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INS INTERSTATE NUCLEAR SERVICES
A DIVISION OF UNIFIRST CORPORATION

August 31, 1992

Document Control Desk
U.S. Nuclear Regulatory Commission
Mail Stop OWFN P1-37
Washington, D.C. 20555
ATTN: Patricia Vacca

Docket No. 030-04632
License No. 20-03529-01

This letter is in response to a letter dated August 25, 1992 from Mr. Robert M. Bernero, Director, Office of Nuclear Material Safety and Safeguards regarding a petition subject to 10 C.F.R. 2.206.

As allowed under the petition, INS would like to provide information for the Staff's consideration in preparation of a response to concerned parties. To provide clarity in the response, I have reiterated the statements of concern outlined in the Federal Register public notice signed by Robert M. Bernero on August 25, 1992.

1. Petitioners request that the NRC: participate in a public hearing in Indian Orchard to respond to the concerns of neighborhood residents.

A public "meeting" was held in the evening of July 23, 1992 at a local American Legion hall. The meeting was attended by approximately 100 people and lasted about two and one-half hours. The meeting was moderated by Mrs. Linda Hammonds of the Indian Orchard Citizens Council. Persons on the dias included Mrs. Hammonds, Mr. Richard Curtis (NRC), Mr. Duncan White (NRC), Ms. Maitry Bannerjee (NRC) and Mr. William Bell (MA Department of Public Health). Please refer to the NRC report of the meeting.

Earlier on the same day of the meeting, local Springfield City officials participated in a plant tour and information session. Please refer to the enclosed attendance list.

2. [Petitioners request that the NRC:] hold a surprise inspection of INS.

The NRC held a surprise inspection on July 8 & 9, 1992. The inspection team consisted of Mr. Duncan White and Ms. Betsy Ullrich of the NRC and Mr. William Bell of the MA Department of Public Health (July 8, only). All areas of our radiation safety program were evaluated with no safety-related violations identified. It should be noted that the Springfield facility last had a surprise inspection in December 1991, with no violations identified.

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3. *[Petitioners request that the NRC:] check homes in the area for radiation contamination.*

We are not sure if the NRC checked homes in the area for radiation as this may extend beyond NRC responsibility. However, it is known that Mr. Bell of the MA Department of Public Health surveyed several homes and surveyed the plant perimeter fence line with several neighbors in attendance on or about July 2, 1992. Based on Mr. Bell's response during the public meeting on July 24, we do not believe that there were any measurements beyond that normally expected.

4. *[Petitioners request that the NRC:] provide a copy of the NRC regulations under which INS operates.*

We have received a copy of a letter from Mr. Robert M. Bernero to Mrs. Mitchell and Hammonds that confirm that regulations were provided.

5. *[Petitioners request that NRC:] check adjoining Park Department land including Dimmock Pond and Loon Pond, for contamination and illegal dumping of waste material.*

As was outlined in the NRC inspection report, land around the adjoining park was surveyed and soil and water samples were analyzed for radioactivity. Please refer to said report. In regards to allegations of illegal dumping, there has never been any disposal of radioactive material to anywhere other than a licensed low-level radioactive waste facility.

6. *[Petitioners request that the NRC:] determine what INS has done with waste material not shipped.*

Because of the low volume of waste produced at the Springfield facility, waste is shipped at approximately six month intervals. The last waste shipment from Springfield was sent for disposal on June 20, 1992.

7. *[Petitioners request that the NRC:] provide the docket number for INS; identify a Public Document Room for INS and its location.*

Addressed in letter from Robert M. Bernero to Mrs. Mitchell and Hammonds.

8. *[Petitioners request that the NRC:] describe the type of monitoring done, who does it, and how frequently.*

These requirements are outlined in the Springfield facility radioactive materials license and are reiterated in kind in the NRC inspection report. Please refer to same.

9. *Petitioners further request on behalf of neighborhood residents that: radioactive readings outside the INS fence perimeters be "0" at all times; "0" nuclear waste by-products be allowed to enter Springfield's water/sewer system.*

As you know, there is presently no requirement that fence perimeter (general public) exposure rates be "0". Further, the Springfield fence borders the extreme edge of a wooded park on one side and railroad tracks on the other. Thus, there is an extremely low likelihood of exposure to members of the general public. Nevertheless, in keeping with ALARA principles, we have reviewed the staging of transient facility trucks to reduce the potential of any fence line exposure.

The plant discharges to the sanitary sewer in accordance with 10 C.F.R. 20.303 and the local City sewer permit. There is no law or technology that provides for "0" discharge. Any such requirement would be disastrous to INS and any other licensee that legally discharges to the sewer system.

10. *[Petitioners further request on behalf of neighborhood residents that:] INS stop using residential streets, specifically Nagle and Nichols Streets, to go to and from its plant.*

INS used the above mentioned streets out of concern for safety. The nearest large street (Oak) intersects at a treacherous corner and therefore was circumvented by the use of adjacent residential streets. While there are no DOT restrictions on the use of residential streets, we have made arrangements with the Indian Orchard Citizens Council to stop using those streets as of July 24, 1992. An alternate route map and plan has since been delivered to, and accepted by the Citizens Council.

11. *[Petitioners further request...] and under no circumstances should INS be allowed to store nuclear waste on its property.*

INS is not in the business to store waste, especially in light of rapidly increasing costs and uncertain disposal. However, as mentioned in response #6, we routinely store waste for approximately six month intervals until such time that the volume is sufficient to make it economically feasible to ship for disposal.

Notwithstanding, there is a possibility that the Springfield facility may lose the ability to dispose of low-level waste due to the failure of the Low-Level Radioactive Waste Compact System. In an effort to be proactive, and at the urging of regulatory agencies, INS has constructed a 5000 cubic foot secure storage facility in the event that interim on-site storage becomes necessary. Until such time, we will make every effort to dispose

of the waste as it is produced. Further, INS has negotiated a surety bond in accordance with Regulatory Guide 3.66, "Financial Assurance" to provide for any future uncertainties.

The remainder of the concerns listed in the Federal Register public notice may be addressed by review of the NRC inspection report. We believe that many of the allegations raised by the newspaper articles were exaggerations aimed at creating controversy. During the ensuing months INS representatives have continued dialogue with members of the Indian Orchard Citizens Council and various Springfield public officials. It is our understanding that the officials' questions and concerns have been satisfied. There remains however a small, vocal, anti-nuclear faction that may continue to try to keep this issue in the news. Nevertheless, we believe that the objective NRC inspection report and public meeting, coupled with the Company commitment for radiation protection program excellence, has demonstrated that INS is a good neighbor with concern for the public and the environment.

