U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-146/90-02

Docket No. 50-146

License No. DPR-4 Category D

Licensee: Saxton Nuclear Experimental Corporation/GPUN Corporation
1 Upper Pond Road
Parsippany, New Jersey 07054

Facility Name: Saxton Reactor

Inspection At: Saxton, Pennsylvania

Inspection Conducted: October 15-26, 1990

Inspectors: _____ 11/29/90
J. Roth, Project Engineer, Effluents date
Radiation Protection Section, Facilities
Radiological Safety and Safeguards Branch
Division of Radiation Safety and Safeguards

Approved by: _____ 11/29/90
R. Bores, Chief, Effluents Radiation date
Protection Section, Facilities Radiological
Safety and Safeguards Branch, Division of
Radiation Safety and Safeguards

Inspection Summary: Inspection conducted on October 15-26, 1990 (Inspection Report No. 50-146/90-02).

Areas Inspected: Special, announced inspection by a region-based inspector to observe a survey conducted by the NRC contractor, Oak Ridge Associated Universities, to verify the final release survey results provided by the licensee in letters dated April 26 and September 6, 1990.

Results: No violations were identified. Preliminary results indicated that there was no residual contamination present on the surfaces of the buildings surveyed in excess of about 40% of the NRC criteria provided in Regulatory Guide 1.86.

DETAILS

1.0 Individuals Contacted

J. Hildebrand, President, Saxton Nuclear Experimental Corporation (SNEC)
B. Good, Vice President and General Manager, SNEC
R. Rolph, Radiation Safety Officer, SNEC

2.0 Background

By memorandum dated June 6, 1990, from Mr. S. H. Weiss, Director, Non-Power Reactor, Decommissioning and Environmental Project Directorate, Office of Nuclear Reactor Regulation, NRC Region I was requested to provide technical assistance in the review of the "Final Release Survey of SNEC (Saxton Nuclear Experimental Corporation) Support Buildings" submitted by the licensee to the NRC by letter dated April 26, 1990. This review was to determine if the information in the final release report supported release of the buildings for unrestricted use and if the information was sufficient to justify scheduling an NRC confirmatory survey.

In accordance with the June 6, 1990 memorandum, Region I evaluated the licensee's submittal dated April 26, 1990. On the basis of that evaluation, it was determined that there was insufficient information available in the submittal to justify scheduling of an NRC confirmatory survey. As a result, an inspection was scheduled and conducted on July 10-12, 1990. On the basis of that inspection and discussions held with licensee representatives during that inspection, the licensee modified the information supplied in the final survey report and submitted that modified information to the NRC in a letter dated September 6, 1990. Evaluation of the revised information indicated that sufficient information was available to justify scheduling an NRC confirmatory survey. Through discussions with the NRC contractor, Oak Ridge Associated Universities (ORAU), the confirmatory survey was scheduled for October 15-26, 1990 in accordance with the statement of work (copy attached to this report). On September 17, 1990, ORAU provided Region I with a survey plan which was reviewed and orally approved on September 28, 1990. This survey plan is also attached. Two modifications were made to the submitted plan. These were the use of a 5-meter grid for outside surveys in lieu of the specified 75-meter grids and the addition of a requirement to obtain and analyze paint samples off facility walls, where appropriate.

3.0 Conduct of Verification Survey

Oak Ridge Associated Universities personnel conducted the verification survey between October 15 and October 26, 1990 in accordance with the NRC-approved survey plan, as described above. Upon arrival of the ORAU team at the site, one further modification to the plan was discussed with the inspector and made on the basis of "as observed" site conditions. Since the licensee had not emptied the Filled Drum Storage Bunker (FDSB) of contaminated soil and/or drums of contaminated soil, verification surveys of this area of the site were not conducted.

