Department of Toxic Substances Control

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

8800 Cal Center Drive
Sacramento, California 95826-3200

Arnold Schwarzenegger
Governor

M E M O R A N D U M

TO: Gerard Abrams, CHG
Senior Engineering Geologist
Northern California Permitting and Corrective Action Branch
8800 Cal Center Drive
Sacramento California

FROM: Peter Bailey, RG
Engineering Geologist
Northern California Permitting and Corrective Action Branch
8800 Cal Center Drive
Sacramento California

DATE: June 17, 2005

SUBJECT: Review of Interim Measure Implementation Report, Expendable Launch Vehicle RFI Site (SWMU 5.2), Santa Susana Field Laboratory (SSFL), Ventura County, California

PCA: 22120 Site: 300122-48 MPC: 37

Northern California Permitting and Corrective Action Branch (NCPCAB) staff have reviewed the Interim Measure (IM) Implementation Report (Implementation Report) dated April 29, 2005. The Implementation Report documents the activities and completion of the excavation, transportation, and disposal of soil and sediment from a source area containing elevated levels of mercury in the vicinity of Building 203 in Area II of the SSFL.

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Background

The Expendable Launch Vehicle (ELV) site is identified as Solid Waste Management Unit 5.2 under the Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI) being conducted at SSFL. The ELV is located in the northern portion of SSFL. Building 203 is located in the north portion of the ELV. Building 203 was formerly used to repair and calibrate various instruments, some of which included manometers and thermometers. The Building is currently used for laser research and development. Current activities include testing of components, polishing, and cleaning (solvents and other chemicals are used). A mercury use area reportedly existed immediately north of Building 203 in the vicinity of a concrete pad. A north facing slope is located north of this area.

As part of the RFI, soil samples were collected on the slope north of Building 203. Mercury was detected at concentrations up to 17.45 milligrams per kilogram (mg/kg). In September 2003, The Boeing Company's (Boeing's) consultant, MWH Americas (MWH) submitted a Building 203 Drainage Interim Measures Workplan to the Department of Toxic Substances Control (DTSC) for the excavation and removal of the impacted area. For the purpose of the IM, MWH divided the site into areas A, B, and C. Area A occupies over 20,000 square feet which includes the former mercury use area or concrete pad and the slope. The focus of the IM is in Area A where the highest concentrations of mercury were detected. Area B is located downslope of Area A and occupies a swath approximately 660 feet long and 20 feet wide with the drainage as the centerline. Mercury was detected in this area at concentrations less than 1 mg/kg yet greater than background concentrations of 0.09 mg/kg in the drainage channel and overbank deposit samples. Area C consists of drainage sediments approximately 725 feet down gradient of Area B. An Area D was designated during the IM which is located approximately 50 feet east of Area A, and occupies about 200 square feet. Area D was identified due to the detections of mercury between 2 and 10 mg/kg.

The objective of the IM was to remove soil to prevent further migration from the source area (Area A) to the drainage below. To meet the objective, Boeing proposed to remove soil from Areas A, B, and C until mercury concentrations were at or below background, 0.09 mg/kg. In June 2004, DTSC approved the IM Workplan with conditions. Later, Boeing submitted a Work Plan (IM Workplan), Scope Revisions letter to DTSC on July 16, 2004. The additions to the scope included increasing the excavation limits from 1,600 to 3,000 yards, the use of up to 1,000 cubic yards of backfill, additional sample collection, and the segregation and containerization of hazardous concentrations of mercury in soil. On July 20, NCPCAB approved the revised scope of work with conditions.

The IM excavation activities were conducted in July and August 2004. Approximately 3,000 cubic yards of mercury impacted soil was excavated from Areas A and D. The Implementation Report was submitted to NPCAB on April 29, 2005.

Conditions

As mentioned above, NCPCAB stated conditions in the June 16 and July 20, 2004 conditional approval letters for the IM Workplan and the IM scope revision, respectively. The following conditions where met.

- Slope stability was not affected. Restoration of Area A was completed such that surface water flow patterns were similar to pre-excavation conditions.
- Boeing allowed safe access of earth moving and removal equipment, and workers in the slope area.
- Boeing revised the Health and Safety Plan based on comments by DTSC's Industrial Hygienist dated May 7, 2004.
- Temporary stockpiles were placed southwest and upslope of the work area on level, paved surfaces until the stockpiles were transferred into Department of Transportation approved end dumps and roll-off bins for offsite disposal.
- Surface soil and subsurface soil samples were collected following the completion of the excavation to confirm the boundary of the excavation limits.
- The IM focused on Area A, only. This condition also identified that subsequent IM cleanup would be conducted at Areas B and C at a later date. The departure to this portion of the condition is discussed below in Areas B and C.