Thank you for the opportunity to respond to the petition regarding INS-Springfield.

Sincerely,

Michael J. Bovino, CHP
Manager, Health Physics and Engineering

enclosure: tour attendance list.

cc: G. Bakevich
P. Manley
file

ATTENDANCE

TOWE Thurs July 23, 98

Paul E Caron - State Rep
Brian P. Lees State Senator
Lois Cignoli Leg. aide
Bill Foley City Council
GEORGE BAKEVICH INS
Tony Ravosa Jr. City Council
Michael J Albano CEM Center
JACK BADEY INS.
Brian Santaniello City Council
Mo Jones "
Maitri Bg (BANERJEE) USNRC
Duncan White USNRC
Linda Hammons DCCC
Jim Controvich Off of Emerg Preparedness
Mike Downey - SPFLD DPW
Jim Mooney Intern w/ off emerg. Preparedness
Sgt Donald Sicard Springfield Police Hazmat
Randy White Springfield Health Dept
CAPT DON ELLIOTT SPFLD FIRE
RICHARD W. COOPER, II U.S. NRC
Mike Barnes INS
Gloria M. MITCHELL INDIAN ORCHARD CITIZENS COUNCIL
William Bell Mass Dept of Public Health

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406

JUL 21 1992

Docket No. 030-04632 License No. 20-03529-01

Interstate Nuclear Services
ATTN: George J. Bakevich, General Manager
295 Parker Street
Indian Orchard, Massachusetts 01151

Dear Mr. Bakevich:

Subject: Routine Inspection No. 030-04632/92-001

On July 8 and 9, 1992, Duncan White and Betsy Ullrich of this office conducted a routine safety inspection at the above address of activities authorized by the above listed NRC license. The inspection was an examination of your licensed activities as they relate to radiation safety and to compliance with the Commission's regulations and the license conditions. The inspection consisted of observations by the inspector, interviews with personnel, and a selective examination of representative records. A copy of the inspection report is enclosed with this letter. The findings of the inspection were discussed with Mr. J. Badey and members of your staff, at the conclusion of the inspection. This also refers to the telephone conversations on July 10, 13, and 14, 1992 between M. Bovino and B. Fischer of your staff and D. White of this office.

Within the scope of this inspection, no violations were identified.

In accordance with Section 2.790 of the NRC's "Rules of Practice", Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the Public Document Room. No reply to this letter is required.

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Your cooperation with us is appreciated.

Sincerely,

Paul D. Swetland, Chief
Industrial Application Section
Division of Radiation Safety
and Safeguards

Enclosure: NRC Region I Inspection Report Number 030-04632/92-001

cc:
Public Document Room (PDR)
Nuclear Safety Information Center (NSIC)
Commonwealth of Massachusetts
Paul Manley, Radiation Safety Officer
Mayor Robert T. Markel
Springfield City Councilors
Gloria Mitchell, Indian Orchards Citizen Council
U.S. Senator Edward Kennedy
U.S. Senator John Kerry
U.S. Representative Richard E. Neal
State Senator Brian Lees
State Representative Paul Caron

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 030-04632/92-001

Docket No. 030-04632

License No. 20-03529-01

Licensee: Interstate Nuclear Services, Inc.
295 Parker Street
Indian Orchard, Massachusetts 01151

Facility: Interstate Nuclear Services

Inspection at: 295 Parker Street
Indian Orchard, Massachusetts

Inspection Conducted: July 8 and 9, 1992

Inspectors: Duncan White
Duncan White, Health Physicist — 7/21/92 date

Betsy Ullrich
Betsy Ullrich, Senior Health Physicist — 7/21/92 date

Approved by: Francis M. Costello
Paul D. Swetland, Chief
Industrial Applications Section — 7/21/92 date

Inspection Summary: Routine unannounced safety inspection conducted on July 8 and 9, 1992 (Report No. 030-04632/92-001).

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Areas Inspected: Organization, internal audits, training and instructions to workers, facilities and equipment, radiological protection procedures, receipt and transfer of radioactive material, personnel radiation protection, radioactive effluents, waste disposal, posting and labeling, environmental monitoring program, surveys, transportation, and independent measurements.

Results: No violations were identified. Independent radiation measurements and samples of water, soil and sediment found radiation levels and radionuclide concentrations in compliance with NRC regulations. Commonwealth of Massachusetts samples taken in Dimmock Pond did not identify any radionuclide concentrations above background levels.

DETAILS

1. Persons Contacted

*Michael J. Bovino - Manager, Health Physics & Engineering
*Michael Fuller - Radiological Instrumentation Coordinator
*Jack R. Badey - Northern Operations Manager
*Brian Fischer - Corporate Health Physicist
Paul Manley - Plant Manager, Radiation Safety Officer
Tony Paris - Production Worker, Union Steward
Paul Kistner - Production Supervisor
Pete Ferland - Driver
George Prince - Health Physics Technician
Dave Barrow - Health Physics Technician
Judy Maio - Office Administrator, Translator
Several Production Workers

William Bell - Radiation Scientist, Commonwealth of Massachusetts, Department of Public Health, Radiation Control Program (accompanied NRC inspectors on July 8, 1992)

2. Background

Interstate Nuclear Services (INS) at Indian Orchard, Massachusetts is authorized by NRC License No. 20-03529-01 to possess a maximum of 2.5 curies of any byproduct material with atomic numbers 1-83, a maximum of 10 kilograms of any source material, a maximum of 250 grams of uranium enriched in U-235, a maximum of 20 grams of plutonium, and up to 10 millicuries of any byproduct material with atomic numbers 84-102 in the form of contaminated material and associated decontaminated waste for the collection, laundering and decontamination of contaminated clothing and other launderable non-apparel items. Individual isotope possession limits are further restricted to eliminate the requirement to implement contingency planning measures as required by 10 CFR 30.32. INS is also authorized by the NRC to possess any byproduct material to a maximum of 1 millicurie per source and 5 millicuries total for the use as calibration standards to calibrate radiation detection and measuring instruments. The license does authorize the transport of licensed material in accordance with 10 CFR 71, "Packaging and Transportation of Radioactive Material". Use of licensed material is restricted to the licensee's facility at 295 Parker Street in Indian Orchard, Massachusetts. The license does not authorize the packaging nor possession of radioactive waste except that generated as a result of laundering activities performed at the licensee's Indian Orchard facility. The license also does not authorize the laundering of contaminated items at temporary job sites of the licensee nor at customers facilities except as specifically authorized by the terms and conditions of specific licenses issued to customers of the licensee by the NRC or an Agreement State.

