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DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY GARRISON COMMAND
1733 PLEASANTON ROAD
FORT BLISS, TEXAS 79916-6816

April 28, 2008



IMWE-BLS-PWE

John E. Kieling, Program Manager
Permits Management Program
State of New Mexico, Environment Department
Hazardous Waste Bureau
2905 Rodeo Park Drive, East Building 1
Santa Fe, New Mexico 87505-6303

Dear Mr. Kieling:

Please find enclosed two copies of the Technical Memorandum Regional Aquifer Monitoring Well Installation Dona Ana Range Camp and Meyer Range Camp Wastewater Lagoons SWMU Numbers 27B and 76, Fort Bliss Texas EPA ID No. NM42113720101 HWB-FB-07-002. This report dated March 2008, documents investigative activities completed in accordance with the Resource Conservation and Recovery Act Settlement Agreement dated 31 January 2006. An additional copy of this letter has been furnished to Mr. Rick Smith, Tulsa District Corps of Engineers.

If you have any questions or need further assistance, please do not hesitate to contact Kelly Blough at 915-568-0794, or kelly.blough@us.army.mil.

Sincerely,

Sylvia A. Waggoner
Sylvia A. Waggoner
Chief, Multimedia Compliance Branch
Environmental Division
Directorate of Public Works

Enclosure

LIBRARY COPY

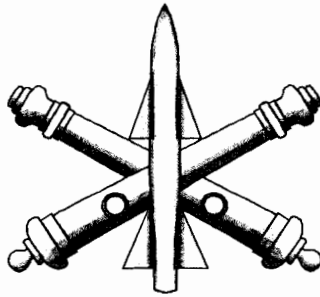
TECHNICAL MEMORANDUM

REGIONAL AQUIFER MONITORING WELL INSTALLATION

DONA ANA RANGE CAMP AND MEYER RANGE CAMP WASTEWATER LAGOONS

Solid Waste Management Unit (SWMU) Nos. 27B and 76
Fort Bliss, New Mexico

FORT BLISS, NEW MEXICO



Prepared for

UNITED STATES ARMY CORPS OF ENGINEERS

Contract No. W912BV-04-D-2005
Task Order No. 0019

And

United States Army Air Defense and Artillery Center at Fort Bliss

Prepared by

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March 2008

W.O. No. 03886.525.019





MEMORANDUM

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TO: Rick Smith (USACE Tulsa)
Jeanne Carroll (USACE Tulsa)

DATE: 20 March 2008

COPY: Ron Baca (Fort Bliss)

FROM: Russ K. Johnson, P.G. (WESTON)
Steve Mitchell, P.G. (WESTON)

**SUBJECT: Technical Memorandum - Dona Ana and Meyer Range Camps Wastewater Lagoons
Regional Aquifer Monitoring Well Installation
Solid Waste Management Unit (SWMU) Nos. 27B and 76
Fort Bliss, New Mexico**

This memorandum documents the completion of deep well installation and sampling activities at the Dona Ana Range Wastewater Lagoon, Solid Waste Management Unit (SWMU) No. 27B and Meyer Range Wastewater Lagoon, SWMU No. 76, Fort Bliss, New Mexico.

BACKGROUND

The New Mexico Environment Department (NMED) required Fort Bliss to install monitoring wells into the regional aquifer at the Dona Ana and Meyer Range Wastewater Lagoons to facilitate the collection of representative groundwater samples as part of the No Further Action (NFA) determination for the SWMUs. The terms of a January 2006 settlement agreement signed by Fort Bliss and NMED include provisions for NFA determinations for both oxidation lagoons, contingent upon 1) periodic monitoring of the quantity and quality of wastewater influent and 2) sampling of the regional aquifer beneath both SWMUs to evaluate whether usable groundwater resources have been impacted by lagoon operation. The U.S. Army Corps of Engineers (USACE) Tulsa District, on behalf of Fort Bliss, contracted Weston Solutions, Inc. (WESTON) to install monitoring wells into the regional aquifer and to collect groundwater samples. Fort Bliss is evaluating the quantity and quality of wastewater influent and will report those results separately.

