent violation of 10 CFR 20.2003.

In a letter to the NRC dated January 8, 1997, and in several subsequent telephone conversations, the licensee stated that they would hold all process water and scrubber water in holding tanks located on site until the water is analyzed for activity and solubility of licensed material. In addition, the licensee is planning to submit procedures to process contaminated water to remove licensed material and/or assure that licensed material contaminates are soluble in water.

4. Radioactive Material Air Effluent Discharges

4.1 Inspection Scope

The NRC reviewed the licensee's air monitoring program to insure that the requirements regarding air effluent releases outside the confines of the licensee's facility are met.

4.2 Observations and Findings

The licensee's air effluent monitoring program consists of obtaining air samples from the Dry Torit stack, Wet Scrubber stack and the Compactor stack. The licensee also possesses a portable air sampler to collect air samples in areas without a permanent air sampling device.

The Dry Torit stack is connected to a fume hood in the RMR. A high capacity blower, a Torit dust collection system and a HEPA filter system has been installed to keep the RMR under negative pressure and to collect particulates which may contain licensed material before releasing the effluents to the environment. The Wet Scrubber stack is connected to a second fume hood in the RMR. A high capacity blower and Wet Scrubber particulate removal system has been installed to keep the RMR under negative pressure and to collect particulates which may contain licensed material before releasing the effluents to the environment. Both of the high capacity blowers connected to the RMR can maintain the room under negative pressure. The Compactor stack is connected to the licensee's radioactive material compactor. A fan and HEPA filter system has been installed to keep the compactor area under negative pressure and to collect particulates generated from the compaction process which may contain licensed material. The two high

capacity blowers and the fan on the compactor run continuously. In addition, air sampling collection systems are located after the appropriate filtering systems.

The licensee's air monitoring program consists of taking air samples from radioactive material release stacks continuously over a 1 week period and analyzing them using a Scintillation Alpha Counter (SAC-4). The licensee has taken a conservative approach in their air monitoring program by establishing effluent limits based on the assumption that all alpha emissions from the air sample's obtained are from the decay of thorium-232, thereby disregarding the contributions from other daughters of thorium-232 which have less restrictive 10 CFR 20 effluent limits.

According to the licensee's analysis of 1996 air effluent release data, the annual average concentration of licensed material effluent released from the Dry Torit stack, Wet Scrubber stack and the Compactor stack is 71E-15, 19E-15 and 57E-15 microcuries per milliliter (2.6, 0.7 and 2.1 microBq per liter) respectively. These concentrations are the release concentrations from the applicable stack exit point. 10 CFR 20, Appendix B, Table 2 states that the thorium-232 air effluent limit for members of the general public is 4E-15 microcuries per milliliter (0.15 microBq per liter). On March 25, 1996, the licensee ran the EPA COMPLY: V1.5d. computer program to determine if radioactive air effluent discharges for members of the general public, were in compliance with EPA and NRC regulatory limits. Given the data entered into the program by the licensee, the effective dose equivalent to a general member of the public is 0.2 millirem per year (2 microSievert per year).

An NRC review of the data entered into the EPA COMPLY: V1.5.d computer code indicates that the results do not take into account doses to individuals who have access to the roof of the building where the radioactive material effluent stacks are located. According to the licensee, the roof of the building is controlled and access limited to supervisors, maintenance personnel and radiation safety personnel. However, the licensee stated not all supervisors and maintenance personnel who have access to the roof are trained regarding the radiological hazards associated with the effluent release of licensed material. In addition, the licensee indicated that no evaluation had been performed regarding doses that may be received from individuals who have access to and work on the roof where radioactive effluents are released.

After an analysis of the Dry Torit stack effluent release data, the NRC identified significant increases in the effluent release rates in September and October 1996, after the Torit filters were exchanged. Specifically, the effluent concentrations increased by a factor of 10 over the annual average for the week of September 18, 1996. During the week of September 25, 1996, the sample filter was lost. However, for the weeks of October 2 and 9, 1996, the effluent concentrations were a factor of 14 and 8 respectively higher than the annual average effluent concentrations. The licensee does not have an explanation for the increase in effluent concentrations and is continuing its review of the increase in effluent release rates.

4.3 Conclusion

According to the licensee, all alpha activity identified on a radioactive effluent air sample is assumed to be thorium-232. However, other alpha emitters are present in the thorium-232 decay chain which all have higher air effluent release limits than thorium-232. Therefore, it appears that the air effluent values calculated by the licensee are conservative and the actual licensed material releases are less than reported by the licensee.

10 CFR 20.1501 requires licensees to make surveys of radioactive materials in effluents to demonstrate compliance with the dose limits for occupational workers pursuant to 10 CFR 20.1201. However, as of December 20, 1996, the licensee had not made an evaluation regarding doses received by occupational workers who have access to the licensee's roof where radioactive material effluents are released.

Failure to make or cause to be made surveys to demonstrate compliance with dose limits for occupational workers is another example of an apparent violation of 10 CFR 20.1501.

The licensee is currently reviewing several methods to insure licensee staff who have access to the roof are informed and, if appropriate, monitored when accessing areas where radioactive material air effluents are being discharged.

The licensee could not explain the unexpected release rates from the Dry Torit stack after the Torit filters were cleaned. The effluent releases from the Dry Torit stack in certain months were significantly higher than the average concentrations reported by the licensee throughout the year. Although these air effluent releases do not exceed 10 CFR Part 20 limits, NRC is concerned with the increased trend in effluent concentrations. The NRC requested the licensee to review this matter to determine the root cause and to prevent elevated effluent releases in the future.

The NRC is concerned about the significant increase in effluent releases from the Dry Torit stack in September and October 1996, after the Torit filters were exchanged.

The licensee agreed to review the root cause surrounding the increased effluent releases from the Dry Torit stack and to insure additional elevated radioactive air effluent releases from all licensed material effluent release stacks are anticipated.

5. Internal and External Dosimetry

5.1 Inspection Scope

The NRC reviewed the licensee's commitments regarding its internal and external dosimetry program. This includes the licensee's respiratory protection program, bioassay program, and external monitoring requirements.

5.2 Observations and Findings

5.2.1 Respiratory Program

The licensee uses a respiratory program for the purposes of chemical protection. The respiratory program consists of full face respirators with dual Organic Vapor and Acid Gas Cartridges which are NIOSH/MSHA approved. All workers who have been provided respirators have had full face respirator training which has been approved by OSHA. The licensee requires each worker to wear a full-face respirator while present in the RMR. The RMR is the only permanent location where the licensee has determined an airborne radioactive material area exists. From interviews with licensee staff authorized to use a respirator, it appears they have adequate knowledge regarding respirator use and emergency procedures.

During the inspection, the licensee stated they were unsure whether or not they could take credit for their respiratory program. A consultants report dated March 18, 1996, stated that a written respiratory protection program had been implemented in accordance with 10 CFR 20.1703(a)(3) and (4) (Attachment C). However, in a letter dated July 19, 1994, referenced in License Condition 15, the licensee stated respirators are used as a control of chemical (not radiological) hazards and the licensee was not requesting NRC approval for their respiratory program.

5.2.2 Bioassay Program

According to a letter dated April 28, 1995, referenced in License Condition No. 15, the licensee's bioassay program consists of quarterly urinalysis for all individuals who the licensee anticipates may be exposed to greater than 10% of the Annual Limit of Intake (ALI). In addition, the licensee stated in the same letter that only individuals who work in the RMR routinely are likely to receive greater than 10% of the ALI or 200 DAC-hours.

