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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 999-90002

Report No.: 999-90002/2003-003

Facility: Smith Iron & Metal Company, Inc.

Location: 3000 Bells Road  
Richmond, Virginia 23234

Inspection Dates: August 4 and 7, 2003, and subsequent  
telephone conversations

Inspector: Wade T. Loo, Senior Health Physicist  
Accompanied by N. Jeff Griffis, Health Physicist  
Materials Licensing/Inspection Branch 1  
Division of Nuclear Materials Safety

Approved by: Thomas Decker, Chief  
Materials Licensing/Inspection Branch 1  
Division of Nuclear Materials Safety

## EXECUTIVE SUMMARY

Smith Iron & Metal Company, Inc.(SI&M)

NRC Inspection Report No. 999-90002/2003-003

An onsite inspection was conducted on August 4 and 7, 2003, at the SI&M facility in Richmond, Virginia. SI&M was not an NRC licensee, but the company was in possession of an abandoned radioactive device that was delivered to the facility in a load of scrap metal at an undetermined time in the past. SI&M did not possess the capabilities to identify radioactive materials in scrap metal received at their facility. As a result, the device was undetected and went through the facility's shearing equipment where it was cut into two pieces. The cut device was placed in a truckload of scrap metal sent to Chapparel Steel in Dinwiddie County, Virginia. However, Chapparel Steel had radiation detectors in place that alarmed when the truckload from SI&M arrived. Chapparel Steel then contacted SI&M to alert them of what had transpired. Other local companies and state agencies responded to SI&M's facility, including the Bureau of Radiological Health, Department of Health, Commonwealth of Virginia (VABRH) and the U. S. Environmental Protection Agency (EPA). The VABRH representative arrived on site first, and characterized the source as cesium-137. The VABRH representative conducted removable contamination and area radiation surveys of the scrap yard and shearing equipment to determine if the source had contaminated any part of the facility. The initial surveys performed by the VABRH representative did not identify any removable contamination on the pieces of the device or on plant equipment. During the NRC inspection, the inspectors observed the physical condition of the abandoned device, and found that it was secured from unauthorized access or removal. In conjunction with the VABRH representative and a health physics consultant on site, inspectors conducted confirmatory surveys for removable contamination at the section of the device where the shear blade cut through it. During these surveys, the inspectors found small amounts of removable contamination (less than 381 picocuries of cesium-137). The inspectors also examined the device for any identifying markings or serial numbers and could not find such markings or numbers. Since the origin of the device was unknown, the NRC coordinated with EPA to send representatives to take possession of the device. The consultant that was present during the inspection packaged the pieces of the device into a sealed and labeled shipping container until the EPA could arrive. Since the responsible party was unknown, no NRC violations were issued for improper disposal of the licensed material.

### Attachments

List of Persons Contacted

Inspection Procedures Used

List of Acronyms

## REPORT DETAILS

### 1. Background, Scope of Inspection

#### a. Background:

On July 31, 2003, the Commonwealth of Virginia notified the NRC Region II office that they had been contacted by Smith Iron & Metal (SI&M) in Richmond, Virginia. SI&M had a shipment of scrap metal returned to them from Chaparral Steel in Dinwiddie County, Virginia. The shipment had alarmed Chaparral Steel's gate radiation monitors indicating that it contained radioactive material.

On July 31, 2003, after receiving that telephone call from SI&M, the Bureau of Radiological Health, Department of Health, Commonwealth of Virginia (VABRH) responded to the SI&M site. Upon arrival at SI&M, the VABRH representative learned that the shipment was scrap metal that had been reduced using shearing equipment at SI&M before it was sent to Chaparral Steel. Using a portable radiation survey instrument, SI&M staff had located two pieces of a cylindrical device in the returned truckload of scrap. Both pieces emitted detectable radiation and appeared to be sections of a device that had been cut in half. The device was approximately 18 - 24 inches long, 4 - 5 inches in diameter, and was filled with lead shielding (see the picture below). Both pieces of the device were placed in a five gallon bucket by SI&M, and were visually inspected by the VABRH representative. The device possessed no identifying markings, such as a vendor label or serial number.