INS was last inspected by the NRC on December 4, 1991. No violations were identified and the NRC inspector issued a NRC Form 591 "Safety Inspection" to the licensee on December 4, 1991.

Prior to the December 1991 inspection, INS was inspected on October 26, 1988 to review workers' concerns about airborne radioactivity in breathing air zones from lint falling from the overhead structure, performance of maintenance on laundry drains by workers not adequately trained, and exposure from the piling of contaminated laundry bags and mops. No violations were identified. However, it was the NRC understanding at the conclusion of the inspection that the licensee would no longer direct union workers to clean laundry drains and would hire and train an individual to periodically clean lint from the overhead structure. This issue was closed during the 1991 inspection.

3. Organization

INS is a subsidiary of UniFirst Corporation whose headquarters is located in Springfield (Indian Orchard), Massachusetts. The company has 13 facilities, each licensed separately by the NRC or an Agreement State. The Springfield facility is one of 8 plants in the company's Northern Operations Group. The Springfield Plant Manager, who also serves as the Radiation Safety Officer, reports to the Northern Operations Manager. Although the Springfield facility has its own health physics staff, the corporate health physics and engineering group oversees safety at all facilities including radiation safety operations. The corporate radiation safety group is headed by Mr. Bovino and supported by a Corporate Health Physicist and a Radiological Instrumentation Coordinator. Both Mr. Bovino and the Northern Operations Manager report directly to the corporation's General Manager.

At the time of the inspection, the facility was operating with approximately 70 employees including supervisory personnel and drivers on two shifts. Supervisory staff include an Assistant Plant Manager and three production supervisors, one of which is always present on-site during laundering operations. The production supervisors and health physics staff are listed as authorized users on the license. There are three full time and two part time drivers. Two Health Physics Technicians report directly to the Radiation Safety Officer.

No safety concerns were identified with the licensee's organization.

4. Internal Audits

The corporate health physicist performs an annual health physics audit for each INS facility. Most recently, the Springfield facility was audited on January 28 and 29, 1991, and from February 3 through 7, 1992. Audit reports were sent to the Plant Manager on February 22, 1991, and February 28, 1992, respectively. The Plant

Manager responded to the findings in letters dated March 7, 1991 and March 31, 1992 which outlined the facility's corrective actions to the audit findings. The areas covered in the audit included the following: Radioactive Material Maximum Permissible Concentrations, Department of Transportation Compliance, Radiation Measurement, Dosimetry, Training, Air Measurement and System. Water Measurement and System, Radiation Levels, Contamination Surveys, Personnel Contamination, Radioactive Material License, Area Designation, Posting and Exposure Levels, Fire Protection, Radioactive Waste, Procedures, Hazardous Materials, Plant Safety, General Items and Past Open Items.

The 1991 audit identified 6 findings and made 10 recommendations in the facility radiation safety program. One open item identified during the previous audit concerned the recalibration of the isokinetic stack sampler. The recalibration was not completed at the time of the audit due to modifications in the air handling system. Four of the remaining five findings were concerned with record keeping and the fifth item required the erection of a fence around the storage trailers (the trailers are no longer used for storing radioactive waste and had been removed at the time of this inspection). The 1992 audit identified 19 items recommended for or requiring corrective action. Most of the items were related to record keeping requirements. There were no open items from the 1991 audit.

No safety concerns were identified with the licensee's audit program or findings.

5. Training and Instructions to Workers

The licensee is required to provide new workers with orientation training as well as annual training for all workers continuously employed who work in the restricted areas. Since a majority of the production workers speak either Portuguese or Spanish, the licensee has printed their safety and procedures manuals in English, Spanish, and Portuguese. There were also a number of bilingual individuals including some of the supervisors and the office staff who assist the radiation safety staff with training.

The inspectors interviewed a number of the production workers (through translators if needed) and determined that they had received the training required by the license. Most of the production workers had been with INS for at least five years and several had been employed for over 15 years, indicating a low turnover rate and stable work force. The inspectors also interviewed a driver for the licensee and determined that he received training required in 49 CFR 390 - 397. Like the production workers, most of the drivers have been with the licensee for several years.

The inspectors reviewed a selection of training records and found that the licensee had been providing the training required by the license. It was also determined that the individual assisting the radiation safety staff conducting the training (individual was

translating) had been signing the examinations given at the conclusion of the class as the instructor. The inspectors determined that the training was given by those individuals authorized by Condition 17 of the license. The tests were graded by the individual who was signing the examinations after correcting the exam. The licensee agreed to have the radiation safety staff person who provided the training sign future training records.

No safety concerns were identified with regard to the licensee's training program.

6. Facilities and Equipment

The air effluent discharge point for the INS facility is located on the roof of the facility near the railroad tracks. The discharge velocity is determined by the number of dryers in use and will operate at a maximum of 25,000 cubic feet per minute (cfm) with all three dryers operating. Air leaves the dryers located inside the facility and enters a common duct which exits out of the side of the building (on the side facing the railroad tracks), goes up the side of the building and enters a lint removal system on the roof. The lint removal system utilizes a two stage multi-impact water mist (scrubber type) system to remove suspended material in the air stream. Prior to release to the atmosphere, the air is sampled by an isokinetic sampler. The isokinetic sampler is oriented with respect to the air stream such that the intake of the sampler approximates the velocity of the surrounding airstream. The lint that is captured in the lint removal system is treated as radioactive waste and disposed of with other solids. The location where the duct exits the building at ground level and the lint removal system on the roof are posted and are surrounded by fences to prevent access.

The liquid waste system discharges into the City of Springfield sanitary sewer system. Prior to entering the sewer system, the waste water from the facility enters a manhole on the UniFirst property which is also the discharge point for the UniFirst facility waste water system. Waste water is collected in the facility from the four washers and the laboratories (health physics and research and development) into a wastewater holding pit. The water is then passed through a screen type filter and placed into two holding tanks of volumes 1150 and 460 cubic feet, respectively. Material collected on the filters is dried and disposed of as solid radioactive waste. Once the tank is filled, health physics personnel sample the tank for gross alpha and beta activity prior to releasing the water to the sewer.

The licensee has made, and is in the process of making, a number of improvements to the facility to meet the NRC discharge requirements in 10 CFR 20 for release of liquid effluents to unrestricted areas which will be required by January 1, 1994. The licensee has purchased and has taken delivery of equipment for a new wastewater treatment system to replace the existing system. The licensee has applied to the Commonwealth of Massachusetts for a discharge permit for the new wastewater

treatment system. The licensee has also submitted an amendment to the NRC regarding the water treatment facility. This action is currently under review by NRC Region 1.