Data from the licensee's records for 1995 and 1996 indicates that thirty-one individuals worked in the RMR. Of those individuals, the licensee stated that only four or five would be likely to received an intake in excess of 10% of the ALI. The licensee's records for 1995 and 1996 indicates that eight individuals were in excess of 10% of the ALI. The licensee informed the NRC that a quarterly bioassay program had not been implemented because the licensee was attempting to locate a commercial laboratory or other analytical facility which would analyze the biological samples. The licensee stated it is still attempting to locate a facility that will perform the appropriate bioassay analysis.

According to the licensee, internal occupational doses are determined by the amount of time each worker remains in the RMR and the airborne concentration levels in the room. The airborne concentration levels are calculated from analytical data obtained from the RMR air sampler. Air samples are taken continuously over a 24 hour period and analyzed using a Scintillation Alpha Counter (SAC-4). The licensee assumes that all alpha activity is a result of thorium-232 decay (see

section 4.2, paragraph 3 for details). The licensee calculates the Derived Air Concentration hours (DAC-hours) that each worker may have received by two methods. The first method involves taking the average hourly airborne concentration of the RMR for each day multiplied by the hours spent by each individual in the room that day. This calculation provides the licensee with the number of DAC-hours each worker may have received each day. The second method involves taking the DAC-hours as calculated above and dividing by 50 which is the protection factor for a full face respirator as stated in 10 CFR Part 20, Appendix A.

A review of the licensee's calculations regarding potential internal exposures, when respiratory protection factors were not used, indicates six individuals working in the RMR had greater than 200 DAC-hours and one individual had greater than 2000 DAC-hours for the year 1996. If respiratory protection factors were used to determine internal doses, no individuals would have exceeded 200 DAC-hours. The value of 2,000 DAC-hours (1 ALI) roughly corresponds to a 5 rem (0.05 Sieverts) dose equivalent which is the 10 CFR Part 20 radiation exposure limit.

The licensee stated that the individual who was documented to have received greater than 2,000 DAC-hours was unlikely to have received a 5 rem (0.05 Sieverts) dose because he was provided respiratory protection while he worked in the RMR, and its use of conservative calculated values to determine the airborne activity in the room. However, the licensee removed the individual from working in the RMR until the individual received a lung bioassay scan to determine the internal dose received while working in the radioactive airborne area. On January 7, 1997, a lung bioassay scan was performed of the above individual at the Kewaunee Nuclear Power Plant under the direction of Helgeson Scientific Services. According to the licensee, the minimal detectable activity of the bioassay program used for thorium-232 analysis was approximately 7.8E-4 microcuries. 10 CFR Part 20 intake limit for occupational workers for thorium-232 is 1E-3 microcuries. The bioassay results on the individual did not identify thorium-232 activity.

5.2.3 Dosimetry Program

The licensee's external dosimetry program consists of whole body and ring badges for individuals handling or working with licensed material. The licensee's internal dosimetry program consists of monitoring the airborne radioactive material concentrations daily in the RMR and using the two methods to assign a dose to a worker as described in section 5.2.2, paragraph 3. According to the licensee, doses calculated using respiratory protection factors are a more accurate reflection of the actual dose received by occupational workers than doses calculated without using respiratory protection factors. However, for the year 1995, the licensee failed to assign a dose to radiation workers who received both internal and external radiation exposures. The licensee stated that they were uncertain which internal dosimetry calculation to use in calculating internal doses, and that uncertainty resulted in the failure to assign internal doses to radiation workers for 1995. According to records provided by the licensee, internal exposures for radiation workers ranged as listed below for 1995 and portions of 1996:

	Respiratory Protection not used in dosimetry calculations: DAC-hours	Respiratory Protection used in dosimetry calculations: DAC-hours
1995 Low/High	0.3/1037	0.006/20
1996 Low/High	0.23/2143	0.004/68

The licensee stated that they are reviewing the feasibility of developing a radiological respiratory program plan for NRC approval in accordance with 10 CFR 20.1703 to be able to use the 10 CFR Part 20, Appendix A radiological protection factors to calculate internal exposures. The licensee plans to provide each worker with a total internal and external exposure history for 1995 and 1996 in the near future.

5.3 Conclusion

The licensee indicated in a letter dated July 19, 1994, referenced in License Condition No. 15, that respiratory protection was not to be used for the purposes of calculating internal doses, and yet the licensee stated during the course of this inspection that it was uncertain on whether or not respiratory protection factors could be used in its calculations to determine internal doses. As a result of the licensee's uncertainty, the licensee permitted an individual, without the use of respiratory protection factors, to receive a calculated committed effective dose equivalent greater than 5 rem in 1996.

In addition, in 1995 the licensee's consultant's audit report stated that the licensee's respiratory protection program was approved as required by 10 CFR 20.1703. However, the licensee has not requested NRC review and approval of its respiratory program.

The NRC is concerned that the licensee's audits of their internal dose assessment and respiratory protection program are inadequate to ensure compliance with NRC requirements.

A bioassay of the individual, who was reported to have received a committed effective dose equivalent of 5 rem, was performed on January 7, 1997. The results of the bioassay indicated that the actual committed effective dose equivalent was not greater than 5 rem. In addition, the NRC understands the licensee uses conservative calculations in determining airborne effluents in the RMR which overestimates the calculated intakes of each occupational worker. Also, the respiratory program, although not authorized by the NRC, may offer some radiological protection regarding intakes to occupational workers. The bioassay results and the other factors as stated above supports the licensee's conclusion that the individual most likely did not receive a committed effective dose equivalent of 5 rem in 1996.

The licensee is reviewing current auditing procedures and developing new auditing procedures to insure compliance with all NRC requirements.

The licensee informed the NRC in a letter dated April 28, 1995, referencing License Condition 15, that all individuals whom the licensee anticipates may be exposed to greater than 10% of the ALI or, equivalently, 200 DAC-hours, the licensee will perform a quarterly urinalysis. However, during the inspection, the licensee stated that several workers that work in the RMR could have received greater than 10% of the ALI but it did not perform a quarterly urinalysis on those workers for 1995 or 1996.

Failure to conduct quarterly urinalysis on workers whom may be exposed to greater than 10% of the ALI or 200 DAC-hours is an apparent violation of License Condition 15.

The licensee is continuing to look for a commercial laboratory which will analyze biological samples to comply with their license condition.

According to the licensee, internal doses were not assigned to radiation workers for 1995. The licensee stated that internal doses were not added to external doses because the licensee was not sure whether respiratory protection factors could be used for the internal dose calculations.

Failure to demonstrate compliance with the dose limits by summing external and internal doses is an apparent violation of 10 CFR 20.1202(a).

The licensee is developing internal dose assessment procedures in order to assign accurate internal doses to occupational workers who work in airborne radioactive material areas.

6. Security

6.1 Inspection Scope

The NRC reviewed the licensee's security program to insure radioactive material was properly secured from unauthorized access or removal.

6.2 Observations and Findings

The licensee uses natural thorium and depleted or natural uranium metals, oxides or salts. The licensee possesses approximately 347 kilograms of thorium and 135 kilograms of uranium. Each kilogram of thorium and uranium corresponds to approximately 100 microcuries (4.0 MBq) and 335 microcuries (12.4 MBq) respectively.

The majority, if not all, thorium processing occurs in the RMR. Uranium repackaging occurs in a glove box outside the RMR. The storage of all radioactive material is located in a storage room on the third floor of the licensee's facility. The

licensee controls access to and unauthorized removal of licensed material by informing all licensee workers where radioactive material is used and/or stored and by maintaining all exterior doors to the facility locked at all times. According to the licensee, second and third shift supervisors perform a security sweep daily to insure that all exterior doors are locked. The RMR, the glove box, where uranium is repackaged, and the storage room are not locked for the purposes of controlling access to licensed material.