Indoor and outdoor surfaces, including walls (to a height of two meters), roofs and floors, were scanned using alpha and/or gamma scintillation, GM, and/or large area alpha/beta proportional detectors. Outdoor soil surfaces were scanned with gamma scintillation detectors to a distance of about three feet from the building walls. Direct alpha and beta/gamma measurements were made on a minimum of 10 percent of the building grid blocks during the confirmatory survey. Exposure rates were determined in and around each building at one meter above the surface using a pressurized ionization chamber. Soil samples were also obtained from randomly selected areas and at locations of elevated contact radiation before and after remediation, as appropriate. Paint samples were obtained from randomly selected locations throughout the buildings. Background measurements and samples were also obtained at eight selected locations within a 0.5 to 10 kilometer radius of the site. The contamination level criteria used by the survey team are contained in Regulatory Guide 1.86 (copy attached).

4.0 Preliminary Survey Results

4.1 Buildings

Surveys were conducted on the Control and Auxiliary Building (C&A), the Radioactive Waste Disposal Facility (RWDF) and the yard pipe tunnel on both inside and outside surfaces. Preliminary results indicated that the licensee had completed cleanup of these facilities in an appropriate manner and as a result, no areas were identified which required additional cleanup or remediation.

4.2 Outside Areas

The inspector and the ORAU survey team surveyed soil around the perimeter of each of the buildings and the surface of the concrete pad which previously held the Refueling Water Storage Tank (RWST). Several locations were identified where radiation levels were elevated (three to seven times background). These locations are listed in the following table.

Location	Radiation Level
a. Northeast Corner C&A Building	3 to 7 times background
b. North edge yard pipe tunnel (22 ft west of the RWDF)	4 to [illegible] times background
c. South side RWDF Building	3 to 4 times background
d. North edge yard pipe tunnel (18 ft east of the C&A)	3 to 5 times background
e. Southeast fenceline (outside fence)	5 times background

Upon identification of the areas of elevated radiation levels identified above, the licensee took immediate actions to remediate these areas. Four of the five areas were remediated (areas a, b, c and e) by the licensee and resampled by the survey team. The fourth area was still being remediated by the licensee at the end of

the survey and will be identified as a "hold point" by the licensee during facility demolition. "Hold points" are areas or locations throughout the facility which have been identified by the licensee for cleanup or removal and held for disposition (verification survey and/or release) by the NRC prior to disposal.

During remediation of area "d", the licensee uncovered and removed a three-foot diameter drywell. Under the drywell, the licensee found a storm drain which was not identified on available site drawings. Soil around this storm drain exhibited radiation levels up to about 10 times background. The licensee continued remediation of this area following completion of this survey. As stated above, the licensee will establish this area as a "hold point" for NRC verification during building demolition.

4.3 Background Sampling

ORAU personnel performed radiation level measurements and soil sampling throughout the site and within ten kilometers of the site to establish appropriate background values. Preliminary results indicated that background radiation in the vicinity of the site ranged from about 8 to 12 microR per hour.

5.0 Future Actions

5.1 Licensee

The licensee will submit a plan of action to the NRC Office of Nuclear Reactor Regulation (NRC-NRR) concerning cleanup or remediation of the Filled Drum Storage Bunker. This plan will include actions to be taken to remove drums of contaminated soil and contaminated soil from inside the bunker; to remove soil from the bunker walls; to survey and remove, if necessary, the macadam floor of the bunker; and to dismantle the inside wall restraining timbers. The licensee will also keep NRC Region I informed of the results of actions taken to cleanup area "d" previously discussed in paragraph 4.2.

In addition, the licensee will review available documents to assure that all appropriate drawings of the site, which show the locations of underground pipes and other equipment, are available.

5.2 NRC

The inspector stated that the licensee would be supplied with a copy of the final ORAU survey report by the NRC, when available. In addition, NRC Region I would conduct verification surveys of area "d" and the Filled Drum Storage Bunker when remediation actions were completed by the licensee.