The licensee has also purchased a high purity intrinsic germanium detector and gamma spectroscopy system and a low background proportional counter for their health physics laboratory to upgrade their analytical capabilities. The gamma spectroscopy system is used to analyze water, soil and air samples down to or near background levels and provides the licensee with the capability to perform both qualitative and quantitative analysis of samples containing large numbers of radionuclides at the same time. The proportional counter is used to perform alpha and beta analysis of wipe samples taken for contamination.

In addition to the analytical equipment described above, the licensee possesses a number of portable survey instruments for contamination and area surveys. The detection range for this equipment is adequate for the type and quantity of licensed material used under the license. Portable survey equipment is calibrated every six months. The licensee also utilizes 23 air sampling stations throughout the restricted area and at effluent release points on the roof. The main vent on the roof contains an isokinetic air sampler with a flow rate of approximately 97 liters per minute (lpm) and is calibrated yearly. Other air samplers operate at about 25 lpm.

Access to the building is adequately restricted and controlled by the licensee. Access to the laundering area is through a corridor in which a whole body frisker is located and the loading dock area is either locked from the inside or has trucks completely blocking the opening created by the roll-up doors. The vents for the dryers which exit out of the side of the building are restricted by a cyclone fence and the lint trap on the roof is also fenced off. Keys to restricted areas are maintained by supervisory and health physics personnel.

The inspectors reviewed a sampling of the analytical equipment and survey instrument daily source count log, minimum detectable activities, daily quality control checks for activity and resolution (gamma spectroscopy system) and calibration records for 1992.

No safety concerns were identified concerning the licensee's equipment and facilities.

7. Radiological Protection Procedures

The licensee's procedures require that a bilingual production supervisor be present on each shift. In addition, procedure and safety manuals written in English, Portuguese, and Spanish are readily available. The inspectors determined through interviews with both management and the production workers that workers and supervisors interact with each other routinely. A representative of the workers indicated that individuals will not hesitate to ask management or the health physics staff about radiation safety

issues; the representative indicated that workers receive timely and straightforward answers.

The inspectors also discussed safety procedures related to transportation with one of the drivers and a production supervisor. The production supervisor's responsibility includes the proper packaging, loading and manifesting of licensed material. Both individuals were knowledgeable of applicable U.S. Department of Transportation regulations and the licensee's shipping requirements, driver requirements and emergency procedures.

Individuals working the productions areas, who perform the monitoring and folding of laundry and routine monitoring work in the wastewater treatment area, are required to wear a lab coat. Individuals working in the washroom are required to wear shoe covers and gloves in addition to the lab coat to minimize the spread of contamination. Lines are clearly marked on the floor to segregate the washing/drying area from other areas. Inspection and cleaning of dryer ducts and the waste water treatment system require coveralls, shoe covers and gloves. The inspectors observed workers following the licensee's protective clothing procedures. The inspectors also noted that the production areas were kept clean and no accumulation of lint was observed.

No safety concerns were identified concerning the licensee's radiation protection procedures.

8. Receipt and Transfer of Radioactive Material

Incoming shipments of laundry are received by operations personnel in the loading dock adjacent to the laundering area. Containers are removed from the trucks and placed inside the loading dock's restricted area where they are surveyed and wipe-tested for contamination. The inspectors observed the receipt and survey of a shipment of contaminated laundry from the Millstone Nuclear Generating Stations. The health physics technician performs the incoming survey and analyzes the contamination wipes in the facility's counting laboratory.

The incoming and outgoing package and vehicle survey results are maintained with the transportation records and filed with each shipment by client. A review of selected records by the inspectors indicated that survey records were maintained as required by 10 CFR 20.401(b) and that receipt and transfer records were maintained as required by 10 CFR 30.51.

No safety concerns were identified with the receipt and transfer of licensed material.

9. Personnel Radiation Protection

All workers who routinely work inside the restricted area are provided with

thermoluminescent dosimeters (TLD) through Landauer, a commercial personnel dosimetry supplier with National Voluntary Laboratory Accreditation Programs (NVLAP) approval. The exchange frequency for TLDs is quarterly. The inspectors reviewed the first quarter 1992 results and determined that the average individual quarterly dose was under 30 millirem (mrem). The highest badge reading of the 67 individuals monitored in the quarter was 180 mrem. 10 CFR 20.101(a) limits an individual's radiation dose in a calendar quarter to 1250 mrem. The licensee has an action level of 1000 mrem per quarter.

The licensee's bioassay program requires that each worker in the restricted area have a chest count done on a quarterly basis. INS utilizes a shielded 2 inch by 2 inch NaI(Tl) detector coupled to a scaler. The licensee's procedure specifies an action level of 25% of the Annual Limit for Intake (ALI) for cobalt-60 as found in International Commission on Radiological Protection Publication 30 (ICRP 30) to initiate an isotopic whole body count. Cobalt-60 is the most abundant isotope handled by the licensee.

The inspectors reviewed bioassay results for the last year and determined that all those individuals whose records were reviewed had a quarterly chest count. The inspectors also evaluated the counting system's lower limit of detectability and action level and determined that the system had sufficient sensitivity to measure internally deposited cobalt-60 below the licensee's action level. No uranium analysis was performed during 1992 because the licensee did not handle uranium during this period.

Prior to exiting the radiation area, all individuals are required to use the whole body frisker to scan for the presence of contamination. If radioactive contamination on any individual trips the alarm on the frisker, that individual is scanned by health physics personnel using hand held survey meters with pancake probe detectors to locate the contamination and initiate decontamination. The inspectors reviewed the licensee's skin contamination log for 1992 and determined that contamination, if present, was usually located on the hands in the range of 40 to 60 counts per minute (cpm) above background. The highest reading during a contamination incident was 200 cpm above background. All contamination was successfully removed by soap and water.

No safety concerns were identified with the licensee's personnel monitoring program.

10. Radioactive Effluents

Airborne Monitoring

The licensee continuously monitors airborne radioactivity during operations through the use of 21 air sampling stations located throughout the restricted areas inside the building. As previously discussed in Section 6 of this report, the main discharge

point for the dryers is located on the roof and monitored by an isokinetic sampler. An exhaust fan discharge for the production area is also located on the roof.