On December 18, 1996, at approximately 5:30 p.m., the NRC inspector was conducting a routine security check of all exterior doors of the licensee's facility. The inspector noticed one door on the south side of the building was unlocked. This door provides access to the first floor where the RMR is located. The inspector entered and moved throughout the first floor area until he was able to contact the second shift supervisor. According to the licensee, a maintenance worker was repairing the lock on the unlocked door on December 16, 1996, and most likely left the door unlocked. The second shift supervisor nor the licensee could explain why the door was left unlocked for several days. The supervisor stated he could not specifically remember if he had checked that door to insure the door was locked on the evenings of December 16 or 17, 1996. When the inspector contacted the supervisor on December 18, 1996, the supervisor was in the process of performing a security walk through of the facility.

6.3 Conclusion

On December 18, 1996, the NRC identified an exterior door to the licensee's facility had remained unlocked for several days. In addition, the door identified provided members of the general public or other unauthorized individuals access to licensed material used and/or stored at the licensee's facility.

Failure to secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas is an apparent violation of 10 CFR 20.1801.

The licensee is currently reviewing further methods to insure all licensed material is secured from unauthorized access which will include the retraining of all employee's regarding the closing and locking of all exterior doors. In addition, the licensee is considering the possibility of locking all rooms where radioactive material is used and/or stored within its locked facility.

7. Instrument Calibrations

7.1 Inspection Scope

The NRC reviewed the licensee's radiation detection instrument calibration procedures for adequacy and compliance with its license commitments.

7.2 Observations and Findings

The licensee possesses numerous portable survey instruments which are used during routine and non-routine surveys to determine if radiation fields and/or contamination exists at the facility. These devices are required to be and have been calibrated on an semi-annual basis using a radiation source. The licensee uses an outside contractor to calibrate these radiation detection devices.

The licensee also possesses a Scintillation Alpha Counter (SAC-4) which is used in gross alpha analysis of radioactive effluent air samples which may contain licensed material. Numerous air samples are collected weekly from various locations throughout the facility. In a letter dated March 14, 1994, referenced in License Condition 15, the licensee stated that the Scintillation Alpha Counter will be calibrated and a CHI-squared calculation performed on a semi-annual basis. The calibration of the SAC-4 includes checking the electronic input sensitivity, determining if the probe voltage is correct and the efficiency of the device. The CHI-squared calculation is based on 10 consecutive counts with a calculated value range of acceptance of 3.3 to 17.0.

Records provided by the licensee indicate that since March 1995 the SAC-4 had been calibrated on March 17, 1995, and June 3, 1996. In addition, the records indicated that the last CHI-squared calculation was performed on January 4, 1994. The inspector's review of records regarding the efficiency of the SAC-4 determined no significant changes had occurred over the last several years. According to the licensee, they thought the calibration for the SAC-4 was to be annually and the CHI-squared calculation was to be tested only once when the unit was installed. The licensee stated that as soon as the electronic equipment could be obtained, they would calibrate and perform a CHI-squared calculation on the SAC-4.

7.3 Conclusion

In a letter dated March 14, 1994, referenced in License Condition 15, the licensee stated that the Scintillation Alpha Counter will be calibrated and a CHI-squared calculation performed on a semi-annual basis. However according to the licensee and a selected review of records, the SAC-4 has not been calibrated on a semi-annual basis since March 17, 1995 and the CHI-squared calculation has not been performed since January 1994.

Failure to calibrate and perform a CHI-squared calculation on a Scintillation Alpha Counter semi-annually is an apparent violation of License Condition 15.

The licensee informed the NRC that they would calibrate and perform a CHI-squared calculation on the SAC-4 on a semi-annual basis as required by license condition.

8. Exit Meeting Summary

A preliminary onsite exit meeting was held with the licensee on December 20, 1996. The inspection findings as noted in the report were discussed with the licensee during a telephonic exit meeting on January 23, 1997. The above meetings included discussions of the apparent violations, the NRC enforcement policy and the licensee's preliminary corrective actions.

The licensee did not identify any information reviewed during the inspection as proprietary.

9. Partial List of Persons Contacted

Dan Verzel, President
Mitchell Colton, Radiation Safety Officer
Bob Leidolf, Plant Manager
Tom Peters, Production Manager
Gerry Manlay, Safety Manager
Mark Witzeling, Radiation Safety Technician
Bill Warwick, Safety Technician
Hal Norling, Facility Engineer
Bill Musolf, Process Collector
Kelly Jurena, Furnace Operator B
George Deiewski, Shipping and Receiving Supervisor
Rich Kaczmarski, Second Shift Supervisor

CERTIFICATE OF ANALYSIS

Attachment A

Service Location	Received	Project	Lab ID
HERITAGE ENVIRONMENTAL SERVICES, INC. COMMERCIAL LABORATORY OPERATIONS 1319 MARQUETTE DRIVE ROMEOVILLE, IL 60441 (708)378-1600	27-SEP-96	4146	C181431
	Complete	PO Number	
	15-OCT-96	40034	
	Printed	Sampled	
	16-OCT-96	29-AUG-96	

Report To	Bill To
MARK WITZELING CERAC, INC. P.O. BOX 1178 MILWAUKEE, WI 53201	ACCOUNTS PAYABLE CERAC, INC. P.O. BOX 1178 MILWAUKEE, WI 53201

Sample Description

CLIENT ID: PROCESS DISCHARGE H2O
DESCRIPTION: PROCESS DISCHARGE WATER
BLDG. OUTFALL,FUME SCRUBBER,PROCESS FILTRATE,
.

THORIUM BY PERALS AM 790.0

Analyst: R. BRUCK Analysis Date: 14-OCT-96 Instrument: COUNTER Test: R790.0.0

Parameter	Result	Counting Error	Detection Limit	Units
THORIUM-228	3.10E-08	6.85E-09	2.20E-08	uCi/mL
THORIUM-230	1.33E-09	1.27E-09	2.21E-08	uCi/mL
THORIUM-232	1.99E-09	1.62E-09	3.07E-08	uCi/mL

High detection limits due to high dissolved solids which reduced the aliquot.

GAMMA EMITTING RADIONUCLIDES (10PCI) EPA 901.1

Analyst: R. BRUCK Analysis Date: 03-OCT-96 Instrument: GAMMA SPEC Test: R901.1.0

Parameter	Result	Counting Error	Detection Limit	Units
POTASSIUM-40	3.20E-07	9.56E-08	5.44E-08	uCi/mL
THALLIUM-208	1.22E-07	1.49E-08	8.70E-09	uCi/mL
LEAD-212	3.70E-07	3.01E-08	1.13E-08	uCi/mL
RADIUM-224	5.41E-08	1.49E-07	1.27E-07	uCi/mL
RADIUM-226	3.13E-07	2.21E-07	1.39E-07	uCi/mL
ACTINIUM-228	4.16E-06	1.04E-07	2.07E-08	uCi/mL

Actinium-228 in secular equilibrium with Radium-228

GROSS ALPHA AND GROSS BETA EPA 900.0

Analyst: R. BRUCK Analysis Date: 08-OCT-96 Instrument: COUNTER Test: R900.0.0

Parameter	Result	Counting Error	Detection Limit	Units
GROSS ALPHA	1.95E-05	2.20E-06	7.13E-07	uCi/mL
GROSS BETA	1.22E-05	4.80E-07	5.46E-07	uCi/mL

Very high dissolved solids - 110,000 ppm.

Attachment B

CERAC™ Incorporated

Quality Manufacturing Since 1964

P.O. Box 1178 • Milwaukee, WI 53201-1178 • U.S.A. • Phone: 414-289-9800 • Fax: 414-289-9805

January 8, 1997

Mr. Michael LaFronza, Radiation Specialist
Nuclear Materials Inspection, Section
U.S. Nuclear Regulatory Commission
Region III
801 Warrenville Road
Lisle, IL 60532-4351

fax: 630-515-1259
voice: 630-829-9865

Re: Corrective actions from inspection on 12/18/96 and 12/20/96.