SITE HISTORY

The Fort Bliss Army Reservation is an active training facility located in the extreme western part of the State of Texas, at El Paso and south-central New Mexico. The reservation occupies approximately 1.2 million acres in two states and three counties (Dona Ana and Otero Counties, New Mexico; El Paso County, Texas). The main cantonment area is situated adjacent to and northeast of the City of El Paso, Texas. The reservation falls under the command of the U.S. Army Training and Doctrine Command, with a primary mission of air defense. A Site Location Map, showing the relative locations of the Dona Ana and Meyer Range Wastewater Lagoons, is provided as Figure 1.

Dona Ana Range Wastewater Lagoon (SWMU No. 27B)

The Dona Ana Range Wastewater Lagoon (SWMU 27B) is an unlined, two-celled, sanitary wastewater evaporation and oxidation lagoon located 0.75 miles southwest of the Dona Ana Range Camp, Fort Bliss, New Mexico. The lagoon was constructed in 1965 and covers a surface area of 4.17 acres. The berm around both cells is intact, and there is no known history of overflow or breach of the berm. Small tree and reed growth exist at the influent pipe outlet in the lagoon, and only sparse growth of desert-type shrubs is present in the rest of the main cell and the overflow cell. Vegetation around the lagoon is typical Chihuahuan desert-type growth. The lagoon is typically dry, but at times has a small amount of water at the influent pipe outlet. The lagoon is fenced with barbed wire and marked with signage. The location of the lagoon is shown on Figure 1, and an aerial photograph is included as Figure 2.

The Dona Ana Range Wastewater Lagoon is used for the collection and evaporation of sanitary wastewater from the Dona Ana Range Camp. The lagoon primarily serviced activities of the 3rd Armored Cavalry, which was reassigned from Fort Bliss in 1996, resulting in a decrease in wastewater flow of approximately 80% or more at this site. Some vehicle maintenance activities still occur at the Dona Ana Range. Motor pool activities are now connected, through oil water separators, to the sanitary sewer line that discharges into the lagoon.

The regional aquifer is approximately 370 feet below ground surface (bgs) at the range camp. The Dona Ana Range Camp is serviced by a permitted water supply (System I.D. No. 010-07) with water obtained from two supply wells, Well 2A and Well 3 (Figure 2). Data for these well is provided in the following table:

Dona Ana Range Camp Water System System I.D. No. 010-07		
	Well 2A	Well 3
Date Constructed	1992	1962
Well Depth	1110 ft bgs	806 ft bgs
Static Water Level	342 ft bgs	349 ft bgs
Screened Interval	Unknown	Unknown
Casing Diameter	8-inch	8-inch
Casing Depth	1107 ft bgs	Unknown (Presumed to be approximately 800 ft bgs)
Pump Setting	374 ft bgs	374 ft bgs
Pump Capacity	580 gal/min	220 gal/min
Wellhead elevation	4098 ft amsl	4131 ft amsl

bgs – below ground surface
 amsl – above mean sea level

The Dona Ana Range Camp water supply wells are periodically monitored by the Army. No evidence of contamination has been observed in groundwater samples collected from these wells.

Meyer Range Wastewater Lagoon (SWMU No. 76)

The Meyer Range Wastewater Lagoon (SWMU 76) is an unlined, two-celled, sanitary wastewater evaporation and oxidation lagoon located 0.5 miles west of the Meyer Target Range, Fort Bliss, New Mexico. The lagoon was constructed in 1969 and covers a surface area of 4.17 acres. The berm around both cells is intact, and there is no history of overflow or breach of the berm. A large cottonwood tree and a stand of reeds exist at the influent pipe outlet in the active cell, and only sparse vegetation is present in the inactive cell. The Meyer Lagoon is enclosed with a 6-ft high, chain-link fence and includes signage declaring it a wastewater lagoon. Outside the fence, the surrounding area is generally flat with no sign of run-on or runoff from storm water. The lagoon is typically dry, except for an occasional small accumulation of water near the influent pipe outlet. The location of the lagoon is shown on Figure 1, and an aerial photograph is included as Figure 3.

