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November 15, 1984

Director
Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Attn: Document Control Desk

License: CX-10 Docket 50-13

Subject: Answers to questions on decommissioning

Gentlemen:

Questions in regard to B&W's application, dated August 7, 1984, for dismantlement and termination of the CX-10 facility were forwarded by letter dated October 12, 1984. Your questions and B&W's responses are attached.

In addition to the fourteen questions presented in the letter one more was added during a visit to the Lynchburg Research Center by Mr. Harold Bernard. Our response to that question is attached as Number 15.

If you require additional information please don't hesitate to call me.

Very truly yours,

BABCOCK & WILCOX COMPANY
Lynchburg Research Center

Arne F. Olsen
Senior License Administrator

ccm

Subscribed and sworn to before me
this 15th day of November, 1984
City of Lynchburg, Virginia

Notary Public

My commission expires November 2, 1985

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Questions and Responses

1. Describe the operating experience of the CX-10 reactor with respect to:

(a) Contamination events during reactor operation, including spills, radioactive leaks that could penetrate concrete and/or soil, and airborne radioactivty that could contaminate ventilation ductwork, piping etc., that may be of particular concern during dismantling and decontamination.

RESPONSE:

Except for Bay 2, the CX-10 Control Room and the radioactive liquid waste holding tank (RLWHT), all former use areas in Building A addressed in the CX-10 Decommissioning Plan have already been decontaminated and put to general use. No major contamination events or effluent releases are known to have occurred in these areas or in Bay 2 that would warrant special attention during dismantling. Minor contamination incidents included spilling small quantities (e.g., one pellet) of fuel from cut or broken fuel pins. Such spills were infrequent and were cleaned up immediately; they should pose little residual hazard. (Irradiation of CX-10 fuel was so low that the radioactive hazard associated with any residual fuel contamination is essentially the same as that associated with the same quantity of fresh fuel). Other incidents include overflowing the Bay 2 sump when the automatic sump pump failed while moderator was being drained from the CX-10 dump tank. Surveys performed before, during, and after the cleanup of these infrequent spills failed to detect any contamination in the moderator or on the basement floor.

One area which does warrent special consideration during the decommissioning operation is the RLWHT, which the CX-10 facility shared with three other critical facilities (CX-1, CX-12, and CX-19) and a pool reactor (R-47) that were also housed in Building A. This holding tank, which is located underground and outdoors (Figure 2-1 of the Plan), has overflowed on several occasions, flooding the surrounding soil. Routine checks of the radioactive contents made each time the RLWHT was emptied, however, typically revealed little or no radioactivity. The planned survey of the RLWHT, its associated drainlines and the soil basin in which it is located is discussed in the LRC's response to question No. 12.

(b) Existence of any high radiation areas due to radioactivity in systems.

RESPONSE:

There are no high radiation areas associated with CX-10 equipment.

(c) Determination of the integrity of the liquid radwaste disposal system to verify the absence of leakage to the contiguous soil system.

RESPONSE:

There is no operating experience to indicate failure of the CX-10 hot drains or resultant contamination. The survey plan for the hot drain system is discussed in the LRC response to Question No. 12.

(d) Area and airborne radioactivity that may have been cause for grossly exceeding monitoring system alarm set-point levels.

RESPONSE:

See response to Question No. 1(a)

(e) Other radwaste effluent releases that may have exceeded technical specification limits.

RESPONSE:

See response to Question No. 1(a).

(f) Fuel handling and storage.

RESPONSE:

Fuel was handled, used and stored in sealed form in Bay 2 except on a few occasions when analytical quantities of fuel were dissolved in a fume hood in the chemistry laboratory (room H of the Plan) and when pins were cut or broken in Bay 2 as mentioned in 1(a) above.

As mentioned in the LRC's responses to Question No. 12, the power level, duration, and frequency of CX-10 reactor operation was such that the fission product inventory in the fuel has been kept extremely low. Except just after operation, the fission product inventory has been low enough to allow the fuel to be manually handled during transfer and loading.

