REMEDIAL ACTION PROGRAM

M. G. White, Chairman

# LUMINOUS PROCESSES CO.:

# THE CLEANUP OF A LOW-LEVEL RADIOACTIVE WASTE SITE

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## ABSTRACT

Luminous Processes Co., located in Athens, Georgia, painted luminous watch dials and clock faces with paint containing radium-226 and tritium. Following bankruptcy, Luminous left the site in a contaminated condition. The State of Georgia ultimately declared the site their number one priority for cleanup under Superfund. In the bidding process, O.H. Materials Co., of Findlay, Ohio, was judged as having the most technically superior cleanup approach in addition to being the low bidder. Decontamination of the site included excavation of soil adjacent to the main building, removal of interior walls and fixtures from inside the building, and decontamination of various items on the premises. The decontamination of the site was successfully completed, well under budget. All cleanup objectives were met and the site was rehabilitated without a single incident of exposure to any of the participants in the cleanup operation.

## Historical Background

Luminous Processes Co., a defunct operating facility, located in Athens, Georgia, was in business from 1952-1978. Its primary function was the painting of luminous watch dials and clock faces.

In late 1977, Luminous Processes made application to the State of Georgia to renew its license to use radioactive material. As a result of the ensueing inspections, areas inside and outside the building were found by the State of Georgia's personnel to be contaminated with radium-226 and tritium.

Luminous Processes subsequently decided to terminate processing activity in Athens, and in 1979, they were issued a license by the State of Georgia for the purpose of decommissioning the facility. Contractors were hired by Luminous Processes to decontaminate the property by removal of radioactive dirt, buildings, and other structures. Because of apparent financial problems which arose between the contractors and Luminous, decontamination began but was never completed.

Luminous Processess did not fulfill its responsibilities to clean up the site and eventually filed bankruptcy. In early 1981, the State of Georgia and the USEPA jointly agreed, through Superfund, to take cleanup action. The State of Georgia has since filed suit versus Luminous Processes in Clarke County, Georgia, Superior Court for payment of the cleanup.

In its joint agreement with USEPA, the State of Georgia agreed to assume leadership in selecting and managing a contractor for the cleanup of the site.

## The Bidding Process

Late in 1981, the State of Georgia held a bid review meeting with potential cleanup contractors. Following preliminary solicitation, a large number of contractors submitted proposals to cleanup the site. This group was then short-listed to a group of ten, including O.H. Materials Co. (OHM) of Findlay, Ohio.

The State of Georgia reached a cooperative agreement with the EPA on funding for the site on April 6, 1982. In mid April, official RFP's were sent to the ten short-listed contractors. On May 13, 1982, the ten contractors made verbal presentations to the State of Georgia and representatives of EPA Region IV.

O.H. Materials was judged as having the most technically superior cleanup approach in addition to being the low bidder. On June 11, contract negotiations had been completed and OHM was given official notice to proceed with the project. The cleanup operation was initiated within four days.

## Project Planning and Site Preparation

Drawing from over 11 years of project management experience, OHM undertook the Luminous cleanup following an extensive amount of preplanning and coordination.

Subcontractors were hired to perform the site monitoring, material transportation, and disposal functions. The scope of work was reviewed thoroughly and a detailed plan was developed to carry out every facet of the operation.

Upon arrival at the site, preparations, were made to begin the operation by providing for electrical hookups, securing support equipment, establishing site security, and installing permanent air-monitoring equipment. Access to the actual work area was restricted to a single entrance/exit point.

In addition, brush and other undergrowth were removed in both the work site and staging areas. An opaque environmental screen was placed on a previously installed fence north of the building, adjacent to U.S. Highway 78. This screen was used to obstruct the view of the property from the highway as well as to reduce the possibility of spreading airborne contamination. The front (north side) of the building was also painted to cover up unnecessary graffiti which had been placed on this portion of the building.

Monitoring Activities

Radiation Management Corporation, the subcontractor who provided both site monitoring and radiation safety programs, conducted whole body counts on each individual entering the site in order to detect any inhalation or ingestion of radioactive materials. Whole body counts were performed at the beginning, middle, and end of the project. No radionuclides other than naturually occuring potassium -40 (K-40) were identified in any of the personnel at any time.

All personnel who would be entering the site were given a detailed training course which included basic radiation theory, radiation monitoring, and other safety- and project-related training.

Upon entering the work area, all personnel were required to wear appropriate protective clothing. When exiting, the clothing was removed, face, and hands were washed, and each worker was monitored to ensure that they were free of any contamination. As another means to ensure that they were free of any contamination. As another means to ensure that radioactive materials were not inhaled during periods of work, lapel air sampling was conducted on all personnel. All air samples taken showed lower than maximum permissible concentrations in air for exposure to the general public of radium-226 (3. 0E-12 microcuries per ml, soluable and 2.0E-12 microcuries, insoluable concentrations).

Monitoring that occurred at the site was double checked by the State of Georgia as a quality control procedure. Throughout the project, the State of Georgia's monitoring results consistently compared with those of the project team.

