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CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

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Ms. Sherrel Henry
Work Assignment Manager
U.S. Environmental Protection Agency
290 Broadway
New York, New York 10007-1866

PROJECT: ARCS II Contract No. 68-W9-0024
Work Assignment 078-2PN7

DOCUMENT NO.: 7720-078-LR-CHMH

SUBJECT: Technical Review of PRP Data Summary Report
Virgin Island Chemical Site
St. Croix, U.S. Virgin Islands

Dear Ms. Henry:

CDM FEDERAL PROGRAMS CORPORATION (CDM Federal) has completed its technical review of the Draft Data Summary Report for the Virgin Island Chemical Site in St. Croix, U.S. Virgin Islands submitted on August 15, 1995. The report was prepared by Harding Lawson Associates (HLA) on behalf of the Island Chemical Company, the Potentially Responsible Party (PRP).

The document was reviewed for its technical competency and to ensure that the objectives specified in the Remedial Investigation Work Plan, prepared by HLA (HLA, 1994), were achieved during HLA's field investigation.

GENERAL COMMENTS

1. At the time of project planning, HLA anticipated the direction of shallow groundwater flow to be southeast towards the Caribbean Sea and subsequently designed the monitoring well network in respect to that flow direction. However, after collecting two rounds of water level measurements, it has been determined that shallow groundwater flow is to east-northeast. The report does not adequately address the difference between the assumed groundwater flow direction and the observed groundwater flow direction. The report also does not address the interaction, if any, between the shallow and deeper aquifer systems.

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Due to the actual flow direction, groundwater quality downgradient of many areas of concern (Areas B, D, E, and F) may not have been adequately characterized. On-site conditions and potential contaminant pathways cannot be thoroughly evaluated without this data. Therefore, several Remedial Investigation (RI) objectives have not been completely achieved by HLA's field program. These RI objectives include: evaluation of on-site conditions for additional areas of potential environmental concern; identify potential contaminant pathways; and to generate data for use in the human health assessment and for comparison with Applicable and Appropriate Requirements (ARARs).

2. During agency review of the work plan (June 2, 1994), EPA requested that HLA collect a background soil sample so on-site soil quality conditions could be compared to local soil conditions. In HLA's written response, dated June 24, 1994, it was stated that on-site soil conditions would be compared against a background sample collected in 1991 by NUS on behalf of EPA. HLA did not include the 1991 background soil results in the Draft Summary Report. Instead HLA used analytical data collected by the United States Geological Survey (USGS) from locations throughout St. Croix. Information on the sample depths, matrix, locations and analytical methods used by the USGS must be provided by HLA in order to determine whether a comparison between the two data sets is appropriate.
3. EPA's Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, December 1989 requires that total (unfiltered) metals groundwater analyses be used when performing a human health assessment. ".....the use of filtered samples for estimating exposure is very controversial because these data may underestimate chemical concentrations in water from an unfiltered tap. Therefore, data from unfiltered samples should be used to estimate exposure concentrations." HLA should present total metals data in the Data Summary Report and use it when conducting the site risk assessment.
4. For interpretation purposes, the soil and groundwater data should be provided in both tabular and graphic form.
5. It would be helpful for the interpretation of data to provide a topographic survey of the property which illustrates all property boundaries, above and below grade structures, and on-site discharge points for drainage ditches and subgrade piping. All below grade structures should also include existing and historical structures, as well as, their corresponding surface and invert elevations.
6. The report does not discuss the depth to bedrock, at or in the vicinity, of the site.
7. The objectives of the investigation outlined in the HLA work plan were designed to fill data gaps identified following the review of historical documents. These data gaps were outlined in Section 4.1 (Data Needs) of the work plan. Based on CDM Federal's review of the

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report, many of these data gaps still remain unresolved. These include: a more detailed understanding of site geology and hydrogeology and their implications on contaminant migration; seasonal variations in groundwater flow; the extent of potential impacts to soil and groundwater quality; information on sewage treatment plant operations and discharges near the well fields; existence of a third septic tank; possible source of chloroform detected in on-site and nearby wells; effect on high chloride and total dissolved solids on groundwater chemistry; and location of contaminated container burning area.

