Mr. Wood

DEPARTMENT OF THE AIR FORCE
27TH SPECIAL OPERATIONS CIVIL ENGINEER SQUADRON (AFSOC)
CANNON AIR FORCE BASE NEW MEXICO

RECEIVED
OCT 2007
NMED Hazardous Waste Bureau

OCT 1 1 2007

Lieutenant Colonel Stephen D. Wood
Commander
506 N DL Ingram Blvd
Cannon AFB NM 88103-5323

Mr. David Cobrain
Chief Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East Building 1
Santa Fe NM 87505-6303

Dear Mr. Cobrain

Enclosed for your review and records are two copies of the Analytical Results of Samples Collected 18, 19, 20, 21, and 22, Jun 07 from ground water monitoring wells at Melrose Air Force Range, New Mexico, dated Sep 07.

The purpose of this sampling is to provide annual groundwater quality data and groundwater altitude data to aid in the protection of the local aquifer.

If you have any questions regarding this information, please contact my Restoration Program Manager, Ms. Kristi Doll at (505) 784-1091 or email Kristi.doll@cannon.af.mil.

Sincerely

Stephen D. Wood
STEPHEN D. WOOD, Lt Col, USAF

Attachments:

Analytical Results of Samples Collected 18, 19, 20, 21, and 22 Jun 07, Groundwater Monitoring at Melrose Air Force Range (2 copies)

United States Air Force

Ground-Water Monitoring at Melrose Air Force Range

Analytical Results of Samples Collected June 18, 19, 20, 21, and 22, 2007

Prepared for
Cannon Air Force Base

September 2007

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EXECUTIVE SUMMARY

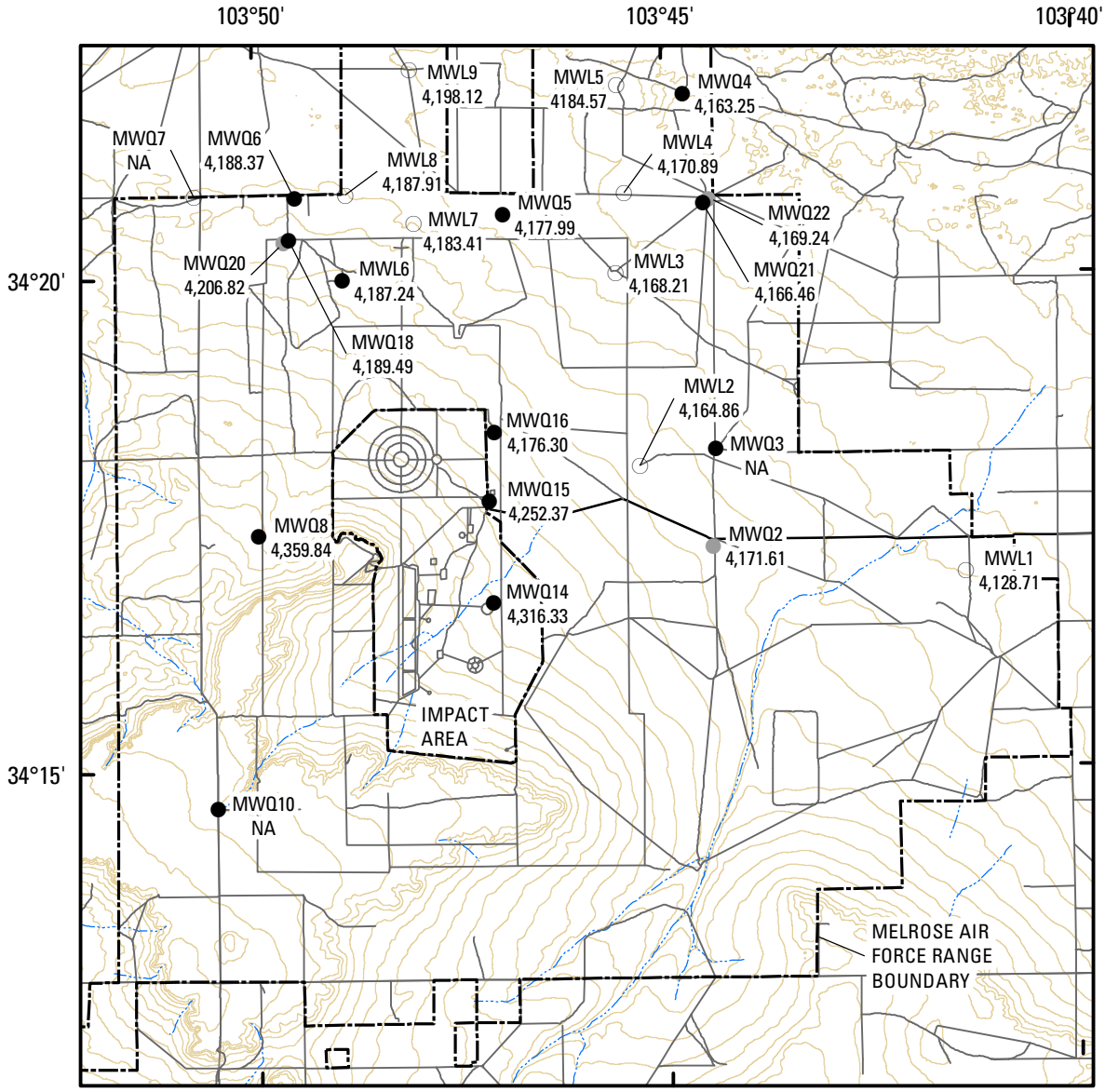
The U.S. Geological Survey (USGS) New Mexico Water Science Center, in cooperation with the U.S. Air Force, is performing annual ground-water monitoring at Melrose Air Force Range (Range), New Mexico, for evaluation and protection of the local aquifer. The primary objective of this monitoring is to evaluate ground-water quality and ground-water altitudes at the Range. Current ground-water monitoring is an extension of the ground-water characterization completed at the Range by the USGS and the U.S. Air Force in 2002 and 2003. The ground-water characterization provided baseline ground-water quality and ground-water flow properties of the local aquifer to assist the U.S. Air Force in protection of this resource. For the 2007 monitoring, ground-water quality samples were collected from 16 wells and ground-water altitude was measured in 23 wells (fig. 1). Water-quality and water-altitude monitoring wells included MWQ2, MWQ20, and MWQ22 completed in the Triassic Dockum Group (or Chinle Formation), and MWQ3–8, MWQ10, MWQ14–16, MWQ18, MWQ21, and MWL6 completed in the Neogene Ogallala Formation. Water-altitude monitoring wells also included MWL1–5 and MWL7–10, all completed in the Ogallala Formation.

This report presents water-quality data for samples collected June 18–22, 2007, at the Range (tables 1 and 2). Filtered ground-water samples were analyzed for trace and major elements (antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, manganese, molybdenum, nickel, selenium, silver, thallium, uranium, vanadium, and zinc by method SW6020; aluminum, beryllium, boron, calcium, iron, lithium, magnesium, potassium, silica, sodium, and strontium by method SW6010B; mercury by method SW7470A; bromide, chloride, fluoride, and sulfate by method MCAWW300.0A, dissolved solids (method MCAWW160.1), organic carbon (method SW9060), alkalinity (method SW310.1), phosphorus (method MCAWW365.3), ammonia (method MCAWW350.1), nitrate plus nitrite (method MCAWW353.2), perchlorate (method SW6860), volatile organic compounds (method SW8260B), and semi-volatile organic compounds (method SW8270C). TestAmerica Laboratories in Arvada, Colorado, conducted all laboratory analyses. All analyte detections are listed in table 2, but concentrations below reporting limits are not considered valid because of the lack of reliability for these estimated concentrations.

Water-quality results from the June 2007 sampling were consistent with previous monitoring. Ground water in the Impact Area (fig. 1) continues to have a substantially different composition than ground water from the same formation in other parts of the Range. The compositional differences include larger concentrations of dissolved solids (fig. 2) and major ions in ground water from wells MWQ14–16. Ground water from the Dockum Group wells (MWQ2, MWQ20, and MWQ22) continues to have compositional similarities with ground water from the Ogallala Formation in the Impact Area, which suggests interaction

between the aquifers. The ground-water potentiometric surfaces of the aquifers in the Ogallala Formation and Dockum Group indicate that upward flow from the Dockum Group to the Ogallala Formation is possible.

