JAN 30 1986

Docket No. 50-219

GPU Nuclear Corporation
ATTN: Mr. P. B. Fiedler
Vice President and Director
Oyster Creek Nuclear Generating Station
P. O. Box 388
Forked River, NJ 08731

Gentlemen:

Subject: Inspection No. 50-219/85-33

We acknowledge receipt of your letter dated January 10, 1986, in response to our letter dated December 4, 1985.

Thank you for informing us of the corrective and preventive actions documented in your letter. These actions will be examined during a future inspection of your licensed program.

Your cooperation with us is appreciated.

Sincerely,

Original Signed By:
Ronald R. Bellamy
for Thomas T. Martin, Director
Division of Radiation Safety
and Safeguards

cc:
M. Laggart, BWR Licensing Manager
Licensing Manager, Oyster Creek
Public Document Room (PDR)
Local Public Document Room (LPDR)
Nuclear Safety Information Center (NSIC)
NRC Resident Inspector
State of New Jersey

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bcc:
Region I Docket Room (with concurrences)
Management Assistant, DRMA (w/o encl)
Section Chief, DRP
P. Clemons, DRSS

RI:DRSS	RI:DRSS	RI:DRSS
MMiller/ms	Pasciak	Bellamy
1/27/86	1/28/86	1/29/86

OFFICIAL RECORD COPY

GPU Nuclear

GPU Nuclear Corporation
Post Office Box 388
Route 9 South
Forked River, New Jersey 08731-0388
609 971-4000
Writer's Direct Dial Number:

January 10, 1986

Thomas T. Martin, Director
Division of Radiation Safety and Safeguards
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Dear Mr. Martin:

Subject: Oyster Creek Nuclear Generating Station
Docket No. 50-219
Inspection Report No. 85-33
Response to Violation

As requested by the subject inspection report dated December 4, 1985, Attachments I and II to this letter provide our response to the Notice of Violation.

Should you require further information, please contact Brenda Hohman, Oyster Creek Licensing Engineer at (609)971-4642.

Very truly yours,

Peter B. Fiedler
Vice President and Director
Oyster Creek

PBF/BH/dam
Attachments
(0103A)

cc Dr. Thomas E. Murley, Administrator
Region I
U.S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Mr. Jack N. Donohew, Jr.
U.S. Nuclear Regulatory Commission
7920 Norfolk Avenue, Phillips Bldg.
Bethesda, MD 20014
Mail Stop No. 314

NRC Resident Inspector
Oyster Creek Nuclear Generating Station

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ATTACHMENT I

Violation

10 CFR 71.5(a) states, in part, that each licensee who delivers licensed material to a carrier for transport, shall comply with the applicable DOT regulations appropriate to the mode of transport in 49 CFR Parts 170 through 189.

49 CFR 173.44(b) states, in part, that a shipment may be transported as an exclusive use shipment if the radiation level does not exceed during transportation in an open transport vehicle 10 millirem per hour at any point 2 meters from the vertical planes projected from the outer edges of the conveyance.

Contrary to the above, on October 13, 1985, shipment OC 1036-85 containing radioactive material classified as low specific activity (LSA) was delivered as an exclusive use shipment to a carrier for transport via an open transport vehicle, and upon arrival at the Quadrex Corporation in Oak Ridge, Tennessee on October 15, 1985, the external radiation level of the shipment at the four survey points 2 meters from the vertical planes projecting from the outer edges of the conveyance were in excess of 10 millirem per hour with the highest measurement recorded as 15 millirem per hour.

Response

GPUN concurs with the violation as stated. The attached Operations Critique regarding this violation provides a detailed description of the incident and corrective actions taken to preclude a recurrence. The following items are summarized from information provided in the critique:

1. Reason for the violation

The package which was delivered to the Quadrex facility contained an underwater cutter shearer (UCS) which had been used in the fuel pool to cut control rod blades (CRB) in preparation for disposal.