Dear Mr. LaFronza:

The following is in response to some of your comments and concerns raised in your inspection of our licensed operations and the discussion on the phone on 1/2/97. The actions are immediate to maintain compliance while technical and regulatory issues are resolved.

Solubility of liquids released to the sewer:

All process waste water from the RAM room and the RAM room scrubber water is now being held for testing of activity and insolubility before being released to the sewer. A documented sampling and testing protocol is being developed to assure future compliance.

As discussed on the phone, we are also waiting for the results and methods of your testing for evaluation and consideration.

Facility Security:

Facility security and lock-up procedures have been reviewed with all relevant supervisory and management personnel, especially second and third shifts. We have also put new postings on the common access doors stating that they are to be locked at all times. The only exception is the main employee entrance which is left unlocked at the shift changes. We are exploring several options of leaving these doors locked at all times with some form of controlled access for employees. Additionally, to secure our source material and to protect against accidental access, we are planning to have the storage room on the third floor and the main operations room on the first floor routinely locked with controlled access to both areas.

Bioassay/Internal Exposures:

The operator in question (Luis Diaz-Rodriguez) was immediately removed from any radioactive material operations pending the results of the tests described following. A whole body count is scheduled on 1/7/97 at the Kewaunee Power Plant under the direction of Helgeson Scientific Services of Pleasonton, CA. He will also participate in a urine bioassay. As mentioned by Peter Lee, we are also going to evaluate the effect of calculating exposures on an activity basis of 50% Th-232 and 50% Th-228.

SAC-4 Calibration:

This instrument is going to be calibrated this month including the CHI-squared tests as stated in our license application and letters. A sticker with last calibrated and to be calibrated dates will be affixed to the instrument. This procedure will be added to the compliance/operation checklist we are creating. We are also looking into the possibility of acquiring the necessary equipment to perform this procedure in-house.

Evaluation of Air Emissions:

We are going to evaluate the stack emissions per 10 CFR 20.1301/1302 to assure the appropriate protection in unrestricted areas. We are also going to evaluate the effect of calculating emissions on an activity basis of 50% Th-232 and 50% Th-228 as discussed above.

Material Inventory:

A computer output of all radioactive material inventory is attached to this letter. This report or similar will be made available to all relevant Cerac personnel to make it easier to monitor our inventory levels. A table previously included in our letter dated March 15, 1994 showing conversion of compound weights to quantities of source material is also attached.

Ventilation System:

A drawing indicating the main duct systems and their diameters is attached to this letter.

Backup Generators:

This is to verify that the emergency backup power generators, which power the RAM room blowers among other equipment, are tested on a routine, weekly basis, typically Sunday nights on third shift.

Ventilation Alarms:

This is to verify that the visual and audio ventilation alarms for the RAM room are tested on a routine, monthly basis, typically during the monthly facility survey. We will be documenting these tests in the future. We are looking at whether the electronic photohelic gauges can be calibrated.

I believe these are the items for which you wanted an immediate response. We will continue to work on the other items discussed and provide written information to you as appropriate. If there is any additional information needed at this time, please let me know.

Sincerely,

Dr. Mitchell C. Colton
Radiation Safety Officer

Alternate Key	Description Line 1	Description Line 2	Item	Qty On Hand	Stk U/M
TH 2N8	THORIUM METAL, Th	-100 mesh, Typ. 99.8% pure	T-1074	1,398	G
TH 2N8	THORIUM METAL, Th	Typ. 99.8% pure	T-1074-SPEC	470	G
TH(NO3)4-4H2O	THORIUM NITRATE, Th(NO3)4-4H2O	-4 mesh, Typ. 99.8% pure	T-1258	117,730	G
TH(NO3)4-4H2O	THORIUM NITRATE, Th(NO3)4-4H2O	granular, Typ. 99.8% pure	[TH(NO3)4-1	400,000	G
TH3N4 2N5	THORIUM NITRIDE, Th3N4	-100 mesh, Typ. 99.5% pure	T-1087	80	G
TH3P4 2N5	THORIUM PHOSPHIDE, Th3P4	-100 mesh, Typ. 99.5% pure	T-1092	54	G
THB4 2N8	THORIUM BORIDE, ThB4	-100 mesh, Typ. 99.8% pure	T-1077	700	G
THB6 2N8	THORIUM BORIDE, ThB6	-100 mesh, Typ. 99.8% pure	T-1078	50	G
THBR4 2N5	THORIUM BROMIDE, ThBr4	-8 mesh, Typ. 99.5% pure	T-1079	125	G
THC 2N5	THORIUM CARBIDE, ThC	-40 mesh, Typ. 99.5% pure	T-1080	300	G
THC2 2N5	THORIUM CARBIDE, ThC2	-40 mesh, Typ. 99.5% pure	T-1081	150	G
THCL4-XH2O 3N	THORIUM CHLORIDE, ThCl4-xH2O	25 mm pcs & smaller, Typ 99.9%	T-1208	1,900	G
THF4 3N	THORIUM FLUORIDE, ThF4	1-1/2" cone, Typ. 99.9% pure	EC-156-1-1/2"	3	EA
THF4 3N	THORIUM FLUORIDE, ThF4	1-1/8" cone, Typ. 99.9% pure	EC-156-1-1/8"	2	EA
THF4 3N	THORIUM FLUORIDE, ThF4	7/8" cone, Typ. 99.9% pure	EC-156-7/8"	4	EA
THF4 3N	THORIUM FLUORIDE, ThF4	unsized, N2 melted, Typ. 99.9%	[THF4-N	16,649	G
THF4 4N	THORIUM FLUORIDE, ThF4	-1/8", +20 mesh, 99.99% pure	T-2025	5,965	G
THF4 4N	THORIUM FLUORIDE, ThF4	-1/8, +1/16" pcs, 99.99% pure	T-2026	800	G
THF4 4N	THORIUM FLUORIDE, ThF4	-200 mesh, Typ. 99.99% pure	T-1084	9,747	G
THF4 4N	THORIUM FLUORIDE, ThF4	-50, +200 mesh, 99.99% pure	T-1236	33,125	G
THF4 4N	THORIUM FLUORIDE, ThF4	1-3 mm pcs, Typ. 99.99% pure	T-2024	1,325	G
THF4 4N	THORIUM FLUORIDE, ThF4	1-6 mm pcs, Typ. 99.99% pure	T-2024-1	368	G
THF4 4N	THORIUM FLUORIDE, ThF4	1.7-3 mm pcs, Typ. 99.99% pure	T-1235	8,010	G
THF4 4N	THORIUM FLUORIDE, ThF4	1.7-3 mm pcs, Typ. 99.99% pure	T-1254	15,212	G
THF4 4N	THORIUM FLUORIDE, ThF4	1.7-3 mm pcs, Typ. 99.99% pure	T-1256	8,279	G
THF4 4N	THORIUM FLUORIDE, ThF4	3-6 mm pcs, Typ. 99.99% pure	T-1083	30,692	G
THF4 4N	THORIUM FLUORIDE, ThF4	3-6 mm pcs, Typ. 99.99% pure	T-1253	2,867	G
THF4 4N	THORIUM FLUORIDE, ThF4	3-6 mm pcs, Typ. 99.99% pure	T-1255	4,607	G
THF4 4N	THORIUM FLUORIDE, ThF4	Typ. 99.99% pure	T-1083-SPEC	12,096	G
THF4 4N	THORIUM FLUORIDE, ThF4	Typically 99.99% pure	T-1255-SPEC	26	G
THF4 4N	THORIUM FLUORIDE, ThF4	Typically 99.99% pure	T-1256-SPEC	5,500	G
THF4 4N	THORIUM FLUORIDE, ThF4	unmelted, unsized, Typ. 99.99%	[THF4-1	14,461	G
THF4 4N	THORIUM FLUORIDE, ThF4	unsized, ABF melted, 99.99%	[THF4-A	42,850	G
THF4 4N	THORIUM FLUORIDE, ThF4	unsized, SF6 melted, 99.99%	[THF4-F	41,809	G
THH3 2N5	THORIUM HYDRIDE, ThH3	-60 mesh, Typ. 99.5% pure	T-1085	100	G
THO2 2N	THORIUM OXIDE, ThO2	cruc., 1/4 x 3/8 x 3/64", 99%	CR-134	40	EA
THO2 2N	THORIUM OXIDE, ThO2	crucible, 1/4x5/8x3/64", 99%	CR-168	79	EA
THO2 2N	THORIUM OXIDE, ThO2	crucible, 99% pure	CR-128	18	EA
THO2 2N	THORIUM OXIDE, ThO2	crucible,3/8x1/2x3/64",99%	CR-160	16	EA
THO2 3N	THORIUM OXIDE, ThO2	Typ. 99.9% pure	T-1209-SPEC	930	G
THO2 4N	THORIUM OXIDE, ThO2	-325 mesh, Typ. 99.99% pure	T-1088	82,065	G
THO2 4N	THORIUM OXIDE, ThO2	1-1/8" cone, Typ. 99.99% pure	EC-143-1-1/8"	7	EA
THO2 4N	THORIUM OXIDE, ThO2	7/8" cone, Typ. 99.99% pure	EC-143-7/8"	5	EA
THO2 4N	THORIUM OXIDE, ThO2	target, Typ. 99.99% pure	SS-113-SPEC	7	EA
THO2-Y2O3 2N	THORIUM OXIDE-YTTRIA STAB.	crucible 1/2 x 1/2 x 3/64" 99%	CR-121-B	1	EA
THO2-Y2O3 2N	THORIUM OXIDE-YTTRIA STAB.	crucible 3/8 x 1/2 x 3/64" 99%	CR-121-A	1	EA
THO2-Y2O3 2N	THORIUM OXIDE-YTTRIA STAB.	crucible, 3/8 x 1 x 3/64", 99%	CR-121-C	1	EA
THO2-Y2O3 2N	THORIUM OXIDE-YTTRIA STAB.	crucible,1/2x2-3/16x1/16", 99%	CR-121-D	1	EA
THS2 2N5	THORIUM SULFIDE, ThS2	-100 mesh, Typ. 99.5% pure	T-1095	50	G
THSE2 2N5	THORIUM SELENIDE, ThSe2	-80 mesh, Typ. 99.5% pure	T-1093	125	G
THSI2	THORIUM SILICIDE, ThSi2	-80 mesh, Typ. 99.5% pure	T-1094	440	G
Y2O3-THO2 3N	YTTRIUM-THORIUM OXIDE	90-10 (wt%), 3-12mm pcs, 99.9%	Y-1056	5,250	G
Y2O3-THO2 3N	YTTRIUM-THORIUM OXIDE 90-10wt%	Typ. 99.9% pure	Y-1056-SPEC	1,805	G
				868,295	