Areas A and D

More than 260 soil samples were collected in Area A. Excavated soil contained mercury concentrations up to 50 mg/kg. Residual levels of mercury detected above background (0.38, .0.55, and 0.97 mg/kg) were left in place at three locations. Further excavation of two of the locations would have impacted slope stability. Shotcrete was applied to the slope to provide stability and minimize the potential of surface migration. The third location (0.55 mg/kg) was not excavated due to the proximity to an oak tree. NCPCAB staff concurs with the levels of mercury left in place and the engineering controls utilized with the condition that these levels are addressed in the RFI and that there is continued monitoring of surface water at outfall 010.

Mercury was detected at 50 mg/kg (Sample EVBK05) in the southern portion of Area A, the highest concentration detected during the IM. This area was over-excavated and additional samples were collected with detections of mercury at 0.32, 5.4, and 1.6 mg/kg. The results are presented on Figure 6 of the Implementation Report. MWH states in section 4.3.1 that the area was "slightly over-excavated to ensure complete removal of the soil that contained elevated mercury concentrations". It appears, however, that no additional confirmation samples were collected after the over excavation occurred. NCPCAB staff recommends that an additional confirmation sample be collected at the bedrock/soil interface below the former sample EVBK05 as part of the RFI site characterization. The sample results should be included in the RFI report.

Mercury was detected up to 0.6 mg/kg in four locations north of the primary excavation area. Boeing states that these sample locations are surrounded by samples with levels below background levels. NCPCAB staff recommends that additional sampling be conducted as part of the RFI to characterize this area and determine whether residual levels of mercury are migrating via surface water to the drainage below Area A.

Approximately 43 samples were collected from Area D and vicinity. After removal of soil from this area residual levels of mercury ranging from 0.10 to 0.38 mg/kg were detected above background at approximately 15 locations. As mentioned as a condition in the July 20, 2004 IM Workplan approval letter, additional characterization of this area will be required as part of the RFI.

Areas B and C

In the IM Workplan, Boeing proposed Phase I and II soil removal activities. Phase I consisted of soil removal in Area A which was completed. Phase II included the removal of soil and sediment in Areas B and C to background levels. This phase was to begin after receipt of Army Corp permits. The second removal activity, however, was not initiated nor was it addressed in the Implementation Report.

More than 55 soil samples were collected from Areas B and C. Of the samples collected, 20 of the detections were above the background level of 0.09 mg/kg ranging from <0.02 to 0.81 mg/kg. Based on a comparison of the residual mercury detections in soil with a human health and ecological risk based soil screening value of 0.88 mg/kg, Boeing indirectly recommended that no further cleanup action be conducted in Areas B and C. Since this screening value was not previously mentioned in the IM Workplan and background was not used as the screening level as originally proposed, there is a departure from the IM Workplan.

NCPCAB staff requested Boeing provide calculations and the methodology used to determine the 0.88 mg/kg soil screening level to DTSC's Human and Ecological Risk Division (HERD) staff for review. Boeing provided this information electronically to NCPCAB and HERD in a June 6, 2005 email to Peter Bailey (NCPCAB) from Arthur Lenox (Boeing). NCPCAB met with HERD to discuss the conclusions of their review and found that the 0.88 mg/kg soil ecological screening level (ESL) was acceptable for protection of human and terrestrial ecological receptors exposed to inorganic forms of mercury in site soils. However, HERD informed the NCPCAB that the 0.88 mg/kg ESL was not applicable to organic forms of mercury in soil. Furthermore, the 0.88 mg/kg soil ESL would not be protective of wetland environments where rates of transformation of inorganic mercury to organic mercury (i.e., methyl mercury) could potentially be orders of magnitude greater than in soils. As an additional level of verification, HERD recommended that Boeing confirm the 0.88 mg/kg ESL would be protective of potential methyl mercury ecological hazard by assuming that a portion of the total mercury found in site soils is methyl mercury.
For example, from paired total mercury and methyl mercury soil samples (i.e., samples EVBS82 and EVBS84), HERD estimated that the methyl mercury concentrations in site

soils are up to 0.03% of the total mercury measured. As part of the RFI, NCPCAB requests that Boeing quantitatively demonstrate that the proposed 0.88 mg/kg soil ESL is protective of potential site methyl mercury exposures by developing a soil methyl mercury ESL and comparing that value to existing or predicted residual soil methyl mercury concentrations.