Various organic compounds were detected at very small concentrations in ground water from wells MWQ2, 8, 14, 15, 16, 18, 20, 22, and MWL6. All values were estimated concentrations (below reporting limits and considered unreliable) except for 4-methyl-2-pentanone and toluene at MWQ8 and MWQ18. Both of these compounds were detected in the field method blank (equipment sample with pure water) and are considered sampling/laboratory contaminants that were not present in the ground water at each location. The compound 4-methyl-2-pentanone is a denaturant of rubbing alcohol, and toluene is a solvent and gasoline component. It appears these compounds were introduced to the samples during sampling and (or) laboratory analysis in sufficient quantity to produce a detection greater than the reporting limit. No drinking water standard exists for 4-methyl-2-pentanone, but the drinking water standard for toluene is 1 mg/L as set by the U.S. Environmental Protection Agency under the Safe Drinking Water Act, National Primary Drinking Water Regulations (2007). Toluene was detected at 5.6 µg/L at MWQ8, 2.4 µg/L at MWQ18, and 5.6 µg/L in the field method blank, and 4-methyl-2-pentanone was detected at 31 µg/L at MWQ8, 6.9 µg/L at MWQ18, and 29 µg/L in the field method blank.



Base from U.S. Geological Survey digital data, 1994, 1:100,000
Universal Transverse Mercator Zone 13N, NAD 83

0 1 2 MILES

0 1 2 KILOMETERS

EXPLANATION

Dirt Road

Paved Road

4,700 — Topographic contour—Contour interval is 20 feet. Vertical coordinate information is referenced to NAVD 88.

MWQ14 4,316.33 — Water-quality and water-altitude well—Top characters are the well site identifier and bottom number is the altitude of water level in feet above NAVD 88. Well is located in the Ogallala Formation.

MWQ2 4,171.61 — Water-quality and water-altitude well—Top characters are the well site identifier and bottom number is the altitude of water level in feet above NAVD 88. Well is located in the Dockum Group.

MWL10 4,536.07 — Water-altitude well—Top characters are the well site identifier and bottom number is the altitude of water level in feet above NAVD 88. Well is located in the Ogallala Formation.

NA — Water-level measurement was unable to be collected because pump was on upon arrival at the well.

Figure 1. Monitoring well network and ground-water altitude at Melrose Air Force Range, June 2007.

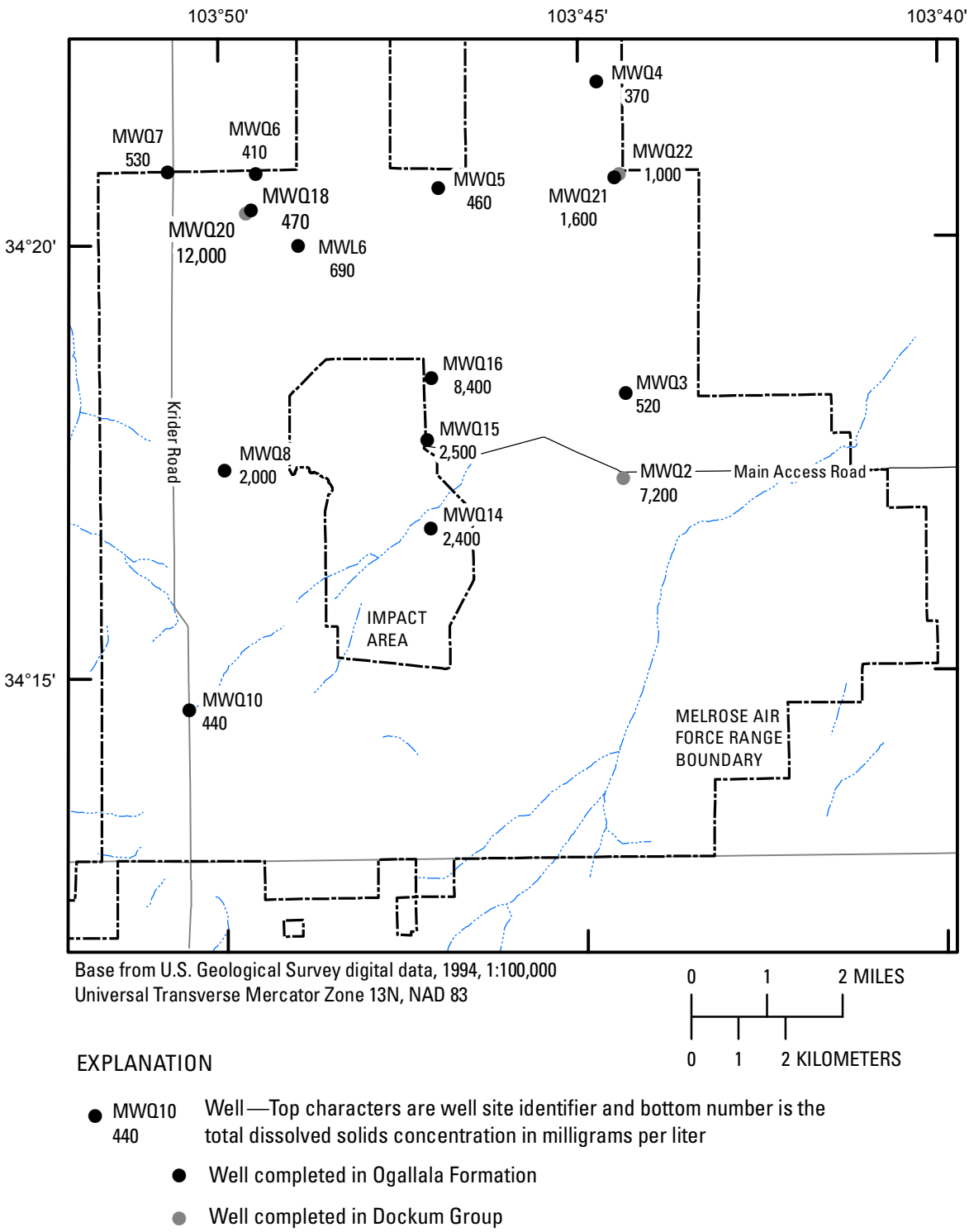


Figure 2. Dissolved-solids concentrations in ground water at Melrose Air Force Range, June 2007.

Table 1. Summary of field properties of ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico.

[**°C**, degrees Celsius; **µS/cm**, microsiemens per centimeter; **mg/L**, milligrams per liter; **NTU**, nephelometric turbidity units; **NA,** parameter not recorded]

Sample ID:	MWQ2	MWQ3	MWQ4	MWQ5
Sample date & time:	6/18/2007 1620	6/18/2007 1235	6/19/2007 1120	6/19/2007 1320
Analytes	Result	Result	Result	Result
Field Properties				
Temperature (°C)	28.6	19.2	18.4	18.4
pH	7.56	7.50	7.47	7.54
Specific conductance (µS/cm)	11,960	796	584	679
Dissolved oxygen (mg/L)	0.32	6.52	7.10	6.11
Turbidity (NTU)	54.5	0.79	NA	0.07

Sample ID:	MWQ6	MWQ7	MWQ8	MWQ10
Sample date & time:	6/20/2007 1205	6/19/2007 1445	6/20/2007 1540	6/20/2007 1410
Analytes	Result	Result	Result	Result
Field Properties				
Temperature (°C)	18.6	19.4	21.6	19.9
pH	7.30	7.53	7.19	7.20
Specific conductance (µS/cm)	578	769	3,280	639
Dissolved oxygen (mg/L)	4.80	6.49	0.31	6.74
Turbidity (NTU)	3.50	0.35	258	0.09

Table 1. Summary of field properties of ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—concluded.