When the CX-10 dismantling order takes effect, all fuel will have been removed from the facility. The shipping operation involved loading intact fuel pins and fuel pin segments into NRC and DOT approved shipping containers and returning the fuel to DOE-ORNL for additional critical experiments or to National Lead Co. for reprocessing. Not all of the fuel pins can be loaded as is; about 190 fuel pins will be cut in two in order to fit inside the DOT-6M containers. This cutting operation will be performed in a specially designed cutting hood provided with a HEPA filtered off gas system. The hood will be located inside a specially built cutting booth to provide additional confinement for controlling the spread of unexpected contamination. A step off pad and personnel monitor will be placed at the cutting booth exit. The cutting booth is located in Bay 2.

The entire cutting operation has been reviewed and approved by the LRC Safety Review Committee, and will be performed in accordance with approved written procedures.

(g) Any excessive activation of areas of the biological shield.

RESPONSE:

As evidenced by the low fuel radioactivity, the total neutron exposure of nearby equipment will be quite small. Activation of the nearest concrete wall, which is several feet from the core tank edge, is expected to be negligible.

2. Section 4.4 of the plan states that pipes, drainlines and ductwork shall be surveyed for contamination provided that any contamination found at appropriate access points is likely to be representative of contamination in the interior of these systems. Is this the only alternative for such surveys? What will be the survey plan, if no appropriate access point is found, which could be used to be representative of contamination on the interior of pipes, etc.

RESPONSE:

See response to Question No. 12.

3. The soil contamination limit proposed in your plan is 30 picocuries/gram for enriched uranium and 10 picocuries/gram for natural thorium and Th-232. Verify that the dose rate derived from the soil contamination meets 5uR/hr above natural background, as measured at one meter from the surface, or why the B&W level of 10uR/hr is appropriate.

RESPONSE:

These criteria were taken from Enclosure 4, to SECY 81-576, and are based on limiting the dose to bones and lungs that might result from any conceivable use of the property, rather than direct radiation levels.

4. The staff position for release for unrestricted use or unrestricted access is Regulatory Guide 1.86 or 5uR/hr above natural background at 1 meter. However, if it can be demonstrated that the maximum exposure to an individual from the radiation would be less than the staff's annual exposure limit of 10uR/yr because of potential occupancy in the vicinity of the radiation, than 10uR/hr may be acceptable alternative. Do you intend to make this analysis or do you intend to change your release or accesss criteria, as addressed in Section 4.2 from 10uR/hr to 5uR/hr to be consistent with the staff criteria?

RESPONSE:

It is the intent of the LRC to prepare the CX-10 facility in a manner that will permit the NRC to release the facility for unrestricted use and unrestricted access. This release shall not carry with it any restriction on the time of occupancy or to the future use of the facility. Therefor all references to the release criteria of 10uR/hr @ 1 meter shall be superseded by the staff position limit of 5uR/hr @ 1 meter.

5. Section 4.7.1 states that fixed contamination shall be measured with a PAC-4G. Discuss the methodology to be used to convert the count rate of the instrument into the surface contamination limits of Reg. Guide 1.86 which gives these limits in units of d/m per 100 cm2.

RESPONSE:

The detector's efficiency will be based on calibration with an alpha (eg, Pu-239) or beta (Tc-99) source whose strength (dpm) is traceable to NBS. This calibration will be performed and the instrument settings established in accordance with an approved written technical procedure. A label will be attached to the instrument describing the calibration status and the radiation type (alpha or beta) for which the instrument is to be used. The activity per unit area will be determined by normalizing the measured dpm (efficiency corrected cpm) by the sensitive surface area of the particular probe being used. This area is provided for each type of probe by the instrument manufacturer.

6. Section 4.7.2 specifies that standard smearing techniques shall be used. Please describe these techniques. The counting system to be used to count these smears is a gas proportional counter. Is this counter a laboratory counting system or a hand-held type survey meter? If the latter type instrument, describe the instrument (commercial identification, if appropriate), and the counting procedure to be used to identify alpha vs beta contamination.