6.0 Exit interview

The inspector met with the licensee representatives denoted in Paragraph 1.0 at the conclusion of the inspection on October 26, 1990. The ORAU Team Leader, Ms. Betty Smith, summarized the results of the survey. The inspector thanked the licensee for providing the survey team logistical support and backup when required, and commended the licensee for the actions taken to assure that the buildings were decontaminated and ready for the verification survey.

ATTACHMENT

REQUEST FOR TECHNICAL ASSISTANCE (RFTA)

INSPECTOR'S NAME Jerome Roth DATE OF REQUEST August 16, 1990

REGION I BRANCH FRSSB ASSISTANCE COMPLETION DATE March 31, 1991

LICENSEE GPU-SNEC LOCATION Saxton, Pennsylvania

DOCKET NO. 50-146

NATURE AND EXTENT OF ASSISTANCE

Perform appropriate verification radiological surveys of the floors, walls, and ceilings of the Saxton Reactor Support Buildings including the Control and Auxiliary Building, in the Radioactive Waste Disposal Facility, the Filled Drum Storage Bunker and the Pipe Tunnel located between the containment Building Fence and the Radioactive Waste Disposal Facility at the GPU Saxton Reactor, Saxton, Pennsylvania site. The surveys for alpha and beta-gamma removable and fixed activity, onsite soil contamination and radiation surveys, as applicable, will be conducted in accordance with a survey plan prepared in accordance with Section 2.2 of the December 1, 1988 Statement of Work previously supplied to Oak Ridge Associated Universities under ORAU Contract No. 7076. This survey plan will be provided to the NRC Region I Inspector for review prior to the start of this task. This work should be initiated on or before October 15, 1990 and should be completed by March 31, 1991.

JUSTIFICATION:

These survey activities are necessary to verify that the indicated facilities can be released for unrestricted use and can be removed as authorized locations for the use of radioactive materials from the facility licensee

ESTIMATES OF TIME: 8 man-weeks AND COST: $55,000

IF ASSISTANCE RESULTS ARE PROPRIETARY, STATE WHY:

AUTHORIZATION: Ronald R. Bellamy, FRS&SB _____
Regional Branch Chief Date

APPROVED: _____ _____
NMSS Project Officer Date

COMMENTS:

25m grid in NE corner; point samples not addressed.

Oak Ridge Associated Universities
Post Office Box 117
Oak Ridge, Tennessee 37831-0117

Energy/
Environment
Systems Division

September 17, 1990

Mr. Jerry Roth
Region I
Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19400

Subject: SURVEY FOR PORTIONS OF THE SAXTON NUCLEAR EXPERIMENTAL FACILITY, SAXTON, PENNSYLVANIA

Dear Mr. Roth:

Enclosed is a copy of ORAU's proposed confirmatory radiological survey plan for portions of the Saxton Nuclear Experimental Facility, Saxton, Pennsylvania.

Requests for additional information may be referred to me at FTS 626-0369 or (615) 576-0369.

Sincerely,

Laurence F. Friedman

Laurence F.Friedman, Ph.D., C.H.P.
Assistant Director
Environmental Survey and
Site Assessment Program

JDB:LFF:pb

Enclosure

cc: D. Tiktinsky, NRC/NMSS 6A4
C. Haughney, NRC/NMSS 6H3
T. Mo, NRC/NMSS 6H3

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ATTACHMENT

PROPOSED
CONFIRMATORY RADIOLOGICAL SURVEY PLAN
FOR PORTIONS OF THE
SAXTON NUCLEAR EXPERIMENTAL FACILITY
SAXTON, PENNSYLVANIA