Report total (count = 53):

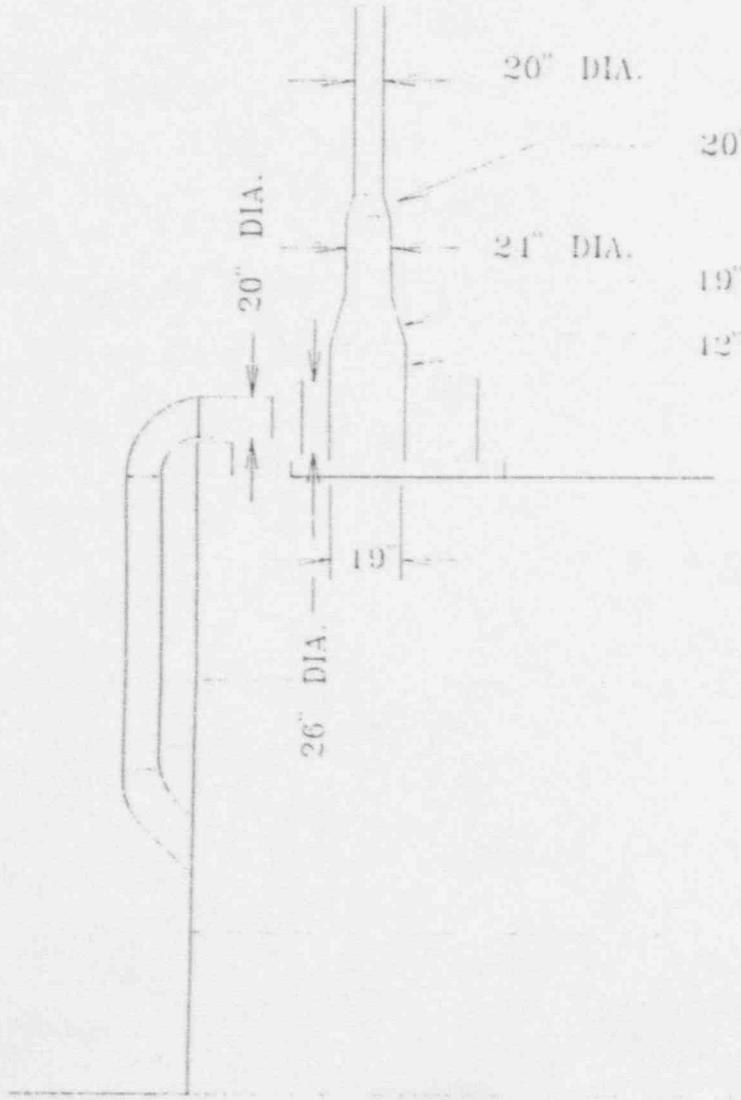
Alternate Key	Description Line 1	Description Line 2	Item	Qty On Hand	Stk U/M
NH4)2U2O7 2N5	AMMONIUM DIURANATE, (NH4)2U2O7	-80 mesh, Typ. 99.5% pure	A-1024	1,050	G
NH4)2U2O7 2N5	AMMONIUM DIURANATE, (NH4)2U2O7	Typ. 99.5% pure	A-1024-SPEC	85,000	G
U 2N7	URANIUM METAL, U	-60 mesh, Typ. 99.7% pure	U-1000	2,920	G
U 2N7	URANIUM METAL, U	turnings, Typ. 99.7% pure	U-1023	1,433	G
U3O8 2N	URANIUM OXIDE, U3O8	-100 mesh, Typically 99% pure	U-1005	2,886	G
U3P4 2N5	URANIUM PHOSPHIDE, U3P4	-100 mesh, Typ. 99.5% pure	U-1007	10	G
UB4 2N5	URANIUM BORIDE, UB4	-8 mesh, Typ. 99.5% pure	U-1001	57	G
UBR4 2N7	URANIUM BROMIDE, UBr4	-60 mesh, Typ. 99.7% pure	U-1018	50	G
UF5 2N7	URANIUM FLUORIDE, UF5	-8 mesh, Typ. 99.7% pure	U-1022	242	G
UH3 2N5	URANIUM HYDRIDE, UH3	-100 mesh, Typ. 99.5% pure	U-1017	177	G
UN1.2-1.8 3N	URANIUM NITRIDE, UN1.2-1.8	-100 mesh, Typ. 99.9% pure	U-1003	620	G
UO2 2N8	URANIUM OXIDE, UO2	-100 mesh, Typ. 99.8% pure	U-1004	600	G
UO2(C2H3O2)2-6	URANYL ZINC ACETATE, crystals	UO2(C2H3O2)2-6Zn(C2H3O2)2 3N	U-2003	4,750	G
UO2(C2H3O2)2 3N	URANYL ACETATE, UO2(C2H3O2)2 -	2H2O, Crystals, 99.9% pure	U-2001	82,514	G
UO2(NO3)2 3N	URANYL NITRATE, UO2(NO3)2-6H2O	Crystals, Typ. 99.9% pure	U-2000	47,597	G
UO2CL2-XH2O	URANYL CHLORIDE, UO2CL2-XH2O	-60 mesh, Typ. 99.5% pure	U-1015	1,365	G
UO2F2 2N5	URANYL FLUORIDE, UO2F2	3/96-no longer available	U-1016	50	G
UO2SO4-3.5H2O	URANYL SULFATE, UO2SO4-3.5H2O	crystals, Typ. 99.9% pure	U-2002	2,375	G
UO3 2N8	URANIUM OXIDE, UO3	-100 mesh, Typ. 99.8% pure	U-1006	36,860	G
UTE2 2N5	URANIUM TELLURIDE, UTe2	-80 mesh, Typ. 99.5% pure	U-1011	35	G
				270,591	