RESPONSE:

There are two types of smears that will be taken; one is a "large area smear", and the other is a "small area smear."

The purpose of the large area smear is to indicate the presence or absence of removable contamination. No attempt will be made to correlate the smear readings with dpm/100cm2. This type of smear is taken by lightly wiping the entire surface (floor, pipes, drum, etc.) with the smear media. The smear is then taken to an area of suitably low background and surveyed with a PAC-4G for the presence of alpha or beta contamination, or both. The PAC-4G high voltage setting(s) (established during instrument calibration) ensure that the radiation types (alpha & beta) can be distinguished.

The purpose of the small area smear is to determine the amount of removable contamination per unit area (dpm/100cm2) on the surface being surveyed. The smear is taken by rubbing the smear media (e.g., 3 cm diameter filter paper) across the area to be surveyed, making an S, X, or Z pass, applying moderate pressure. Usually, a 100cm2 area is wiped with a single pass. Alternatively, areas that are multiples of 100cm2 may be wiped. The smear is then packaged, labeled, and taken to a laboratory counting system (such as an NMC model PC-5 proportional counter or an ORT-S-1 gas proportional smear counter) for analysis.

All instrumentation used in surveying large and small area smears will be calibrated in accordance with written and approved technical procedures. All smears that are part of the final termination survey will be taken, tagged, identified, and analyzed in accordance with written and approved technical procedures.

7. Section 4.7.3 states that an Eberline Model PRM-7 may be used to measure intrinsic activity. Please state how you will correct your instrument read-out for energy dependence, since a PRM-7 incorporates a scintillation detector which is factory calibrated to 137-Cs.

RESPONSE:

The PRM-7 readings will be supplemented by a GM survey meter and a Reuter-Stokes RSS-111 pressurized ion chamber. The RSS-111 has a sufficiently uniform response over the entire gamma energy range of interest to ensure that its exposure readings are independent of the gamma spectrum being measured. As appropriate (i.e., when a significant fraction of total exposure is due to photons whose energy is much different from 662kev) the PRM-7 readings will be corrected for spectral effects by empirically developed correlations determined in one of two ways:

1) Making a paired observation with the RSS-111.

2) Measuring the PRM-7 response in a gamma field of known strength and whose spectrum simulates the survey area.

8. Will the High Resolution Gamma Spectroscopy system addressed in Section 4.7.4 be used to identify radioactive nuclides found in swipes, core samples, etc. that may be taken during dismantling? If not, why not?

RESPONSE:

The High Resolution Gamma Spectroscopy system will be used to identify radioactive nuclides, primarily in core samples. If nuclide identity is desired for other samples or for smears it will be so used.

9. Section 9.0 alludes to decontamination to components to meet criteria specified in a plan for transfer to another licensed facility. Describe the decontamination procedure, packaging and shipping to be used for equipment listed in section 6.3.1 to be transferred to DOE, or the equipment listed in Section 6.3.2 to be transferred to other licensed facilities. To what levels of radiation will this equipment be decontaminated? What are the provisions of the other (receiving) licenses?

RESPONSE:

Transfers of equipment from the LRC to the Department of Energy or to another licensee of the NRC will be in compliance with the license of the receiving facility. Preparation, packaging, and transportation of the equipment shall be performed in compliance with the Department of Transportation regulations or 10 CFR Part 71.

10. What release limits are inferred in Section 6.3.3 that may cause facility equipment to be disposed of as radioactive waste? Describe the measurement procedures to be used to determine when these limits are exceeded.

RESPONSE:

Radioactive waste generated during the decommissioning program shall be transferred to the LRC's materials license SNM-778. Preparation, packaging, storage, and disposal of that waste shall be in compliance with the materials license.

11. Describe the training program for the individuals involved in dismantlement, including training of contractor personnel. The description should include the scope of training in decontamination and other decommissioning activities, health physics, and use and maintenance of radiation surveillance and monitoring equipment.

