

U. S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-54/92-01

Docket No. 50-54

License No. R-81

Licensee: Cintichem, Inc.  
P.O. Box 816  
Tuxedo, New York 10987

Facility Name: Sterling Forest Research Center

Inspection At: Tuxedo, New York

Inspection Conducted: January 8 - 10, 1992

Inspectors:

G. C. Smith  
G. C. Smith, Senior Security Specialist  
Safeguards Section

1/23/92  
date

J. Roth  
J. Roth, Project Engineer  
Facilities Radiation Protection Section

1/28/92  
date

Approved By:

W. Pasciak  
W. Pasciak, Chief  
Facilities Radiation Protection Section  
Facilities Radiological Safety and  
Safeguards Branch  
Division of Radiation Safety and Safeguards

1-29-92  
date

Areas Inspected: Examination of conformance to the general requirements for packaging and shipment of irradiated reactor fuel at the point of origin.

Results: The licensee was in compliance with NRC requirements in the areas examined.

## DETAILS

### 1.0 Individuals Contacted

- \* J. Adler, Manager, Health Safety and Environmental Affairs
- R. Biesel, Officer, New York State Police
- F. Bora, Sergeant, New York State Police
- L. Glander, Supervisor, Health Physics
- M. Goodwin, Driver/Escort Tri-State Motor Transit Company
- T. Goodwin, Driver/Escort Tri-State Motor Transit Company
- \* D. Grogan, Manager, Waste and Disposal
- H. Hart, Supervisor, Shipping and Waste Handling
- \* J. McGovern, Plant Manager
- \* F. Morse, D&D Project Manager
- \* R. Strack, Manager, Quality Assurance

\* denotes those present at the exit interview. Other individuals were also interviewed by the inspector during this inspection.

### 2.0 Safety Requirements

#### 2.1 Background

Subsequent to the shutdown of the reactor facility in February 1990 the licensee made arrangements with the United States Department of Energy to reprocess spent reactor fuel at the Department's Savannah River Plant. In order to facilitate reprocessing of the reactor fuel, the licensee initiated transfer of the spent fuel assemblies to the Department in a series of shipments. The purpose of this inspection was to observe the packaging of the spent fuel into the transfer cask, to review the licensee's established packaging and shipping procedures, and to assure that all aspects of this activity were conducted in accordance with USNRC and USDOT requirements.

#### 2.2 Safety Inspection Activities

The licensee selected the Model BMI-1 cask (Certificate of Compliance No. 5957) to be used for these shipments. The cask consists of a steel encased lead shielded cavity that is large enough to hold 24 twenty-five inch long fuel assemblies in two boral steel moderated baskets. The total cask weight including contents is 23,600 pounds.

During this review, the inspector verified that the annual maintenance and acceptance test requirements had been satisfied prior to this shipment, that the presence and effectiveness of the boral poison plates were verified by the licensee and that the leak test was performed as required by the conditions of the Certificate of Compliance. The results of this review are documented in

Attachment 1, "Preshipment Facilities Inspection Checklist - Origination Site".

The results of the review conducted in connection with this specific shipment are provided in Attachment 2. The verification radiological survey conducted by the inspector as a part of this review indicated that the cask and the vehicle met the USDOT radiological requirements as shown in the attachment.

3.0 Safeguards Requirements

3.1 Background

Region I was notified by the licensee in a letter dated December 30, 1991, that shipments of irradiated reactor fuel would be made from Cintichem, Inc., Tuxedo, New York, to the U.S. Department of Energy, Savannah River Plant, Aiken, South Carolina. The route for these shipments was approved by the NRC's Office of Nuclear Materials Safety and Safeguards in May 1991. This inspection was conducted to ensure conformance to the NRC's general requirements for shipment of irradiated reactor fuel at the point of origin. Checklists associated with the results of this review are provided as Attachments 3 and 4.

3.2 Transportation of Irradiated Reactor Fuel (General Requirements)

During this inspection, the inspector determined, as described below, that the licensee followed established procedures and NRC regulatory requirements for the physical protection of irradiated reactor fuel in transit.