I. Introduction

The Saxton Nuclear Experimental Facility is a deactivated 35 megawatt thermal (35 MWt) pressurized water reactor (PWR), licensed by the Nuclear Regulatory Commission (Operating License DPR-4, Docket No. 50-146). It is owned by the Saxton Nuclear Experimental Corporation (SNEC) and maintained by GPU Nuclear Corporation. The facility was built between 1960 to 1962 and operated from 1962 to 1972, primarily as a research and training reactor. The fuel was removed in 1972 and shipped to the Atomic Energy Commission (AEC) facility at Savannah River, S.C. Following fuel removal, equipment, tanks, and piping located outside the Containment Vessel were removed. The buildings and structures that supported reactor operations were partially decontaminated in 1972 through 1974. Complete decontamination of reactor support buildings was initiated in 1987. Activities have been completed for the Control and Auxiliary Building (C&A), Radioactive Waste Disposal Facility (RWDF), Yard Pipe Tunnel, and Filled Drum Storage Bunker (FDSB), and Refueling Water Storage Tank (RWST).

Prepared by the Environmental Survey and Site Assessment Program of Oak Ridge Associated Universities, Oak Ridge, TN, under interagency agreement (NRC Fin. No. A-9076) between the U. S. Nuclear Regulatory Commission and the U. S. Department of Energy.

September 17, 1990

A report, submitted by GPU in April, 1990, describes the decommissioning activities and presents the results of the radiological survey, indicating that the C & A Building, RWDF, Pipe Tunnel, FDSB, and RWST satisfy the established NRC guidelines for release to unrestricted use.

The Nuclear Regulatory Commission (NRC) has requested that the Environmental Survey and Site Assessment Program of Oak Ridge Associated (ORAU) perform a confirmatory survey of those portions of the facility for which release is being sought.

II. Purpose

The purpose of the survey is to confirm the results of the licensee's decommissioning survey by providing sufficient data to evaluate the radiological condition of the facility relative to the NRC guidelines for unrestricted use.

III. Responsibility

Work described in this survey plan will be performed under the direction of J. D. Berger, Director of the Environmental Survey and Site Assessment Program of the Energy/Environment Systems Division of ORAU.

IV. Procedures

A. ORAU will review the licensee's final survey results and supporting documentation concerning site decommissioning activities. Information will be evaluated to assure that areas identified as exceeding site guidelines have

undergone decontamination and that residual activity levels satisfy the established guidelines.

B. A survey team from ORAU will visit the Saxton Facility and perform visual inspections and independent measurements and sampling. Survey activities will be conducted in accordance with the ORAU ESSAP Survey Procedures Manual. These procedures are listed in Section VII of this survey plan.

1. Background exposure rates will be determined for the building interior by a minimum of 6 measurements at locations of similar construction but without a history of radioactive materials use. Also, eight locations for area background measurement will be selected within a 0.5 to 10 km radius of the site. Exposure rate measurements will be performed using a pressurized ion chamber. A baseline soil sample will be collected from each location of external background measurement.

2. Indoor measurements and sampling will be referenced to the existing 1 m grid, used by the licensee. The drum storage area, storage tank area, and any other outdoor areas to be surveyed will be gridded at 75m intervals. In areas of very low contamination potential, where grids will not be established, measurements and sampling will be referenced to prominent facility features, existing land marks, or nearby gridded surfaces.

3. Gridded indoor surfaces will be scanned using NaI (Tl) gamma scintillation, thin window beta-gamma GM, alpha scintillation, and/or large area alpha/beta proportional detectors. All detectors will be coupled to countrate meters with audible indicators. Particular

attention will be given to cracks and joints in the floors and walls, ledges, ducts, drains and other locations where material may have accumulated. Outdoor soil surfaces will be scanned with NaI (Tl) gamma scintillation detectors. Locations of elevated direct radiation levels will be identified for further investigation.

4. Direct measurements for total alpha and beta-gamma activity will be performed on a minimum of 10% of randomly selected grid blocks, and on grid blocks which the licensee's survey identified as having residual contamination greater than 25% of the guideline value. One set of five direct measurements will be obtained from each selected grid block, and one smear for transferable contamination will be taken for each set of five measurements, corresponding to the location of highest total (direct) measurement. Direct measurements and smears for transferable contamination will also be performed on ungridded surfaces. The number of such measurements will be determined based on findings as the survey progresses, but a minimum of 1 measurement per 20 m^2 will be performed.