RESPONSE:

Personnel performing tasks pursuant to this decommissioning plan shall be under the direction of the Building A Decommissioning Foreman. The foreman holds a license as a Senior Reactor Operator for the CX-10 facility and he is designated as an Authorized User of Material (Authorized User). This latter designation is used in our materials license to describe a level of training that permits individuals, so designated, to handle radioactive material unsupervised and to direct the handling of radioactive material by personnel not so designated.

Candidates for the Authorized User designation must be nominated by their section manager. They must become familiar with:

A. Health Physics Procedures
B. The Emergency Plan and Implementing Procedures
C. The applicable Area Operating Procedures
D. The SNM transfer and accounting procedures

Candidates must also satisfactorily complete one of the two training programs described below:

RADIATION SAFETY II

This program, presented as a series of lectures and tests, is presented to new employees who will do a significant amount of work with radioactive materials. The content of the program is modified periodically to reflect new regulations, etc. The effectiveness of the course is evaluated by written examination and by observations made during the monthly health physics audit. The general course content is:

1. Radioactivity

   - Types of radiation
   - Radioactive decay
   - Radiation dose and dose rates
   - Protection factors
   - Radiation effects on living systems
   - Radiation sickness
   - Effects of radiation exposure as compared with other common hazards

2. Health Physics Instruments

   - Ionization chamber
   - GM counter
   - Alpha counter
   - Air monitors
   - Criticality alarm system
   - Emergency equipment
   - Instructions in field use of instruments

3. Regulations and Procedures

   - Title 10 Code of Federal Regulations
   - License requirements
   - Shipment of radioactive materials
   - Waste disposal
   - Internal procedures

RADIATION SAFETY III

This program is presented to technical and scientific personnel who are knowledgeable and experienced in work with radioactive materials. The course content consists primarily of Parts 2 and 3 of Program II, with extension of this material into more advanced areas. The effectiveness of this course is evaluated during the monthly health physics audit by observing workers following proper procedures and safety practices.

Personnel assigned to the CX-10 decommissioning project shall be designated as Authorized Users or perform their tasks under the supervision of an Authorized User.

12. Describe the termination radiation survey plan to demonstrate that the facility will meet the criteria for release for unrestricted use. The description should include (a) proposed method for assuring that sufficient data and all pertinent structures, systems and components are included in the survey, (b) the type of radiation readings, and (c) the type, operating condition and calibration of instruments used.

RESPONSE:

The nature of operations at the CX-10 facility was such that the likelihood of finding significant contamination or activation is extremely low. The CX-10 facility was licensed to operate at a low maximum power (1kw) and was run infrequently (usually at power levels below 10 watts). The fuel (uranium and thorium) was in sealed form, possessed a low specific activity, and did not receive enough exposure to accumulate a significant fission product inventory.

Except for a few cases involving small amounts of material, all radioactive material was handled in solid (metallic) or sealed form. Moreover, except for Bay 2 and the CX-10 control room, all indoor areas covered by this plan that were formerly used to handle or store radioactive material have been decontaminated and put to general laboratory or office use.

The final termination survey will take the form of a stratified random sampling program that takes into consideration the likelihood of finding contamination or activation in various areas throughout the facility, and the type of contamination or radiation that may be found.

The survey strata can be divided into two categories, indoors and outdoors. These are described below:

Indoors:

1. Bay 2 and CX-10 control room floors, including walls up to 2 meters above the floors. "Bay 2 floors" means all horizontal walking surfaces (including the fuel storage ledge) remaining after dismantlement.

2. Horizontal walking surfaces on the second floor of Bldg. A, Phase 2 as defined in the Plan, excluding Bay 2 and the CX-10 control room. (Rooms B, C, D, E, F, G, H, hallway and stairs in Figure 3.1 of the Plan).

3. Horizontal walking surfaces on the first floor of Bldg. A, phase 2 as defined in the Plan, excluding the Bay 2 basement, (Rooms I, J, K, L, M, N, O, P, and hallways in Figure 3.2 of the Plan).