The Meyer Range Wastewater Lagoon is used for the collection and evaporation of sanitary wastewater from the Meyer Range Camp. The range camp and lagoon were used primarily by the 3rd Armored Cavalry. As with the Dona Ana Lagoon, the 3rd Cavalry was reassigned from Fort Bliss in 1996, resulting in an approximately 80% decrease in wastewater flow at this site.

The regional aquifer is about 480 feet bgs in this area and reportedly has total dissolved solids (TDS) of 8,900 parts per million (ppm). It is not considered a potential source of domestic drinking water.

MONITORING WELL INSTALLATION, COMPLETION, AND DEVELOPMENT

Dona Ana Range Wastewater Lagoon

The site selected for the installation of the regional aquifer monitoring well is southeast and downgradient of the primary cell of the Dona Ana Range Camp Wastewater Lagoon, as illustrated on Figure 2. Sufficient data do not exist to precisely determine the direction of groundwater flow in the regional aquifer. However, the direction of groundwater flow in the regional aquifer is assumed to be toward the southeast, following topography away from the mountains northwest of the camp and toward the center of the basin to the east.

Well installation activities at the Dona Ana Range were initiated in August 2007. The licensed driller that performed the well installation is Grady Richard Graham of GeoProjects International, Inc., license number WD-1311. The boring for the monitoring well was advanced to 355 ft below ground surface (bgs). The subsurface lithology at the Dona Ana Range is dominantly sand, with varying amounts of silts, clays, and gravels. The regional aquifer was encountered at approximately 330 ft bgs.

Monitoring well DA-01 was completed to a depth of 350 feet below ground surface (ft bgs), using 330 ft of blank, 4-inch diameter, Schedule 40, flush-threaded polyvinyl chloride (PVC) casing, and 20 ft of 0.010-inch slotted PVC screen from 330 to 350 ft bgs. The annulus surrounding the screen was filled with 20/40 silica sand filter pack to a depth of 325 ft bgs, 5 ft above the screen. Above the filter pack, 21 ft of hydrated bentonite slurry was injected (using a tremie pipe) to a depth of 304 ft bgs and topped (using a tremie pipe) with successive lifts of 14 lbs/gallon bentonite-cement grout from 2 to 304 ft bgs. The grouting was completed on 28 August 2007. During routine well development activities (i.e., surging and bailing), on 2 September 2007, the drilling subcontractor allowed the bailer to fall with too much force. This caused the bottom cap to crack or become separated from the well casing, allowing

sand to enter the inside of the well screen. The monitoring well was completed on 18 September 2007, when a packer was installed to seal the bottom of the well. A letter report detailing installation and development activities for monitoring well DA-01 is provided as Attachment 1. The final screened interval for the well is 330 to 346 ft bgs. The surface completion consists of concrete from 2 ft bgs to the ground surface and a 4 ft x 4 ft x 4 inch well pad with a protective steel riser and four, 3-inch diameter steel bollard posts. A boring log with well construction details, a detailed lithologic log, and a New Mexico Office of the State Engineer Well Record form are provided in Attachment 2.

The location and top of casing (TOC) elevation of the Dona Ana Range Wastewater Lagoon regional aquifer monitoring well were surveyed, as follows:

Dona Ana Range Wastewater Lagoon Regional Aquifer Monitoring Well DA-01 Survey Data			
	Degrees - Minutes - Seconds	Decimal Degrees	UTM Zone 13
Latitude	32° 08' 27.39674'' North	32.1409435 North	3557056 Northing
Longitude	106° 30' 32.48763'' West	106.5090243 West	357676 Easting
Elevation Survey	Feet amsl		Meters amsl
Elevation (TOC)	4073.556		1241.62

amsl – above mean seal level

Based on the survey data collected, the Dona Ana Range Wastewater Lagoon regional aquifer monitoring well is screened from 3743.56 to 3727.56 ft above mean sea level (amsl). The regional aquifer was encountered at approximately 3743.5 ft amsl.

