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LANL
Chromium Plume
Restoration Contingency



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
GROUND WATER AND ECOSYSTEMS RESTORATION DIVISION
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February 16, 2016

MEMORANDUM

OFFICE OF
RESEARCH AND DEVELOPMENT

SUBJECT: Technical review comments of the Interim Measures Work Plan for Chromium Plume Control, Los Alamos National Laboratory, Los Alamos County, New Mexico (16-RC06-001).

FROM: Randall Ross, Ph.D., Hydrologist
Applied Research and Technical Support Branch

TO: Richard Mayer, RPM
USEPA, Region 6

Per your request for continued technical support, the document titled Interim Measures Work Plan for Chromium Plume Control, Los Alamos National Laboratory, Los Alamos County, New Mexico was reviewed by Dr. Milovan Beljin (Dynamac subcontractor) and me. The following comments are submitted for your consideration. If you would like to discuss them, please contact us at your convenience (Ross: 580-436-8611).

COMMENTS

1. The primary objective of the Interim Measures (IM) proposed in the work plan (WP) is to achieve and maintain the 50 ppb downgradient edge of the chromium plume within the LANL boundary, by pumping extraction well CrEX-1 and injecting the treated water into new injection wells located along the downgradient portion of the plume. The secondary objective is to hydraulically control plume migration in the vicinity of the well R-45. Groundwater modeling discussions and results presented in the WP appendix include numerous uncertainties, which make it unclear whether the objectives will be fully or partially achieved, especially within the projected period of three years. The authors of the WP acknowledge these uncertainties and some of the limitations of the model. Despite these limitations, there are no compelling reasons why the proposed capture system should not be initiated. Data collected during the operation of the extraction and injection system will be useful to refine the current groundwater model.
2. It is noted that the current groundwater monitoring program does not include downgradient monitoring wells necessary to delineate the 50 ppb chromium contour south of R-50 and beyond the LANL site boundary. It is recommended that samples be



acquired from the injection wells, specifically CrIN-3, CrIN-4 and CrIN-5, prior to initiation of injection to enhance the general understanding of the chromium plume. Further, the extent of the chromium plume cannot be determined without the installation of additional downgradient monitoring wells. Any new wells installed to delineate the downgradient extent of the chromium plume should be monitored regularly to evaluate the effectiveness of hydraulic capture.

3. Hydraulic capture is used to create a capture zone such that plume capture is achieved within a predetermined target capture zone. The proposed pumping of CrEX-1 at approximately 80 to 100 gallons per minute (gpm), along with the use of injection wells, is designed to establish a capture zone for the chromium plume as defined by the 50-ppb contour. The IMWP acknowledges that one extraction well may not be sufficient to arrest plume migration and that additional extraction wells may be required. The relatively small calculated capture zones dimensions (A-5.1 and A-5.2) seem to support the need for one or more additional extraction wells.
4. Six injection wells are proposed for plume control. The priority injection well locations are along the boundary west and east of R-50. The other injection wells are proposed at the plume edge west of R-45 and at the plume edge west of R-44, and the sixth injection well near R-42. The WP assumes that the injection wells will be able to accept injection rates comparable to the rates of extraction. However, it is more common for injection wells to accommodate rates less than the extraction rates due to numerous processes (e.g., biofouling, clogging by particulates, etc.). The need for regularly scheduled rehabilitation of injection (and extraction) wells should be assumed.
5. Pumping CrEX-1 at a rate of approximately 80 gpm produces a drawdown of 20 ft. According to the IMWP "...the well-specific capacity does not decline with the increase of the pumping rate (and the respective increase of the pumping drawdown; see below). This suggests that borehole skin effects cause a portion of the drawdown; as a result, the drawdown in the aquifer near the well is expected to be much lower than the one observed within the pumped borehole" (page A-1). A decrease in specific capacity is normally observed with increasing pumping rates. The aquifer material, the screen length, and the fast recovery suggest much lower theoretical drawdown than observed, suggesting that the efficiency of the well may be low. The question of the drawdown in the extraction well versus the formation will be important in determining the capture zone of the well. Water levels measured in extraction wells should not be used to evaluate capture or construct water level elevation maps.
6. Pumping data for CrEX-1 were difficult to analyze because of the small magnitude of the drawdown measured in the observation wells (CrPZ-1, R-1, R-15, and others). Most of the transmissivity and storativity values listed in Table A-4.0-1 should be considered suspect, given the minimal drawdown observed in the corresponding wells and the

interference of production wells in the area. These data should not be used to define the heterogeneity of the aquifer.

cc: Mike Fitzpatrick (5303P)
Terry Burton, Region 6
Gregory Lyssy, Region 6
Vince Malott, Region 6
Chris Villarreal, Region 6