The inspectors reviewed the weekly analytical results for all air sampling stations for 1992. The highest weekly measurement recorded in the wash room and wastewater treatment area was 6.40 E-12 microcuries per milliliter of air (uCi/ml) for gross alpha activity and 2.61 E-10 uCi/mi for gross beta activity. The highest weekly measurement recorded in the production areas was 8.69 E-14 uCi/ml for gross alpha activity and 1.15 E-11 uCi/ml for gross beta activity. The maximum weekly measurement for the main release point to the atmosphere was 1.27 E-14 uCi/ml for gross alpha activity and 2.98 E-13 uCi/ml for gross beta activity. For comparison sake, the most abundant radionuclide, Co-60, has a limit for airborne concentrations in restricted areas of 9 E-9 uCi/ml and a limit for airborne releases to unrestricted areas of 3 E-10 uCi/ml. These concentrations are well within the limits for concentrations of radionuclides in restricted and in releases to unrestricted areas, as appropriate.

No safety concerns were identified regarding the licensee's air monitoring program.

Wastewater Monitoring

The licensee samples each holding tank prior for discharge into the sanitary sewers for gross alpha and gross beta activity. The number of tank discharges during 1992 ranged from 4 to 9 per day. A monthly composite sample is analyzed by gamma spectroscopy to identify gamma emitters and a quarterly composite is sent to a commercial laboratory for analysis of alpha (if present) and beta emitters. The licensee's isotopic results of the monthly and quarterly wastewater composites for 1991 and 1992 are attached to this report.

The inspectors observed the sampling of a holding tank as well the analytical procedure. The inspector took a sample of the 460 ft^3 holding tank at the same time the licensee took their samples. The results are reported in Section 16 of this report.

The inspectors reviewed the gross alpha and gross beta analysis for all discharges in 1992. The maximum gross alpha concentration recorded was 9.57 E-7 uCi/ml and the maximum gross beta result was 4.68 E-5 uCi/ml. The NRC limit for releases to a sanitary sewer is 1 E-3 uCi/ml for Co-60. The inspectors determined that the licensee was in compliance with 10 CFR 20.303 regarding the discharge of wastewater into the sanitary sewer.

Based on the analytical data and shipping records reviewed by the inspectors during this inspection and statements made by the licensee, the isotopic ratio of radionuclides does not vary significantly from year to year. The stability of the isotopic ratio over a long period of time supports the use of gross alpha and gross beta analysis of the

wastewater prior to discharge.

No safety concerns were identified regarding the licensee's wastewater sampling program.

11. Waste Disposal

The radioactive waste stored at INS includes filtered waste water products from the laundering process awaiting discharge to the sewer system, used filtration media used to filter the water, radioactively contaminated lint collected at the dryer vent and contaminated clothing. The media and lint are collected and stored in wooden and metal boxes and metal drums. The radionuclides most abundant in the waste are cobalt-60, zinc-65, iron-55, manganese-54 and cesium-137. The concentrations of these isotopes in radioactive waste meet the DOT definition of low specific activity (LSA) defined in 49 CFR 173.403(n).

In May 1992, INS began using a new storage facility for radioactive waste. It is located underground, adjacent to the health physics laboratory, and accessible only from inside the building. The storage facility replaces the storage of waste in trailers in the parking lot next to one of the licensee's buildings. The storage area is constructed of concrete and steel and includes a fire suppression system, a liner/collection system around the exterior walls and floor to direct any potential releases to a sump for collection and subsequent sampling, and an air sampling system. Waste that is placed in this facility is already packaged for shipment. The facility is monitored on a daily basis for airborne contamination, removable contamination and radiation levels. The licensee has submitted a license amendment request to the NRC describing the new interim waste storage facility. This action is currently under review by NRC Region I.

Since 1989, the licensee made the following shipments of waste to Scientific Ecology Group (SEG) for processing (i.e. compaction) and final disposal at a commercial low level disposal site.

Year	No. of Shipments	Volume (ft^3)	Activity (millicuries)
1989	2	2,125.3	1,856.5
1990	1	907.0	147.8
1991	2	2,005.7	1,638.8
1992	1 (to date)	1,417.7	594.5

During this inspection, the inspectors reviewed the licensee's records related to the June 20, 1992 shipment of waste to SEG. The waste was classified as LSA and shipped as exclusive use using the licensee's own vehicles. Based on the radioactive material inventory, the following radionuclides contributed 94% of the activity:

cobalt-60 (44%), zinc-65 (27%), iron-55 (12%), manganese-54 (6%) and cesium 137 (5%). No alpha emitters were noted on the inventory. The maximum contact reading on the packages in this shipment was 90 millirem per hour (mrem/hr). DOT specifies in 49 CFR 173.441(b)(1) a maximum reading of 1000 mrem/hr for packages shipped as exclusive use. The maximum allowable reading drops to 200 mrem/hr if the shipment is not exclusive use. DOT specifies in 49 CFR 173.441(b)(2) and (3) that the maximum radiation level on contact with any outer surface of the vehicle and the maximum radiation level two meters from any outer lateral surface of the vehicle be 200 mrem/hr and 10 mrem/hr, respectively. The maximum contact reading on the surface of the licensee's waste shipment vehicle was 60 mrem/hr on the undersurface of the vehicle and 20 mrem/hr on the side, and had a maximum reading of 4 mrem/hr at two meters from the vehicle.

Shipment of radioactive material as exclusive use must meet the DOT requirements in 49 CFR 173.425(b) which specifies the conditions of shipment, acceptable radiation and contamination levels, placarding of the vehicle, marking containers and specific maintenance instructions which must accompany the shipping papers. The inspectors reviewed the licensee's shipping documents and measurements related to the shipment of waste and determined that the licensee met the DOT requirements for exclusive use shipments in 49 CFR 713.425.

No safety concerns were identified with the licensee's waste disposal program.

12. Posting and Labeling

The licensee posts the entire production area as a radiation area. 10 CFR 20.202(b)(2) defines radiation area as any area accessible to personnel in which a major portion of the whole body would receive a dose of 5 mrem in an hour or 100 mrem in any consecutive 5 days. The dryer ducts leading to the roof and the link collection system on the roof are also posted as radiation areas. The licensee stated that the entire area was considered to be a radiation area due to the continuous movement of contaminated clothing through the production area and the possibility that contaminated lint may build up inside the duct work.

Based on a review of the licensee's records for 1992, the inspectors determined that radiation levels inside the radiation area ranged from background (0.01 mrem per hour) to 12 mrem per hour. The highest reading measured 12 mrem per hour in the waste water treatment area on the lint drying table. The inspectors determined that the licensee was in compliance with posting and labeling requirements in Part 20 as well as posting requirements in 10 CFR 19.11.

No safety concerns were identified concerning posting and labeling.