Development of the Dona Ana Range Wastewater Lagoon regional aquifer monitoring well DA-01 began on 27 August 2007 by bailing and surging using a 10-ft long, 3-inch diameter steel bailer operated by a Smeal® pump truck. The bailer is capable of removing up to 5 gallons per trip. The well was purged dry several times while monitoring turbidity levels. Initial turbidity measurements were above 500 Nephelometric Turbidity Units (NTUs). Turbidity levels dropped as the well was developed over a period of several weeks, from 27 August to 21 September 2007. The well was developed in accordance with the 24 May 2006 Work Plan, as amended 19 April 2007 and approved by NMED in a letter dated 1 May 2007, and included monitoring the following parameters: temperature, pH, conductivity, dissolved oxygen (DO), TDS, and turbidity. Final well development was not achieved until the well was developed to a point at which turbidity measurements were confirmed below the goal of 50 NTU. Final well development observations were as follows:

Time 0840:

Volume (gal)	Temperature (F)	pH	Conductivity (µs/cm)	DO (mg/L)	Turbidity (NTU)
5	74.66	8.5	576	7.34	25.7
10	75.88	8.32	530	6.07	16.7
15	75.32	8.32	529	5.8	380*

* driller tagged bottom, causing sediment to go into suspension

Time 1230:

Volume (gal)	Temperature (F)	pH	Conductivity (µs/cm)	DO (mg/L)	Turbidity (NTU)
5	80.05	8.05	535	5.25	24.6
10	78.08	8.04	529	7.47	26.5
15	77.62	7.99	524	6.5	78*

* driller tagged bottom, causing sediment to go into suspension

Time 1810:

Volume (gal)	Temperature (F)	pH	Conductivity (µs/cm)	DO (mg/L)	Turbidity (NTU)
5	78.64	8.2	526	4.06	16.9
10	78.22	8.02	518	4.12	17.4
15	77.95	7.97	520	4.24	19
20	78.49	7.95	518	4.21	18.1

Static water levels measured during well development ranged from approximately 3741.6 ft amsl to 3743.5 ft amsl. The static groundwater elevation measured after development was approximately 3742.4 ft amsl on 21 September 2007.

Meyer Range Camp Wastewater Lagoon

At the Meyer Range Camp Wastewater Lagoon, the site selected for the installation of the regional aquifer monitoring well is southwest and downgradient of the lagoon, as illustrated on Figure 3. Sufficient data do not exist to precisely determine the direction of groundwater flow in the regional aquifer. However, the direction of groundwater flow in the regional aquifer is assumed to be toward the west-southwest, following topography away from the mountains east of the camp and toward the center of the basin to the west.

Well installation activities at the Meyer Range Camp Wastewater Lagoon were initiated in August 2007. The licensed driller that performed the well installation is Grady Richard Graham of GeoProjects International, Inc., license number WD-1311. The boring for the monitoring well was advanced to 500 ft bgs. The subsurface lithology at the Meyer Range Camp Wastewater Lagoon is dominantly clay, with varying amounts of silt and fine sand, and rare intervals of sand and gravel. Potential water-bearing zones were identified at approximately 350 ft bgs and 450 ft bgs. In consultation with the Army and NMED, the monitoring well was completed to a depth of 365 ft bgs. A record of communication is provided in Attachment 3.

Monitoring well MR-01 was completed to a depth of 365 ft bgs, using 340 ft of blank, 4-inch diameter, Schedule 40, flush-threaded polyvinyl chloride (PVC) casing, 20 ft of 0.010-inch slotted PVC screen from 340 to 360 ft bgs, and a 5 ft sump from 360 to 365 ft bgs. The annulus surrounding the screen was filled with 20/40 silica sand filter pack to a depth of 335 ft bgs, 5 ft above the screen. Above the filter pack, 20 ft of hydrated bentonite slurry was injected (using a tremie pipe) to a depth of 315 ft bgs and topped (using a tremie pipe) with successive lifts of 14 lbs/gallon bentonite-cement grout from 315 to 2 ft bgs. The grouting was completed on 17 September 2007. The surface completion consists of concrete from 2 ft bgs to the ground surface and a 4 ft x 4 ft x 4 inch well pad with a protective steel riser and four, 3-inch diameter bollard posts. A boring log with well construction details, a detailed lithologic log, and a New Mexico Office of the State Engineer Well Record form are provided in Attachment 2.