The Cleanup Operation

Before excavation activities began, items which remained from the previously initiated cleanups were removed. A septic tank which had been unearthed in 1979 was broken up and drummed. In addition to the septic tank, 74 drums were also left on site. The contents of these drums were first transferred to new drums. The old drums were then washed with a hydro laser and tested for radiation content -- rewashed and retested if necessary -- and ultimately removed for disposal in the Clarke County Landfill.

The original scope of work prepared by the State of Georgia called for the excavation of 15,000 cubic feet of soil from the site. The excavation was to range in depths from six inches to three feet. Areas to be excavated were carefully layed out on a grid map. Excavation was accomplished with a backhoe/front-end loader. Excavations were done in 20' x 20' grids. As soon as each grid was excavated, the Georgia DNR's site representative surveyed the area and certified that excavations were made to the proper depths. The entire area was then monitored to ensure that all the contaminated soil was removed. It was ultimately determined that several areas needed further excavations. These areas were added to a later amendment to the scope of work.

Preventing the migration of radiation beyond the boundries of the site was a top priority. Dust control, therefore, became a primary objective. To accomplish this, OHM designed and fabricated a drum-filling device which allowed for the simultaneous filling of three drums through an enclosed entry point designed to collect both dust and overfill. In addition, a fine spray of water was used during the operations to prevent and/or limit the amount of dust created. Drum handling areas were periodically sprayed for the same purpose.

During the course of the operation, two additions were made to the scope of work. The first entailed the removal of contaminated soil and gravel contained within an abandoned septic tank leachfield as well as the additional areas of excavation identified after monitoring the original excavation.

Two hundred feet of leachfield line was excavated to depths between three and six feet and the underlying soil which was significantly contaminated, was removed. Excavated soil which was not contaminated was then placed back into the trenches.

The second addition to the scope of work involved the decontamination of a 4,000 sq. ft. manufacturing building located on the site. To decontaminate the building, it was necessary to shore up the inside ceiling, remove all duct work, and remove all the interior walls. Full-face respirators were worn during the building decontamination phase of the project in order to prevent any dust inhalation.

Following removal from the inside of the building, the ductwork was taken outside and washed with a hydrolaser. After testing to verify it was no longer contaminated, the ductwork was crushed and transported to the Clarke County Landfill. The interior walls of the building, as well as fuse boxes, electrical panels, and contaminated sections of interior doors were all broken or crushed and placed in drums for disposal.

All soil and building materials were packaged in Department of Transportation (DOT) 17-H specification drums and transported by Tri-State Motor Transit to the U.S. Ecology burial site in Richland, Washington. Each trailer load contained an average of 72 drums and 43,199 pounds of material.

All drums were washed and weighed after filling. Each drum was swipe tested to ensure its exterior was free from contamination. All drums were found to be within the DOT removable surface contamination limit of 22 dpm/100 sq. cm, as a result of careful handling procedures.

Each shipment was surveyed prior to leaving the site to ensure that the transport vehicle requirements of 200 millirem per hour at contact, 10 millirem per hour at 6 feet, and 2 millirem per hour at occupied positions in the cab, were met. All surveys indicated that each shipment was well within these limits.

## Site Rehabilitation

Following the removal of all contaminated material and the decontamination of all equipment used during the project, the site was prepared for rehabilitation. Thirty-four truckloads of backfill and six loads of top soil, each containing 20 cubic yards of earth, were spread on the Luminous Processes' Site. The backfill dirt was spread uniformly on the excavated area and the top soil was then spread over the surface.

Browntop Millet Bermuda Grass was planted and the soil was covered with hay. To prevent erosion before the grass could grow to a sufficient height to hold the soil, 4 siltration fences were placed approximately 40 feet apart in the open area south of the main building.

## Cleanup Results

The completion of the cleanup operation at Luminous Processes' can be summarize as follows:

Man hours:

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| OHM | 2,720.50 |
| Subcontractors | 1,320.00 |
| Total | 4,040.50 |
| Drums Removed | 2,402.00 |
| Earth Removed (cubic ft.) | 18,015.00 |
| (tons) | 712.29 |
| Trailer Shipments | 33 |
| Estimated Radiation Removed | 513 |
| Millicuries of Radium-226 Activity | |
| Estimated Working Days | 42 |
| Actual Work Days (including two additions to scope of work) | 30 |
| Original Budget | $ 731,000.00 |
| Final Cost (following two additions to scope of work) | $ 685,700.00 |

## Another Successful Operation

The success of the operation can be summed up by quoting Mr. Jim Setser, Chief of the Program Coordination Branch of the Georgia DNR, in a letter to Mr. Carey Daniel, OHM's Project Manager at the Luminous site:

> " I want to express my appreciation for the professional attitude you displayed throughout the duration of the remedial action. The preplanning and management control system that O.H. Materials implemented proved to be the key factors in the success of the project. The completion of the project ahead of schedule helped to maintain the credibility of both the EPA and the State of Georgia in the surrounding community."

The Luminous Processes' site ranked as the second cleanup completed under Superfund program. It was also the first low-level radiological cleanup of its kind in the U.S. under Superfund.

For additional information, please refer to the Luminous Superfund Project Report: Remedial Action for the Removal of Ra-226 Contamination at the Luminous Processes', Site in Clarke County, Georgia, prepared by the State of Georgia Department of Natural Resources, Environmental Protection Division, August 31, 1982.