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July 18, 1996

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RE: Comments specific to the characterization of ground water in the Fort Wingate Depot Activity RI/FS, McKinley County, NM.

Dear Mr. Fisher:

Subsequent to the meeting held at Fort Wingate Depot Activity (FWDA) on June 4, 1996 regarding the location of ground-water monitoring wells, and in response to Mr. Tim Alexander's telephone call of June 7, 1996, the New Mexico Environment Department (NMED) Ground Water Quality Bureau has generated the following comments on the FWDA Revised Draft Final Remedial Investigation/Feasibility Study (RI/FS) dated 25 March 1995. These comments are in addition to those submitted in NMED's March 2, 1994 letter addressing the Draft Final RI/FS dated 28 January 1994. The new comments focus specifically on the issue of compliance with New Mexico statutes protecting ground water, as set forth in the New Mexico Water Quality Act.

The New Mexico Water Quality Control Commission (WQCC), having statutory authority under the Water Quality Act to issue and enforce ground and surface water protection regulations, has set the precedent that shallow ground water, like that identified in the FWDA RI/FS, is protected for present and future use. Twc parameters are considered in determining whether ground water is protected under the WQCC Regulations:

(A), if the total dissolved solids (TDS) concentration in the ground water is 10,000 milligrams per liter or less, and
(B), if ground water will enter a well in sufficient quantity to be used as a water supply.

The FWDA RI/FS identifies three alluvial wells in sufficient detail to determine that the shallow ground water is protected under the WQCC Regulations. The recent underground storage tank investigation at FWDA, conducted concurrently with the RI/FS and therefore not included in the RI/FS, provides further conclusive evidence that shallow ground water exists below FWDA and is of such quality and quantity that it could be utilized as a water supply.

NMED Ground Water Quality Bureau Comments on the Fort Wingate Depot Activity Revised Draft Final Remedial Investigation/Feasibility Study, dated 25 March 1995:

Ground Water Characterization and Monitoring

1. Section 3.1.2.6: Figure 3-1 uses the same symbol to represent wells that intersect ground water and dry wells which have been completed in the vadose zone. Because this important distinction is made in the text it should also be depicted in Figure 3-1.

2. Sections 3.1.2.6 and 5.2.1: Both sections state that "13 ground water monitoring wells" were installed by ESE in the 1980 to 1981 time-frame. However, section 2.2.5.6 indicates that only one of the 13 wells encountered ground water during drilling. During Environmental Resources Management's (ERM) assessment of the 13 wells for the RI/FS, three contained sufficient quantities of ground water for sampling. Unsaturated flow in the vadose zone is dominated by capillary forces. Therefore, it is highly unlikely that water will enter a large void, such as a well in the vadose zone. Furthermore, sand packs around wells at FWDA may be coarser-grained than the native material, and therefore represent a capillary barrier to fluid flow. It is incorrect and misleading to refer to the dry wells with screens set in unsaturated alluvium as "ground water" monitoring wells. This should be corrected where it occurs in the text.

3. Section 5.2.1: From the fact that 10 dry wells contain too little water to sample, the conclusion is drawn that "no permanent ground water system is present in the shallow alluvial sediments at FWDA." This conclusion cannot be made from the available data because, as an Army Environmental Center (AEC) representative detailed during the June 4, 1996 meeting at FWDA, characterization of ground water was not an objective of the ESE investigation. Well construction information confirms this assertion. As indicated in Section 2.2.5.6 of the RI/FS, the average depth of the wells drilled during the ESE study is 30 feet. The fact that 10 shallow boreholes did not encounter ground water does not preclude its existence in the alluvium at any well location. To the contrary, the ground-water investigation performed by the Army Corps of Engineers to assess the impact of leaking underground storage tanks (UST) near Building #6 demonstrates that a water table exists at a depth of between 45 and 47 feet in that area. Wells drilled to comparable depths in the 1980 ESE study also encountered ground water, counter to the statement that "no permanent ground water system is present." Sweeping generalizations about the nature and extent of alluvial ground water should be removed from the RI/FS until such a time as a body of evidence exists to support them.

4. Section 2.2.5.6: Table 2-2 indicates that the background monitoring well, FW-31, was drilled to a total depth of 30 feet. Section 3.1.2.6 text states that FW-31 was drilled to a depth of 50 feet. This is a critical distinction because FW-31 is a well that intersects ground water. Also, text in Section 3.1.2.6 refers to Table 6-63 for well-depth comparisons with time. This information actually appears in Table 7-65.