5. Direct measurements and smears will be obtained at locations of elevated contact radiation levels identified by the surface scans of indoor areas.

6. Direct measurements will be performed on building roofs; at a frequency of one measurement per 20 m^2 of surface.

7 Exposure rates at 1m above the surface will be measured at a minimum of 20 indoor locations and 10 outdoor locations, using a pressurized ionization chamber.

8. Samples of residue from drains, ducts, floor cracks or joints, and ledges will be collected, where such material is present.

9. Five surface soil samples will be collected and composited from a minimum of 10% of the outdoor grid blocks. Additional soil samples will be collected at locations of elevated contact radiation identified by outdoor surface gamma scans.

10. Shallow subsurface (1 to 1.5 m depth) will be collected from locations of elevated direct radiation.

11. Measurement and sampling locations and frequencies may be increased or decreased, based on findings as the survey progresses.

V. Samples Analyses and Data Interpretation

Samples and data will be returned to the ESSAP laboratory at ORAU in Oak Ridge, TN for analysis and interpretation., Smears will be counted using a low background alpha/beta counter to determine gross activity. Direct measurements will be converted to units of μR/h (gamma exposure rate) and disintegrations per minute per 100 cm^2 for alpha/beta total and removable activity measurements. Soil, asphalt, concrete, and residue samples will be analyzed by solid state gamma spectrometry. Additional wet chemistry analysis for Sr-90 and Plutonium will be performed on selected samples. Data will be compared with the NRC guidelines for this site. Results will be presented in a report, provided to NRC for review and comment. Data and samples collected as part of this survey will be archived by ORAU.

VI. **Tentative Schedule**

Measurement and Sampling	October 15 - 26, 1990
Sampling Analysis	December, 1990
Draft Report	February, 1991

VII. **List of Current Procedures to be used in the Survey**

Applicable procedures from ORAU ESSAP Survey Procedures Manual include:

Section 5.0 Site Preparation

- 5.2 Reference Grid System

Section 6.0 Measurement Techniques

- 6.1 Alpha Radiation Measurement
- 6.2 Beta-Gamma Radiation Measurement
- 6.3 Gamma Radiation (Exposure Rate) Measurement
- 6.4 Surface Scanning
- 6.10 Instrument Calibration

Section 7.0 Sampling Procedures

- 7.1 Surface Soil Sampling
- 7.2 Subsurface Sampling
- 7.7 Determination of Transferrable Contamination
- 7.10 Sample Identification and Labeling

Section 8.0 Integrated Survey Procedures

8.1 Background Measurements and Baseline Sampling

8.3 Surveys of Open Land Areas

8.4 Surveys of Indoor Areas

June 1974

U.S. ATOMIC ENERGY COMMISSION

REGULATORY GUIDE

DIRECTORATE OF REGULATORY STANDARDS

REGULATORY GUIDE 1.86

TERMINATION OF OPERATING LICENSES FOR NUCLEAR REACTORS

A. INTRODUCTION

Section 50.51, "Duration of license, renewal," of 10 CFR Part 50, "Licensing of Production and Utilization Facilities," requires that each license to operate a production and utilization facility be issued for a specified duration. Upon expiration of the specified period, the license may be either renewed or terminated by the Commission. Section 50.82, "Applications for termination of licenses," specifies the requirements that must be satisfied to terminate an operating license, including the requirement that the dismantlement of the facility and disposal of the component parts not be inimical to the common defense and security or to the health and safety of the public. This guide describes methods and procedures considered acceptable by the Regulatory staff for the termination of operating licenses for nuclear reactors. The Advisory Committee on Reactor Safeguards has been consulted concerning this guide and has concurred in the regulatory position.