13. Environmental Monitoring Program

The licensee has experienced problems with the intermittent overflow of foam from the manhole located on the UniFirst site near Parker Street. Wastewater containing soap and contaminated material not removed from the filtration process is discharged from a three-inch diameter pipe into an eight-foot deep collection area prior to discharge into the sanitary sewer. The UniFirst operation also uses the same collection point prior to discharge. The license stated that they believe that the high velocity discharge into the manhole coupled with a discharge from UniFirst causes the foaming and subsequent overflow of foam around the seal of the manhole cover. Since the INS wastewater contains small quantities of radioactive materials, the foam also contains some of this radioactive material. The foaming problem was apparently worsened by the installation of a new wastewater system by UniFirst in early 1992 which is more effective in removing oil and grease which act as an antifoaming agent. During a survey of the manhole on February 17, 1992, beta contamination levels of 1744 disintegrations per minute per 100 square centimeters (dpm/100 cm^2) and Geiger-Mueller readings up to 3000 cpm above background were identified by the licensee. Measurements of surface soil around the manhole were performed on February 27th. A foaming incident occured on February 28th that resulted in the licensee performing additional measurements and subsequently removing approximately 3 cubic feet of soil from around the manhole on February 29th. Contamination of soil was limited to areas immediately downstream of the manhole within the fenced INS property in the direction of the UniFirst parking lot. Documented post decontamination survey results were reviewed by the inspectors showed near background levels. See Section 16 for NRC measurements of this location.

The licensee continues to perform daily radiation and contamination surveys on and around the manhole. A total of eight beta and gamma radiation readings are recorded and eight smears are taken daily for analysis for gross alpha and beta radiation. No measurements or readings at levels as high as those found in late February have been recorded by the licensee. A basis of comparison for surface contamination can be found in the attached NRC's "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material". Comparison of the contamination levels measured in late February 1992 with the attached guidelines finds that the licensee did not exceed these unrestricted release guidelines.

The licensee conducts weekly outdoor gamma radiation surveys along the restricted area boundary of the facility with a side window Geiger-Mueller detector (see Section 14). The Unifirst side of the property is not included in the survey. A review of licensee's records indicated that readings ranged from 0.05 mrem/hr (background) to 0.4 mrem/hr. Maximum readings were measured inside the fence near the building where waste was stored. The maximum reading measured at the fence or along the railroad tracks was 0.1 mrem/hr. Dose rates outside the fence which exceeded background radiation levels were determined by the inspectors to have resulted from

the transitory storage of contaminated clothing or trucks containing contaminated laundry. The inspectors concluded that the licensee is in compliance with NRC regulations for unrestricted areas specified in 10 CFR 20.105(b)(1) which limit radiation levels to 2 mR in an hour or a 100 mrem in any seven consecutive days if an individual was continuously present in the area.

The licensee has purchased environmental TLDs for deployment this year along the fence of their property. The use of TLDs will improve the measurement of the radiation exposure at the fence line because the devices will be continuously present. Accumulated radiation exposure can not be accurately determined from weekly radiation surveys due to the frequent movement of licensed material around this facility.

No safety concerns were identified with the licensee's environmental monitoring program.

14. Surveys

The licensee is required by 10 CFR 20.201(b) to perform radiation surveys to show compliance with the regulations in Part 20 to evaluate the extent of radiation hazards that are or may be present. The licensee must also maintain records of these surveys as per 10 CFR 20.401. The types of radiation surveys that INS performs to satisfy NRC regulations are approved by the NRC during the licensing process.

The following is a summary of the radiation monitoring performed by the licensee:

a. Personnel:
1. Thermoluminescent Dosimeters (TLDs); exchanged quarterly
2. Camma Chest Count; performed quarterly
3. Urine analysis for uranium; performed quarterly (if uranium present at facility)

b. Air Sampling:
1. Continuous air sampling for gross alpha and beta activity of work areas inside plant in areas where radioactive materials are used; analyzed weekly.
2. Continuous air sampling for gross alpha and beta activity of effluent air to the atmosphere whenever air is exhausted; analyzed weekly.

c. Water Sampling:
1. Holding tanks prior to each discharge to sanitary sewer for gross alpha and beta activity.
2. Monthly composite of all discharges analyzed by gamma spectroscopy.
3. Quarterly composite of all discharges analyzed for beta emitters.

d. Contamination	1. Daily radiation surveys of interior work areas. 2 Daily smears to measure removable contamination of interior work areas. 3. Weekly radiation survey of discharge piping for dryers.
e. Exterior Surveys	1. Weekly survey of restricted area boundary (fence line). 2. Daily radiation and smears to measure contamination of manhole through which waste water is discharged
f. Transportation	1. Each truck is surveyed for radiation levels prior to shipment 2. Each truck is smeared after containers are unloaded 3. Each container is surveyed for removable contamination and radiation levels upon receipt and prior to shipment.

The inspectors reviewed a sampling of those records listed above. Related records, such as calibration and quality assurance, were also reviewed. The inspectors determined that the licensee was in compliance with Part 20 and that the type and frequency of these surveys was adequate to evaluate the radiation hazards present at the facility.

No safety concerns were identified with the licensee's survey program.

15. Transportation

The inspectors reviewed a selection of transportation records from Millstone, Combustion Engineering, United Nuclear, Electric Boat and Niagara Mohawk. A total of 20 shipments were reviewed. For each shipment, the following items were reviewed: transfer record, checklist for driver, radiation survey for containers and truck, radioactive material shipment record and bill of lading. Millstone and Combustion Engineering utilize DOT 7A Type A containers; records indicated that other shipments were either LSA or exempt quantity which require strong, tight containers. The licensee had Certificates of Compliance for Type A containers on file for both clients. Radiation levels around the trucks were typically measured at background levels. Maximum contact radiation levels on vehicles' survey records reviewed by the inspector were 1.5 mrem/hr. The inspectors determined that shipping records contained the information required by DOT in 49 CFR 173.

Sections 5, 8 and 11 of this report contain additional information related to the transportation of radioactive materials.

No safety concerns were identified concerning the licensee's shipping and transportation program.

16. Independent Measurements

The inspectors took a number of independent measurements during the course of the inspection. The following field instruments were used to measure environmental gamma radiation levels: Bicron Micro-Rem meter, Serial No. 033431, calibrated on June 22, 1992; and a Ludlum Model 12S, Serial No. 008582, calibrated on June 28, 1992. An Eberline Model E-120 with an end window Geiger-Mueller detector, Serial No. 001087, calibrated on March 5, 1992, was used to measure beta and gamma radiation inside the restricted areas of the facility and around the manhole cover. Soil, sediment and water samples were analyzed at the NRC Region I laboratory in King of Prussia, Pennsylvania. Analytical equipment included a Princeton Gamma-Tech high purity intrinsic germanium detector with 28% efficiency for gamma spectroscopy analysis, Tennelec Model LB5100 gas flow proportional counter for gross alpha and beta activity, and a Packard Model 2250CA liquid scintillation analyzer for tritium analysis.