Risk of Exposure through the Ground-Water Pathway

5. Section 5.5: Five contaminant migration pathways are considered. The text concludes the migration pathway to ground water can be "dismissed as a potential transport pathway due to the high evapotranspiration rates and corresponding low precipitation rates and the ephemeral nature of shallow ground water observed during both the current and previous investigation at FWDA." Both reasons are assumptions made without evidence to support them. While evapotranspiration is high and precipitation is low at FWDA relative to other parts of the country, aquifer recharge through the vadose zone has been shown to occur in New Mexico. No studies at FWDA refute this. Refer to Gee, et. al., 1994, "Variations in Water Balance and Recharge Potential at Three Western Desert Sites," Soil Science Society of America Journal, 58:63-72, for detail of studies of potential aquifer recharge. Comments 1-3 above treat the assumption that shallow ground water is "ephemeral" at FWDA. Additionally, contaminants may be carried with liquid wastes artificially recharging ground water. This migration route may be as important as, or more important than, leaching of contaminants driven by precipitation in terms of impact on ground-water quality at FWDA. Additional comments below address the migration of liquid wastes to ground water.

6. Section 7.4.1.2: Referring to monitoring well FW-10 at the TNT leaching bed area the text states, "Although several inorganic constituents exceed their respective screening levels in ground water, they were not carried forward to the Baseline Risk Assessment (BRA) primarily because they are suspected of being background concentrations for the area." The ground-water sample analysis from FW-10 detected 32 milligrams per liter nitrate reported as nitrogen. This concentration is more than three times the New Mexico human health standard and the federal maximum contaminant level (MCL). When, as in the case of FWDA, potential land reuse scenarios include transfer of properties to the Department of the Interior and where there is a likelihood that Bureau of Indian Affairs (BIA) may control the land and develop residences, the **suspicion** that nitrate contamination of ground water adjacent to unlined explosive leaching beds may be due to background conditions does not satisfy corrective action requirements under New Mexico law. Do analytical results from the

background well (FW-31) figure in the suspicion that naturally occurring ground water at FWDA contains three times the MCL for nitrate? As stated by NMED in the June 4, 1996 meeting at FWDA, additional ground-water monitoring wells to be drilled in the area of the TNT leaching beds should be located for the purpose of determining whether the ground-water contamination in FW-10 is due to background conditions or to FWDA operations. If it is determined that nitrate contamination is sourced at the TNT washout facility, the extent of contamination will have to be determined and remedial options should be added to the Feasibility Study (Section 10).

7. Section 7.4.1.2: The text also states that "the limited quantities of ground water in the alluvium are insufficient for consumptive use." NMED refutes this assertion in previous comments and adds further that monitoring well FW-10 contained a nearly 20-foot column of water when it was sampled in 1992 as part of the RI/FS. On June 4, 1996, ERM determined that FW-10 contained approximately 12 feet of water. Both measurements indicate that quantities of ground water in the alluvium may be sufficient for consumptive use. Further investigation of ground water in the TNT leaching beds planned for 1996 has the potential to, and should, address this issue.

8. Section 6.4.1: Under the heading, "Identification of Potential Exposure Pathways for the Screening Assessment," the text reads: "As discussed in Section 5.0, leaching to ground water and generation of fugitive dusts are not significant migration pathways for areas of concern at the FWDA...." Comments above, especially comments 6 and 7 when referring to well FW-10, express NMED's position that evidence in the RI/FS supports the consideration of ground water as a potential exposure pathway. Furthermore, NMED concurs with EPA comment #4 in Attachment A of the September 12, 1995 letter from David Neleigh. That comment on Section 5 of the RI/FS states that "the report does not present enough information to conclude that a ground-water pathway is absent at FWDA."

The EPA comment further states that "hydrogeologic cross-sections and maps are needed for the Northern Property to show the nature of the alluvial aquifer system, including stratigraphy, control points, depth to the base of the aquifer, and the potentiometric surface." To date, NMED has not seen a response to the comment that would incorporate this necessary hydrogeologic information into the RI/FS. However, Tim Alexander requested in a telephone conversation on June 7, 1996 that NMED identify specific contaminant sources which have the potential to threaten ground-water quality. NMED comments on contaminant sources appear below and it is the position of NMED that a ground-water investigation at these areas of concern would, in aggregate, provide sufficient data to enable a response to EPA comment #4. Characterizing the

ground water potentially affected by these AOCs is prerequisite to evaluation of the risk to human health through the ground-water exposure pathway because the soil investigations described in the RI/FS are of very limited vertical and horizontal extent and cannot rule out the contamination of ground water.

Areas of Concern

9. Section 2 and Section 7: These sections identify 45 areas of concern at FWDA and detail the investigations performed to determine if releases from the AOCs represent a health threat. The approach used in screening the AOCs was a program of soil borings and sampling. This approach advances 3 of the AOCs forward to the Feasibility Study (Section 10) because of concentrations of contaminants in soils. However, the approach cannot detect contamination of ground water. Owing to the fact that several wells demonstrate that ground water exists at FWDA and can become contaminated by discharges at or near the ground surface (for example, the underground storage tank investigation at Building #6 and potentially monitoring well FW-10), monitoring of ground water at AOCs which discharged significant quantities of wastes in liquid form is necessary.