4. Interior hot drainlines, including the Bay 2 sump.

5. Bay 2 ventilation ductwork (interior surfaces).

6. Ventilation ductwork (interior surfaces) in Bldg. A, Phase 2 as defined in the Plan, excluding ductwork in Bay 2.

7. Source storage tubes and through-wall instrument cable conduits.

Outside Strata:

1. Outside surfaces of Bldg. A, Phase 2 as defined in the Plan (walls & roof).

2. Security area behind Bay 2.

3. Radioactive Liquid Waste Holding Tank (RLWHT) including exterior hot drains and contiguous soil.

Because of the nature of operations in the CX-10, ceilings, walls, beams and ledges are generally not included in survey strata. If, however, unexpected contamination is found, the need to include these additional strata in the termination survey will be evaluated and included, if appropriate.

Each indoor building surface stratum will be divided into uniformly sized survey blocks, each block being 1 to 3 meters on an edge. Since all readings are expected to be at or near background, a minimum of 30 survey blocks will be used in each stratum. Since we do not plan to remove permanently attached equipment (such as laboratory benches) in areas outside of Bay 2 and the CX-10 control room, the number of survey blocks into which the stratum is actually divided will be sufficient to ensure that the minimum number of blocks (> or = 30) will be accessible for survey. If covering (such as paint or tile) has been applied to the surface of a former use area since radioactive material was handled there, the covering in at least one spot of that survey block will be removed so that a contamination survey can be made on the original surface. The resulting paint or tile debris will be surveyed by gamma spectroscopy.

The radiation measurements taken in each survey block of indoor strata (1) through (3) are:

- Alpha and beta activity, dpm/100cm2, fixed and smearable.
- Gamma and beta-gamma exposure rate (uR/hr) within a few centimeters and at 1 meter from the surface. This measurement will also be performed on the concrete wall nearest the core tank.

The instrumentation used will be that described in paragraphs 4.7.1 through 4.7.4 of the Plan, and further detailed in the responses to questions 5, 6, and 7 above.

The interior hot drains (indoor stratum 4) will be surveyed by pulling or pushing a smear through the drainline and checking the smear for the presence of alpha and beta activity. This check will be made with instrumentation described in paragraphs 4.7.1 and 4.7.2 of the Plan, and further detailed in the responses to questions 5 and 6 above. If no activity is found, the hot drainline will be abandoned in place. If activity is found

or measurements cannot be made to establish whether contamination levels are below those specified by Reg. Guide 1.86, the drain line will be removed and either decontaminated or disposed of as radioactive waste. The cavity left by the drainline's removal will be surveyed for alpha and beta contamination, (dpm/100cm2) fixed and removable, and for gamma and beta-gamma radiation levels (uR/hr). The instrumentation will be the same as that described in paragraphs 4.7.1 through 4.7.3 of the Plan and further detailed in the responses to questions 5, 6, and 7 above. In the case of drainlines removed from soil, the soil will be sampled and analyzed by gamma spectroscopy with the instrumentation described in paragraph 4.7.4 of the Plan.

Because of the nature of operations at the CX-10 facility, no contamination is expected to be found in interior ductwork (strata 5 and 6). Nevertheless, the interior surfaces of ventilation ductwork will be smeared for alpha and beta contamination. In addition, where accessibility permits, and smear data indicates, direct alpha and beta surveys will be performed. The points surveyed will be those where contamination might be expected to concentrate, such as angles or bends. The choice of such survey locations will be guided by taking large area smears of the ductwork interior in an attempt to locate any possible hot spots.

Portions of the ductwork that show no contamination on a large area smear will not be subjected to a more detailed small area smear or direct survey campaign.

The entire inside surface of straturm 5 (Bay 2 ductwork) will be wiped with one or more large area smears in an effort to detect the presense of contamination. Because the likelihood of contamination in stratum 6 (ductwork outside Bay 2) is so small, only the inside area practicably accessible through existing duct openings will be checked for removeable contamination. More extensive surveys of less accessible areas will be considered if unexpected contamination is found.