[**°C**, degrees Celsius; **µS/cm**, microsiemens per centimeter; **mg/L**, milligrams per liter; **NTU**, nephelometric turbidity units]

Sample ID:	MWQ14	MWQ15	MWQ16	MWQ18
Sample date & time:	6/22/2007 0900	6/21/2007 1105	6/21/2007 1350	6/20/2007 1305
Analytes	Result	Result	Result	Result
Field Properties				
Temperature (°C)	20.2	28.9	32.6	20.2
pH	7.67	6.40	6.79	7.34
Specific conductance (µS/cm)	3,810	7,540	12,171	667
Dissolved oxygen (mg/L)	4.59	0.23	2.87	6.16
Turbidity (NTU)	1.44	0.62	2.02	0.39

Sample ID:	MWQ20	MWQ21	MWQ22	MWL6
Sample date & time:	6/20/2007 1105	6/19/2007 1040	6/19/2007 1215	6/19/2007 1450
Analytes	Result	Result	Result	Result
Field Properties				
Temperature (°C)	21.0	19.1	21.4	23.3
pH	7.45	6.79	7.33	7.20
Specific conductance (µS/cm)	18,440	2,130	1,777	971
Dissolved oxygen (mg/L)	0.29	4.14	0.23	4.92
Turbidity (NTU)	12.4	1.98	3.29	17.2

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico.

[**RL**, reporting limit; **mg/L**, milligrams per liter; **J**, the associated method blank contained the target analyte at a reportable limit; **B**, estimated concentration–detected below the reporting limit; **Q**, Reporting limit is elevated due to high analyte levels; **G**, The reporting limit is elevated due to matrix interference; **ND**, not detected]

Sample ID:	MWQ2		MWQ3		MWQ3-2		MWQ4	
Sample date & time:	6/18/2007	1620	6/18/2007	1235	6/18/2007	1240	6/19/2007	1120
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Major Ions (mg/L)								
Calcium, SW6010B	190 J	0.2	31 J	0.2	30 J	0.2	42 J	0.2
Magnesium, SW6010B	120	0.2	33	0.2	32	0.2	19	0.2
Potassium, SW6010B	9.8	3	5.9	3	5.9	3	2.9 B	3
Sodium, SW6010B	2,300	5	82	5	82	5	52	5
Alkalinity, MCAWW310.1	66 J	5.0	150 J	5.0	150 J	5.0	190 J	5.0
Chloride, MCAWW300.0A	3,400 Q	300	65 Q	15	63 Q	15	19	3.0
Sulfate, MCAWW300.0A	1,500 Q	500	150 Q	25	150 Q	25	63 Q	25
Other Major Elements (mg/L)								
Boron, SW6010B	1.6	0.1	0.22	0.1	0.22	0.1	0.16	0.1
Bromide, MCAWW300.0A	7.2 G	1.0	0.56 B,G	1.0	0.37	0.20	0.17 B	0.20
Fluoride, MCAWW300.0A	ND G	2.5	1.0 B,G	2.5	2.0	0.50	1.4	0.50
Lithium, SW6010B	0.45	0.01	0.088	0.01	0.089	0.01	0.037	0.01
Silica, SW6010B	8.5	1.1	33	1.1	32	1.1	39	1.1
Strontium, SW6010B	11	0.01	1.9	0.01	1.9	0.01	0.83	0.01
General Chemistry (mg/L)								
Dissolved Solids, MCAWW160.1	7,200 Q	100	520	10	520	10	370	10
Ammonia as N, MCAWW350.1	0.35	0.10	0.051 B	0.10	0.059 B	0.10	0.052 B	0.10
Nitrate & Nitrite, MCAWW353.2	ND	0.10	0.95	0.10	0.90	0.10	5.1	0.10
Organic Carbon, SW9060	ND	1.0	ND	1.0	ND	1.0	ND	1.0
Phosphorous, MCAW365.3	ND	0.050	0.0079 B	0.050	0.010 B	0.050	0.0070 B	0.050
Sulfide, SW9030B/9034	1.7 B	4.0	1.5 B	4.0	1.6 B	4.0	1.3 B	4.0

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **µg/L**, micrograms per liter; **ND**, not detected; **B**, estimated concentration–detected below the reporting limit; **J**, the associated method blank contained the target analyte at a reportable limit]

Sample ID:	MWQ2		MWQ3		MWQ3-2		MWQ4	
Sample date & time:	6/18/2007	1620	6/18/2007	1235	6/18/2007	1240	6/19/2007	1120
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Trace Elements and Compounds (µg/L)								
Aluminum, SW6010B	ND	100	ND	100	ND	100	27 B	100
Antimony, SW6020	0.22 B	4.0	ND	2.0	ND	2.0	ND	2.0
Arsenic, SW6020	4.3 B	10	9.5	5.0	9.5	5.0	6.9	5.0
Barium, SW6020	25	2.0	25	1.0	25	1.0	40	1.0
Cadmium, SW6020	0.11 B	2.0	ND	1.0	ND	1.0	ND	1.0
Chromium, SW6020	1.4 B	4.0	1.4 B	2.0	1.4 B	2.0	1.1 B	2.0
Cobalt, SW6020	8.4	2.0	0.19 B	1.0	0.22 B	1.0	0.30 B	1.0
Copper, SW6020	3.3 B	4.0	2.4	2.0	1.6 B	2.0	8.3	2.0
Iron, SW6010B	38 B,J	100	29 B,J	100	22 B,J	100	100 J	100
Lead, SW6020	ND	2.0	0.29 B	1.0	0.19 B	1.0	0.49 B	1.0
Manganese, SW6020	350	2.0	0.63 B	1.0	0.54 B	1.0	1.0	1.0
Molybdenum, SW6020	26	4.0	5.7	2.0	5.5	2.0	2.9	2.0
Nickel, SW6020	22	4.0	4.5	2.0	4.9	2.0	6.5	2.0
Selenium, SW6020	7.1 B	10	5.9	5.0	7.1	5.0	4.0 B	5.0
Uranium, SW6020	0.89 B	2.0	6.5	1.0	6.2	1.0	6.0	1.0
Vanadium, SW6020	ND	10	74	5.0	75	5.0	56	5.0
Zinc, SW6020	5.0 B	20	7.8 B	10	7.3 B	10	14	10
Perchlorate, SW6860	ND	0.10	8.2	2.0	8.8	2.0	3.1	0.50
Anthropogenic Compounds (µg/L)								
Toluene, SW8260B	0.39 B	1.0	ND	1.0	ND	1.0	ND	1.0
Caprolactam, SW8270C	10 B	20	ND	20	ND	20	ND	20

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **mg/L**, milligrams per liter; **J**, the associated method blank contained the target analyte at a reportable limit; **B**, estimated concentration–detected below the reporting limit; **Q**, Reporting limit is elevated due to high analyte levels; **G**, The reporting limit is elevated due to matrix interference; **ND**, not detected]

Sample ID:	MWQ5		MWQ6		MWQ7		MWQ8	
Sample date & time:	6/19/2007	1320	6/20/2007	1205	6/19/2007	1445	6/20/2007	1540
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Major Ions (mg/L)								
Calcium, SW6010B	42 J	0.2	37 J	0.2	54 J	0.2	46 J	0.2
Magnesium, SW6010B	22	0.2	18	0.2	23	0.2	17	0.2
Potassium, SW6010B	2.9 B	3	2.3 B	3	2.3 B	3	3.6	3
Sodium, SW6010B	64	5	56	5	67	5	660	5
Alkalinity, MCAWW 310.1	170 J	5.0	160 J	5.0	150 J	5.0	290 J	5.0
Chloride, MCAWW300.0A	24	3.0	17	3.0	50	3.0	490 Q	60
Sulfate, MCAWW300.0A	110 Q	25	85 Q	25	160 Q	25	660 Q	100
Other Major Elements (mg/L)								
Boron, SW6010B	0.2	0.1	0.15	0.1	0.16	0.1	1.3	0.1
Bromide, MCAWW300.0A	0.19 B	0.20	0.14 B	0.20	0.28	0.20	3.0 G	0.40
Fluoride, MCAWW300.0A	2.5	0.50	2.8	0.50	1.3	0.50	2.4 G	1.0
Lithium, SW6010B	0.060	0.010	0.063	0.01	0.068	0.01	0.11	0.01
Silica, SW6010B	48	1.1	49	1.1	53	1.1	8.5	1.1
Strontium, SW6010B	1.0	0.01	0.8	0.01	0.96	0.01	1.30	0.01
General Chemistry (mg/L)								
Dissolved Solids, MCAWW160.1	460	10	410	10	530	10	2,000	10
Ammonia as N, MCAWW350.1	0.052 B	0.10	0.046 B	0.10	0.057 B	0.10	0.63	0.10
Nitrate & Nitrite, MCAWW353.2	6.5	0.10	4.8	0.10	1.7	0.10	0.022 B	0.10
Organic Carbon, SW9060	ND	1.0	ND	1.0	0.19 B	1.0	1.2	1.0
Phosphorous, MCAWW365.3	ND	0.050	0.0082 B	0.050	0.0079 B	0.050	0.086	0.050
Sulfide, SW9030B/903	0.83 B	4.0	1.1 B	4.0	1.2 B	4.0	0.77 B	4.0