This USC belongs to a GPUN contractor and was being shipped to Quadrex for decontamination and repairs. When the package arrived, the receipt survey revealed a general radiation field increase (over initial shipment of surveys) of 4-6 mr/hr at essentially all locations around the package at two meters.

When the package was opened, it was determined that local shielding, installed prior to shipment, was intact and had not shifted in transit. Subsequent dismantling of the equipment revealed a small piece of a boron poison tube with a contact radiation level of 25 to 40 R/hr. It has been determined that the shifting of this boron tube in the internals of the USC, due to transport stresses, caused the general two-meter radiation level increase.

2. Corrective steps which have been taken and results achieved

(a) The shipment was immediately dispositioned and off-loaded by agreement between GPUN and Quadrex.

(b) The NRC, transport carrier and the State of Tennessee were notified of the incident.

(c) An investigation/critique was commenced and the results are attached

(d) The GPUN manager of Radwaste Operations and Radwaste Shipping Supervisor met with Quadrex and WasteChem personnel at the Quadrex Oak Ridge Facility to ensure immediate corrective actions were taken consistent with regulatory requirements and good radiological control practices.

(e) The contractor owning the USC was informed that the equipment would not be accepted at Oyster Creek until such time that design modifications were made to the USC to preclude irradiated scrap from entering the areas of the machine not readily accessible for visual inspection.

(f) The boron tube was placed in a secure shielded location at the Quadrex facility to avoid additional personnel exposure.

(g) The Radiological Controls Department performed a dose assessment to the population as a result of this shipment. The total (conservative) estimated dose to the general population was 1.41 MRem.

The modifications (detailed in attached critique) to the USC have been completed, however, the contract to process CRB's has been indefinitely postponed. Consequently, future shipments of this equipment are not planned.

The boron tube segment is presently at Quadrex and plans are being made to return it to the Oyster Creek fuel pool for storage and ultimate disposal with other irradiated components.

3. Corrective steps which will be taken to avoid further violations

(a) This shipment was made with a reasonable assumption that the radiation levels (1.34 R/hr maximum contact) was from fixed contamination on the USC surfaces. Our experience with storage racks and other non-irradiated components, exposed to the fuel pool water environment (as the USC was), shows these radiation levels to be normal and not indicative of irradiated hardware. However, this incident clearly indicates the potential for small sources of irradiated hardware to be inadvertantly mixed with LSA material, provided ample intrinsic shielding exists to mask the relatively higher radiation levels. Shipments of LSA material that could be co-mingled with irradiated hardware are extremely rare and, in fact, limited to equipment utilized to handle or process the latter. To preclude a similar recurrence of this nature, the Oyster Creek general Radwaste Shipping Procedure (O.C. 101.3) will be revised to include a specific precaution for a prior review of these types of shipments to determine if irradiated pieces could be inadvertently included. This review will include a requirement not to make waste classification determinations when internal surveys are unavailable for equipment which potentially could contain irradiated pieces.

(b) From a broader perspective, this incident instigated a review of our Radioactive Material Management Program. The procedures utilized to classify radioactive waste for our normal waste streams, such as dry activated waste (DAW) and solidified process waste, specifically address those variables which could preclude accurate determination of waste classification. The dose to curie conversion computer program (RADMAN) utilized to classify our normal waste streams provides ample protection to ensure accurate classification of waste.

(c) The violation notice expressed a concern because "the radiation level was only slightly below the limit, yet further decontamination was not performed." A review was conducted of the management decision which authorized the administrative limit of 8 mr/hr to be temporarily revised to 9.5 mr/hr. The result of that review, and specifically the following facts, led us to conclude that this decision was made with due consideration of the known circumstances, at the time of shipment, and had no impact on the cause of this violation:

(1) The USC had been hydrolased extensively prior to packaging. Additional attempts to hydrolase did not reduce the maximum contact radiation levels.

(2) Shielding requirements were based on the assumption of fixed contamination rather than a source of irradiated hardware. Lead shielding was applied to the upper portions of the equipment with other areas intentionally not shielded because no dose rate problems were indicated in these areas. WasteChem personnel verified that when the shipping package was opened, shielding was found to be intact as originally installed.

