HAZARDOUS MATERIALS AND WASTE MANAGEMENT
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Technical Memorandum

To: John Hamrick, Jim Cain, Cotter Corporation

From: Errol P. Lawrence, HydroSolutions

Date: October 14, 2011

Subject: Responses to USEPA Region VIII Comments on the August 23, 2011 Lincoln Park Monitor Well Installation Plan

Responses to USEPA Region VIII comments on the August 23, 2011 Technical Memorandum titled "Draft Lincoln Park Monitor Well Installation Plan" are provided below. The USEPA comment is cited first, followed by the response.

Responses to General Comments

This technical memo describes the installation of monitoring wells, the locations of which were discussed by Cotter, CDPHE and EPA during meetings and via email communication. However, the memo does not contain what would normally be considered an acceptable level of detail. Usually, more detail would be required for field methods, and a SAP or SOPs would be attached.

Response: SOPs have been referenced. Copies of the SOPs will be submitted.

Responses to Specific Comments

1. Extent of Groundwater Impacts. The memo states: *"Groundwater contamination in the bedrock aquifer has not been measured within Lincoln Park. If groundwater contamination exists within the bedrock beneath Lincoln Park, it would most likely be restricted to the upper weathered portions of the bedrock."* Rather than make this assumption without supporting data, it is recommended that either during this field event, or a future event, that monitoring wells be installed into bedrock (ideally paired with alluvial wells) to define the vertical extent of the plume.

Response: The "Deep (bedrock) pathway" has been extensively evaluated and previously presented to USEPA and CDPHE in quarterly meetings and at the January 22, 2009 Citizens Advisory Group (CAG) meeting. The CAG meeting was summarized by Randall Breeden of the USEPA in a memo (dated January 26th, 2009) to Patricia Smith, also of the USEPA.

2. Potential Sources of Groundwater Impacts. The memo states: *"No sources are known to exist within Lincoln Park. However, historic overland flow may have resulted in infiltration and sorption of U and Mo onto subsurface materials. Slow release(desorption) of U and Mo may be an ongoing secondary source of groundwater contamination in the Lincoln Park."* It is recommended that soil samples be collected during the soil borings for the well installations to help determine whether sorption to subsurface material has occurred and/or to determine leachability.

Response: This comment is directed more on the area between the Deweese Dye Ditch and the SCS Dam where leachability studies have been conducted. None of the Lincoln Park wells proposed in this Plan are within that area. Additional soil samples will be collected in one key area to ascertain whether sorption has occurred as a result of surface irrigation with pumped groundwater that may be the cause of persistent levels of U and Mo. That area is near existing well 129 at proposed monitor well LP07.

3. Rationale for Proposed Locations (LP04). The memo states: *"Well LP04 will be also used to*

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assess hydraulic and chemical aquifer conditions in the critical area near well 129 where elevated levels of Mo and U persist." By assessing hydraulic conditions, does the memo mean to suggest that the well will be used to better define the hydraulic gradient, or that an aquifer test is planned for well LP04? The text should be more specific.

Response: The well will be measured for depth to water in order to generate data for development of potentiometric surface maps. That data will be instrumental in developing a groundwater model to be used for further evaluation of remedial measures, if necessary, or the implementation of monitored natural attenuation.

4. Rationale for Proposed Locations. The memo states: *"It is also proposed that once these new wells have been installed and sampled for four quarters, that all of the wells with unknown depths and/or screen intervals be removed from the routine groundwater monitoring program and only be sampled as part of the 5-Year Lincoln Park Water Use Survey sampling."* It is recommended that this section be reworded to say that following four quarters of data collection from the new wells, the groundwater monitoring plan will be reassessed to determine if any of the private or domestic wells can be removed from the program. Although monitoring wells will provide data that is more reliable and useful due to the known construction data, we should not discount the utility of sampling private or domestic wells.

Response: The plan only "proposes" removal of the wells in question. It is understood that a reassessment of the groundwater monitoring plan would be conducted prior to recommendation of removal of any wells from the current quarterly monitoring schedule. The decision to remove any wells from the quarterly groundwater sampling schedule would ultimately rest with CDPHE.

5. Drilling/Coring. The memo states: *"The core will be appropriately stored and marked to allow for identification of the recovered interval for subsequent observation and or testing purposes."* The memo should provide more detail regarding what appropriately stored means. If samples of the core are ever to be analyzed for U or Mo, or if the structural integrity of the cores is critical for future analysis, cores should be kept in sleeves and frozen.

Response: Cores may be sampled for U or Mo but the analysis for those constituents doesn't require that the cores be frozen. The purpose of the core recovery is to provide description and lithologic identification of the strata that is penetrated by the well. No structural integrity testing is planned or intended for the cores collected during this monitor well installation program.

6. Monitor Well Installation. The memo states: *"The screens will be placed from the alluvium bedrock contact to at least two feet above the first occurrence of groundwater"* Based on the hydrogeology section, this would suggest that screens could be up to 32 feet long. Unless the subsurface saturated alluvium is homogeneous and isotropic, screens should be limited to 10 feet in length. A saturated thickness of 30 feet may require multiple monitoring wells screened at varying depths.

Response: Isotropy is a characteristic of the aquifer and cannot be readily determined without conducting a pumping test (which would require that the well already be completed). Designation of a 10 foot maximum screen interval is arbitrary. Available data indicate that U and Mo concentrations related to site impacts decrease with depth. That is the reason for the preference for the uppermost portion of the saturated alluvium. The following is proposed for screen placement. The screens will be placed from the alluvium bedrock contact to the uppermost occurrence of groundwater where the total saturated thickness is 15 feet or less. In cases where the saturated thickness is

greater than 15 feet, the screens will be placed so that they encounter the uppermost 15 feet of saturated alluvium. In the event that a potential confining unit is encountered in the saturated alluvium (above the bedrock contact), multiple monitor wells may be installed that are screened in the appropriate intervals to discretely monitor each hydrostratigraphic unit.

7. Monitor Well Installation. The memo states: *"The site geologist will determine the appropriate screen interval. The screens will be four (4)-inch schedule forty (40) PVC with 0.020 inch slots."* A 0.020 slot size may be too large depending on the alluvial material.

Response: The site geologist will determine the appropriate screen interval. The screens will be four (4)-inch schedule forty (40) PVC with 0.020 inch slots unless determined otherwise in the field by the site geologist."

8. Monitor Well Development. The memo is too general about the method of development. The memo should be more specific, and as per comment #1, should provide detailed information in a SAP or SOP.

Response: A more specific SOP for well development will be submitted.

9. Monitor Well Measurement and Sampling. The memo states: *"Groundwater samples will be collected from each of the newly installed monitoring wells using Cotter's standard water quality sampling protocols established in the Remedial Action Plan, Radiological Program Plan Procedures and the Quality Assurance Program Plan. Specifically, sampling will follow the procedures EV-040, EV-041 and EV-042 for sampling the monitor wells."* Although the memo references the RAP, at a bare minimum it should indicate the method of sampling and purging, what analytes will be sampled, the analytical method to be used, and whether CIA samples will be collected.

Response: The referenced RAP procedures and plans will be submitted along with the plan.

10. Schedule. The memo states that CDPHE will be notified if there needs to be any modifications to the locations proposed in the plan. We would expect that EPA will also be notified and involved in the review and approval of alternate locations.

Response: It is anticipated that CDPHE will notify EPA of proposed modifications to the well locations because they are the lead agency for regulating the site.