NCPCAB recommends that additional characterization of Areas B and C be conducted under the RFI. A portion of these samples should include determination of soil methyl mercury concentrations, as well as total mercury. In addition, surface water samples should be collected down drainage of Areas B and C concurrent with Outfall 010 sampling events. The results from this sampling effort will assist in determining whether residual mercury concentrations above background have migrated down drainage from the localized area north of Area A and from within Areas B and C.

Other Contaminants

During the initial stages of the RFI sampling, trichloroethene (TCE) was detected up to 3,200 micrograms per liter vapor (ug/Lv) in soil vapor at a depth of 9.5 feet near the concrete pad. TCE was also detected at 3,000 ug/kg in soil at 8 feet below ground surface in the same proximity. Only 8 vertical feet of soil was removed in this area during the IM, and thus the TCE previously detected at greater depths most likely still remains. Residual TCE concentrations were detected in soil matrix samples up to 34 ug/kg. Post-excavation soil vapor sampling, however, was not conducted. NCPCAB recommends additional characterization in this area to determine the extent of TCE.

Concentrations of lead and zinc were detected (45 and 300 mg/kg) above background in a sample collected near metal debris in Area A. Also, silver was detected above background at 4.1 mg/kg in the same sample that contained the highest detection of mercury. Although these sample locations were excavated, no confirmation sampling was conducted. NCPCAB recommends collecting confirmation soil matrix samples from these two locations as part of the RFI.

Outfall 010

After the completion of the IM excavation activities, a National Pollutant Discharge Elimination System (NPDES) sampling point (Outfall 010) was constructed to collect surface run-off from Area A. This was conducted in accordance with a renewed NPDES permit under the oversight of the Los Angeles Regional Water Quality Control Board (LARWQCB). In two of five precipitation events between October 2004 and January 2005, mercury concentrations (0.24 and 0.36 ug/l) in surface water exceeded the LARWQCB's permit limit of 0.20 ug/l established for other outfalls at SSFL. Boeing attributes the levels to 1) surface water containing suspended sediments with background levels of mercury and 2) forest fire ash deposited at the site in 2003. Although Boeing's supposition maybe true, there is insufficient data to support it.

Continued sampling of Outfall 010 will increase the data set and provide a better basis for this conclusion. In addition, NCPCAB recommends collecting surface water samples down drainage of Areas B and C as mentioned above. The results of this additional surface water sampling will 1) supplement the dataset for the NPDES monitoring system, 2) provide additional confirmation of the effectiveness of the IM, and 3) provide a method to monitor potential migration of mercury carried in surface water from locations down drainage of Outfall 010 and areas were residual concentrations were detected above background.

Summary and Conclusions

The objective of the IM was to remove soil impacted with elevated levels of mercury to prevent surface migration from the source area to the drainage. The Implementation Report is adequately complete and the objective of the IM has been met. NCPCAB recommends approving the Implementation Report with the condition that further characterization be conducted as part of the RFI. Additional investigation is required to assess the extent of mercury above background in Areas B and C, in the area north of Area A, and in the vicinity of area D. Also, NPCAB recommends collecting additional surface water samples down drainage of areas B and C. HERD concurs with the comparison value of 0.88 mg/kg soil for protection of human and terrestrial ecological receptors; however, Boeing should demonstrate that this level of total mercury in soils also is protective of potential methyl mercury ecological hazards. The comparison value of 0.88 mg/kg is not protective of perennial wetland-associated soils or sediments and is not applicable to soils or sediments that may impact or provide foundation material for wetlands. Additional assessment will be necessary to confirm whether the site could support or drain into a perennial wetland area. In the event NPDES comparison permit limits are continuously exceeded following rainfall events the comparison value should be reevaluated. Further evaluation and documentation of this and other risk based comparison levels will be required and should be presented in the RFI Report.

Author	Reviewer	Reviewer	Reviewer	Reviewer	Site Name/Code	TYPIST
P. Bailey 255-3602	P. Batarseh 255-3609	J. Pappas 255-3574			Santa Susana Field Laboratory P	Michele McKenzie 255-3907 EIV Approval Memo PB14W.065 memo

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Senior Engineering Geologist
Northern California Permitting and Corrective Action Branch
8800 Cal Center Drive
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