Gamma Measurements

The following is a summary of gamma radiation measurements taken by the inspectors outside of the licensee's facility. Background gamma radiation levels were measured at 0.005 to 0.01 mrem/hr.

1. Licensee's fence line (unrestricted area): All readings were background with the exception of the area along the railroad track adjacent to the licensee building which ranged from background to 0.04 mrem/hr. Licensee's measurements taken at the time of the NRC measurements were less than 0.05 mrem/hr.

2. Dimmock Pond Area (including unimproved road between Pond and licensee's property and trails along the Parker Avenue side of the Pond): All readings were background.

3. Manhole Area on UniFirst property: All readings were background.

4. Waste Truck from Millstone: Contact readings ranged from background to 0.3 mrem/hr. Readings two meters from the truck were less than 0.05 mrem/hr (Geiger-Mueller detector used).

5. Licensee's facility (restricted areas inside main building): Background to 10 mrem/hr. Maximum reading was measured at the lint drying table.

Based on the independent measurements taken by the NRC, the inspectors determined that the licensee was in compliance with NRC regulations in 10 CFR 20.105 which limits radiation levels in unrestricted areas to 2 mrem in an hour or 100 mrem in any

seven consecutive days if an individual is continuously present in the area.

Water Sampling

The inspectors took 3 water samples; two samples from Dimmock Pond and a sample from the licensee's 460 ft^3 wastewater holding tank. One pond sample was taken from a ramp area near the INS property and a second pond sample was taken from a storm drain leading from Parker Avenue. Water samples were analyzed for gamma emitters, gross alpha and gross beta activity and tritium. The NRC limit for liquid releases to unrestricted areas for tritium is 3 E-3 uCi/ml. All results in the table below are in units of uCi/ml with a one sigma counting error. LLD means less than the lower limit of detectability for the counting system.

Sample	Gross Alpha	Gross Beta	Tritium	Gamma Emitters
Pond-Ramp Area	1±2 E-8	1.0±0.5 E-7	5±3 E-7	LLD*
Pond-Storm Drain	2±2 E-8	8±5 E-8	2±2 E-7	LLD*
INS Holding Tank	5±3 E-8	8.1±0.2 E-6	1.4±0.2 E-7	See Below

* The LLD for Co-60 is 1 E-7 uCi/ml.

Gamma emitters for Holding Tank

Cr-51: (2.13±0.16) E-5	Mn-54: (1.5±0.2) E-6
Co-58: (8.4±0.3) E-6	Co-60: (1.53±0.04) E-5
Zn-65: (1.9±0.5) E-6	Zr-95: (1.9±0.3) E-6
Ru-103: (4.8±1.4) E-7	Cs-134: (5.8±1.4) E-7
Cs-137: (2.68±0.16) E-6	

Comparison of the holding tank sample results with 10 CFR 20.106 and 10 CFR 20.303 show that the licensee is in compliance with NRC requirements.

Soil and Sediment Sampling

The inspectors took three soil samples and one sediment sample during the course of the inspection. The sediment sample was a composite sample taken from Dimmock Pond near the licensee's property. A composite soil sample was taken along the licensee's fence line in the area where the licensee's trucks are parked. A third soil sample was taken in a local park about a half mile from the licensee's facility as a background sample for comparative purposes. The final sample was taken on the license's property around the manhole which had experienced the foaming overflow and was remediated on February 29th. All samples, including the background sample, contained measurable quantities of Cs-137 and/or Co-60. The presence of Cs-137 and Co-60 in soil and sediment is consistent with known results from atmospheric testing of nuclear weapons because of their long half-lives and retention in soil.

Results of soil analysis are given in picocuries per gram of soil (pCi/g) with a one sigma counting error.

Location	Soil Concentration (pCi/g)
Background	Cs-137: 0.10 ± 0.02
Fenceline Composite	Cs-137: 0.20 ± 0.03
Pond Composite	Cs-137: 0.70 ± 0.03
	Co-60: 0.052 ± 0.15
Manhole	Mn-54: 0.25 ± 0.04
	Co-58: 0.21 ± 0.04
	Co-60: 1.46 ± 0.06
	Zn-65: 1.13 ± 0.08
	Cs-137: 0.24 ± 0.02

The soil sample from the manhole area was counted by both the NRC and the licensee on their respective gamma spectroscopy systems. The correlation between the results was determined to be 0.98 ± 0.10 which indicates very good agreement.

Commonwealth of Massachusetts Samples

On July 7, 1992, an inspector from the Commonwealth of Massachusetts, Department of Public Health, Radiation Control Program, took a water sample and sediment sample from Dimmock Pond. Both samples were analyzed by the Commonwealth using gamma spectroscopy techniques. No positive results were measured in the water sample above the detection limit of their counting system. The only radionuclide measured in the sediment sample was Cs-137 with a concentration of 0.76 ± 0.05 pCi/g. This concentration is similar to the Cs-137 concentration measured in the sediment sample taken by the NRC.

No safety concerns were identified as a result of the independent measurements taken by the inspectors.

17. Exit Interview

The inspection findings were discussed with the licensee representatives identified in Section 1 of this report on July 9, 1992.

Springfield 1992 Water Results (uCi/ml)

	Cs 134	Cs-137	Co-58	Co-60	Mn-54	Zn-65	Sb-125	Tc-99	Fe-55	Sr-90	H-3	Gallons Disch	uCi Disch
Jan	1.02E-06	3.79E-06	8.65E-07	3.20E-06	5.86E-07	1.48E-06		4.38E-07	1.02E-06	2.38E-08	5.97E-06	569452	39636
Feb	3.96E-07	1.27E-06		1.31E-06				4.38E-07	1.02E-06	2.38E-08	5.97E-06	670956	26498
Mar	1.67E-07	6.00E-07	1.57E-07	6.58E-07		8.32E-07		4.38E-07	1.02E-06	2.38E-08	5.97E-06	1012948	37830
Apr	3.65E-07	7.23E-07	2.94E-07	2.03E-06	5.55E-07	2.18E-06						908371	21110
May	2.19E-07	7.03E-07	3.52E-07	1.18E-06	3.01E-07	1.12E-06						882565	12955
Jun	3.54E-07	1.45E-06	8.32E-07	4.37E-06	9.21E-07	2.62E-06						996112	39735
Jul													
Aug													
Sep													
Oct													
Nov													
Dec													
										YTD Totals:		5040404	177764