B. DISCUSSION

When a licensee decides to terminate his nuclear reactor operating license, he may, as a first step in the process, request that his operating license be amended to restrict him to possess but not operate the facility. The advantage to the licensee of converting to such a possession-only license is reduced surveillance requirements in that periodic surveillance of equipment important to the safety of reactor operation is no longer required. Once this possession-only license is issued, reactor operation is not permitted. Other activities related to cessation of operations such as unloading fuel from the reactor and placing it in storage (either onsite of offsite) may be continued.

A licensee having a possession-only license must retain, with the Part 50 license, authorization for special nuclear material (10 CFR Part 70, "Special Nuclear Material"), byproduct material (10 CFR Part 30, "Rules of General Applicability to Licensing of Byproduct Material"), and source material (10 CFR Part 40, "Licensing of Source Material"), until the fuel, radioactive components, and sources are removed from the facility. Appropriate administrative controls and facility requirements are imposed by the Part 50 license and the technical specifications to assure that proper surveillance is performed and that the reactor facility is maintained in a safe condition and not operated.

A possession-only license permits various options and procedures for decommissioning, such as mothballing, entombment, or dismantling. The requirements imposed depend on the option selected.

Section 50.82 provides that the licensee may dismantle and dispose of the component parts of a nuclear reactor in accordance with existing regulations. For research reactors and critical facilities, this has usually meant the disassembly of a reactor and its shipment offsite, sometimes to another appropriately licensed organization for further use. The site from which a reactor has been removed must be decontaminated, as necessary, and inspected by the Commission to determine whether unrestricted access can be approved. In the case of nuclear power reactors, dismantling has usually been accomplished by shipping fuel offsite, making the reactor inoperable, and disposing of some of the radioactive components.

Radioactive components may be either shipped offsite for burial at an authorized burial ground or secured

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on the site. Those radioactive materials remaining on the site must be isolated from the public by physical barriers or other means to prevent public access to hazardous levels of radiation. Surveillance is necessary to assure the long term integrity of the barriers. The amount of surveillance required depends upon (1) the potential hazard to the health and safety of the public from radioactive material remaining on the site and (2) the integrity of the physical barriers. Before areas may be released for unrestricted use, they must have been decontaminated or the radioactivity must have decayed to less than prescribed limits (Table I).

The hazard associated with the retired facility is evaluated by considering the amount and type of remaining contamination, the degree of confinement of the remaining radioactive materials, the physical security provided by the confinement, the susceptibility to release of radiation as a result of natural phenomena, and the duration of required surveillance.

C. REGULATORY POSITION

1. APPLICATION FOR A LICENSE TO POSSESS BUT NOT OPERATE (POSSESSION-ONLY LICENSE)

A request to amend an operating license to a possession-only license should be made to the Director of Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20545. The request should include the following information:

a. A description of the current status of the facility.

b. A description of measures that will be taken to prevent criticality or reactivity changes and to minimize releases of radioactivity from the facility.

c. Any proposed changes to the technical specifications that reflect the possession-only facility status and the necessary disassembly/retirement activities to be performed.

d. A safety analysis of both the activities to be accomplished and the proposed changes to the technical specifications.

e. An inventory of activated materials and their location in the facility.

2. ALTERNATIVES FOR REACTOR RETIREMENT

Four alternatives for retirement of nuclear reactor facilities are considered acceptable by the Regulatory staff. These are:

a. **Mothballing.** Mothballing of a nuclear reactor facility consists of putting the facility in a state of protective storage. In general, the facility may be left intact except that all fuel assemblies and the radioactive fluids and waste should be removed from the site. Adequate radiation monitoring, environmental surveillance, and appropriate security procedures should be established under a possession-only license to ensure that the health and safety of the public is not endangered.