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **µg/L**, micrograms per liter; **ND**, not detected; **B**, estimated concentration–detected below the reporting limit; **J**, the associated method blank contained the target analyte at a reportable limit]

Sample ID:	MWQ5		MWQ6		MWQ7		MWQ8	
Sample date & time:	6/19/2007	1320	6/20/2007	1205	6/19/2007	1445	6/20/2007	1540
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Trace Elements and Compounds (µg/L)								
Aluminum, SW6010B	ND	100	ND	100	ND	100	46 B	100
Antimony, SW6020	0.11 B	2.0	ND	2.0	ND	2.0	ND	2.0
Arsenic, SW6020	7.0	5.0	6.2	5.0	5.4	5.0	4.3 B	5.0
Barium, SW6020	30	1.0	30	1.0	28	1.0	19	1.0
Cadmium, SW6020	ND	1.0	ND	1.0	ND	1.0	0.042 B	1.0
Chromium, SW6020	1.1 B	2.0	1.7 B	2.0	1.1 B	2.0	1.8 B	2.0
Cobalt, SW6020	0.15 B	1.0	0.28 B	1.0	0.21 B	1.0	4.2	1.0
Copper, SW6020	1.2 B	2.0	1.3 B	2.0	3.9	2.0	1.6 B	2.0
Iron, SW6010B	88 B,J	100	83 B,J	100	50 B,J	100	96 B,J	100
Lead, SW6020	ND	1.0	ND	1.0	0.59 B	1.0	0.26 B	1.0
Manganese, SW6020	ND	1.0	1.1	1.0	0.46 B	1.0	390	1.0
Molybdenum, SW6020	4.2	2.0	2.4	2.0	5.0	2.0	14	2.0
Nickel, SW6020	2.7	2.0	6.5	2.0	3.2	2.0	9.2	2.0
Selenium, SW6020	3.5 B	5.0	3.3 B	5.0	4.5 B	5.0	12	5.0
Uranium, SW6020	5.0	1.0	3.7	1.0	3.4	1.0	2.5	1.0
Vanadium, SW6020	65	5.0	58	5.0	52	5.0	1.6 B	5.0
Zinc, SW6020	8.4 B	10	31	10	11	10	5.3 B	10
Perchlorate, SW6860	3.7	0.50	3.3	0.50	6.6	2.0	0.015 J	0.10
Anthropogenic Compounds (µg/L)								
Ethylbenzene, SW8260B	ND	1.0	ND	1.0	ND	1.0	0.27 B	1.0
4-Methyl-2-pentatone, SW8260B	ND	5.0	ND	5.0	ND	5.0	31	5.0
Toluene, SW8260B	ND	1.0	ND	1.0	ND	1.0	5.6	1.0
m- & p-Xylenes, SW8260B	ND	2.0	ND	2.0	ND	2.0	0.42 B	2.0

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **mg/L**, milligrams per liter; **J**, the associated method blank contained the target analyte at a reportable limit; **Q**, Reporting limit is elevated due to high analyte levels; **B**, estimated concentration–detected below the reporting limit; **G**, The reporting limit is elevated due to matrix interference; **ND**, not detected]

Sample ID:	MWQ10		MWQ14		MWQ15		MWQ16	
Sample date & time:	6/20/2007	1410	6/22/2007	0900	6/21/2007	1105	6/20/2007	1350
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Major Ions (mg/L)								
Calcium, SW6010B	61 J	0.2	80 J	0.2	130 J	0.2	310 J	0.2
Magnesium, SW6010B	33	0.2	72	0.2	95	0.2	270	0.2
Potassium, SW6010B	5.1	3	12	3	9.7	3	16	3
Sodium, SW6010B	18	5	650	5	1,400	5	2,100	5
Alkalinity, MCAWW310.1	210 J	5.0	130 J	5.0	150 J	5.0	48 J	5.0
Chloride, MCAWW300.0A	23	3.0	640 Q	60	1,400 Q	150	3,500 Q	300
Sulfate, MCAWW300.0A	52 Q	10	960 Q	100	1,900 Q	250	2,000 Q	500
Other Major Elements (mg/L)								
Boron, SW6010B	0.098 B	0.1	1.8	0.1	1.6	0.1	1.6	0.1
Bromide, MCAWW300.0A	0.17 B	0.20	4.8 G	0.40	8.4 G	1.0	8.0 G	1.0
Fluoride, MCAWW300.0A	0.73	0.50	2.5 G	1.0	1.7 B,G	2.5	ND G	2.5
Lithium, SW6010B	0.042	0.01	0.23	0.01	0.40	0.01	0.42	0.01
Silica, SW6010B	37	1.1	12	1.1	15	1.1	7.5	1.1
Strontium, SW6010B	2.4	0.01	3.7	0.01	4.9	0.01	15	0.01
General Chemistry (mg/L)								
Dissolved Solids, MCAWW160.1	440	10	2,400	10	2,500	10	8,400 Q	100
Ammonia as N, MCAWW350.1	0.033 B	0.10	0.040 B	0.10	0.044 B	0.10	0.048 B	0.10
Nitrate &Nitrite, MCAWW353.2	9.4 Q	0.50	2.8	0.10	6.7	0.10	0.87	0.10
Organic Carbon, SW9060	0.20 B	1.0	0.37 B	1.0	6.4	1.0	0.66 B	1.0
Phosphorous, MCAWW365.3	0.0087 B	0.050	0.89	0.050	0.0096 B	0.050	ND	0.050
Sulfide, SW9030B/903	1.3 B	4.0	1.3 B	4.0	1.0 B	4.0	0.96 B	4.0

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **µg/L**, micrograms per liter; **ND**, not detected; **B**, estimated concentration–detected below the reporting limit; **J**, the associated method blank contained the target analyte at a reportable limit]

Sample ID:	MWQ10		MWQ14		MWQ15		MWQ16	
Sample date & time:	6/20/2007	1410	6/22/2007	0900	6/21/2007	1105	6/20/2007	1350
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Trace Elements and Compounds (µg/L)								
Aluminum, SW6010B	ND	100	ND	100	ND	100	ND	100
Antimony, SW6020	ND	2.0	0.11 B	2.0	0.28 B	2.0	0.36 B	2.0
Arsenic, SW6020	4.4 B	5.0	4.4 B	5.0	12	5.0	5.0	5.0
Barium, SW6020	120	1.0	11	1.0	11	1.0	16	1.0
Cadmium, SW6020	ND	1.0	0.10 B	1.0	0.078 B	1.0	0.098 B	1.0
Chromium, SW6020	0.96 B	2.0	1.7 B	2.0	2.3	2.0	3.7	2.0
Cobalt, SW6020	0.43 B	1.0	6.8	1.0	6.5	1.0	61	1.0
Copper, SW6020	1.7 B	2.0	4.0	2.0	8.1	2.0	9.1	2.0
Iron, SW6020	24 B,J	100	43 B,J	100	45 B,J	100	79 B,J	100
Lead, SW6020	0.55 B	1.0	ND	1.0	ND	1.0	0.21 B	1.0
Manganese, SW6020	ND	1.0	0.57 B	1.0	4.3	1.0	1.7	1.0
Molybdenum, SW6020	4.7	2.0	28	2.0	14	2.0	11	2.0
Nickel, SW6020	9.7	2.0	7.7	2.0	13	2.0	48	2.0
Selenium, SW6020	3.2 B	5.0	27	5.0	160	5.0	39	5.0
Uranium, SW6020	11	1.0	23	1.0	33	1.0	4.2	1.0
Vanadium, SW6020	36	5.0	5.2	5.0	9.5	5.0	6.7	5.0
Zinc, SW6020	15	10	8.3 B	10	6.3 B	10	7.1 B	10
Perchlorate, SW6860	0.40	0.10	4.8	1.0	23	5.0	2.8	1.0
Anthropogenic Compounds (µg/L)								
Benzene, SW8260B	ND	1.0	0.20 B	1.0	0.23 B	1.0	0.33 B	1.0
Bromodichloromethane, SW8260B	ND	1.0	ND	1.0	ND	1.0	0.20 B	1.0
Toluene, SW8260B	ND	1.0	0.55 B	1.0	0.79 B	1.0	0.64 B	1.0
Chloroform, SW8260B	ND	1.0	ND	1.0	ND	1.0	0.43 B	1.0