(3) It should be noted that previous experience has shown it is extremely difficult to appreciably reduce radiation levels (by 1 or 2 mr/hr) of large packages (broad area source) by installation of additional localized shielding. Likewise, significant amounts of shielding applied to general areas are restricted by container and shipment weight constraints. Consequently, our shipping procedure provides for relief from the 8 mr/hr requirement up to 9.5 mr/hr maximum at two meters with prior approval of the Manager of Radwaste Operations.

These situations are very infrequent, however, they do recur with large equipment packages such as control rod drives and fuel storage racks. This waiver has been applied for no more than 10 shipments out of approximately 225 in the last three (3) years and there has never been a similar incident, i.e. increased two-meter dose rates.

(4) The package was placed on the shipping trailer, surveyed and found to be reading 8 mr/hr at two-meter in one location. To add additional shielding would have required additional

personnel exposure while returning the equipment to the Reactor Building, opening the package and applying more shielding.

4. Date when full compliance will be achieved

Full compliance was achieved on 10/15/85 when agreement was reached between GPUN and Quadrex for the package to be received, off-loaded and processed by the Quadrex Decontamination Facility.

Attachment II

GPU Nuclear

Memorandum

Subject: Operation Critique -
O. C. Radioactive Material
Shipment Number 1036-85

Date: December 24, 1985

From: T. W. Snider
Manager, Radwaste Operations

Location: Oyster Creek

To: Operations Critique File

This operatons critique was initated to review the events, determine cause, and corrective action to preclude a recurrence of radwaste shipping discrepencies which occurred with O. C. shipment number 1036-85 on October 15, 1985. The following format is utilized:

I. Brief Description of the Incident.
II. Detailed Sequence of Events.
III. Determination of Cause.
IV. Corrective Action to Prevent Recurrence.

I. Brief Description of the Incident

WasteChem Corporation was awarded the contract to volume reduce misc. irradiated hardware, i.e., control rod blades (CRB), flow channels. Volume reduction of the hardware was performed by utilizing an underwater shearer crusher (USC). Control rod blades were selected as the first item to be volume reduced. Five (5) CRB's were volume reduced with no apparent problems with the USC. The sixth CRB was placed in the USC and was being volume reduced when WasteChem noticed a drop in hydraulic pressure. The process was stopped and was technically evaluated by WasteChem to determine the reason for the loss of hydraulic pressure. It was determined that there was a damaged seal around one of two hydraulic pistons which are physically located inside the USC.

To insure personnel exposure was minimized, it was determined that the USC should be sent to Quadrex Corp. in Oakridge, TN for decontamination and repair. The equipment was decontaminated, as much as possible without disassembly, by hydrolazing. Removable external apparatus, such as filters and cutting blades, with highest radiation levels were removed and stored. The equipment was packaged and shipped from Oyster Creek on 10/13/85. It arrived at Quadrex Corporation, Oak Ridge, TN, on 10/15/85. The receipt survey determined that the external radiation limit of 10 millirem per hour at two meters was exceeded at four survey points ranging from 11 to 15 millirem per hour. This violated the specific requirements of 49 CFR 173.441(b). As such, it is also deemed a violation of 10 CFR 71.5(a).

II. Detailed Sequence of Events

A. Specific Preparations for Shipment

To meet the requirements for packaging and shipment, the Radwaste Shipping Section gave WasteChem the following instructions to be implemented prior to packaging:

1. The USC shall be hydrolased to reduce smearable contamination levels and contact radiation levels. Hydrolasing will cease when there is no further reduction in radiation/contamination levels.

2. The USC shall be inspected to insure that there are no pieces of irradiated hardware on or within the USC.

3. The filter shall be removed from the filtration system.

4. Any and all shielding used shall be installed, banded, and secured to insure that it does not shift during transportation.

5. A one square inch scraping shall be taken from the area with the highest direct radiation level on the USC in order to determine the total specific activity on all surface areas.