The location and top of casing (TOC) elevation of the Meyer Range Wastewater Lagoon regional aquifer monitoring well were surveyed as follows:

Meyer Range Camp Wastewater Lagoon Regional Aquifer Monitoring Well MR-01 Survey Data			
	Degrees - Minutes - Seconds	Decimal Degrees	UTM Zone 13
Latitude	32° 01' 33.19232" North	32.0258868 North	3543895 Northing
Longitude	106° 09' 41.59939" West	106.1615554 West	390312 Easting
Elevation Survey	Feet amsl		Meters amsl
Elevation (TOC)	4096.001		1248.46

Based on the survey data collected, the Meyer Range Wastewater Lagoon regional aquifer monitoring well is screened from 3756.0 to 3736.0 ft amsl.

The Meyer Range Wastewater Lagoon regional aquifer monitoring well MR-01 has not produced sufficient water for development and sampling. Augmented development of the well began on 16 September 2007 and was accomplished by surging and bailing the well with potable water (obtained from Fort Bliss potable water supply) which was added to the well to keep the casing from floating during installation of the grout seal. The well was bailed dry, and the water level did not recover. Potable water was added, and the well was surged and bailed again. An infiltration test was performed by monitoring the water level in the well after adding sufficient potable water to the casing to create an approximately 85-ft water column. The water level was observed to drop approximately 31 ft over a 3-hour period, suggesting that the well screen is open and that the formation is capable of taking water. The well was surged and bailed dry again. The well was monitored for several days following the infiltration test and did not produce water. A groundwater elevation, therefore, could not be obtained. The well was not sampled. The dominantly clay geology observed in the boring for this well may preclude the well from producing sufficient groundwater for sampling.

GROUNDWATER SAMPLING RESULTS

Two groundwater samples, DA01-GW-01 and DA01-GW-02 (a primary and duplicate sample pair) were collected from the Dona Ana Range Wastewater Lagoon regional aquifer monitoring well on 21 September 2007. The samples were collected using a bailer, as the groundwater elevation in the well was too deep to be pumped (i.e., the volume of water in the well was less than the volume of the riser pipe for the down-hole pump). Care was taken to minimize the disturbance to the water column during bailing. The samples collected were submitted to Gulf Coast Analytical Laboratories, in Baton Rouge, Louisiana, for the following analyses:

- Volatile Organic Compounds (VOCs) using Environmental Protection Agency (EPA) Method SW846 8260B
- Semi-Volatile Organic Compounds (SVOCs) using EPA Method SW846 8270C
- 23 Total Analyte List (TAL) metals using EPA Method SW846 6010B, including total mercury using EPA Method SW846 7471A.

Several metals were reported in the samples collected from the Dona Ana Range Wastewater Lagoon regional aquifer monitoring well. Analytical results are provided in Table 1. Laboratory analytical data packages are provided in Attachment 4. All of the reported metals concentrations are below EPA Maximum Contaminant Levels (MCLs), EPA Region 6 Tap Water Medium-Specific Screening Levels (MSSLs), and New Mexico Water Quality Control Commission (NMWQCC) Domestic Water Supply Water Quality Standards, except for arsenic. Arsenic was reported at concentrations of 0.0085B and 0.0064B mg/L (Table 1) in the primary and duplicate samples respectively. The “B” is a laboratory qualifier for inorganic constituent analyses that indicates an estimated result above the method detection limit, but below the laboratory quantitation limit. Both reported arsenic results are below the EPA MCL of 0.01 mg/L, but are above the NMWQCC Domestic Water Supply Water Quality Standard of 0.0023 mg/L.

According to Fort Bliss personnel familiar with groundwater quality at Fort Bliss (Paul Raisch, 20 November 2007, Attachment 3), arsenic has been reported in Dona Ana Range Camp water supply wells, north and upgradient of the Dona Ana Range Wastewater Lagoon, at 0.0039 mg/L (water supply well 2A) and 0.0059 mg/L (water supply well 3). Therefore, reported arsenic levels in the regional aquifer monitoring well at the Dona Ana Range Wastewater Lagoon are similar to those reported in upgradient water supply wells, suggesting that the reported concentrations of arsenic are not attributable to a release from the lagoon.