The survey instrumentation used will be that described in paragraphs 4.7.1 and 4.7.2 of the Plan, and further detailed in the responses to questions 5 and 6 above.

There are several large metal tubes in the Bay 2 walls used for storage of radioactive sources and for instrumentation cable conduit. These will be surveyed by pulling a smear through the tube and checking the smear for the presence of alpha and beta activity. This check will be made with instrumentation described in paragraphs 4.7.1 and 4.7.2 of the Plan, and further detailed in the responses to questions 5 and 6 above. If no activity is found, these tubes will be abondoned in place. If activity is found or measurements cannot be made to establish whether contamination levels are below those specified by Reg. Guide 1.86, the tube will be removed and either decontaminated or disposed of as radioactive waste.

Outdoor stratum 1 (roof and walls up to 3 meters above the ground level) will be divided into uniformly sized surveys blocks, each 1 to 3 meters on an edge. Surveys within each block will consist of measurements of alpha and beta contamination (dpm/100cm2), fixed and removable. In addition, measurements of gamma exposure rate (uR/hr) will be made. Instrumentation will be that described in paragraphs 4.7.1, 4.7.2, and 4.7.3 of the Plan and further detailed in the responses to questions 5, 6, and 7 above.

Outdoor stratum 2 (security area behind Bay 2) will be divided into uniformly sized survey blocks of 1 to 3 meters on an edge. Each block will be surveyed for beta-gamma and gamma exposure rate (uR/hr) at a few cm and at 1 meter from the soil surface. The instrumentation used will be that described in paragraph 4.7.3 of the plan and further detailed in the response to question 7 above. A minimum of 5 soil samples will be collected for gamma spectrometric analysis. The instrumentation for the soil analysis will be that described in paragraph 4.7.4 of the Plan. The soil samples will be from the 5 survey blocks having the highest gamma exposure rate. Samples will be taken from the top 0 to 15 cm of soil. More than 5 samples will be taken if warranted by the gamma survey results.

Outdoor stratum 3 (RLWHT, exterior hot drainline and contiguous soil) will be surveyed as follows:

- Core soil samples will be taken around the concrete tank and the hot drainline leading to it. These will be analyzed by gamma spectroscopy with instrumentation described in paragraph 4.7.4 of the Plan. These results will be used to define the extent of any soil contamination.

- The inside surface of the exterior hot drain will be smeared in the same manner as the interior drainlines. If contamination is found, the hot drainline will be removed and either decontaminated or disposed of as radioactive waste.

- If the hot drain is removed, soil samples will be taken from the excavation area and subjected to gamma spectrometric analysis.

- Sludge will be removed from the RLWHT and analyzed by gamma spectrometry using the instrumentation described in paragraph 4.7.4 of the Plan.

- The interior surface of the RLWHT will be surveyed for alpha and beta contamination (dpm/100cm2), fixed and removable. In addition, gamma exposure rates (uR/hr) at 1 meter (or less) from the interior surfaces will be measured. The instrumentation for this survey will be that described in paragraphs 4.7.1 through 4.7.3 of the Plan, and further detailed in the responses to questions 5, 6, and 7 above. If these surveys show that contamination and radiation levels are low enough to meet the criteria for unrestricted use, the RLWHT will be abandoned in place.

The entire dismantling effort, including the termination survey, will be performed in accordance with an approved QA Plan. The QA Plan will prescribe requirements for development of applicable test, measurement, operating, and calibration procedures. The termination survey will be performed in accordance with written procedures as required by the QA Plan.

All radiation measurement instruments will be calibrated with radioactive sources traceable to NBS to ensure that instruments readings (e.g., cpm) can be properly correlated with specified limits (e.g, dpm/100cm2). These calibrations will be performed in accordance with written and approved procedures.