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **mg/L**, milligrams per liter; **J**, the associated method blank contained the target analyte at a reportable limit; **B**, estimated concentration–detected below the reporting limit; **Q**, Reporting limit is elevated due to high analyte levels; **G**, The reporting limit is elevated due to matrix interference; **ND**, not detected]

Sample ID:	MWQ18		MWQ20		MWQ21		MWQ22	
Sample date & time:	6/20/2007	1305	6/20/2007	1105	6/19/2007	1040	6/19/2007	1215
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Major Ions (mg/L)								
Calcium, SW6010B	42 J	0.2	560 J	0.2	170 J	0.2	35 J	0.2
Magnesium, SW6010B	19	0.2	330	0.2	77	0.2	15	0.2
Potassium, SW6010B	2.7 B	3	15	3	11	3	3.1	3
Sodium, SW6010B	65	5	3,100	5	200	5	320	5
Alkalinity, MCAWW310.1	160 J	5.0	51 J	5.0	230 J	5.0	170 J	5.0
Chloride, MCAWW300.0A	39	3.0	5,900 Q	600	150 Q	15	290 Q	30
Sulfate, MCAWW300.0A	110 Q	25	1,800 Q	250	690 Q	100	260 Q	50
Other Major Elements (mg/L)								
Boron, SW6010B	0.18	0.1	1.20	0.1	0.37	0.1	0.86	0.1
Bromide, MCAWW300.0A	0.22	0.20	10 G	2.0	1.1	0.20	0.80	0.20
Fluoride, MCAWW300.0A	1.4	0.50	ND G	5.0	2.7	0.50	0.56	0.50
Lithium, SW6010B	0.069	0.01	0.67	0.01	0.17	0.01	0.087	0.01
Silica, SW6010B	47	1.1	9.6	1.1	49	1.1	11	1.1
Strontium, SW6010B	0.92	0.01	28	0.1	3.3	0.01	0.89	0.01
General Chemistry (mg/L)								
Dissolved Solids, MCAWW160.1	470	10	12,000 Q	100	1,600	10	1,000	10
Ammonia as N, MCAWW350.1	0.071 B	0.10	0.39	0.10	0.060 B	0.10	0.070 B	0.10
Nitrate & Nitrite, MCAWW353.2	0.54	0.10	ND	0.10	1.4	0.10	0.39	0.10
Organic Carbon, SW9060	ND	1.0	0.19 B	1.0	1.2	1.0	11	1.0
Phosphorous, MCAWW365.3	0.0078 B	0.050	ND	0.050	0.0059 B	0.050	ND	0.050
Sulfide, SW9030B/903	1.3 B	4.0	1.7 B	4.0	1.3 B	4.0	1.1 B	4.0

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **µg/L**, micrograms per liter; **B**, estimated concentration–detected below the reporting limit; **ND**, not detected; **J**, the associated method blank contained the target analyte at a reportable limit]

Sample ID:	MWQ18		MWQ20		MWQ21		MWQ22	
Sample date & time:	6/20/2007	1305	6/20/2007	1105	6/19/2007	1040	6/19/2007	1215
Analytes and Methods	Result	RL	Result	RL	Result	RL	Result	RL
Trace Elements and Compounds (µg/L)								
Antimony, SW6020	0.071 B	2.0	0.50 B	2.0	0.099 B	2.0	0.23 B	2.0
Arsenic, SW6020	6.9	5.0	2.0 B	5.0	5.8	5.0	2.0 B	5.0
Barium, SW6020	31	1.0	29	1.0	37	1.0	34	1.0
Cadmium, SW6020	ND	1.0	0.091 B	1.0	ND	1.0	ND	1.0
Chromium, SW6020	1.7 B	2.0	2.9	2.0	1.1 B	2.0	0.94 B	2.0
Cobalt, SW6020	1.6	1.0	12	1.0	2.7	1.0	3.3	1.0
Copper, SW6020	0.90 B	2.0	3.9	2.0	2.7	2.0	1.4 B	2.0
Iron, SW6010B	36 B,J	100	56 B,J	100	ND	100	150 J	100
Lead, SW6020	0.21 B	1.0	0.20 B	1.0	ND	1.0	0.21 B	1.0
Manganese, SW6020	0.37 B	1.0	900	1.0	0.73 B	1.0	410	1.0
Molybdenum, SW6020	5.0	2.0	16	2.0	8.8	2.0	9.0	2.0
Nickel, SW6020	6.9	2.0	84	2.0	9.3	2.0	2.8	2.0
Selenium, SW6020	4.0 B	5.0	13	5.0	11	5.0	7.0	5.0
Thallium, SW6020	ND	1.0	0.037 B	1.0	ND	1.0	0.026 B	1.0
Uranium, SW6020	4.0	1.0	1.2	1.0	120	1.0	25	1.0
Vanadium, SW6020	62	5.0	0.87 B	5.0	47	5.0	15	5.0
Zinc, SW6020	8.0 B	10	18	10	7.8 B	10	6.4 B	10
Perchlorate, SW6860	5.4	1.0	ND	0.10	7.0	2.0	1.5	0.50
Anthropogenic Compounds (µg/L)								
4-Methyl-2-pentatone, SW8260B	6.9	5.0	ND	5.0	ND	5.0	ND	5.0
Toluene, SW8260B	2.4	1.0	0.60 B	1.0	ND	1.0	0.33 B	1.0
Benzene, SW8260B	ND	1.0	0.47 B	1.0	ND	1.0	ND	1.0
Chloroform, SW8260B	ND	1.0	0.16 B	1.0	ND	1.0	ND	1.0
1,2-Dichloroethane, SW8260B	ND	1.0	0.13 B	1.0	ND	1.0	ND	1.0
Caprolactam, SW8270C	ND	20	5.9 B	20	ND	20	ND	20

Table 2. Summary of analyte concentrations in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—concluded.

[**RL**, reporting limit; **mg/L**, milligrams per liter; **J**, the associated method blank contained the target analyte at a reportable limit; **Q**, Reporting limit is elevated due to high analyte levels; **B**, estimated concentration–detected below the reporting limit; **ND**, not detected]

		Sample ID:	MWL6		
Sample date & time:	6/19/2007	1450	Sample date & time:	6/19/2007	1450
Analytes and Methods	Result	RL	Analytes and Method	Result	RL
Major Ions (mg/L)			*Trace Elements and Compounds (µg/L)*		
Calcium, SW6010B	70 J	0.2	Arsenic, SW6020	5.8	5.0
Magnesium, SW6010B	34	0.2	Barium, SW6020	21	1.0
Potassium, SW6010B	4.5	3	Chromium, SW6020	0.70 B	2.0
Sodium, SW6010B	71	5	Cobalt, SW6020	1.9	1.0
Alkalinity, MCAWW310.1	120 J	5.0	Copper, SW6020	0.87 B	2.0
Chloride, MCAWW300.0A	110 Q	15	Iron, SW6010B	200 J	100
Sulfate, MCAWW300.0A	210 Q	25	Manganese, SW6020	86	1.0
Other Major Elements (mg/L)			Molybdenum, SW6020	2.2	2.0
Boron, SW6010B	0.19	0.1	Nickel, SW6020	4.6	2.0
Bromide, MCAWW300.0A	0.60	0.20	Selenium, SW6020	7.3	5.0
Fluoride, MCAWW300.0A	1.1	0.50	Uranium, SW6020	3.3	1.0
Lithium, SW6010B	0.089	0.01	Vanadium, SW6020	46	5.0
Silica, SW6010B	48	1.1	Zinc, SW6020	11	10
Strontium, SW6010B	1.70	0.01	Perchlorate, SW6860	11	2.0
General Chemistry (mg/L)			*Anthropogenic Compounds (µg/L)*		
Dissolved Solids, MCAWW160.1	690	10	Toluene, SW8260B	0.25 B	1.0
Ammonia as N, MCAWW350.1	0.084 B	0.10			
Nitrate & Nitrite, MCAWW353.2	0.63	0.10			
Organic Carbon, SW9060	0.31 B	1.0			
Phosphorous, MCAWW365.3	ND	0.050			
Sulfide, SW9030B/903	2.2 B	4.0			

APPENDIX I

Volatile and Semi-volatile Organic Compounds Not Detected

Table I-1. Summary of volatile and semi-volatile organic compounds that were not detected in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico.