- a. The inspector determined that there were two driver/escorts with the transport vehicle. The inspector also verified that these two driver/escorts and the transport vehicle were qualified for the transport of irradiated reactor fuel. Discussions were held with the two driver/escorts relative to their training, knowledge of procedures and contingency preparedness. No deficiencies were identified.
- b. The inspector examined the tamper seals on the shipping cask (Seal Nos. 1986, 1987 and 1988) and found that all seals were intact.
- c. The inspector observed that the transport vehicle was equipped with the required communications equipment. The inspector also reviewed the trip plan log to confirm that telephone calls to the Tri-State dispatcher (located in Joplin, Missouri) were scheduled every two hours, as required.
- d. The inspector verified through interviews of the driver/escorts and by

observation that the transport vehicle was equipped with an immobilization device that was approved by the NRC and that the driver/escorts were familiar with its operation.

- e. The inspector reviewed the shipping papers for completeness and found them to be in order. Shipping papers reviewed included the Bill of Lading, the South Carolina Certificate of Shipment and the NRC Form 741, "Nuclear Material Transaction Report".
- f. The inspector observed that both the transport vehicle and the trailer were equipped with "Radioactive" placards on both sides, front and rear of the trailer, as required.
- g. The inspector observed that there were two fully completed Radioactive Yellow III labels affixed to the shipment cask, as required.
- h. The inspector reviewed the licensee's safety check of the transport vehicle and observed the New York State Police (NYSP) Motor Carrier Safety Inspection of the vehicle. No discrepancies were noted during either safety check. The NYSP Safety Inspector affixed a Commercial Vehicle Safety Alliance sticker to the vehicle after the safety inspection. This sticker (accepted nationwide) signifies that the vehicle has met all applicable federal and state safety requirements. The sticker is valid for a 90-day period and additional safety inspections are not required during that period.

#### 4.0 Specific Observations

During the course of this inspection the inspector made several observations with regard to the procedures reviewed and activities observed. These observations were discussed with licensee representatives during the inspection and at the exit interview.

##### 4.1 Heat Content Data

The inspector noted that the fuel assembly heat content data was recorded on data sheets in terms of both BTUs and watts. However the total heat content value was recorded in BTU's. The Certificate of Compliance required that the total heat content be recorded in watts. The data sheets were modified accordingly.

##### 4.2 Certificate of Compliance Number

The inspector noted that the Certificate of Compliance (C of C) number marked on the cask could be considered not "conspicuous" as required by the regulations

in 10 CFR 71.85 "Preliminary Documentation". In fact, the number could not be easily read by the inspector nor licensee representatives at a distance of about 18 to 24 inches and from several directions. Although the number was more readable once placed on the transporting vehicle, the licensee indicated that action would be taken to make this number, 5957, more conspicuous. Licensee representatives stated that for future shipments actions will be taken to make the C of C number more conspicuous.

#### 4.3 Procedure Review

During the inspection, the inspector reviewed the cask loading procedure and procedures used to prepare the cask for shipment. Although no significant observations were made, several comments for improvement of the procedures were provided to the licensee for consideration and incorporation, if applicable.

#### 4.4 Quality Assurance Reviews

During examination of the shipping papers, the inspector noted several inconsistencies that were corrected immediately by the licensee. As a result of these observations, the inspector suggested that the licensee establish a specific checklist to assure that all paperwork is properly completed and provided to the carrier. Licensee representatives stated that a quality assurance type review of shipment paperwork would be performed prior to the release of each shipment.

#### 4.5 Partial Shipments

During discussions with licensee representatives, the inspector determined that at least one partial shipment would be made. That shipment would consist of 9 fuel assemblies instead of 24 and, as a result, would involve a partial loading of one of the fuel baskets. The inspector expressed concern that the brittle boron-steel plates could disintegrate during an accident condition thereby compromising the criticality control configuration of the cask if the empty holes in the basket were not filled with dummy assemblies. Licensee representatives stated that this accident condition would be evaluated prior to the shipment in question. The results of this evaluation will be provided to the NRC and appropriate actions would be taken.

## 5.0 Exit Interview

The inspector met with the licensee representatives identified in Paragraph 1 at the conclusion of the inspection on January 10, 1992. The inspector summarized the scope and findings of the inspection.