Report total (count 20):

CERAC, inc.
ATTACHMENT 1, control number 96209

Formula	Weight % Th/U	name
Th(NO3)4-4H2O	42.03%	thorium nitrate
ThF4	75.33%	thorium fluoride
ThO2	87.88%	thorium oxide
Th	100.00%	thorium metal
ThI4	31.37%	thorium iodide
ThCl4	61.41%	thorium chloride
UO2(C5H7O2)2	50.83%	uranyl acetylacetonate
UO2(C2H3O2)2-2H2	56.12%	uranyl acetate
UO2(NO3)2-6H2O	47.40%	uranyl nitrate
(NH4)2U2O7	76.28%	ammonium diurante
UO2SO4-3.5H2O	55.47%	uranyl sulfate
U	100.00%	uranium metal
UO2	88.15%	uranium oxide
U3O8	84.80%	uranium oxide
UO3	83.22%	uranium oxide
UCl4	62.01%	uranium chloride

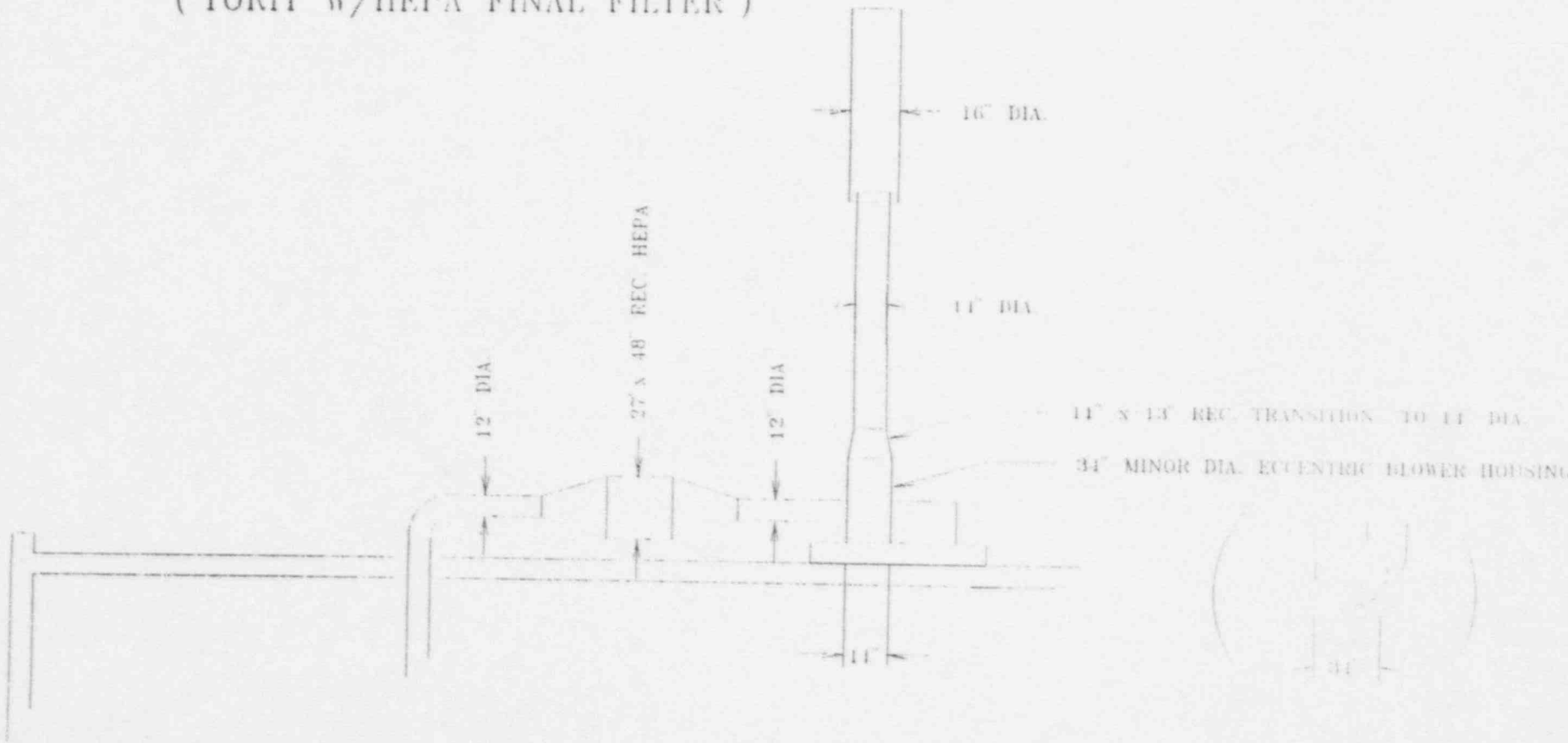
STACK # 2
(TRI-MER WET FUME SCRUBBER)



7/11/91

STACK # 3

(TORIT W/HEPA FINAL FILTER)



7/11/91

RADIATION SAFETY PROGRAM INSPECTION

Licensee: Cerac, Inc.

Address: P.O. Box 1178, Milwaukee, WI 53201-1176

License No.: SMB-1402

Expiration Date: March 31, 2000

Inspected By: S. Engelhardt Inspection Date: 18 March 96

Reviewed By: _____ Date Reviewed: _____

PROGRAM DESCRIPTION

1. Type of License: Specific

2. Dates and Description of Amendments: Renewed

3. Description of Licensed activities: Thorium - Uranium

4. Primary Location(s) of Use: In main plant

5. Radionuclides used and balances (attach most recent inventory if available):
   N/A - Have a continuous inventory

6. Radiation Safety Officer (RSO): Mitch Colton

7. Other Radiation Safety Staff: Mark Witzling

8. Number of Authorized Users: Licensee record

9. Total Number of Users and Number Badged: Licensee record

INSPECTION FINDINGS (see next page)

10 CFR Part 20 - STANDARDS FOR PROTECTION AGAINST RADIATION

The regulations in 10 CFR Part 20 apply to persons licensed by the Nuclear Regulatory Commission (NRC) to receive, possess, use, transfer, or dispose of byproduct, source, or special nuclear material or to operate a production or utilization facility under Parts 30 through 36, 39, 40, 50, 60, 61, 70 , 72, or 76.60 of 10 CFR. The limits in Part 20 do not apply to background radiation, to exposure of patients to radiation for the purpose of medical diagnosis or therapy, or to voluntary participation in medical research programs.

Part A	Radiation Protection Programs	Yes	No	NA
A.1	A written radiation protection program has been developed and includes provisions for maintaining doses as low as is reasonably achievable (ALARA). 10 CFR 20.1101(a)(b), 20.2102	☒	☐	☐
A.2	The radiation protection program is reviewed periodically (at least annually) and records of these reviews/audits are retained as required. 10 CFR 20.1101(c), 20.2102	☒	☐	☐
A.3	License specific requirements for the radiation protection program are in place (see notes).	☒	☐	☐

Notes: Bioassays - These need to be set up as soon as possible. It does not seem likely that any one was exposed to an inhalation/ingestion hazard, but these are needed.

