

70-371

# UNC Naval Products

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IN REPLY PLEASE REFER TO:  
NIS 91-03-17

March 26, 1991

U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Attn.: Mr. George H. Bidinger, Section Leader  
Uranium Fuel Section  
Fuel Cycle Safety Branch  
Division of Industrial and  
Medical Nuclear Safety, NMSS

Dear Mr. Bidinger,

Attached is our reply to your letter dated March 22, 1991 which requested additional information for the application dated March 18, 1991.

If you have any questions regarding this matter, please contact Don Luster at (303) 848-1511 ext. 2569.

Sincerely,

*R. J. Gregg*  
R. J. Gregg, Director  
Technical Services

RJG:maj

Attachment

cc: D. R. Luster  
J. Roth (NRC)  
Dr. S. Soong (NRC)

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A UNC Company

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## NRC REQUEST:

1. Provide a description of survey instruments being used and their lower limits of detection.

## UNC REPLY:

1. Primary Sampling and Analytical Equipment:

Direct Radiation Measurements

Bicron Corporation, Newbury, Ohio

Model Frisk Tech Rate Meter/Monitor

Model A-50 Alpha Scintillation Detector

Eberline Instrument Corporation, Santa Fe, New Mexico

Model RM-19 Radiation Monitor

Model HP-210 "Pancake" GM Detector

Lucium Instrument Corporation, Sweetwater, Texas

Model 3 Survey Meter

Model 12 Survey Meter

Model 19 Micro R Survey Meter

Model 43-2 Alpha Scintillation Detector

Model 43-65 Alpha Scintillation Detector

Model 44-2 Gamma Scintillation Detector

Model 44-9 "Pancake" GM Detector

Model 239-1F Floor Monitor System with Model 43-37 Gas Flow  
Detector and Model 2221 Single Channel Analyzer

Laboratory Analysis

Tennelec Incorporated, Oak Ridge, Tennessee

Model LB 5100 Low Background Counting System

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## 1. UNC REPLY (Continued)

### Final Alpha and Beta-Gamma Contamination Measurements:

Measurements of total alpha activity were performed on floors and walls up to two meters on each grid block. Count rates in cpm were converted to disintegration rates (dpm/100 cm<sup>2</sup>) by multiplying the rate by a factor which corrected for the 4 pi efficiency of the probe and the active area of the detector. Effective window area for the alpha probe was approximately 50 cm<sup>2</sup>. The minimum detection level for the alpha counting system is approximately 50 pCi/probe area or 100 pCi/100 cm<sup>2</sup>. A typical survey involves placing the probe in contact with the surface being surveyed for a minimum of five seconds and listening for an audible response. If an audible response is noted, the probe is kept at the measurement grid point for an additional ten seconds. If additional clicking occurs, the probe is held at that point for one minute and the total counts are recorded or the count rate is read and converted into dpm/probe. A count rate of approximately 100 dpm/probe (50 pCi) is considered to be the equivalent of non-detectable.

For beta-gamma measurements, floors and walls up to two meters were slowly scanned in each grid block with a beta-gamma probe to identify elevated counts above background and "hot spots", if any. Fixed beta-gamma readings were then taken. Count rates in cpm were converted to dpm/100 cm<sup>2</sup> by taking the net cpm and multiplying by a factor which corrects for 4 pi efficiency of the probe and the active area of the detector. Effective window area for this probe is approximately 15 cm<sup>2</sup>. The minimum detectable level based on typical background counts of 60-90 cpm for this detector is approximately 1000 dpm/100 cm<sup>2</sup>.

### Removable Contamination Measurements:

Smear measurements were performed on numbered filter paper disks and placed in labeled smear booklets with the item/location recorded. They were counted in a low background gas proportional counting system. The minimum detectable activity calculated for this system as set up for processing these smears is approximately 24 dpm where there is a 5% chance that the smear with 24 dpm of activity will be counted as less than the MDA and a 5% chance that the smear with zero activity will be counted as exceeding the MDA.

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## NRC REQUEST:

2. Please provide radioactive standard sources used for instrument calibration.

## UNC REPLY:

### 2. INSTRUMENT/PROBE

Eberline Model AC-3  
Ludlum Model 43-2  
Ludlum Model 43-65  
Ludlum Model 43-37

Bicron Model A-50

Pancake Probes

Tennelec Model LB 5100

### STANDARD SOURCES

Eberline Model S94-1 and S94-4 Source sets using electroplated Pu<sup>239</sup> permanently fixed to a nickel disc without any covering over the active surface. Sources cover 4 decades.  
U<sup>235</sup> sources  
Mini Pulser

Bicron H type Alpha Source and Holder Set modified for use with Bicron A-50 probe; four Th230 sources to cover 4 decades.