SPENT FUEL SHIPMENTS  
PRE SHIPMENT FACILITIES  
INSPECTION CHECKLIST

Origination Site

1. Verify that <sup>the licensee</sup> DOE has all required Certificate of Compliance (C of C) documents. JR 1/8/92
2. Verify that the package has been fabricated in accordance with the C of C. JR 1/8/92
3. Verify that the licensee is an authorized user of the package. JR 1/8/92
4. Confirm that <sup>the licensee</sup> DOE has procedures for performing C of C required periodic maintenance. JR 1/8/92  
SP-14 dated 11/15/88
5. Verify that all required periodic maintenance has been performed. JR 1/8/92  
completed 1/7/92
6. If possible, observe maintenance operations. JR 1/8/92  
replacement of the lid gaskets.
7. Verify that <sup>the licensee</sup> DOE has procedures for loading the package. JR 1/8/92  
SP-8C

8. Assure that <sup>the licensee</sup> DOE has procedures for closing and loading the package on the vehicle. JR 1/8/92  
SP-08E
  
9. Verify that <sup>the licensee</sup> DOE has properly trained personnel involved in transport activities. JR 1/10/92
  
10. Verify that <sup>the licensee</sup> DOE has established procedures for cask handling.
  - a. Cask is within weight limit of spent fuel area crane. <sup>10 1/2 tons</sup> <sub>15 tons</sub> crane JR 1/8/92
  - b. Spent fuel area ventilation system is operating properly. Room air JR 1/8/92
  - c. Building radiation and airborne radioactivity monitors are operable. JR 1/8/92
  
11. Verify that <sup>the licensee</sup> DOE has procedures and capability for cask decontamination. SP08C JR 1/9/92
  
12. Verify that <sup>the licensee</sup> DOE has procedures for monitoring radiation/contamination levels on the cask. JR 1/10/92
  
13. Verify that the licensee has an established and implemented a shipping QA program JR 1/8/92  
70-6109 dated May 7, 1991



Date 1/10/92

SPENT FUEL SHIPMENT  
POINT OF ORIGIN/DESTINATION  
INSPECTION CHECKLIST

Origin Tuxedo NY  
Destination Savannah River  
Transportation TMST

Tractor No. 198  
Trailer No. 228105  
Cask No. BMI-1

A. Inspect at Shipment Point of Origin

- 1. Verify there is at least one driver and one escort in truck or one driver in truck and two escorts in a separate vehicle.
- 2. Verify that a transport vehicle safety check has been performed and review results.
- 3. Verify seal numbers and that seals are intact.  
1466, 1467, 1468
- 4. Verify communications equipment is installed and operable.
  - a. A CB Radio in each vehicle.
  - b. A radiotelephone or equivalent in the transport escort vehicle.
- 5. Review <sup>has been</sup> DOE radiation/contamination surveys.
- 6. Verify radiation/contamination surveys by independent measurements.

JR 1/10/92

JR 1/10/92

JR 1/10/92

JR 1/10/92

JR 1/10/92

JR 1/10/92

JR 1/10/92

Maximum Allowable Levels

- a. ~~200~~ mR/hr on contact with cask-open vehicle or outside surface of closed vehicle
- b. 1,000 mR/hr on contact with cask-closed vehicle.

<1.0 mR/hr

N/A

- c. 10 mR/hr at 6 feet from surface of cask or surface of closed vehicle. 0.4
- d. 2 mR/hr in cab truck. 0.03
- e. 220 dpm/100cm<sup>2</sup> removable alpha contamination on any surface of cask. < 2 dpm/100cm<sup>2</sup>
- f. 2200 dpm/100cm<sup>2</sup> removable beta/gamma contamination on any surface of cask. < 120 dpm/100cm<sup>2</sup>
7. Review shipping papers for completeness. JR 1/10/92
8. Review cask loading checklist. (Note any problems identified. 1 damaged fuel element) JR 1/10/92
9. Review certificate of compliance required Testing and Maintenance Records. JR 1/10/92
10. Verify vehicle is placarded "Radioactive" on both sides, front and rear of trailer. JR 1/10/92
11. Verify that two (2) Radioactive Yellow III labels are on the cask. JR 1/10/92
12. Verify driver and escorts have been trained concerning radiation protection during accidents, security enroute, response to safeguards or radiological contingencies, and the two hour status call-in requirement. JR 1/10/92