Part B	Radiation Dose Limits and Monitoring	Yes	No	NA
B.1	The ocupational dose to individual adults is controlled to remain within the applicable dose limits, except for planned special exposures. 10 CFR 20.1201(a)	☐	☐	☒
B.2	The occupational dose to minors is controlled to remain within 10 % of the annual dose limits specified for adults. 10 CFR 20.1207	☐	☐	☒
B.3	The dose to an embryo/fetus due to occupational exposure of a declared pregnant woman is controlled to remain within 0.5 rem during the entire pregnancy (or within 0.05 rem during the remainder of the pregnancy if the dose has exceeded 0.5 rem by the time the woman declares the pregnancy), and efforts are made to avoid substantial variation above a uniform monthly exposure rate. 10 CFR 20.1208	☐	☐	☒

Part B	Radiation Dose Limits and Monitoring (continued)	Yes	No	NA
B.4	Soluble uranium intake by any individual is limited to 10 mg in a week in consideration of chemical toxicity. 10CFR 20.1201(e) glove box/repackage only	☐	☐	☒
B.5	The dose that an individual is allowed to receive in the current year is reduced by the amount of occupational dose received while employed elsewhere. 10 CFR 20.1201(f), 20.2104(e) need to assess this	☐	☒	☐
B.6	External and internal doses are summed to demonstrate compliance with applicable dose limits. Note: Summation is not required if monitoring is required only under §20.1502(a) or only under §20.1502(b). 10 CFR 20.1202 this is being done now	☒	☐	☐
B.7	When determining external dose from airborne radioactive material, the contribution to the deep-dose equivalent, eye dose equivalent, and shallow dose equivalent is included. 10 CFR 20.1203	☒	☐	☐
B.8	When assessing dose to determine compliance with occupational dose limits, measurements are taken of concentrations of radioactive materials in air or work areas and/or quantities of radionuclides in the body or excreted from the body. 10 CFR 20.1204	☒	☐	☐
B.9	Planned special exposures are authorized only in situations where alternatives that might avoid the higher exposure are unavailable or impractical, and the provisions of §20.1206(b)-(g) are satisfied. 10 CFR 20.1206(a)	☐	☐	☒
B.10	Occupational doses received in excess of the annual limits are subtracted from the limits for planned special exposures that the individual may receive during the current year and during the individual's lifetime. 10 CFR 20.1201(b), 20.1206(e)(1)(2)	☐	☐	☒
B.11	Operations are conducted so that the total effective dose equivalent to individual members of the public does not exceed 0.1 rem in a year (exclusive of dose contribution from disposals to the sanitary sewer per §20.2003), and dose in any unrestricted area does not exceed 0.002 rem in any one hour. 10 CFR 20.130(a)	☒	☐	☐
B.12	Compliance with applicable Environmental Protection Agency (EPA) radiation standards in 40 CFR Part 190 is maintained (e.g., NESHAPS). 10 CFR 20.1301(d)	☒	☐	☐
B.13	Surveys of radiation levels in, and radioactive materials in effluents released to, unrestricted and controlled areas have been made to demonstrate compliance with the dose limits for members of the public. 10 CFR 20.1302(a)(b)	☒	☐	☐

Liquids - more detailed protocal is being developed.

B.14	Personnel dosimeters (except pocket ionization chambers and extremity dosimeters) that are used to comply with §20.1201 or other applicable provisions are evaluated by a dosimetry processor holding NVLAP accreditation for the approximate types of radiations being monitored. 10 CFR 20.1501(c) Dosimeter Vendor: Landauer	☒	☐	☐
B.15	Dosimeters are supplied and required for use by adults likely to receive, in 1 year from sources external to the body, an occupational dose in excess of 10% of the applicable limits in §20.1201(a). 10 CFR 20.1502(a)	☒	☐	☐
B.16	Dosimeters are supplied and required for use by minors and declared pregnant women likely to receive, in 1 year from sources external to the body, a dose in excess of 10% of the applicable limits in §20.1207 or §20.1208. 10 CFR 20.1502(a)	☐	☐	☒
B.17	Dosimeters are supplied and required for use by individuals entering a high or very high radiation area. 10 CFR 20.1502(a)	☒	☐	☒
B.18	The occupational intake of radioactive material and committed effective dose equivalent is assessed for adults likely to receive, in 1 year, an intake in excess of 10 % of the applicable ALI(s) of table 1, Appendix B to 10 CFR 20. 10 CFR 20.1502(b)	☒	☐	☐
B.19	The occupational intake of radioactive material and committed effective dose equivalent is assessed for minors and declared pregnant women likely to receive, in 1 year, a committed effective dose equivalent of 0.05 rem. 10 CFR 20.1502(b)	☐	☐	☒
B.20	License specific requirements for monitoring and measuring occupational doses or doses to members of the public are in place (see notes).	☒	☐	☐

Notes: _____

Part C	Surveys and Monitoring	Yes	No	NA
C.1	Surveys are conducted as necessary and reasonable to evaluate radiation levels, concentrations or quantities of radioactive material, and the potential radiological hazards that could be present. 10 CFR 20.1501(a) Survey frequency: monthly/as need - moved/changed Date of last survey: 22 Feb 96 weekly - change room	☒	☐	☐

C.2	Instruments and equipment used for quantitative radiation measurements are calibrated periodically for the radiation measured. 10 CFR 20.1501(b) Calibration frequency: 6 months Date of last calibration: 12/5/95 (1) 1/13/96 (2) 1/30/96 (3) SAC-4 May/Abacus - Dee 4 In-house	☒	☐	☐
C.3	License specific survey and monitoring requirements are in place (see notes).	☐	☐	☐

Notes: Air pumps - periodically checked. A more detailed procedure is being developed.

Part D	Control of Exposure From External Sources In Restricted Areas	Yes	No	NA
D.1	Each entrance or access to a high radiation area (>0.1 rem in 1 hr at 30 cm from the radiation source/surface) has one or more of the controls or features specified in §20.1601(a) or (b). 10 CFR 20.1601	☐	☐	☒
D.2	Additional measures are in place to prevent unauthorized or inadvertent access to very high radiation areas (≥500 rad in 1 hr at 1 m from the radiation source/surface). 10 CFR 20.1602	☐	☐	☒
D.3	License specific requirements for control of exposure from external sources are in place (see notes).	☒	☐	☐

Notes: D.3 - Certain components are being re-evaluated. Are using PDM's to verify info. on exposures. Use time factors where nothing else is available.

Part E	Respiratory Protection and Controls to Restrict Internal Exposure In Restricted Areas	Yes	No	NA
E.1	Process or other engineering controls are used to the extent practicable to control the concentration of radioactive materials in air. 10 CFR 20.1701 see comments	☒	☐	☐
E.2	When process or other engineering controls are not practicable in airborne radioactivity areas (areas where concentrations are > DACs specified in Appendix B to §§20.1001-20.2401, or concentrations that could cause an individual intake of 0.6% of the ALI, i.e., 12 DAC-hours, in 1 week), intakes are limited by control of acces, limitation of exposure times, use of respiratory protection equipment, and/or other controls. 10 CFR 20.1702	☒	☐	☐

E.3	Respiratory equipment used to limit intakes pursuant to §20.1702 or as emergency devices is NIOSH/MSHA tested and certified. 10 CFR 20.1703(a)(2),(c)	☒	☐	☐
E.4	A written respiratory protection program and policy statement on respirator useage has been implemented. 10 CFR 20.1703(a)(3),(4)	☒	☐	☐
E.5	The NRC Regional Office was notified at least 30 days before respiratory protection equipment was first used under the provisions of §20.1703(a) or (b). 10 CFR 20.1703(d) as part of license	☒	☐	☐
E.6	License specific requirements for respiratory protection and controls to restrict internal exposures in restricted areas are in place (see notes).	☐	☐	☒

Notes: E.1 - 3rd floor storage area needs additional ventilation.
E.2 - 3rd floor - badged persons and under time limitations. Uncontrolled - arsenic folks are limited to less than 30 minutes - Suggestion: air monitor for area.

