-----Original Message-----
From: Mayer.Richard@epamail.epa.gov [mailto:Mayer.Richard@epamail.epa.gov]
Sent: Friday, August 10, 2007 3:06 PM
To: Moats, William, NMENV
Cc: King.Laurie@epamail.epa.gov
Subject: Draft Mixed Waste Landfill Groundwater Monitoring Comments per citizens request

Will, the attached comments are draft and may have some changes, although I don't expect major changes. One of the questions pertaining to groundwater flow does not have a comment. I'll be out all of next week, but should be back in office Mon. the 20th. I included two versions, wordperfect (the orginal) and word (converted from wordperfect). (See attached file: mixedwlandfcomm.doc)The commentors are Chuck Hendrickson, Scott Ellinger, and Rich Mayer.(See attached file: mixedwlandfcomm.wpd)

DRAFT DRAFT DRAFT DRAFT DRAFT

Mixed Waste Landfill Groundwater Monitoring System Comments

Question on Purging of Wells for Sampling: EPA recommends the low-flow purging method for collecting future groundwater samples at the wells around the Mixed Waste Landfill (MWL). This method will reduce the possibility of aerating VOC samples, reduce turbidity of the samples, and minimize damage to the well screen or sand pack. The current method involving higher flow rates (from 2-4 liters per minute) increases the possibility of turbid samples which contain colloids. If low flow sampling is not possible, Sandia should evaluate and propose alternative methods to collect samples with acceptable parameters.

Question on Lack of Knowledge on Speed of Groundwater in two Aquifers: Answer pending.

Question on Nickel Contamination in MW1: EPA reviewed the DVD of the video camera log of MW-1. The video clearly indicates corrosion of the stainless steel well screen, which is composed of nickel, chromium, and iron; the metals found in the well's groundwater samples. Since corrosion problems would mask any nickel or chromium contaminants from the landfill, EPA cannot conclude whether there is contamination in the well from the landfill.

Question on 2 Background Wells Needed, One in each Aquifer: Currently, EPA believes that only one background well is needed in the AF facies, which is considered the uppermost aquifer under RCRA.

Question on using Low Level Tritium Analysis: EPA recommends that a low level tritium analytical method be used in the future (at least periodically). Tritium is a very mobile constituent and should be a good tracer (high quantity was disposed of at the landfill) to determine whether contamination above background levels from the landfill has reached the aquifer. EPA recommends using the Low Level with Electrolytic Enrichment (LLEE) method with detection limits down to about 0.3 pCi/L. This method has been used at LANL for determining groundwater contamination with great success. The University of Miami's Tritium Laboratory can perform this analysis. EPA recognizes that the current analytical method is still protective of the groundwater standard (MCL) of 20,000 piC/L.

Question on Drilling Wells within the Landfill: Monitoring wells are normally located around the perimeter of a landfill. A well inside a landfill would not be part of a monitoring well network to determine if there are releases outside the landfill. Drilling through known contamination will also increase the chances of cross contamination between shallow and deeper zones. Such a well poses a risk of creating a direct conduit for contamination from the surface to the aquifer. RCRA regulations do not require groundwater monitoring within a landfill; rather, the detection monitoring system is to be located at the point of compliance, which is the hydraulically downgradient edge of the unit or waste management area.

Question on Drilling Methods for Well Installation: The preferable drilling method for purposes of ground water sampling is the one that introduces the least amount of foreign matter into the aquifer, for both mechanical (i.e., well damage from pore plugging) and chemical reasons.

Question on Aquifer Characteristics at the MWL: There are two distinct aquifers at the Mixed Waste Landfill, the AF and the ARG. This distinction is evident in the clearly different potentiometric surfaces for the two units. The AF aquifer has very low average hydraulic conductivity (1.81 ft/day) and appears to have some beds with vertical hydraulic conductivity low enough to act as confining beds. EPA recognizes that the ARG facies is more productive and that wells screened in both zones will likely be "controlled" by the ARG facies.

Also, the flow directions are different. The AF aquifer flow direction is to the west-southwest. The ARG aquifer flow direction is the west-northwest.

Also noted is the elevated nitrate contamination (4-5 ppm) that is found in the monitoring wells screened in the uppermost portion of the AF aquifer, but is not found or is in much lower concentrations in the wells (1-1.5 ppm) screened in the ARG aquifer.