No VOCs or SVOCs were reported in the sample collected from the Dona Ana well, except for acetone. Acetone was reported at 0.0150J and 0.0166J mg/L (Table 1) in the parent and duplicate samples respectively and was reported in the laboratory method blank associated with the analyses (Attachment 4). The “J” is a laboratory qualifier for organic constituent analyses that indicates an estimated result above the method detection limit, but below the laboratory quantitation limit. The reported acetone concentrations are two orders of magnitude below the EPA MCL of 5.475 mg/L for acetone. Because acetone was also reported in the laboratory method blank and there is not a known source of acetone at the Dona Ana Range Wastewater Lagoon, the reported results are interpreted as being attributable to laboratory contamination.

As previously described, the well installed at the Meyer Range Wastewater Lagoon did not produce groundwater. The well has not been sampled.

IDW MANAGEMENT

Investigation-derived waste (IDW) such as soil/rock cuttings and drilling mud from the well installation activities at the Dona Ana and Meyer Range Wastewater Lagoons were sampled for waste characterization purposes. At each site, a representative characterization sample was collected from the drilling mud and soil/rock cuttings. The samples were submitted to Gulf Coast Analytical Laboratories, Baton Rouge, Louisiana for analysis. The samples were analyzed for the following:

- 23 TAL metals by EPA Method SW846 6010B, including total mercury by EPA Method SW846 7471A
- VOCs by EPA Method SW846 8260B
- SVOCs by EPA Method SW846 8270C

The results of laboratory analyses were compared to Residential New Mexico Soil Screening Levels (NMSSLs) and EPA Region 6 Residential MSSLS. The comparison is provided as Table 2, which shows that all of the constituent concentrations were reported below the Residential NMSSLs and EPA Region 6 Residential MSSLS. Therefore, the soil/rock cuttings, drilling mud, and purge water were stabilized (solidified) and managed on-site as uncontaminated material. Laboratory analytical results of IDW are provided as Attachment 5.

DATA REVIEW

The laboratory analytical data were reviewed to evaluate whether the data are of sufficient quality for the purpose of this investigation. The laboratory case narrative, method blank data, laboratory control sample and duplicate data, matrix spike and matrix spike duplicate data were reviewed. No issues were identified that would affect the usability of the data.

CONCLUSIONS AND RECOMMENDATIONS

Based on the field activities and analytical results described herein, the following is concluded:

- **Dona Ana Range Wastewater Lagoon:**
 - The Dona Ana Range monitoring well, DA-01, was completed on 18 September 2007 and is screened from 330 to 346 ft bgs (3743.56 to 3727.56 ft amsl).
 - The static water level of the regional aquifer at DA-01 as of 21 September 2007 is 3742.4 ft amsl.
 - Analytical results from the Dona Ana regional aquifer sample suggest that this water-bearing zone has not been impacted by the operation of the lagoon.

- **Meyer Range Wastewater Lagoon:**
 - The Meyer Range monitoring well, MP-01, was completed 17 September 2007 and is screened from 340 to 360 ft bgs (3756.0 to 3736.0 ft amsl).
 - As of 21 September 2007, the completed zone at the Meyer range well has not produced water, and a static water level has not been measured.
 - The Meyer well has not produced sufficient water to be sampled. The dominantly clay lithology at the Meyer Range Wastewater Lagoon suggests that downward migration of water or constituents from the lagoon is unlikely.

- The regional aquifer monitoring well installation, as described in the January 2006 settlement agreement between Fort Bliss and NMED, is complete.

Under provision IV(G)(3) of the January 2006 settlement agreement, Fort Bliss must re-sample the Dona Ana Range and Meyer Range regional aquifer monitoring wells (DA-01 and MR-01, respectively) every five (5) years ‘as required depending on the status of the units.’ If the analytical results obtained from the next five-year sample collected at the Dona Ana monitoring well DA-01 remain below EPA MCLs, EPA MSSLS, and NMWQCC Domestic Water Supply Water Quality Standards, Fort Bliss proposes that this well be abandoned. Additionally, if Meyer monitoring well MR-01 remains dry, Fort Bliss proposes that this well be abandoned.