

September 12, 2005

Mr. Steve Doremus  
Department of the Navy  
NAVSEADDET RASO  
NWS P.O. Drawer 260  
Yorktown, VA 23691-0260

SUBJECT: NRC INSPECTION REPORT 040-08306/05-001(DNMS)  
FORMER ENGELHARD MINERALS & CHEMICAL CORPORATION

Dear Mr. Doremus:

On August 31, 2005, the NRC completed an inspection at the Naval Station Great Lakes, Former Monazite Sand Storage Area, Great Lakes, Illinois. The purpose of the inspection was to determine whether decommissioning activities were conducted in accordance with your final status survey plan and NRC requirements, and to perform independent confirmatory surveys of the remediated areas. Specifically, during onsite inspections on July 7, 29, and August 3, 2005, the NRC inspectors evaluated the performance of the contractor's sample collection, analysis, and field laboratory operation; performed surveys and collected soil samples from an offsite area adjacent to the contractor's designated reference (background) area, and from the recreation and center tank areas. On July 12, 2005, NRC management met with members of your staff, personnel from the Great Lakes Environmental Department, and Cabrera Services management to discuss findings of the July 7, 2005 inspection and issues pertaining to the completion of the project. At the conclusion of the onsite inspections, the NRC inspectors discussed the preliminary findings with Mr. Mark R. Schultz, Environmental Department Head at the Naval Station Great Lakes. On August 31, 2005, the inspectors completed an in-office review of the laboratory data results for the soil samples that were collected during the inspections and conducted a telephone exit interview with Mr. Schultz.

This inspection consisted of an examination of decommissioning activities at the Naval Station's Former Monazite Sand Storage Area as they relate to safety and compliance with the Commission's rules and regulations. Areas examined during the inspection are identified in the enclosed report. Within these areas, the inspection consisted of a selective examination of representative records, interviews with personnel, and independent confirmatory measurements.

Based on the results of the analyses of the soil samples collected during the July 7, 2005 inspection, the NRC inspectors determined that thorium contamination was present outside of the known site boundaries of the affected areas. Specifically, the inspectors identified elevated gamma radiation levels next to the contractor's designated reference (background) area approximately 50 meters east of the affected areas near a stream. This area, which was not considered to have been impacted by the formerly-licensed activities, was used by the contractor to collect background samples. The inspectors collected samples and sent them to the NRC's contract lab, the Environmental Survey and Site Assessment Program (ESSAP) of

the Oak Ridge Institute for Science and Education (ORISE), for analysis. The results of the analyses identified concentrations of thorium-232 that were as high as 21 times the Derived Concentration Guideline Level (DCGL) for the site. During the July 12 meeting, Region III management met with your staff and base level and contractor management to discuss the need to further characterize the site, establish new site boundaries, and develop new work plans (remediation and final status survey) for the site. Establishing a new site-specific DCGL was discussed during the meeting, as well as the submittal of new timelines to the NRC for the completion of the project. It is our understanding, based on the identification of the offsite contamination, that the Navy will not be able to release the site for unrestricted use by December 2005, as was your earlier plan.

Based on the results of this inspection, the NRC did not identify any violations of NRC regulatory requirements.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). The NRC's document system is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

We will gladly discuss any questions you have concerning this inspection.

Sincerely,

*/RA/*  
Jamnes L. Cameron, Chief  
Decommissioning Branch  
Division of Nuclear Materials Safety

License No. SMC-01207 (Terminated)  
Docket No. 040-08306 (Terminated)

Enclosure: Inspection Report 040-08306/05-001(DNMS)

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION III**

Docket No.: 040-08306 (terminated)

License No.: SMC-01207 (terminated)

Report No.: 040-08306/05-001(DNMS)

Former Licensee: Engelhard Minerals & Chemicals Corporation

Site Owner: Department of the Navy

Facility: Former Monazite Sand Storage Area

Location: Naval Station Great Lakes, Great Lakes, Illinois

Dates: July 7, 29, and August 3, 2005 (on-site inspections)  
July 12, 2005 (meeting)  
August 31, 2005 (in-office review)