8. The report does not address data needs or RI objectives which were not resolved during this investigation and does not present recommendations for future resolution.
9. The work plan stated (Section 5.5.3) that during rehabilitation of the on-site production wells, the wells would be screened for volatile organic compounds (VOCs) using field instrumentation and a grab sample of the sediment would be obtained for inspection. This data is not presented in the report text or appendices and there is no discussion of the findings.
10. Section 5.5.5.2 of the work plan stated that "One or more continuous water level recorders will be installed in selected wells to supplement quarterly measurement data". Again, no discussion is provided in the text as to which wells are being continuously monitored and how the preliminary results of those readings compare with those levels presented in this report. This is important because the field data show groundwater flow in a different direction than what was originally assumed.
11. Groundwater contamination has been detected in previous samples from the deep on-site production wells and in wells located southeast of the property. At a minimum, additional samples from the production wells should be obtained for comparison with the shallow monitoring well data. This is important since on-site water level measurements indicate that groundwater flow in the deeper zone is to the southeast. Also since contamination has been detected in both the shallow and deeper horizons some effort should have been extended to determine the degree of interaction between the upper and lower aquifers. It should also be determined what lithologic conditions exist at the deeper screened interval.
12. Round 2 groundwater sampling occurred on May 9 and 10, 1995. Based on the text, a significant rainfall event (1.85 inches) occurred on the afternoon of May 9, 1995 which provided a sufficient influx of water which temporarily reversed the direction of groundwater flow and raised the water level elevations several feet. The report does not discuss the potential implications this large influx of water may have on the results of groundwater sampling (i.e., potential dilution of contaminant levels detected). The report should provide a discussion of this event's impacts on groundwater flow and the Round 2 sampling results.

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SPECIFIC COMMENTS

1. **Section 1.2, Page 1, Second Bullet:** The second objective of this investigation was to identify the existence of previously unidentified source areas on-site. Based on the work plan, at a minimum, four additional potential areas of concern remain to be evaluated. First is the unlocated septic tank; second, is the location of the "contaminated container burning area"; third is further subsurface evaluation of the soils (not sediment) at the effluent discharge point for the pipe from the process pit; and fourth is the discharge point for Drain Lines # 1 and 2. The justification for each of these areas is summarized as follows:

Unlocated Septic Tank - Given the reported chemical manufacturing processes which occurred at the facility, the potential for accidental discharge existed and, therefore, should be evaluated.

Contaminated Container Burning Area - The nature of this operation needs to be described and the location of the area investigated to determine the potential for historical discharges.

Effluent Discharge Point - Sediment sampling conducted in the area reveals the presence of low level contaminants in the sediment within the River Gut at the effluent discharge point for the pipe from the former process pit area. The work plan (Section 3.3) indicates that the pit was used to collect cooling water and any spills which may have occurred. Reportedly, water which accumulated within the process pit was sampled to determine if it was contaminated. If it was determined that the water was clean, it was then discharged to the River Gut. It is implied that water not discharged was recirculated in the system. No description of the sampling procedures, results of sampling or disposal procedures or documentation has been provided. Since sludge and water collected from the base of the pit during cleaning was disposed of as contaminated material, this unit is of particular concern. Given the nature of the stream and the volatility of the compounds disposed of in the process pit, the potential exists for the shallow volatilization of compounds within the sediment and for the infiltration of contaminated waters to the shallow groundwater.

Effluent Discharge Point for Drain Lines #1 and 2 - The results of samples obtained from the Drain Lines #1 and 2 revealed elevated levels of volatile organic compounds. For the same reasons outlined above (i.e., volatilization in the shallow sediments and vertical infiltration of contaminated water in the River Gut) the exclusion of sampling in the River Gut appears insufficient to eliminate the area as a potential concern.

2. **Section 1.2, Page 1, Third Bullet:** The third objective of the investigation was to identify potential contaminant pathways. Although several potential pathways were identified, a thorough

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examination of the effects of the lithology on vertical migration of contaminants requires further clarification.

3. **Section 1.2, Page 2, Fifth Bullet:** The fifth objective of the investigation was to determine the direction of shallow groundwater flow. Although flow has been determined to be in a radiating pattern, generally trending to the northeast - east, no hypotheses has been provided for the variation from the assumed direction of flow (east - southeast towards the Caribbean Sea). This is important given that the newly installed wells were installed to monitor groundwater quality downgradient of suspected sources. Based on these findings, several of the wells may not be properly located to accomplish this task. Since the intermittent River Gut provides recharge to the water table that causes temporary impact to localized flow, further clarification of its effects on contaminant migration is warranted.
4. **Section 2.3.1, page 4, Paragraph 3:** CDM Federal also collected a split sample from boring location SBD3 (0-2').
5. **Section 2.3.3, Page 7, Paragraph 1:** The results of the field screening and observation activities that were specified in the work plan have not been presented. It is unclear whether these tasks have been performed. This information must be provided.
6. **Section 3.2, Page 10:** As per the HLA work plan, data validation activities were conducted according to the USEPA Contract Laboratory Program Functional Guidelines for Inorganic/Organic Data Review (1994). It should be noted that if Region 2 validation guidelines had been followed, the evaluation of blank contamination would have resulted in a different qualification of associated samples.
7. **Section 4.2.2.1, Page 12, Paragraph 1:** HLA should note that ethylbenzene was also detected in SBB1 (24-26') and that carbon disulfide was also detected in SBF3.
8. **Section 4.2.2.1, Page 13, Paragraph 1:** HLA should note that an acetone concentration of 19,000 ppb was detected in sample SBB1 (6-8').
9. **Section 4.2.2.3, Page 13, Paragraph 1:** HLA should note that gamma-chlordane and endosulfan -II were detected in SBF3 (0-1').
10. **Section 4.4, Page 14:** Groundwater data in this section is presented in a very confusing manner. Since limited analytes were detected in the four wells, HLA should present the data for each sampling round separately.
11. **Section 4.4.1, Page 15, Paragraph 4:** The values for toluene have been reversed. Toluene was detected at 5 ppb in MW-1 not in MW-5 as reported.