Question on Installing Monitoring Wells in the ARG Aquifer: Additional monitoring wells are not needed in the deep ARG aquifer initially. The "uppermost aquifer" under RCRA is considered the AF facies and is where contamination from the landfill will be found initially. EPA recognizes that the AF facies has very low conductivity and is unlikely to be used for production purposes. However, if contamination is found in the AF facies, then vertical delineation of contamination would be required by installing wells in the deeper zones of the aquifer (ARG facies).

EPA Review of the Borehole Well Videos: EPA reviewed the DVD's of the borehole videos provided by Sandia National Laboratories of monitoring wells BW1, MW1, MW2, MW3, MW5 and MW6. MW1 indicated the most corrosion of the stainless steel screen. MW3 showed much less corrosion, with MW2 and BW1 indicating minimal corrosion. Several of the wells had a brown colored "encrustation like" material on the screen. MW-3 also had a foot long hole in the PVC casing at 40 feet, exposing the annular grout.

Question on the Moats Evaluation: EPA did not review the Moats evaluation due to other factors of the groundwater monitoring system which made the review of that document not pertinent.

Below is EPA's technical evaluation of each monitoring well at the Mixed Waste Landfill.

BW1: This monitoring well needs to be replaced due to the fact that the water levels have dropped to below the screen interval (verified by video log). The replacement well should be located east (hydraulically upgradient) of the mixed waste landfill and screened with a PVC screen across the water table in the AF facies/aquifer.

MW1: This well should be replaced due to corrosion of the stainless steel screen which will mask certain metal constituents. The corrosion is corroborated by the video log and the exceedances of chromium and nickel. Also, the lower part of the screened interval is filled with sediment. In addition, the well is located mostly upgradient or side gradient of the landfill and is unlikely to detect contamination. A replacement well should be located on the western boundary of the landfill and screened with a PVC screen across the water table in the AF facies.

MW2: The well is cross gradient from the landfill, so it is unlikely to observe releases from the landfill. The camera video log indicates very little corrosion and this is confirmed by no exceedances of chromium and nickel. EPA recommends this well be used to measure groundwater elevation, unless corrosion problems occur later.

MW3: This monitoring well should be replaced due to some corrosion (much less than MW-1) of the stainless steel screen which is verified by the video camera log and the analytical exceedances of chromium and nickel. Also, the water table has dropped almost below the screened interval. Of note, there is a foot long hole in the PVC casing at 40 feet that appears to be the result of efforts to free jammed equipment. The replacement well should perhaps be moved closer to the unit boundary and should be screened with a PVC screen across the water table of the AF facies.

MW4: This well should be plugged to "shut off" the communication between the Alluvial Fan (AF) aquifer and the Ancestral Rio Grande (ARG) aquifer. Both aquifers (AF and ARG) are mixing in this well, with the more productive ARG aquifer providing the bulk of the water and controlling the water level. The RCRA regulations do not require placing a well within the landfill boundary, as is the case with this well. Such a well poses a risk of creating a direct conduit for contamination from the surface to the aquifer, particularly if the locations of the disposal cells are not well known/accurate.

MW5: The intent of this well appears to be monitoring the alluvial fan strata, because the screen is nearly all within that strata. However, the well screen extends slightly into the ARG deposits and according to the water level, is actually monitoring the ARG facies instead of the AF facies. The water level in this well is about 10 feet above the top of the screen, indicating an upward gradient. Also, this well had grout placed inside the well (not the annulus) and it is highly questionable whether this material was fully removed from the screened interval (sand pack) or formation in order to obtain representative groundwater results. A replacement well monitoring the water table AF facies should be located adjacent to the western landfill boundary, approximately 200 feet southeast of the current location.

MW6: This well is acceptable for monitoring the ARG aquifer, although it's location (not a desirable distance, approximately 500 feet west) is not adjacent to the landfill boundary. MW6 is a good as a control point for helping determine flow

directions in that strata. The water level in this well is approximately 15-20 feet above the top of the screen, indicating the confined nature of this aquifer.

Summary, Detection Monitoring Wells Needed: EPA recommends that the Mixed Waste Landfill have three detection monitoring wells at the unit's point of compliance, its western boundary. The wells should be fairly evenly spaced and located to intercept expected potential groundwater releases to the uppermost aquifer, the AF facies. Two of these wells are mentioned above as replacements for wells MW1 and MW3; a third well also needs to be installed approximately 200 feet southeast of MW5.