6. All equipment shall be wrapped in plastic prior to being placed into the shipping container.

The items listed above were contained in plant specific procedures with supervisory signoffs, for verification of completion, with the exception of Item #5 which was a requirement listed in the Radiological Engineering Request (RER). The RER was listed as a prerequisite in the procedure which made it part of the procedure.

The USC was hydrolased until the radiation levels could not be reduced any further. Radiation surveys indicated there was a maximum 1.34 R/hr hot spot. This rad level was appreciable below the original levels (approximately 4 R/hr maximum) on the unit when Oyster Creek received it from another licensee. In addition, it is consistent with hot spots, remaining after hydrolasing, on the non-irradiated equipment removed from the fuel pool. Consequently, the source was assumed to be from fixed contamination. This assumption was reinforced by the fact that WasteChem had not found significant, mobile radioactive material in this or similar equipment in eleven years of operation. This incident and subsequent investigations would prove this to be a wrong assumption, as the 1.3 R/hr was in the area where the boron tube piece was ultimately found.

The Radwaste Shipping Supervisor (RSS) was called at home for his approval to shield the hot spot. The RSS reiterated the requirements of the procedure regarding shielding, specifically it was to be installed in a manner so as not to shift in transit, and approved application of the shielding.

WasteChem supervisors completed the stipulated requirements to insure shipping compliance of the USC. The USC was wrapped in plastic and transfered to its designed shipping container which was located on Elev. 23' in the Reactor Bldg. Localized lead shielding was installed under the direction of WasteChem supervisors to reduce contact radiation levels. After installation of the lead shielding, the USC container was closed and loaded on the trailer. The trailer was removed from the Reactor Bldg. to a lower background area in the RCA yard and surveys were performed on the containers. The box containing the USC was reading 9.5 mr/hr at two meters which was 1.5 mr/hr above allowable administrative limits. The contact rad levels were well below the administrative limit of 180 mr/hr.

The Radwaste Shipping Supervisor was contacted at home and advised of the radiation levels. He reported to work to evaluate the need for further shielding or make the necessary procedure changes. WasteChem Supervisors were questioned about the lead shielding and the manner in which it was installed. The Radwaste Shipping Supervisor was told that the shielding was properly installed and secured.

NOTE:

It should be noted that previous experience has shown it is extremely difficult to appreciably reduce radiation levels (by 1 or 2 mr/hr) of large packages (broad area source) by installation of additional localized shielding. Likewise, significant amounts of shielding applied to general areas are restricted by container and shipment weight constraints. Consequently, our shipping procedure provides for relief from the 8 mr/hr requirement up to 9.5 mr/hr maximum at two meters with prior approval of the Manager of Radwaste Operations. These situations are very infrequent, however, they do recur with large equipment packages such as control rod drives and fuel storage racks. This waiver has been applied for no more than 10 shipments out of approximately 225 in the last three years and there has never been a similar incident, i.e., increased two meter dose rates.

To reduce personnel exposure, the decision was made not to return the container to the Reactor Building and open the container to install more shielding, but rather make a one time procedure change to authorize shipment at these radiation levels. The Manager, Radwaste Operations was called at home for his approval to make a one time change to the procedure which would allow the administration limit of 8 mr/hr at two meters to be waived and increased to 9.5 mr/hr for this shipment. His instructions were to survey the area in question utilizing two survey instruments to verify readings. This was performed and both instruments read 9.5 mr/hr. The Radwaste Operations Manager then questioned the adequacy of the lead shielding and its installation. With the assurance that the shielding was properly installed, he authorized the procedure change. The shipping papers were completed and the shipment made from the site on 10/13/85 as LSA material in an open flatbed designated as exclusive use.