**Above:** Picture showing the two pieces of the device as found at Smith Iron & Metal. Note the silver shutter mechanism on the top of the left piece.

The VABRH representative conducted removable contamination and area radiation surveys of the device without removing it from the bucket, determining that it contained a cesium-137 (Cs-137) source. The VABRH representative reported exposure rates of

120 milliroentgen per hour (mR/hr) on contact and less than 2.6 mR/hr at three feet from the bucket. SI&M posted the bucket with a radiation sign and temporarily placed it in a secured location on site. A local company assisted SI&M in these efforts by hiring a health physics consultant to characterize the damage to the device and any resulting contamination.

On the afternoon of July 31, 2003, the VABRH notified the NRC Region II office of the events discussed above. The NRC Region II office then notified the NRC Operations Center and, since the origin of the abandoned material was unknown, the EPA was also notified.

b. Inspection Scope:

On August 4, 2003, the inspectors arrived at the SI&M facility in Richmond, Virginia. The objectives of the inspection were the following:

- Review the physical security of device/material.
- Interview individuals that handled or came into contact with the device to characterize any radiation exposure issues.
- Allay the fears and answer the questions of any workers at the SI&M.
- Physically inspect the source/device and look for identification information.
- Tour the facility and perform confirmatory surveys, and surveys for other byproduct material that may have been on site.
- Gather any available verbal and written information concerning the origination of the shipment that contained the device.
- Gather information to establish the root cause of event.
- Evaluate the actions that the facility had enacted to protect against the recurrence of such an event.

c. Observations and Findings:

During the onsite inspection, the inspectors removed the two separate pieces of the device from the bucket at SI&M and performed a thorough visual inspection to search for any identification markings or serial numbers. Based on those direct observations, the inspectors were unable to identify any markings or serial numbers. In addition, pictures were taken of the device and sent to active vendors of fixed gauges to see if the vendors could recognize the make and model of the device. Through coordination with the VABRH representative and an independent consultant that were on site, the inspectors performed additional surveys for removable contamination on the device. These surveys included smears of the two damaged ends of the device, including what appeared to be a severed source (see the pictures on the following page). A small amount of removable contamination was identified on the swipes taken of the cut area



**Left:** Picture showing one half of the cylindrical device. The shutter mechanism is discernable on the left end of the device. The right end of the device shows where it was cut and deformed by the shear. In all, this section measured approximately 12 inches long.

**Right:** This is the second section of the device. A portion of the exposed source rod is visible (centered within the dashed circle) at the location where the shear cut the device in two. This section of the device measured approximately 8 inches long. Neither section of the device was marked with identifying labels or markings.



of the device. The highest reading swipe was later quantified in the VABRH lab to be 381 picocuries of Cs-137. Area radiation surveys were also performed by the inspectors, and the highest readings on both pieces were detected near the cut ends of the device. The highest readings observed by the inspectors at these ends were approximately 650 mR/hr and 3.5 mR/hr at contact and three feet, respectively. After surveying, the pieces were returned to the bucket and placed in a locked and secured building at the SI&M facility.

Through discussions with select fixed gauge vendors, the inspectors determined that the device was an old fixed gauge that was manufactured by Ohmart. Through further discussions with the Radiation Safety Officer of Ohmart, the inspectors were informed that a device such as this typically would contain between 100 and 200 millicuries of Cs-137. Due to the absence of an identifying label on the device, Ohmart staff stated that there was insufficient information to determine specific details of the device or the name of the original customer that had purchased it. Ohmart stated that the only way to identify the customer would be to remove the radioactive source from the device and obtain the source serial number that was stamped on it.

The inspectors conducted independent area radiation surveys of SI&M's facility to determine if there were any other similar radioactive sources or devices that may have been present. Based on those surveys, the inspectors did not identify any other radioactive materials. The surveys conducted by the inspectors measured radiation levels to be at or below background, which were similar to the results of radiation measurements made by SI&M staff and the consultant.