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12. **Section 4.4.4, Page 17:** See Specific Comment No. 6 regarding data validation qualifiers.
13. **Section 5.2.2.1, Page 24:** Limited sampling and organic analyses have been performed in the area of the above ground tanks where HLA noted stained soil. Analytical results of samples collected in the tank farm area indicated elevated levels of ethylbenzene, xylenes, acetone, and toluene in the soil. Additionally, elevated levels of volatile organic compounds were detected in the site groundwater. Since volatile organic compounds were detected at elevated levels in the groundwater and only limited organic soil analysis has been performed, it is premature for HLA to conclude that volatile organic compounds in the soil do not represent an area of environmental concern. Additional characterization of the tank farm area, especially the area that HLA defines as the "source of ethylbenzene in the groundwater", must be conducted before any definitive conclusions on soil quality can be drawn.
14. **Section 5.2.2.4, Page 25, Paragraph 1:** See General Comment No. 2 regarding background soil concentrations. It should be noted that beryllium, antimony, arsenic, and cadmium were not detected in the EPA background sample. The EPA sample was analyzed using the inorganic Contract Laboratory Program method and detection limits.
15. **Section 5.2.2.4, Page 25, Paragraph 2:** Beryllium was detected in both the soil and groundwater at concentrations above screening criteria. Its presence in the soil may represent a potential concern when a better characterization of downgradient groundwater quality has been achieved.
16. **Section 5.3.2.1, Page 26, Paragraph 1:** The report presents data that the concentrations of ethylbenzene and xylene have decreased between the two sampling rounds. However, the potential reasons for the decrease in concentration levels are not discussed. It is a concern that the sampling results may not be indicative of actual concentrations given the potential impacts of the rainfall event covering the 24 hour period of May 9 and 10. See General Comment #12.
17. **Section 5.3.2.3, Page 27, Paragraph 1:** Pesticides were detected in the soil and in the groundwater at concentrations above water quality screening criteria. HLA has also documented the potential for on-site pesticide use. Pesticide compounds may represent a potential concern when a better characterization of downgradient groundwater quality has been achieved.
18. **Section 5.3.2.4, Page 27, Paragraph 1:** See General Comment No. 3 regarding the use of total metals in human health assessments.
19. **Section 5.3.2.4, Page 28, Paragraph 1:** See Specific Comments No. 6 and No. 15 regarding the use of data validation qualifiers and beryllium detections, respectively.
20. **Section 5.3.2.4, Page 28, Paragraph 2:** While groundwater beneath the site is not used for potable purposes, the elevated concentrations of iron and manganese could affect downgradient, offsite

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receptors. Groundwater flow direction and contaminant migration pathways must be clarified and defined before the elevated concentrations of these analytes can be dismissed as a non-concern.

21. **Section 6.0, Page 29:** Before any final recommendations for further action can be made, HLA must address the following :

- Groundwater flow directions in the shallow and deep aquifers must be clarified;
- Groundwater quality conditions in shallow and deep aquifers must be discussed;
- The potential interaction between the shallow and deep aquifers and the potential impacts on contaminant migration must be evaluated;
- The tank farm soils that are visibly stained and that have been defined as a potential source area must be further characterized;
- Downgradient groundwater quality must be addressed and characterized;
- Potential impacts of the May 9 and 10 rainfall events on the Round 2 groundwater sampling results must be evaluated;
- Contaminant migration pathways and offsite receptors must be defined and identified; and
- The specified objectives of the investigation must be fulfilled and all identified data gaps addressed.

22. **Figure 4-1 and Appendices G & H:** In comparing soil boring and well construction logs provided in Appendices G & H with lithologies presented on Figure 4-1, the lithologies presented do not appear to match. A reexamination of the lithologies presented should be made. It would also be helpful if additional representative cross-sectional views are provided. This is of particular concern given potential lithologic impacts on contaminant migration.