b. **In-Place Entombment.** In-place entombment consists of sealing all the remaining highly radioactive or contaminated components (e.g., the pressure vessel and reactor internals) within a structure integral with the biological shield after having all fuel assemblies, radioactive fluids and wastes, and certain selected components shipped offsite. The structure should provide integrity over the period of time in which significant quantities (greater than Table I levels) of radioactivity remain with the material in the entombment. An appropriate and continuing surveillance program should be established under a possession-only license.

c. **Removal of Radioactive Components and Dismantling.** All fuel assemblies, radioactive fluids and waste, and other materials having activities above accepted unrestricted activity levels (Table I) should be removed from the site. The facility owner may then have unrestricted use of the site with no requirement for a license. If the facility owner so desires, the remainder of the reactor facility may be dismantled and all vestiges removed and disposed of.

d. **Conversion to a New Nuclear System or a Fossil Fuel System.** This alternative, which applies only to nuclear power plants, utilizes the existing turbine system with a new steam supply system. The original nuclear steam supply system should be separated from the electric generating system and disposed of in accordance with one of the previous three retirement alternatives.

3. SURVEILLANCE AND SECURITY FOR THE RETIREMENT ALTERNATIVES WHOSE FINAL STATUS REQUIRES A POSSESSION-ONLY LICENSE

A facility which has been licensed under a possession-only license may contain a significant amount of radioactivity in the form of activated and contaminated hardware and structural materials. Surveillance and commensurate security should be provided to assure that the public health and safety are not endangered.

a. Physical security to prevent inadvertent exposure of personnel should be provided by multiple locked barriers. The presence of these barriers should make it extremely difficult for an unauthorized person to gain access to areas where radiation or contamination levels exceed those specified in Regulatory Position C.4. To prevent inadvertent exposure, radiation areas above 5 mR/hr, such as near the activated primary system of a power plant, should be appropriately marked and should not be accessible except by cutting of welded closures or the disassembly and removal of substantial structures

and/or shielding material. Means such as a remote-readout intrusion alarm system should be provided to indicate to designated personnel when a physical barrier is penetrated. Security personnel that provide access control to the facility may be used instead of the physical barriers and the intrusion alarm systems.

b. The physical barriers to unauthorized entrance into the facility, e.g., fences, buildings, welded doors, and access openings, should be inspected at least quarterly to assure that these barriers have not deteriorated and that locks and locking apparatus are intact.

c. A facility radiation survey should be performed at least quarterly to verify that no radioactive material is escaping or being transported through the containment barriers in the facility. Sampling should be done along the most probable path by which radioactive material such as that stored in the inner containment regions could be transported to the outer regions of the facility and ultimately to the environs.

d. An environmental radiation survey should be performed at least semiannually to verify that no significant amounts of radiation have been released to the environment from the facility. Samples such as soil, vegetation, and water should be taken at locations for which statistical data has been established during reactor operations.

e. A site representative should be designated to be responsible for controlling authorized access into and movement within the facility.

f. Administrative procedures should be established for the notification and reporting of abnormal occurrences such as (1) the entrance of an unauthorized person or persons into the facility and (2) a significant change in the radiation or contamination levels in the facility or the offsite environment.

g. The following reports should be made:

(1) An annual report to the Director of Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20545, describing the results of the environmental and facility radiation surveys, the status of the facility, and an evaluation of the performance of security and surveillance measures.

(2) An abnormal occurrence report to the Regulatory Operations Regional Office by telephone within 24 hours of discovery of an abnormal occurrence. The abnormal occurrence will also be reported in the annual report described in the preceding item.

h. Records or logs relative to the following items should be kept and retained until the license is terminated, after which they may be stored with other plant records:

(1) Environmental surveys,

(2) Facility radiation surveys,

(3) Inspections of the physical barriers, and

(4) Abnormal occurrences.