Through discussions with select staff at SI&M and a tour of the facility, inspectors determined that the facility accepted scrap metal from a variety of sources, ranging from individuals who walked up the facility to large corporate accounts. The general manager of S&IM stated that vehicles would enter the yard and drive onto scales where the load of metal would be weighed. According to the SI&M staff, the weight and vehicle plates were the only information that would be recorded for most deliveries. After weighing, the trucks would then pull into a segregation area where metal was removed from the vehicle and placed in large piles according to alloy. The general manager stated that items in individual shipments could sit in the segregation area for weeks to years, depending on where they were placed, their weight, and shape. The general manager stated that these factors made it impossible for his company to pinpoint the exact shipment from which the radioactive device originated.

Through interviews with select staff at SI&M, the inspectors determined that no individuals had come into contact with the device for prolonged periods of time, and no overexposures of members of the public seemed likely. Through these interviews, inspectors concluded that the device had been stored away from areas that workers inhabited. The general manager stated that he was the only individual that had come into close contact with the device to remove it from the scrap load. The manager further stated that subsequent movements of the device were accomplished using a fork lift that put the operator at a safe distant from the source.

The inspectors and the general manager discussed measures that the company was taking to identify any other devices that may be shipped to them, since the yard was unequipped with radiation gate alarms. The company manager stated that he was frisking outgoing trucks with a portable radiation survey instrument, and had ordered a permanent gate alarm system from a vendor to be installed within a few weeks. The company also stated that the shear operator and the crane operator loading the shear were visually inspecting contents entering the shear equipment until the new detection system arrived.

On August 5, 2003, in coordination with a local company and a health physics consultant, SI&M packaged the device into a labeled shipping container, and locked the container in a secured building on site. On August 7, 2003, the inspectors met with a representative of the U. S. Environmental Protection Agency (EPA) at the SI&M facility to ensure that the licensed material was appropriately packaged and secured. From direct observations and independent confirmatory area radiation surveys, the inspectors did not identify any concerns with the shipping container or survey results. The inspectors found that the licensed material had been properly packaged and labeled for transport. The EPA representative informed the inspectors that EPA would coordinate the disposal of the device appropriately with SI&M.

d. Conclusion:

Based on discussions with cognizant individuals and direct observations, the inspectors could not identify the responsible party that abandoned the radioactive device found at SI&M. Inspectors identified no apparent overexposures to members of the public resulting from the radioactive device, and ensured that the device was physically secured. Through arrangements with the EPA, the device was scheduled to be disposed of properly.

#### EXIT MEETING SUMMARY

An exit meeting was held with the General Manager of SI&M on August 7, 2003. The overall findings from the inspection were discussed, including the responsibility of SI&M to physically secure the radioactive material and carry out all actions to have it disposed of appropriately and expeditiously. SI&M did not specify any information reviewed during the inspection as proprietary in nature.



## ATTACHMENT

### 1. PERSONS CONTACTED

#### Licensee

\*Jim DeKraft, Assistant Director, Bureau of Radiological Health, Department of Health, Commonwealth of Virginia

\*Glenn Huber, President, Stan A. Huber Consultants, Inc.

\*Robert T. Lind, Plant Engineer, Westvaco

#\* Tom Tolbert, General Manager, Smith Iron & Metal Company, Inc.

# Chris Wagner, On-Scene Coordinator, Removal Response Section,  
U. S. Environmental Protection Agency, Region III

\* Jerry G. Waldrup, Manager - Engineering and Maintenance, Westvaco

\*Present at the entrance meeting, August 4, 2003

#Present at the exit meeting, August 7, 2003

### 2. INSPECTION PROCEDURE USED

IP 87103      Inspection of Material Licensees Involved in an Incident or Bankruptcy  
Filing

### 3. LIST OF ACRONYMS USED IN THIS REPORT

|        |   |
|--------|---|
| Cs-137 | Cesium-137  |
| EPA    | U. S. Environmental Protection Agency   |
| mCi    | millicurie  |
| mR/hr  | millirem per hour   |
| NRC    | Nuclear Regulatory Commission   |
| RSO    | Radiation Safety Officer  |
| SI&M   | Smith Iron and Metal Company, Inc.  |
| VABRH  | Bureau of Radiological Health, Department of Health, Commonwealth of Virginia |