Samples taken in the field (soil, smears, etc.) for laboratory analysis will be collected, labeled, and prepared in accordance with written and approved procedures to ensure the dependability and integrity of the subsequent analysis, and to ensure proper identification and documentation of archived samples.

Survey criteria to be applied are as follows: Reg. Guide 1.86 for surface contamination; response to question 4 above for gamma radiation levels; and paragraph 4.6 of the Plan for soil contamination. The instrumentation referred to in the preceeding paragraphs has sufficient range, accuracy and sensitivity to determine that the facility complies with these criteria.

13. Discuss potential accidents and consequesces that have been considered for the dismantling operation.

RESPONSE:

The decommissioning plan shall become effective only after all the fuel has been removed from the facility. Therefore, criticality safety is not an issue for accident consideration. The only radioactive material that may be present in the facility at the time the decommissioning plan becomes effective is sealed sources and low level contamination.

Sealed sources are smear checked each 6 months to determine if they have developed leaks. None of the sources in the facility have indicated leaks. These sources will be removed from the facility before dismantlement begins and transfered to the LRC's materials license for disposal or storage. These sources will be placed in appropriate containers for the transfer from the facility. The transfer will be directed by health physics personnel. The chances of an accident during container loading or source transfer are very remote and because of the presence of trained and knowledgeable health physics personnel, the consequesces of an accident will be small.

Low levels of contamination that may be present in the facility will not present an accident potential because this contamination would have been present during the operational or fuel shipment phases and the controls placed on personnel will remain essentially unchanged and the amount of surveys to detect the contamination will, by the nature of the project be increased.

14. Provide pre-decommissioning baseline radiation survey data and soil contamination levels, including identification of radionuclides.

RESPONSE:

The nature of operations at the CX-10 facility were such that residual contamination and activation is expected to be extremely low. However, because of the enhanced background in the facility due to the remaining fuel and sources stored in the facility, unambiguous radiation levels near equipment and structures in Bay 2 cannot be made at this time. Ambient radiation levels in Bay 2 are typically 0.050 to 0.150mR/hr, with readings up to a few mR/hr adjacent to the stored fuel and sources. The fuel and sources will be removed prior to the beginning of dismantlement, at which time a meaningful baseline survey can be performed.

Radiation fields outside Bay 2 are essentially at background levels.

The extremely low degree of fuel activation (as evidenced by the direct radiation measurements of the fuel pins and by the infrequency of operation as documented in the facility logbooks) attests to the low neutron fluence to which facility components (mainly the two core tanks, grid plates, and base plate) were subjected. Except for the 9-foot diameter by 9-foot high core tank, which is made of carbon steel, all of the components were constructed of aluminum. It is estimated that the carbon steel core tank may contain a total of a few uCi's of Co-60 from component activation. Other gamma emitting activities (such as Fe-59) are too shortlived to have persisted at significant levels (the facility has not been operated for over a year).

15. NRC reviewers asked for additional information regarding item No. 4 of Guidence and Discussion of Requirements for an application to Terminate a Non-power Reactor Facility and Operating license. That item requests information of an environmental nature that is in addition to that already submitted in the Decommissioning Plan. The questions and our responses are listed below in order in which they appear in the guidance.

1. The collective dose equivalent or workers for the entire dismantling and decommissioning project.

RESPONSE:

The collective dose equivalent for workers for the entire project will be < 1 person Rem.

2. Exposure of the general public to radioactive effluents released during the proposed activities.

RESPONSE:

Because most areas have already been decontaminated, and little or no residual radioactive material is expected to be found in Bay 2, LRC projects that no identifiable dose will result to the general public from effluents

released during the proposed operation. Any effluents actually released that contain radioactive substances are expected to have activity concentrations at or below the sensitivity of instrumentation used for effluent monitoring.

3. Anticipated exposure levels of the general public following license termination.

RESPONSE:

The calculated exposure of the general public before the decommissioning project is the same as the results after the project. That level is < 10 person millirem for the population within a 10 mile radius.