B. Receipt of shipment at Quadrex Corp. Oakridge, TN.

The shipment arrived at Quadrex Corp. Oakridge, TN. on 10/15/85 at 7:10 a.m. A receipt survey was performed and the radiation levels at two meters were found to be in excess of 49 CFR 173.441(B) for the container which housed the USC. At the time of receipt, WasteChem Supervisors were at Quadrex to repair the equipment. GPU Nuclear was notified and copies of the surveys were sent via telecopy to Oyster Creek. Quadrex accepted receipt of the equipment and it was offloaded for decontamination and repair. WasteChem and Quadrex were asked to apprise the as found condition of the shielding and any other conditions that would have caused the increase in the two meter radiation levels. WasteChem personnel verified the shielding integrity as shipped and the equipment was unpackaged for repair.

The Oyster Creek Manager, Radwaste Operations had numerous telephone conversations with the Quadrex Facility representatives to determine the extent of the problem and immediate corrective action. Subsequently, the NRC Region I and Tri-State Corp., (the carrier) were notified and appraised of the situation. The State of Tennessee was notified by Quadrex and the Manager, Radwaste Operations had a number of telelphone conversations with Tennessee officials to explain the event and offered to meet with them to review the cause and corrective action. They determined a meeting unnecessary.

Upon disassemoly of the equipment, a segment of a boron tube from a CRB was discovered below the hydraulic processing cylinder internal to the USC in the area shown on Figure 1 (attached). The tube was approximately 2 1/2 inches long, 3/16 inch outside diameter, with a contact radiation level of 25 to 40 R/hr. GPUN was notified of the finding and Quadrex agreed to place the piece of boron tube in a secure area for evaluation and subsequent dispositioning.

On October 21, 1985, the Manager, Radwaste Operations and the Radwaste Shipping Supervisor went to Quadrex to investigate the situation. The radiation survey instrument used for the outgoing shipment at Oyster Creek was taken along for a comparison with the survey instrument used by Quadrex for receipt surveys. It was preliminarily determined the movement of the boron tube in transit within the USC was the cause for the increase in the two meter radiation levels.

The radiation survey instruments were compared using a Cobalt 60 source. Both instruments read the same on contact and at three and one half inches from the source (160 mr/hr and 15 mr/hr respectively).

C. Investigation Meeting at Oyster Creek

A critique was held at Oyster Creek on October 24, 1985 with all responsible parties involved with the packaging and shipment of WasteChem's volume reduction equipment. The purpose of the meeting was two fold to determine; (1) whether the shielding used was installed adequately and secured in such a manner that it would not shift during transport and (2) how a piece of boron tube got inside the pressure piston area of the USC.

1. Shielding:

Shielding requirements were based on the assumption of fixed contamination rather than a source of irradiated hardware. Lead shielding was applied to the upper portions of the equipment with other areas intentionally not shielded because no dose rate problems were indicated in these areas. WasteChem personnel verified that when the shipping package was opened, shielding was found to be intact as originally installed.

Based on a review of the incoming survey of the USC container at the Quadrex facility, it was concluded that the general increase of 4-6 mr/hr at essentially all locations around the box (shielded and unshielded) at two meters is the result of the unexpected movement, due to transport stresses, of the CRB boron tube piece previously assumed to be fixed contamination, to an area with less internal shielding. This conclusion is given additional credence by the fact that a piece of loose scrap in this area of the machine has mobility, i.e., it can move within a space with dimensions of 16 inches x 19 inches x 0.60 inches. Within this location, there is an absolute minimum inherent shield thickness of one inch of steel. In most other areas of the USC, it is two inches or greater.

2. Boron Tube:

It was determined after extensive discussion that the only possible method of entry for the boron tube segment was to fall from a control rod being processed, with the control rod being simultaneously raised as the press jaw was being retracted. The boron tube would then have entered the space where it was found by falling behind the jaw to the area below the cylinders. This space is inaccessible except when the jaw is partly open. Such an occurrence was believed so improbable that this space had been left open in design. It is now being modified to seal it and preclude recurrence.