Inspector: Gene Bonano, Health Physicist  
Peter J. Lee, PhD., CHP, Health Physicist

Approved By: Jamnes L. Cameron, Chief  
Decommissioning Branch  
Division of Nuclear Materials Safety

## EXECUTIVE SUMMARY

### Engelhard Minerals & Chemicals Corporation Naval Station Great Lakes, Great Lakes, IL Inspection Report No. 040-08306/05-001(DNMS)

The Engelhard Minerals & Chemicals Corporation (Engelhard), which is no longer in business, was licensed to repackage and ship monazite sand containing thorium-232 from the Naval Station Great Lakes to other Atomic Energy Commission and Nuclear Regulatory Commission licensees. The Engelhard license was terminated in 1975. The U.S. Navy is the site owner and assumed responsibility for the site cleanup of residual contamination from the monazite sand.

The decommissioning inspectors evaluated: 1) the performance of the contractor's sample collection, analysis, and field laboratory operation; and 2) the remediation and radiological final status surveys performed by the Navy's contractor, of the recreation and center tank areas. NRC management met with members of the Navy's Radiological Affairs Support Organization (RASO), personnel from the Great Lakes Environmental Department, and Cabrera Services (contractor) management to discuss findings of the July 7, 2005 inspection and issues pertaining to the completion of the project.

#### **Close-out Inspection and Survey**

- The inspectors concluded, based on inspection observations, evaluations and independent surveys, that the Navy and its contractor conducted the remediation and final status survey of the Recreation and Center Tank Area in accordance with the final status survey plan.

#### **July 7, 2005 Inspection and July 12, 2005 Site Visit/Meeting**

- On July 7, 2005, NRC inspectors identified additional thorium-232 contamination outside of the site boundaries east of the affected areas near a stream.
- On July 12, 2005, Region III management met with members of the Navy's Radiological Affairs Support Organization (RASO), personnel from the Great Lakes Environmental Department, and Cabrera Services (contractor) management to discuss the need to further characterize the site, establish new site boundaries, and develop new work plans (remediation and final status survey) for the site. Establishing a new site-specific Derived Concentration Guideline Level (DCGL) was discussed, including the submittal of new timelines to the NRC for the completion of the project.

## Report Details

### 1.0 Closeout Inspection and Survey (83890)

#### 1.1 Inspection Scope

The inspectors evaluated the performance of the contractor's sample collection, analysis, and field laboratory operation, and the results of the contractor's remediation and final status surveys (FSS) of the recreation and center tank areas to verify that work was done in accordance with the final status survey plan. The inspectors interviewed contractor personnel, performed independent radiological surveys, and collected soil samples from selected remediated areas.

#### 1.2 Observations and Findings

The Navy's contractor had performed 100 percent walkover surveys and collected soil samples in accordance with the Navy's FSS plan. The contractor collected, analyzed soil samples, and performed quality assurance on the field instruments and laboratory in accordance with their approved written procedures and the FSS plan.

The inspectors did not find any deficiencies with the contractor's surface scans, and radiological analytical results of the soil samples counted in the contractor's on-site laboratory. The contractor implemented a laboratory quality assurance program, which consisted of sending 10 percent of the soil samples (duplicates) to an independent third party laboratory for analysis.

The inspectors performed independent radiological surveys (25 to 50 percent surface scans) of the recreation and center tank areas using calibrated radiation survey meters with 2 inch by 2 inch sodium iodide (NaI) detectors (sensitive to gamma radiation) listed below.

Survey Meter Model Number	Survey Meter Serial Number	Calibration Due Date	2 in. by 2 in. NaI Detector Model Number	Detector Serial Number
Ludlum 2241-2	130052	March 18, 2006	Ludlum 44-10	PR110264
Ludlum 2241-2	132192	July 1, 2006	Ludlum 44-10	PR110265

Two soil samples were collected from the recreation area from locations that were of the highest readings: 12,000 and 14,000 counts per minute (cpm) (background radiation levels were around 7,000 to 10,000 cpm). The NRC's contract laboratory analyzed the samples and the results ( $1.22 \pm 0.18$  pCi/g and  $1.05 \pm 0.20$  pCi/g, respectively) were below the Derived Concentration Guideline Level (DCGL) action level of 1.7 pCi/g (1 pCi/g plus 0.7 pCi/g background).