Date 1/10/92

TRANSPORTATION - RADIATION/CONTAMINATION SURVEY

Shipment No. 34021



BMI-1

CASK <sup>side</sup> VIEW

~~TYPE~~ CASK

Cask No. 1

Seal No. 1986

1987

1988

GAMMA  
CONTAMINATION SURVEY DPM / 100 cm<sup>2</sup>

ALPHA

COMMENTS \_\_\_\_\_

Position shown above

1	83 ± 6	8	16 ± 3
2	22 ± 3	9	20 ± 3
3	76 ± 6	10	41 ± 4
4	70 ± 5	11	118 ± 7
5	69 ± 5	12	
6	29 ± 4	13	
7	34 ± 4	14	

	0	0
	0	0
	0	0.4
	0	1.3
	0	
	0	
	0	

Surveyed by J. Roth

Date 1/10/92 Time 11:30 am

# CINTICHEM, INC.

INTEROFFICE CORRESPONDENCE

HEALTH PHYSICS SURVEY REPORT

CINTICHEM SHIPPING CASK

EFFICIENCY OF DETECTOR: ALPHA 38.85% DATE: 1/10/92  
 BETA AND GAMMA 40.70% SURVEYOR: J. KERSTANSKI

BACKGROUND OF DETECTOR: ALPHA 0 cpm  
 BETA AND GAMMA 28 cpm

Outgoing (NRC's Smears)

LOCATION	ALPHA				BETA AND GAMMA			
	CTG. TIME	c/m GROSS	c/m NET	d/m/100 cm <sup>2</sup>	CTG. TIME	c/m GROSS	c/m NET	d/m/100 cm <sup>2</sup>
1- EARS	1/2 Min	0	0	≤5	1/2 Min	46	18	44
2- Upper Valve Body		0	0	≤5		16	-12	≤27
3- Upper Tiedowns		0	0	≤5		28	-8	≤27
4- Lower Tiedowns		0	0	≤5		40	12	29
5- DRAW BOX		0	0	≤5		30	2	≤27
6- Body (VALVE Side)		0	0	≤5		24	-4	≤27
7- Body (LABEL Side)		0	0	≤5		38	10	≤27
8- Right Side		0	0	≤5		30	2	≤27
9- Left Side		0	0	≤5		22	-6	≤27
10- TOP		0	0	≤5		28	0	≤27
11- BASE Lip	↓	0	0	≤5	↓	60	32	79

SPENT FUEL SHIPMENT  
PRE-SHIPMENT SAFEGUARDS  
INSPECTION CHECKLIST

SHIPMENT NO. \_\_\_\_\_

1. Determine licensee-of-record for the proposed shipment(s) of irradiated fuel. *Continuum Int.* JR
2. Determine carrier of the proposed shipment(s) of irradiated fuel. *TSMT* JR
3. Review licensed shipper's proposed shipping schedule and determine how many individual shipments are involved. *8* JR
4. Determine from advanced licensee notification when the first shipment will leave point of origin (PO). ~~TSMT~~ *Safeguards Information* JR
5. Review proposed routes and verify that they have been approved in advance by the NRC. *Done* JR
6. Determine if contacts have been made with local law enforcement agencies (LLEA) and if licensee or NRC has prior response commitments from LLEA along the proposed routes. NRC has *assumed* responsibility for notification of LLEA (done during route survey). *Done* JR
7. Determine if shipments will travel through NRC regions other than those of the PO and point of destination (PD). *NO* JR

8. Determine if a PD or PD inspection will be conducted. *PO only* JR

9. Determine who will conduct PD or PD inspection.  
Region Inspector  
Resident Inspector JR  
N/A

10. Determine who will verify contents of shipment.  
Region Inspector  
Resident Inspector JR  
N/A

11. Determine whether the carrier will be inspected during shipment movement or at some other scheduled time. *No* JR

12. Determine from the shipping schedules which of the individual shipments will constitute the sample to be inspected. Select the sample based on the availability of inspectors, and region schedules. *1, 3, 5* JR

13. Determine from tentative shipping dates, the selected shipments to be sampled. *1, 3, 5* JR

14. Determine from route maps if any of the shipments will travel through a heavily populated area. *Done* JR

15. If shipments will traverse a heavily populated area, verify that arrangements have been made with either LLEA, transport company, or licensee to provide armed escorts.

JR

16. Determine by review of licensee's training and qualifications (T&Q) plan if armed escorts are trained and equipped per requirements of Appendix D of 10 CFR 73 or if armed escorts are from LLEA.