III. Determination of Cause

The determination of cause regarding this incident has been made considering all information reviewed during the investigation, and more specifically, the following:

(1) Portions of the upper area of the equipment were shielded with lead blankets while others were intentionally not shielded because no dose rate problem was indicated in this area when the machine left the Oyster Creek site (dose rates less than 10 mr/hr). Shielding requirements were considered to be local for fixed contamination, not general. When the box was opened, no shielding was found to be hanging askew or to be lying on the floor of the box. Therefore, the ropes and ties affixed at the top of the USC remained stable.

(2) The Quadrex survey dose rates went up in a general fashion around the USC container, approximately 4-6 mr/hr at all locations, including shielded and unshielded areas of the machine, indicating that a general source increase had occurred. The addition of more shielding (reasonable amounts within size and weight contraints) where it already existed and at unshielded areas to reduce the two meter dose rates to less than the administrative limit (8 mr/hr) would not have prevented this more general dose increase above 10 mr/hr.

(3) Movement of the tube segment to the position in which it was found resulted in a change in shield geometry, with only one inch of steel between the tube and outside surface of the machine as opposed to two inches for most other machine sections.

In conclusion, it was determined that the unknown piece of boron tube segment moving freely within the USC during transit, caused the increase in the two meter radiation levels which exceeded the permissable limits specified in 173.441(B)(3).

IV. Corrective Action to Prevent Recurrence

A. Specific

To prevent the entrance of contaminated or irradiated hardware into the USC internals, and to enhance the effectiveness of decontamination of internal surfaces, WasteChem Corporation has made the following physical changes to the USC.

1. Introduction of barriers to seal the entrances of areas difficult to flush clean and prevent the entrance of foreign material.

2. Addition of a "Sweep" to push scrap, which could potentially settle on the moving knives, into the collection bucket.

3. Twenty four access holes will be drilled in the side plates for the introduction of a hydrolaser lance. The hole pattern provides excellent coverage to machine internals to dislodge foreign material and contamination. These holes will also permit introduction of a survey instrument for accurate detection of radioactive material.

4. Addition of a pump interlock to insure that the USC cannot be operated without the filtration cleanup system in service.

5. Use of a compacting jaw set to "crimp" the work piece and thus retaining the boron tubes in the control rod blade sheath.

The above changes preclude a similar event. These changes will also provide more effective decontamination of other internal machine surfaces as well as the detection of any internal radioactive material.

6. General.

This shipment was made with a reasonable assumption that the radiation levels (1.34 R/hr maximum contact) was from fixed contamination on the USC surfaces. Our experience with storage racks and other non-irradiated components, exposed to the fuel pool water environment (as the USC was), shows these radiation levels to be normal and not indicative of irradiated hardware. However, this incident clearly indicates the potential for small sources of irradiated hardware to be inadvertantly mixed with LSA material, provided ample intrinsic shielding exists to mask the relatively higher radiation levels. Shipments of LSA material that could be comingled with irradiated hardware are extremely rare and, in fact, limited to equipment utilized to handle or process the latter. To preclude a similar recurrence of this nature, our general Radwaste Shipping procedure (O.C. 101.3) will be revised to include a specific precaution for a prior review of these types of shipments to determine if irradiated pieces could be inadvertently included. This review will include a requirement not to make waste classification determinations when internal surveys are unavailable for equipment which potentially could contain irradiated pieces.

From a broader perspective, this incident instigated a review of our Radioactive Material Management Program. The procedures utilized to classify radioactive waste for our normal waste streams, such as DAW and solidified process waste, specifically address those variables which could preclude accurate determination of waste classification. The dose to curie conversion computer program (Radman) utilized to classify our normal waste streams provides ample protection to ensure accurate classification of waste.

In conclusion, I believe this incident was not indicative of a programmatic problem but rather a unique situation which is limited to the area of classifying LSA material which had the potential to be comingled with irradiated hardware. This waste type is classified on a case-by-case basis and the potential for recurrence with the implementation of the above corrective actions is minimal for this waste type and highly improbable for all other waste types.

Submitted by: T. W. Snider
Manager, Radwaste Operations

Approved by: J. L. Sullivan, Jr. 1/8/86
Plant Operations Director

Attachments

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FIGURE 1

USC VIEW I

(Front)