The contractor plans to further characterize the soils below Building 3214 in the recreation area. The contractor's surveys identified residual concentrations 4 to 5 times above the site's action level along the edges of the building's footprint. The contractor plans to remediate the soils that were part of the excavated wall area, located east and next to the center tank.

### 1.3 Conclusions

The inspector concluded, based on inspection observations, evaluations and independent surveys, that the Navy and its contractor conducted the remediation and final status survey of the Recreation and Center Tank Area in accordance with the final status survey plan.

### 2.0 July 7, 2005 Inspection and July 12, 2005 Site Visit/Meeting

Based on the soil samples collected during the July 7, 2005 inspection, the NRC inspectors determined that thorium contamination was present outside of the known site boundaries of the affected areas. Specifically, the inspectors identified elevated gamma radiation levels next to the contractor's designated reference (background) area approximately 50 meters east of the affected areas near a stream. This area, which was not considered to have been inspected by the formerly-licensed activities, was used by the contractor to collect background samples. The inspectors collected samples and sent them to the NRC's contract lab, the Environmental Survey and Site Assessment Program (ESSAP) of the Oak Ridge Institute for Science and Education (ORISE), for analysis. The results of the analyses identified concentrations of thorium-232 that were as high as 21 times the DCGL for the site.

The analytical results of the soil samples collected by the NRC are listed below:

ESSAP Sample ID	NRC Region III Sample ID	Radionuclide Concentrations (pCi/g dry weight)
		Thorium-232 (by Actinium-228)
1667S0001	NRC-1-R3	21.4 ± 1.8
1667S0002	NRC-2-R3	21.9 ± 1.8
1667S0003	NRC-3-R3	1.05 ± 0.19
1667S0004	NRC-4-R3	10.84 ± 0.94

During a July 12, 2005 meeting, Region III management met with members of the Navy's Radiological Affairs Support Organization (RASO), personnel from the Great Lakes Environmental Department, and Cabrera Services (contractor) management to discuss the need to further characterize the site, establish new site boundaries, and develop new work plans (remediation and final status survey) for the site. Establishing a new site-specific DCGL was discussed, as well as the submittal of new timelines to the NRC for the completion of the project.

### 3.0 Exit Meeting

The inspectors presented preliminary inspection results to the Navy's management team at the conclusion of the onsite inspections on July 7, 29, and August 3, 2005. A final exit meeting was conducted by telephone on August 31, 2005, with the Navy's management team to discuss NRC's in-office review of the analytical results of the soil sample analyses. The Navy's management team acknowledged the findings presented. Navy's management team did not identify any materials that could be included in the inspection report as proprietary.

#### **PARTIAL LIST OF PERSONS CONTACTED**

P. Hayworth, Environmental Protection Manager, NAVSEADDET, RASO  
M. Shultz, Regional Environmental Program Director, Navy Region Midwest  
D. Horton, Health Physicist, U.S. Army Field Support Command

#### **INSPECTION PROCEDURES USED**

IP 83890 Closeout Inspection and Survey  
IP 87104 Decommissioning Inspection Procedure for Materials Licensee

#### **ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened	None
Closed	None
Discussed	None

#### **LIST OF ACRONYMS USED**

ADAMS	Agencywide Documents Access and Management System
CFR	Code of Federal Regulations
cpm	counts per minute
DCGL	Derived Concentration Guideline Level
DNMS	Division of Nuclear Materials Safety
ESSAP	Environmental Survey and Site Assessment Program
FSS	Final Status Survey
NRC	Nuclear Regulatory Commission
ORISE	Oak Ridge Institute for Science and Education
PARS	Publicly Available Records
pCi/g	microcuries per gram
RASO	Radiological Affairs Support Organization