4. DECONTAMINATION FOR RELEASE FOR UNRESTRICTED USE

If it is desired to terminate a license and to eliminate any further surveillance requirements, the facility should be sufficiently decontaminated to prevent risk to the public health and safety. After the decontamination is satisfactorily accomplished and the site inspected by the Commission, the Commission may authorize the license to be terminated and the facility abandoned or released for unrestricted use. The licensee should perform the decontamination using the following guidelines:

a. The licensee should make a reasonable effort to eliminate residual contamination.

b. No covering should be applied to radioactive surfaces of equipment or structures by paint, plating, or other covering material until it is known that contamination levels (determined by a survey and documented) are below the limits specified in Table 1. In addition, a reasonable effort should be made (and documented) to further minimize contamination prior to any such covering.

c. The radioactivity of the interior surfaces of pipes, drain lines, or ductwork should be determined by making measurements at all traps and other appropriate access points, provided contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement should be assumed to be contaminated in excess of the permissable radiation limits.

d. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated in excess of the limits specified. This may include, but is not limited to, special circumstances such as the transfer of premises to another licensed organization that will continue to work with radioactive materials. Requests for such authorization should provide:

(1) Detailed, specific information describing the premises, equipment, scrap, and radioactive contaminants and the nature, extent, and degree of residual surface contamination.

(2) A detailed health and safety analysis indicating that the residual amounts of materials on surface areas, together with other considerations such as the prospective use of the premises, equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

e. Prior to release of the premises for unrestricted use, the licensee should make a comprehensive radiation survey establishing that contamination is within the limits specified in Table I. A survey report should be filed with the Director of Licensing, U.S. Atomic Energy Commission, Washington, D.C. 20545, with a copy to the Director of the Regulatory Operations Regional Office having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report should:

(1) Identify the premises;

(2) Show that reasonable effort has been made to reduce residual contamination to as low as practicable levels;

(3) Describe the scope of the survey and the general procedures followed; and

(4) State the finding of the survey in units specified in Table I.

After review of the report, the Commission may inspect the facilities to confirm the survey prior to granting approval for abandonment.

5. REACTOR RETIREMENT PROCEDURES

As indicated in Regulatory Position C.2, several alternatives are acceptable for reactor facility retirement. If minor disassembly or "mothballing" is planned, this could be done by the existing operating and maintenance procedures under the license in effect. Any planned actions involving an unreviewed safety question or a change in the technical specifications should be reviewed and approved in accordance with the requirements of 10 CFR §50.59.

If major structural changes to radioactive components of the facility are planned, such as removal of the pressure vessel or major components of the primary system, a dismantlement plan including the information required by §50.82 should be submitted to the Commission. A dismantlement plan should be submitted for all the alternatives of Regulatory Position C.2 except mothballing. However, minor disassembly activities may still be performed in the absence of such a plan, provided they are permitted by existing operating and maintenance procedures. A dismantlement plan should include the following:

a. A description of the ultimate status of the facility.

b. A description of the dismantling activities and the precautions to be taken.

c. A safety analysis of the dismantling activities including any effluents which may be released.

d. A safety analysis of the facility in its ultimate status.

Upon satisfactory review and approval of the dismantling plan, a dismantling order is issued by the Commission in accordance with §50.82. When dismantling is completed and the Commission has been notified by letter, the appropriate Regulatory Operations Regional Office inspects the facility and verifies completion in accordance with the dismantlement plan. If residual radiation levels do not exceed the values in Table I, the Commission may terminate the license. If these levels are exceeded, the licensee retains the possession-only license under which the dismantling activities have been conducted or, as an alternative, may make application to the State (if an Agreement State) for a byproduct materials license.

TABLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDE[a]	AVERAGE[b c]	MAXIMUM[b d]	REMOVABLE[b e]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1000 dpm/100 cm^2	3000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.	5000 dpm β-γ/100 cm^2	15,000 dpm β-γ/100 cm^2	1000 dpm β-γ/100 cm^2

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.