[**RL**, reporting limit; **µg/L**, micrograms per liter]

Analyte	Method	Units	RL	Wells
Volatiles				
Acetone	SW8260B	µg/L	10	All wells
Bromoform	SW8260B	µg/L	1.0	All wells
Bromomethane	SW8260B	µg/L	2.0	All wells
2-Butanone (MEK)	SW8260B	µg/L	5.0	All wells
Carbon Tetrachloride	SW8260B	µg/L	1.0	All wells
Chlorobenzene	SW8260B	µg/L	1.0	All wells
Chloroethane	SW8260B	µg/L	2.0	All wells
Chloromethane	SW8260B	µg/L	2.0	All wells
Dibromomethane	SW8260B	µg/L	1.0	All wells
1,2-Dibromoethane (EDB)	SW8260B	µg/L	1.0	All wells
1,2-Dichlorobenzene	SW8260B	µg/L	1.0	All wells
1,3-Dichlorobenzene	SW8260B	µg/L	1.0	All wells
1,4-Dichlorobenzene	SW8260B	µg/L	1.0	All wells
Dichlorodifluoromethane	SW8260B	µg/L	2.0	All wells
1,1-Dichloroethane	SW8260B	µg/L	1.0	All wells
1,1-Dichloroethene	SW8260B	µg/L	1.0	All wells
1,2-Dichloroethene (total)	SW8260B	µg/L	1.0	All wells
cis-1,2- Dichloroethene	SW8260B	µg/L	1.0	All wells
trans-1,2- Dichloroethene	SW8260B	µg/L	1.0	All wells
1,2- Dichloropropane	SW8260B	µg/L	1.0	All wells
cis-1,2- Dichloropropane	SW8260B	µg/L	1.0	All wells
trans-1,2- Dichloropropane	SW8260B	µg/L	1.0	All wells
2-Hexanone	SW8260B	µg/L	5.0	All wells
Methylene chloride	SW8260B	µg/L	5.0	All wells
Styrene	SW8260B	µg/L	1.0	All wells
1,1,1,2-Tetrachloroethane	SW8260B	µg/L	1.0	All wells
1,1,2,2-Tetrachloroethane	SW8260B	µg/L	1.0	All wells
Tetrachloroethene	SW8260B	µg/L	1.0	All wells
1,2,4-Tetrachlorobenzene	SW8260B	µg/L	1.0	All wells
1,1,1-Trichloroethane	SW8260B	µg/L	1.0	All wells
1,1,2-Trichloroethane	SW8260B	µg/L	1.0	All wells
Trichloroethene	SW8260B	µg/L	1.0	All wells
Trichlorofluoromethane	SW8260B	µg/L	2.0	All wells
1,2,3-Trichloropropane	SW8260B	µg/L	1.0	All wells
Vinyl Chloride	SW8260B	µg/L	1.0	All wells
n-Butylbenzene	SW8260B	µg/L	1.0	All wells
sec-Butylbenzene	SW8260B	µg/L	1.0	All wells
Isopropylbenzene	SW8260B	µg/L	1.0	All wells
1,2,4-Trimethylbenzene	SW8260B	µg/L	1.0	All wells
1,3,5-Trimethylbenzene	SW8260B	µg/L	1.0	All wells
n-Propylbenzene	SW8260B	µg/L	1.0	All wells
tert-Butylbenzene	SW8260B	µg/L	1.0	All wells
Dibromochloromethane	SW8260B	µg/L	1.0	All wells
2-Chlorotoluene	SW8260B	µg/L	1.0	All wells
4-Chlorotoluene	SW8260B	µg/L	1.0	All wells

Table I-1. Summary of volatile and semi-volatile organic compounds that were not detected in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—continued.

[**RL**, reporting limit; **µg/L**, micrograms per liter]

Analyte	Method	Units	RL	Wells
Volatiles—continued				
1,2-Dibromo-3-chloropropane (DBCP)	SW8260B	µg/L	2.0	All wells
1,3-Dichloropropane	SW8260B	µg/L	1.0	All wells
2,2-Dichloropropane	SW8260B	µg/L	5.0	All wells
1,1-Dichloropropane	SW8260B	µg/L	1.0	All wells
Hexachlorobutadiene	SW8260B	µg/L	1.0	All wells
4-Isopropyltoluene	SW8260B	µg/L	1.0	All wells
Methyl tert-butyl ether	SW8260B	µg/L	5.0	All wells
1,2,3-Trichlorobenzene	SW8260B	µg/L	1.0	All wells
o-Xylene	SW8260B	µg/L	1.0	All wells
Bromobenzene	SW8260B	µg/L	1.0	All wells
Bromochloromethane	SW8260B	µg/L	1.0	All wells
Napthalene	SW8260B	µg/L	1.0	All wells
Semi-volatiles				
Acenaphthene	SW8270C	µg/L	10	All wells
Acenaphthylene	SW8270C	µg/L	10	All wells
Acetophenone	SW8270C	µg/L	10	All wells
Anthracene	SW8270C	µg/L	10	All wells
Benzo (a) anthracene	SW8270C	µg/L	10	All wells
Benzo (b) fluoranthene	SW8270C	µg/L	10	All wells
Benzo (k) fluoranthene	SW8270C	µg/L	10	All wells
Benzo (ghi) perylene	SW8270C	µg/L	10	All wells
Benzo (a) pyrene	SW8270C	µg/L	10	All wells
bis (2-Chloroethoxy) methane	SW8270C	µg/L	10	All wells
bis (2-Chloroethyl) ether	SW8270C	µg/L	10	All wells
bis (2-Ethylhexyl) phthalate	SW8270C	µg/L	10	All wells
4-Bromophenyl phenyl ether	SW8270C	µg/L	10	All wells
Butyl benzyl phthalate	SW8270C	µg/L	10	All wells
4-Chloroaniline	SW8270C	µg/L	10	All wells
1-Chloro-3-methylphenol	SW8270C	µg/L	10	All wells
2-Chloronaphthalene	SW8270C	µg/L	10	All wells
2-Chlorophenol	SW8270C	µg/L	10	All wells
4-Chlorophenyl phenyl ether	SW8270C	µg/L	10	All wells
Chrysene	SW8270C	µg/L	10	All wells
Dibenz (a,h) anthracene	SW8270C	µg/L	10	All wells
Dibenzofuran	SW8270C	µg/L	10	All wells
Di-n-butyl phthalate	SW8270C	µg/L	10	All wells
3,3-Dichlorobenzidine	SW8270C	µg/L	50	All wells
2,4-Dichlorophenol	SW8270C	µg/L	10	All wells
Diethyl phthalate	SW8270C	µg/L	10	All wells
2,4-Dimethylphenol	SW8270C	µg/L	10	All wells
Dimethyl phthalate	SW8270C	µg/L	10	All wells
4,6-Dinitro-2-methylphenol	SW8270C	µg/L	50	All wells
2,4-Dinitrophenol	SW8270C	µg/L	50	All wells

Table I-1. Summary of volatile and semi-volatile organic compounds that were not detected in ground water collected June 18–22, 2007, from monitoring wells at Melrose Air Force Range, New Mexico—concluded.