Fraction Totals

(% of Maximum Permissible Concentrations)

	Cs-134	Cs-137	Co-58	Co-60	Mn-54	Zn-65	Sb-125	Tc-99	Fe-55	Sr-90	H-3	Fraction Total
Jan	0.34%	0.95%	0.03%	0.32%	0.02%	0.05%		0.01%	0.01%	0.24%	0.01%	0.0196
Feb	0.13%	0.32%		0.13%				0.01%	0.01%	0.24%	0.01%	0.0084
Mar	0.06%	0.15%	0.01%	0.07%		0.03%		0.01%	0.01%	0.24%	0.01%	0.0056
Apr	0.12%	0.18%	0.01%	0.20%	0.02%	0.07%						0.0061
May	0.07%	0.18%	0.01%	0.12%	0.01%	0.04%						0.0043
Jun	0.12%	0.36%	0.03%	0.44%	0.03%	0.09%						0.0106
Jul												
Aug												
Sep												
Oct												
Nov												
Dec												

Springfield 1991 Water Results (uCi/ml)

	Cs-134	Cs-137	Co-58	Co-60	Mn-54	Zn-65	Sb-125	Tc-99	Fe-55	Sr-90	H-3	Gallons Disch	uCi Disch
Jan	1.45E-06	2.54E-06	2.73E-07	3.34E-06	9.91E-07	4.41E-06		2.54E-06	5.62E-06	3.95E-08	5.8E-06	373327	38157
Feb	8.55E-07	3.25E-06	1.55E-06	3.05E-06	7.21E-07	1.88E-06	2.06E-06	2.54E-06	5.62E-06	3.95E-08	5.8E-06	553969	57358
Mar	8.92E-07	3.36E-06	1.44E-06	2.58E-06	3.96E-07	6.44E-07	2.23E-06	2.54E-06	5.62E-06	3.95E-08	5.8E-06	734611	71018
Apr	1.09E-06	3.65E-06	6.73E-07	3.65E-06		2.02E-06	2.44E-06	6.85E-07	7.03E-07		2.85E-06	753535	50648
May	3.64E-07	3.25E-06	6.37E-07	4.37E-06	7.37E-07	2.25E-06	2.16E-06	6.85E-07	7.03E-07		2.85E-06	750169	51118
Jun		1.93E-06		2.65E-06	5.23E-07	8.62E-07		6.85E-07	7.03E-07		2.85E-06	816218	31494
Jul	3.37E-07	1.89E-06		4.16E-06	6.91E-07	6.77E-07		7.00E-07	5.51E-07	7.9E-09	4.15E-05	529880	101215
Aug	2.14E-07	7.08E-07	1.86E-07	2.56E-06	6.49E-07	9.38E-07		7.00E-07	5.51E-07	7.9E-09	4.15E-05	433540	78717
Sep	3.72E-07	1.23E-06	4.76E-07	1.67E-06	3.46E-07	1.35E-06		7.00E-07	5.51E-07	7.9E-09	4.15E-05	316550	57705
Oct	6.10E-07	1.35E-06		4.35E-07	1.30E-07	4.67E-07		2.31E-06	1.35E-06			354402	8911
Nov	1.00E-06	2.19E-06	3.70E-07	1.52E-06				2.31E-06	1.35E-06			454185	15016
Dec	1.12E-06	2.74E-06	4.30E-07	1.61E-06	1.60E-07			2.31E-06	1.35E-06			499807	18376
												======	======
										YTD Totals:		6570192	579734

Fraction Totals

(% of Maximum Permissible Concentrations)

	Cs-134	Cs-137	Co-58	Co-60	Mn-54	Zn-65	Sb-125	Tc-99	Fe-55	Sr-90	H-3	Fraction Total
Jan	0.48%	0.63%	0.01%	0.33%	0.03%	0.15%		0.05%	0.03%	0.40%	0.01%	0.021
Feb	0.29%	0.81%	0.05%	0.31%	0.02%	0.06%	0.07%	0.05%	0.03%	0.40%	0.01%	0.021
Mar	0.30%	0.84%	0.05%	0.26%	0.01%	0.02%	0.07%	0.05%	0.03%	0.40%	0.01%	0.020
Apr	0.36%	0.91%	0.02%	0.37%		0.07%	0.08%	0.01%	0.00%		0.00%	0.018
May	0.12%	0.81%	0.02%	0.44%	0.02%	0.08%	0.07%	0.01%	0.00%		0.00%	0.016
Jun		0.48%		0.26%	0.02%	0.03%		0.01%	0.00%		0.00%	0.008
Jul	0.11%	0.47%		0.42%	0.02%	0.02%		0.01%	0.00%	0.08%	0.04%	0.012
Aug	0.07%	0.18%	0.01%	0.26%	0.02%	0.03%		0.01%	0.00%	0.08%	0.04%	0.007
Sep	0.12%	0.31%	0.02%	0.17%	0.01%	0.04%		0.01%	0.00%	0.08%	0.04%	0.008
Oct	0.20%	0.34%		0.04%	0.00%	0.02%		0.05%	0.01%			0.007
Nov	0.33%	0.55%	0.01%	0.15%				0.05%	0.01%			0.011
Dec	0.37%	0.68%	0.01%	0.16%	0.01%			0.05%	0.01%			0.013

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

U.S. Nuclear Regulatory Commission
Division of Fuel Cycle, Medical, Academic,
and Commercial Use Safety
Washington, DC 20555

May 1987

TABLE 1

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES[a]	AVERAGE[b c f]	MAXIMUM[b d f]	REMOVABLE[b e f]
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 $\beta\gamma$/100 cm^2	15,000 dpm $\beta\gamma$/100 cm^2	1000 dpm $\beta\gamma$/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.

[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

The instructions in this guide, in conjunction with Table 1, specify the radionuclides and radiation exposure rate limits which should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control is considered on a case-by-case.

1. The licensee shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that 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 shall be presumed to be contaminated in excess of the limits.

4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer to premises to another organization continuing work with radioactive materials, or conversation of facilities to a long-term storage or standby status. Such requests must:

   a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent, and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be filed with the Division of Fuel Cycle, Medical, Academic, and Commercial Use Safety, U. S. Nuclear Regulatory Commission, Washington, DC 20555, and also the Administrator of the NRC Regional Office having jurisdiction. The report should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the survey in units specified in the instruction.

   Following review of the report, the NRC will consider visiting the facilities to confirm the survey.