10. Sections 7.4.1.1 and 7.4.1.2: The investigations of the unlined TNT leaching beds demonstrate the impracticality of relating soil sampling results and potential ground-water impact. Until further investigation is completed these beds must be considered to be the likely source of the 32 milligrams per liter nitrate concentration in well FW-10. Although nitrate concentrations in the soils at the pre-1962 leaching bed exceed background, it's impossible to predict the concentration of nitrate in ground water based on the soil data. The negatively charged nitrate ion has little affinity for soil particles and so may leach readily through the vadose zone. Several other physical mechanisms exist to explain why contaminants not detected in soil samples near a particular source occur in ground water. Preferential flow pathways can channel contaminants to restricted conduits that would only be detected by a fortuitous sample location. Contaminants can volatilize from the shallow subsurface while the portion escaping the shallow zone migrates downward (possibly explaining analytical results of soil sample from fire training ground, Section 7.3.3). Over time, the shallow subsurface can be flushed of contaminants which leach downward. But in all cases prediction of impact to ground water by correlating to surface and near-surface soil sampling is unreliable.

11. Section 7: Several facilities formerly operating at FWDA released quantities of liquid wastes to the environment as part of standard operating procedure. These facilities are concentrated in the northern portion of the FWDA property and are detailed

below. In accordance with New Mexico WQCC regulation 1203, it is the recommendation of NMED that a plan be developed to install, maintain, and use monitoring devices for the ground water most likely to be affected by the liquid waste discharges. In so doing, adequate information would be available to generate the hydrogeologic characterization recommended in EPA's comment #4 (referenced in comment 8, above) while also satisfying the state's requirements.

11a. Section 7.3.1.1: The Building 5 garage discharged liquid wastes to a storm sewer. Solvents, including TCA, were used at the garage. The garage came into use in the 1940's. The RI/FS does not contain information about disposal of solvents throughout FWDA operations. If a disposal site were identified, a soil-vapor survey to define the extent of contamination would be appropriate.

11b. Section 7.3.1.2: The Building 15 garage was in use beginning in the 1940's and utilized solvents. Disposal sites for liquid wastes from Building 15 are not described in the RI/FS and presumably cannot be determined from FWDA records.

11c. Section 7.3.1.3: The former locomotive shop (Building 11) was previously reported to have 3 pits, each with drains. The RI/FS confirms only 1 pit and does not indicate where the discharge point of the drain(s) is located.

11d. Section 7.3.3: Operations at the Fire Training Ground involved dumping fuel, solvents, or oil into unlined pits for fire crew training three times per year. Volatile organic compounds were identified in soil borings below the pits.

11e. Section 7.3.3.1: The Sewage Treatment Plant was designed to dispose of treated wastewater by evaporation and infiltration in unlined lagoons. Well FW-29 was drilled to monitor the facility's impact on ground water, but the well screen is set in the vadose zone.

11f. Section 7.3.7.2: The former petroleum, oils, and lubricants (POL) area was a site used to dispose of an estimated 200 gallons of these materials by pouring them onto the ground. The RI/FS indicates that well FW-26 in this area was drilled to a depth of 31 feet, apparently above alluvium which may be saturated with ground water.

11g. Section 7.4.2: Acidic waste pickling solutions from Building 515 were routinely discharged to the unlined Acid Waste Holding Pond for evaporation and infiltration. No volume estimate is given, but the facility operated from the 1940's to the late 1960's. Discharges of solvents, chlordane

and other chemicals wastes to the Acid Waste Holding Pond are also reported. The discharges to this facility represent a potential threat to ground-water quality. Two wells adjacent to the Acid Waste Holding Pond were drilled to depths of 49 and 26 (as reported in Table 2-2). Neither well has yielded information on depth to ground water or ground-water quality.

12. The leaking underground storage tank investigation at Building #6 demonstrates both that ground water is present at approximately 47 feet below the FWDA Administration Area, and that contaminant releases to the shallow subsurface have the potential to contaminate this shallow alluvial aquifer. Relevant hydrogeological information generated in the UST investigation should be incorporated into the RI/FS.

13. An initial phase of the Western Landfill investigation has been completed. The investigation has so far taken place outside of the RI/FS format. If the investigation determines that contaminant releases at the Western Landfill have occurred in such quantity as may with reasonable probability injure or be detrimental to human health, animal or plant life, or property, or unreasonably interfere with the public welfare or the use of property, the site should be assessed, monitored, and remediated in conjunction with the base-wide assessment and remediation plan in the RI/FS.

The thirteen comments above specifically address the assertion in the RI/FS that ground water is not an exposure pathway because the first useable aquifer is the San Andres Formation. NMED believes that such a conclusion is unwarranted as is it contradicted by evidence found within the RI/FS and other sources. Therefore, the RI/FS should assess the potential risk to human health (including stock watering) through the ground-water exposure pathway. It is not the NMED position that each of the facilities needs to be designated for one or more monitoring wells, but rather that a comprehensive ground-water monitoring approach can be designed to address both NMED and EPA comments with fewer ground-water monitoring wells. Please feel free to contact me with any questions or concerns regarding these comments.

Sincerely,

Chris Whitman
Geologist
Assessment and Abatement Section

CFW/cfw

cc: Ed Kelley, WWMD
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