E.6 - No NRC approved program, but have OSHA protection program.

Part F	Storage and Control of Licensed Material	Yes	No	NA
F.1	Licensed materials stored in controlled or unrestricted areas are secured from unathorized removal or access. 10 CFR 20.1801 Security method(s): building locked electronic system tells them door unlocked	☒	☐	☐
F.2	Control and constant surveillance of licensed materials in controlled or unrestricted areas, that are not in storage, is maintained. 10 CFR 20.1802 Control/surveillance method(s): whole building is a restricted area	☒	☐	☐
F.3	License specific requirements for storage and control of licensed materials are in place (see notes).	☒	☐	☐

Notes: F.3 - Is done in accordance with license.

Part G	Precautionary Procedures	Yes	No	NA
G.1	Each radiation area (>0.005 rem in 1 hr at 30 cm from the radiation source/surface) is conspicuously posted with a "CAUTION, RADIATION AREA" sign and symbol, unless excepted per §20.1903. 10 CFR 20.1902(a) Location(s):_____	☐	☐	☒
G.2	Each high radiation area (>0.1 rem in 1 hr at 30 cm from the radiation source/surface) is conspicuously posted with a "CAUTION, HIGH RADIATION AREA" or "DANGER, HIGH RADIATION AREA" sign and symbol, unless excepted per §20.1903. 10 CFR 20.1902(b) Location(s):_____	☐	☐	☒
G.3	Each very high radiation area (>500 rad in 1 hr at 1 m from the radiation source/surface) is conspicuously posted with a "GRAVE DANGER, VERY HIGH RADIATION AREA" sign and symbol, unless excepted per §20.1903. 10 CFR 20.1902(c) Location(s):_____	☐	☐	☒
G.4	Each airborne radioactivity area (areas where concentrations are > DACs specified in Appendix B to §§20.1001-20.2401, or concentrations that could cause an individual intake of 0.6% of the ALI, i.e., 12 DAC-hours, in 1 week) is conspicuously posted with a "CAUTION, AIRBORNE RADIOACTIVITY AREA" or "DANGER, AIRBORNE RADIOACTIVITY AREA" sign and symbol, unless excepted per §20.1903. 10 CFR 20.1902(d) Location(s): posted even though not at that level	☒	☐	☐
G.5	Each room or area where licensed material exceeding 10X the quantities in Appendix C to §20.1001-20.2401 is used or stored is posted with a "CAUTION, RADIOACTIVE MATERIAL(S)" or "DANGER, RADIOACTIVE MATERIAL(S)" sign and symbol, unless excepted per §20.1903. 10 CFR 20.1902(e) Location(s):_____	☒	☐	☐
G.6	Each container of licensed material bears a durable, clearly visible "CAUTION, RADIOACTIVE MATERIAL" or "DANGER, RADIOACTIVE MATERIAL" label and other information to permit others to take precautions, unless excepted per §20.1905 (e.g., containers holding < Appendix C to §§20.1001-20.2401 quantities). 10 CFR 20.1904 Example(s):_____	☒	☐	☐
G.7	Radioactive material labels are removed or defaced prior to disposal of empty uncontaminated containers to unrestricted areas. 10 CFR 20.1904(b)	☒	☐	☐
G.8	Arrangements are made for expeditious receipt of any package containing greater than Type A quantities of radioactive material. 10 CFR 20.1906	☒	☐	☐

G.9	The external surfaces of a labeled package (i.e., White I, Yellow II, or Yellow III label) are monitored for radioactive contamination as soon as practicable and not later than 3 hr after receipt during normal working hours (or within 3 hr of the beginning of the next working day if received after normal working hours), unless the package contains a gas or special form material. 10 CFR 20.1906(b)(1)	☒	☐	☐
G.10	The external surfaces of a labeled package are monitored for radiation levels as soon as practicable and not later than 3 hr after receipt during normal working hours (or within 3 hr of the beginning of the next working day if received after normal working hours), unless the package contains ≤ a Type A quantity. 10 CFR 20.1906(b)(2)	☒	☐	☐
G.11	The external surfaces of any package are monitored for radioactive contamination and radiation levels as soon as practicable if there is evidence of package degradation or loss of integrity (e.g., crushed, wet, damaged). 10 CFR 20.1906(b)(3),(f)	☒	☐	☐
G.12	The final delivery carrier and NRC Regional Office was immediately notified of any package with removable surface contamination > §71.87(I) limits or external radiation levels > §71.47 limits. 10 CFR 20.1906(d)	☐	☐	☒
G.13	Written procedures for safely opening radioactive material packages are followed and due consideration is given to any special package opening instructions. 10 CFR 20.1906(e)	☒	☐	☐
G.14	License specific precautionary procedures for posting and receiving and opening packages are in place (see notes).	☒	☐	☐

Notes: _____

Part H	Waste Disposal	Yes	No	NA
H.1	Pursuant to §20.2001(a), licensed material is only disposed of (check each that applies): ☒ By transfer to an authorized recipient (see H.__) ☐ By decay in storage (see H.__) ☐ By release in effluents within the limits in §20.1301 (see B.11,B.12) ☐ As authorized by §§20.2002-20.2005 (see H.___-H.__)	☒	☐	☐
H.2	Wastes containing licensed materials are not received from other persons, except as specifically licensed. 10 CFR 20.2001(b)	☒	☐	☐

H.3	Only material that is readily soluble in water, or that is readily dispersible biological material, is discharged to the sanitary sewer. 10 CFR 20.2003(a)(1) checking for sure	☒	☐	☐
H.4	The quantity of radioactive material, excluding patient excreta, released to the sewer in 1 month divided by the average monthly volume of water released to the sewer does not exceed the concentration listed in Table 3 of appendix B to §§20.1001-20.2401 (using sum of the fractions for multiple nuclides). 10 CFR 20.2003(a)(2)(3),(b) Example(s):_____	☐	☐	☒
H.5	The total quantity of radioactive material released to the sanitary sewer in 1 year, excluding patient excreta, does not exceed 5 Ci of ^{3}H, 1 Ci of ^{14}C, or 1 Ci of all other materials combined. 10 CFR 20.2003(a)(4),(b) Total released:_____	☐	☐	☒
H.6	Only material in a form and concentration specified in §20.2005 (animals and scintillation fluids), as waste oils or residues of waste oils from nuclear power plants, or as specifically approved by the NRC pursuant to §20.2002 is incinerated. 10 CFR 20.2004	☐	☐	☒
H.7	Liquid scintillation counting media containing ≤ 0.05 μCi/g of ^{3}H or ^{14}C is disposed of as if it were not radioactive. 10 CFR 20.2005(a)(1)	☐	☐	☒
H.8	Animal tissues containing ≤ 0.05 μCi/g of ^{3}H or ^{14}C, averaged over the weight of the entire animal, is disposed of as if it were not radioactive, but not in a manner that permits its use as food for humans or animals.. 10 CFR 20.2005(a)(2),(b)	☐	☐	☒
H.9	Transfers of low-level radioactive waste for disposal at a land disposal facility are accompanied by a shipment manifest that has been certified by the waste generator, and meets the requirements in section III of Appendix F to §§20.1001-20.2401. 10 CFR 20.2006	☒	☐	☐
H.10	License specific waste disposal procedures and authorizations are in place (see notes).	☒	☐	☐

Notes: _____