Done LLEA

JR

17. If armed escorts are furnished by licensee or transport company, determine if T&Q records of escorts will be inspected prior to shipment.

N/A

18. Obtain list of seal serial numbers used on containers for verification if available prior to shipping.

N/A

19. Review available documents and determine that for all shipments that shipping information has been prepared indicating at least the following:

- Type of irradiated fuel elements.
- Number of elements and total weight.
- Mode or modes of shipment.
- Number of shipments proposed.
- Scheduled departures.
- Scheduled arrivals.

(24) each shipment except last (9)

truck

8

JR  
N/A

JR

JR

N/A

N/A

- Type of physical protection provided. *armed escort + escort appropriate states* JR
- Any transfer points. *none* ~~JR~~ JR
- Whether shipment will traverse embargoed areas. *NA* JR
- Route maps. *N/A* N/A
- Ports and docks to be used for sea shipment. *N/A* N/A
- Railyards, railroads, and routes to be used. *N/A* N/A
- LLEA arrangements (done by NRC). *Done* JR
- Communication arrangements. *Done* JR
- Number of escorts and types. *Reviewed* JR
- Consignor and consignees. *License* JR
- Transport carriers and/or agents to be used. *+SMT* JR
- Types of containers. *BMI - 1 cask* JR
- Locks and seals to be used. *Serial # = 1986, 1987, 1988* JR
- Transfer agents, if any. *None* N/A



SPENT FUEL SHIPMENT  
INITIAL SHIPMENT INSPECTION  
CHECKLIST  
(to be used for initial shipments  
to each licensee)

SHIPMENT NO. 34021

- 1. Verify that the licensee who transports or delivers irradiated reactor fuel to a carrier for shipment has established and implemented a physical protection system. ADD
  
- 2. Verify that the physical protection system provides for the early detection of unauthorized access to the shipment. ADD
  
- 3. Verify the physical protection system implements procedures for coping with attempts of deliberate damage to irradiated fuel and for other safeguards emergencies that may threaten shipments. ADD
  
- 4. Verify that procedures have been developed on how to assess threats to shipments, how to summon LLEA aid, and how to identify and handle other safeguards emergencies. ADD
  
- 4(a) Verify that all persons serving as escorts have been trained to implement the above procedures. ADD
  
- 5. Verify by interview and observation that the licensee has established and maintains a communications center to be manned continuously during shipments. ADD

6. Verify that shipments have been planned to minimize intermediate stops.

YHJ

7. Verify that at least one escort maintains visual surveillance of the shipment when a vehicle is stopped.

N/A

8. Verify by interviews and by review of records that individuals (other than members of LLEA) serving as escorts have successfully completed a training course.

N/A

9. Verify that shipments traveling through heavily populated areas have at least two individuals, one of whom serves as escort, in the transport vehicle and are escorted by an armed member of the LLEA in a mobile unit, or that the transport is led and trailed by armed escorts in separate vehicles.

YHJ

10. Verify that for shipments not within heavily populated areas, the transport vehicle is occupied by one driver and one escort or occupied by one driver with two escorts accompanying the transport vehicle in a separate vehicle.

N/A


11. Verify that the transport vehicle is equipped with NRC approved operable features that allow for immobilizing the cab or cargo-carrying portion of the vehicle.

YHJ


12. Verify that the driver of the transport vehicle is capable of implementing the immobilization features, communications, and other security procedures needed for transport.

  
\_\_\_\_\_


13. Verify by reviewing records that the licensee notified the NRC by mail and telephone at least seven days in advance of the irradiated fuel shipment.

  
\_\_\_\_\_


14. Verify that shipment status calls are made every two hours to the communications center.

shipment plan  
to review - ok  
  
\_\_\_\_\_

15. Verify that the vehicle has the capability of communicating with the communications center and LLEA along the route.

  
\_\_\_\_\_


16. Verify that a CB radio is available and operational in each transport and escort vehicle.

  
\_\_\_\_\_

17. Verify that a radiotelephone or other NRC approved means of two-way voice communications is available in the transport or escort vehicle committed to travel the entire route.

  
\_\_\_\_\_

18. Verify that if escort or guard service is provided by LLEA in addition to normal LLEA radio communications, the LLEA mobile unit is equipped to communicate with the transport vehicle via two-way electronic communications, such as CB radios, walkie-talkies, etc.

  
\_\_\_\_\_