[**RL**, reporting limit; **µg/L**, micrograms per liter]

Analyte	Method	Units	RL	Wells
Semi-volatiles—continued				
2,4-Dinitrotoluene	SW8270C	µg/L	10	All wells
2,6-Dinitrotoluene	SW8270C	µg/L	10	All wells
Di-n-octyl phthalate	SW8270C	µg/L	10	All wells
Fluoranthane	SW8270C	µg/L	10	All wells
Fluorene	SW8270C	µg/L	10	All wells
Hexachlorobenzene	SW8270C	µg/L	10	All wells
Hexachlorocyclopentadiene	SW8270C	µg/L	50	All wells
Hexachloroethane	SW8270C	µg/L	10	All wells
Indeno (1,2,3-cd) pyrene	SW8270C	µg/L	10	All wells
2-Methylnaphthalene	SW8270C	µg/L	10	All wells
2-Methylphenol	SW8270C	µg/L	10	All wells
Napthalene	SW8270C	µg/L	10	All wells
2-Nitroaniline	SW8270C	µg/L	50	All wells
3-Nitroaniline	SW8270C	µg/L	50	All wells
4-Nitroaniline	SW8270C	µg/L	50	All wells
Nitrobenzene	SW8270C	µg/L	10	All wells
2-Nitrophenol	SW8270C	µg/L	10	All wells
4-Nitrophenol	SW8270C	µg/L	50	All wells
N-Nitrosodiphenylamine	SW8270C	µg/L	10	All wells
N-Nitrosodi-n-propylamine	SW8270C	µg/L	10	All wells
Pentachlorophenol	SW8270C	µg/L	50	All wells
Phenanthrene	SW8270C	µg/L	10	All wells
Phenol	SW8270C	µg/L	10	All wells
Pyrene	SW8270C	µg/L	10	All wells
2,4,5-Trichlorophenol	SW8270C	µg/L	10	All wells
2,4,6-Trichlorophenol	SW8270C	µg/L	10	All wells
bis (2-Chloroisopropyl) ether	SW8270C	µg/L	10	All wells
4-Methylphenol	SW8270C	µg/L	10	All wells
Hexachlorobutadiene	SW8270C	µg/L	10	All wells
Atrazine	SW8270C	µg/L	50	All wells
Carbazole	SW8270C	µg/L	10	All wells

APPENDIX II

Quality Assurance/Quality Control Review—Laboratory Data Validation Checklist

LABORATORY DATA VALIDATION CHECKLIST

SECTION 1.0: GENERAL INFORMATION

Data reviewer(s) name, affiliation, title, signature, and date of review:
Jeff Langman, USGS-WRD, Hydrologist

Data Inventory

1.1 Sample project number: TestAmerica No's. D7F220355 & D7F230175

1.2 Operable unit and site: Melrose Air Force Range
Sample collection date: June 18, 19, 20, 21 and 22, 2007

1.3 Sample locations (location IDs): MWQ2, MWQ3, MWQ3-2 is the duplicate, MWQ4, MWQ5, MWQ6, MWQ7, MWQ8, MWQ10, MWQ14, MWQ15, MWQ16, MWQ18, MWQ20, MWQ21, MWQ22, MWL6, MWQ-2-MB is the equipment blank, MWQ-TB is the trip blank

1.4 Sample matrix (ground water, soil, other): filtered ground water

1.5 Type and number of field samples (environmental and quality control) in sample project:

Type	Number	Type	Number
environmental	16	MS/MSD	1 pair
field duplicate	1	trip blank	1
equipment blank	1	ambient blank	0

Data validation level: note—see Attachment A for description of different levels

LEVEL 1

SECTION 2.0: DATA REPORTS AND COMPLETENESS

Data reviewer(s) name, affiliation, title, signature, and date of review:
Jeff Langman, USGS-WRD, Hydrologist

Laboratory Data Reports

2.1 Analytical Results Report--report date: July 24, 2007

2.2 Raw Data Report--number of volumes: Raw data not reviewed

2.3 Was completeness of lab reports acceptable? Yes √ No ____
(overview, analytical results, quality-control report)

Data Completeness

2.4 Were all samples requested on chain of custody form analyzed by lab?
Yes √ No__

	Alkalinity	Dissolved Solids	Anions	Ammonia
requested:	19	19	19	19
analyzed:	19	19	19	19

	Nitrate-Nitrite	Phosphorous	Organic Carbon	Trace Elements
requested:	19	19	19	19
analyzed:	19	19	19	19

	Perchlorate	Volatiles	Semi-Volatiles	Mercury
requested:	19	20	19	19
analyzed:	19	20	19	19

2.5 List cancelled analyses on cancelled-data worksheet: none

2.6 Were sample cooler seals intact upon receipt by lab? Yes

2.7 What were the sample cooler temperatures upon receipt by lab? 2.6–4.3 °C at TestAmerica

2.8 Additional comments:

SECTION 3.0: DATA VALIDATION REVIEW

In the following table (Table II-1), results from the June 18–22, 2007, sampling is reviewed for the following data validation parameters: holding times, surrogate spike recovery, field duplicates, equipment blanks, lab control samples, lab method blanks, matrix spike and duplicates, and results over the reporting limits with qualifiers. Data validation parameters are reviewed for compliance with individual requirements for each parameter specific to the individual analyses of trace and major elements (methods SW6020 and SW6010B); mercury (method SW7470A); bromide, chloride, fluoride, and sulfate by method MCAWW300.0A; dissolved solids (method MCAWW160.1); organic carbon (method SW9060); alkalinity (method SW310.1); phosphorus (method MCAWW365.3); ammonia (method MCAWW350.1); nitrate plus nitrite (method MCAWW353.2); perchlorate (method SW6860); volatile organic compounds (method SW8260B); and semi-volatile organic compounds (method SW8270C).

Table II-1. Data validation worksheet table for June 18–22, 2007, sampling at Melrose Air Force Range—validation parameters, analytes, and methods (USEPA, 1994a; USEPA, 1994b; USGS, 1992).

[**RPD**, relative percent difference; **RL**, reporting limit; **%R**, percent recovery]

Data Validation Parameters	**Total Alkalinity by Method MCAWW 310.1**	**Total Dissolved Solids by Method MCAWW160.1**	**Anions (including Chloride, Fluoride, and Bromide, and Sulfate) by Method MCAWW300.0A**
Holding times **Met**	14 days sample to analysis ☑ Yes ☐ No, see notes	7 days sample to analysis ☑ Yes ☐ No, see notes	28-days sample to analysis ☑ Yes ☐ No, see notes
Surrogate Spike Recovery **Met**	Not Applicable	Not Applicable	Not Applicable
Field Duplicates **Met**	RPD <20% ☑ Yes ☐ No, see notes	RPD <30% ☑ Yes ☐ No, see notes	RPD <30% ☐ Yes ☑ No, see notes
Equipment Blanks **Met**	≤ RL ☑ Yes ☐ No, see notes	≤ RL ☑ Yes ☐ No, see notes	≤ RL ☑ Yes ☐ No, see notes
Lab Control Samples **Met**	%R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes	%R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes	%R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes
Lab Method Blanks **Met**	≤ RL ☑ Yes ☐ No, see notes	≤ RL ☑ Yes ☐ No, see notes	≤ RL ☑ Yes ☐ No, see notes
Matrix Spike and Duplicates **Met**	% R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes	% R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes	% R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes
Results over RL with Qualifiers	List: Low levels of $CaCO_3$ alkalinity present in the method blank.	List: The reporting limit was elevated due to high analyte levels for MWQ2, 16, and 20.	List: Reporting limit elevated due to high chloride for MWL6, MWQ2, 3, 3-2, 8, 14, 15, 16, 20, 21, and 22; and high sulfate for MWL6, MWQ2, 3, 3-2, 4, 5, 6, 7, 8, 10, 14, 15, 16, 18, 20, 21, and 22. Reporting limit adjusted due to matrix interference for bromide (MWQ2, 8, 14, 15, 16, and 20); and fluoride (MWQ8, and 14).

Table II-1. Data validation worksheet table for June 18–22, 2007, sampling at Melrose Air Force Range—validation parameters, analytes, and methods (USEPA, 1994a; USEPA, 1994b; USGS, 1992)—continued.

[**RPD**, relative percent difference; **RL**, reporting limit; **%R**, percent recovery]

Data Validation Parameters	**Ammonia by Method MCAWW350.1**	**Nitrate-Nitrite by Method MCAWW353.2**	**Phosphorous by Method MCAWW365.3**
Holding times	28-days sample to analysis	28-days sample to analysis	28-days sample to analysis
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Surrogate Spike Recovery	Not Applicable	Not Applicable	Not Applicable
Met			
Field Duplicates	RPD <30%	RPD <30%	RPD <30%
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Equipment Blanks	≤ RL	≤ RL	≤ RL
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Lab Control Samples	%R and RPD within 3 SD of historical laboratory performance	%R and RPD within 3 SD of historical laboratory performance	%R and RPD within 3 SD of historical laboratory performance
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Lab Method Blanks	≤ RL	≤ RL	≤ RL
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Matrix Spike and Duplicates	% R and RPD within 3 SD of historical laboratory performance	% R and RPD within 3 SD of historical laboratory performance	% R and RPD within 3 SD of historical laboratory performance
Met	☐ Yes ☑ No, see notes	☐ Yes ☑ No, see notes	☑ Yes ☐ No, see notes
Results over RL with Qualifiers	List: None	List: The reporting limit for MWQ10 was elevated due to high analyte level	List: None

Table II-1. Data validation worksheet table for June 18–22, 2007, sampling at Melrose Air Force Range—validation parameters, analytes, and methods (USEPA, 1994a; USEPA, 1994b; USGS, 1992)—continued.