Technecium 99 source and mini pulser

Alpha-U<sup>235</sup> standard;  
Beta-technecium 99 standard

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## NRC REQUEST:

3. Provide a description of survey techniques used to generate an average for each grid block.

## UNC REPLY:

3. Survey blocks for each survey unit will either be 2 meter square or 1 meter square. Within each block we will survey to determine average and maximum levels of contamination and radiation as follows:

### For Average Levels:

- o 5 alpha fixed dpm/100 cm<sup>2</sup>
- o 5 beta gamma fixed dpm/100 cm<sup>2</sup>
- o 2 gamma fixed micro-R/hour
- o 1 smear alpha and beta dpm/100 cm<sup>2</sup>

### For Maximum Point:

- o 1 alpha fixed
- o 1 beta gamma fixed
- o 1 gamma surface
- o 1 smear

### For 1 Meter Square Survey Units

- o Take the five fixed readings - four (4) one foot in towards the center and one (1) in the center
- o Take the smear in the center
- o Take the gamma in the center and upper right
- o Scan the block for the maximum point and take the readings designated.

### For 2 Meter Square Survey Units

- o Take the five fixed readings at uniformly spaced points in 1 meter<sup>2</sup> area in the center of the survey block.
- o Scan the entire 2 meter<sup>2</sup> block for the max. reading. The max. reading may be within the 1 meter<sup>2</sup>, outside it or partially in and out. Take the readings designated.

The entire survey block is scanned with the floor monitor (alpha) or a G-M meter, pancake type, in order to locate the point showing the maximum reading if any. Each type of measurement (including smear samples of measurements of transferable alpha and beta contamination levels) is made at this "alpha or beta maximum point". Because of the interdependence of the conditions being considered, these measurements should locate the maximum or near-maximum of each radiological condition.

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## NRC REQUEST:

4. Provide the gamma exposure rate at 1 meter above the surface in the pit and stairway areas.

## UNC REPLY:

4. GAMMA EXPOSURE RATE AT 1 METER  
ABOVE THE SURFACE

<u>LOCATION (GRID BLOCK)</u>	<u>MICRO R PER HOUR READINGS (BACKGROUND NOT SUBTRACTED)</u>
13 J 13 (Pit)	15
13 J 17 (Pit Hallway)	16
13 H 11 (Pit)	15
13 E 13 (Pit)	16
13 F 9 (Pit)	16
14 PIT 10 (Stairway)	13
14 PIT 17 (Stairway)	14
14 PIT 23 (Stairway)	16
<u>BACKGROUND READINGS</u>	
24 K 22 (Main Floor Unit 2)	14
Corridor Towards Lab	12

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## NRC REQUEST:

5. The reported survey results were obtained for the concrete lined pit area. Is there contamination in or under the liner material? How was this established?

## UNC REPLY:

5. The pit areas were originally epoxyed before operations started and have not been recoated. One pit area was a passive, no traffic area which housed an equipment hydraulic system and an automatic fire suppressant system. A metal grate covered the accessible floor area and prevented any possibility of floor contamination. A smaller pit housed mechanical elevator platforms. These surface areas were cleaned and deconed as necessary. Final surveys verify that all floor areas meet the releasable limits.

## NRC REQUEST:

6. Provide a description of the locations of blocks 14EL1 thru 14EL8 and 14PIT9 thru 14PIT23.

## UNC REPLY:

6. Grid blocks 14EL1 through 14EL8 represents two sets of steps accessing the elevator pit (Map #14) - three steps on the east side E-1, E-2, E-3 and five steps on the west side E-4, E-5, E-6, E-7, and E-8.

Grid blocks 14PIT 9 through 14PIT23 represent the set of stairs in descending order accessing the large pit (grid map #24, Appendix A of the decommissioning report shipped to you on 3-22-91).

## NRC REQUEST:

7. Provide controls and procedures to assure that the pit area is not recontaminated.

## UNC REPLY:

7. The pit area is within the Unit 2 area. All decon work has been completed in this area, final surveys have been reported to the NRC and the area is awaiting confirmatory surveys.

Once the pits are released by the NRC for unrestricted use, UNC will physically lock the entrance doors. There will be no access unless pre-approved by the NIS Department and/or Security. Approved entry would be from clean areas only.

The Unit 2 area remains secured by motion detectors, cameras, door alarms and other controls and procedures in order to continue to support the security portions of our active NRC license.