[**RPD**, relative percent difference; **RL**, reporting limit; **%R**, percent recovery]

Data Validation Parameters	**Organic Carbon by Method SW9060**	**Trace elements by Methods SW6010B and SW6020**	**Perchlorate by Method SW6860**
Holding times **Met**	28 days sample to analysis ☑ Yes ☐ No, see notes	180 days sample to analysis ☑ Yes ☐ No, see notes	28 days sample to analysis ☑ Yes ☐ No, see notes
Surrogate Spike Recovery **Met**	Not Applicable	Not Applicable	Not Applicable e
Field Duplicates **Met**	RPD <30% ☑ Yes ☐ No, see notes	RPD <30% ☐ Yes ☑ No, see notes	RPD <30% ☑ Yes ☐ No, see notes
Equipment Blanks **Met**	≤ RL ☑ Yes ☐ No, see notes	≤ 2 X RL ☑ Yes ☐ No, see notes	≤ RL ☑ Yes ☐ No, see notes
Lab Control Samples **Met**	% R within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes	%R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes	% R within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes
Lab Method Blanks **Met**	≤ RL ☑ Yes ☐ No, see notes	≤ RL ☑ Yes ☐ No, see notes	≤ RL ☑ Yes ☐ No, see notes
Matrix Spike and Duplicates **Met**	% R and RPD within 3 SD of historical laboratory performance ☑ Yes ☐ No, see notes	% R and RPD within 3 SD of historical laboratory performance ☐ Yes ☑ No, see notes	% R and RPD within 3 SD of historical laboratory performance ☐ Yes ☑ No, see notes
Results over RL with Qualifiers	List: None	List: Samples reported method blank contamination in MWQ2, 2-MB, 3, 3-2, 4, 5, 6, 7, 8, 10, 14, 15, 16, 18, 20, 21, 22, and MWL6 for Ca. Samples reported method blank contamination in MWQ4, 22, and MWL6 for Fe.	List: None

Table II-1. Data validation worksheet table for June 18–22, 2007, sampling at Melrose Air Force Range—validation parameters, analytes, and methods (USEPA, 1994a; USEPA, 1994b; USGS, 1992)—concluded.

[**RPD**, relative percent difference; **RL**, reporting limit; **%R**, percent recovery]

Data Validation Parameters	**Volatiles by Method SW8260B**	**Semi-volatiles by Method SW8270C**	**Mercury by Method SW7470A**
Holding times	14 days sample to analysis	7 days sample to extraction, 40 days sample to analysis	28 days sample to analysis
Met	☑ Yes ☐ No, see notes	☐ Yes ☑ No, see notes	☑ Yes ☐ No, see notes
Surrogate Spike Recovery	Not Applicable	Not Applicable	Not Applicable
Met			
Field Duplicates	RPD <30%	RPD <30%	RPD <30%
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Equipment Blanks	≤ 2 X RL	≤ 2 X RL	≤ 2 X RL
Met	☐ Yes ☑ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Lab Control Samples	% R within 3 SD of historical laboratory performance	% R within 3 SD of historical laboratory performance	% R within 3 SD of historical laboratory performance
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Lab Method Blanks	≤ RL	≤ RL	≤ RL
Met	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes	☑ Yes ☐ No, see notes
Matrix Spike and Duplicates	% R and RPD within 3 SD of historical laboratory performance	% R and RPD within 3 SD of historical laboratory performance	% R and RPD within 3 SD of historical laboratory performance
Met	☐ Yes ☑ No, see notes	☐ Yes ☑ No, see notes	☑ Yes ☐ No, see notes
Results over RL with Qualifiers	List: None.	List: None.	List: None.

Table II-2. Data validation worksheet table for June 18–22, 2007, sampling at Melrose Air Force Range—notes.

Analyte and Method:	Notes of Data Validation Parameters:
Alkalinity by method MCAWW310.1	- None.
Total dissolved solids by method MCAWW160.1	- None.
Chloride, fluoride, bromide, and sulfate by method 300.0A	- Field duplicate RPD was greater than 30% for fluoride and bromide likely because concentrations were near the reporting limit.
Ammonia by method MCAWW350.1	- Matrix spike duplicate relative percent difference of spiked recovery values was outside control limits.
Nitrate-nitrite by method MCAWW353.2	- Matrix spike duplicate relative percent difference of spiked recovery values was outside control limits.
Phosphorous by method MCAWW365.3	- None.
Organic carbon by method SW9060	- None.
Trace elements by methods SW6010B/SW6020	- Field duplicate RPD was greater than 30% for copper and lead because concentrations were near or below reporting limits. Matrix spike percent recovery for silica was outside control limits.
Perchlorate by method SW6860	- Matrix spike duplicate percent recovery was outside control limits.
Volatiles by method SW8260B	- Matrix spike percent recoveries were outside control limits for three compounds and matrix spike duplicate percent recoveries were outside control limits for two compounds.
Semi-volatiles by method SW8270B	- Holding time to extraction was not met for all samples because of re-extraction and re-analysis of all samples. Lab control sample recoveries were outside of control limits for three compounds during the first analysis. No semi-volatile compound was detected above reporting limits for either analysis. Percent recovery and relative percent difference values were outside control limits for four compounds during spiked recoveries during analysis of the matrix spike duplicate sample.
Mercury by method SW7470A	- None.

Attachment A—Instruction Notes for the Data Validation Checklist

This data validation checklist will be used when validating the chemical analytical results. Data validation is a systematic and independent verification of data quality and consists of checking, verifying, evaluating, and qualifying, the chemical analytical results.

Two different levels of data validation are used with level I being not as detailed or as rigorous as level II. Level I data validation includes: (1) checking holding times limits, (2) evaluating the results of field and laboratory quality control (QC) samples such as field replicates, matrix spikes, surrogate samples, and duplicate control samples, and (3) checking that contamination during sample processing has not occurred in QC blanks such as equipment, method, ambient, and trip blanks. Most of the information and data used to conduct a level I data validation is contained in the summary-data reports prepared by the reporting laboratory. Level II data validation includes all the level I guidelines plus using the raw-date reports prepared by the reporting laboratory to: (1) check that laboratory instruments have been properly tuned and calibrated, and (2) verify that selected sample results do not have any omissions, problems, discrepancies, transcription errors, and reduction (dilution, conversion) errors.

Field samples (environmental and QC) are processed and analyzed by the reporting laboratory in specific groups of samples called sample projects (also called sample cases). A sample project usually consists of 20 or fewer samples that are collected from one or more sampling locations (monitoring well) in a given sampling period. Numerous laboratory QC samples also are analyzed with the field samples for each sample project.

This data validation checklist is designed to be used when validating the analytical results for a given sample project and it has a multi-level organization. The first part of the checklist contains general information (section 1.0) about the scope (who, when, how, and what) of the data validation and data reports and completeness (section 2.0) for each sample project. Sections 1.0 and 2.0 will be completed and included with all data validation checklists. The data validation checklist also contains numerous supplemental sections that are listed at the bottom of the first page of this document. These supplemental checklist sections are used for specific analytical methods and will be marked with a checkmark (√) when they are completed for a given sample project. Specific project-required frequency and QC acceptance criteria and pertinent reference page numbers are listed with most of the checklist items. The Major data-validation references are the USEPA guidance documents (USEPA 1994).

References

USEPA, 1994a, USEPA Contract laboratory program national functional guidelines for organic data review, February 1994, Publication 9240.1-05, Document number PB94-963501, 124 p.

USEPA, 1994b, USEPA Contract laboratory program national functional guidelines for inorganic data review, February 1994, Publication 9240.1-05-01, Document number PB94-963502, 42 p.

USGS, 1992, Laboratory data validation checklist: Wyoming District, U.S. Geological Survey checklist prepared for the U.S. Air Force, multiple pages.