



**DCP Midstream**  
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April 18, 2012

Mr. Leonard Lowe  
Environmental Engineer  
New Mexico Oil Conservation Division  
1220 S. St. Francis Dr.  
Santa Fe, NM 87505

**RE: 4th Quarter 2011 Groundwater Monitoring Results  
DCP Midstream, LP J-4-2 Pipeline Release (1RP-1728)  
Unit C, Section 27, Township 19 South, Range 35 East  
Lea County, New Mexico**

RECEIVED OGD  
2012 APR 19 A 10:24

Dear Mr. Lowe:

DCP Midstream, LP (DCP) is pleased to submit for your review, a copy of the 4th Quarter 2011 Groundwater Monitoring Results for the DCP J-4-2 Pipeline Release located in Lea County, New Mexico (Unit C, Section 27, Township 19 South, Range 35 East).

If you have any questions regarding the report, please call at 303-605-1718 or e-mail me [swweathers@dcpmidstream.com](mailto:swweathers@dcpmidstream.com).

Sincerely

**DCP Midstream, LP**

Stephen Weathers, PG  
Principal Environmental Specialist

cc: Larry Johnson, OCD Hobbs District Office (Copy on CD)  
Environmental Files

# Fourth Quarter 2011 Groundwater Monitoring Summary Report

## J-4-2 Pipeline Release Lea County, New Mexico 1RP-1728

Prepared for:



370 17<sup>th</sup> St., Suite 2500  
Denver, CO 80202

*Prepared by:*



Tasman Geosciences

5690 Webster, Ave  
Arvada, CO 80002

**February 20, 2012**

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## **1. Introduction**

Tasman Geosciences, LLC (Tasman) is submitting to DCP Midstream (DCP) the results of the fourth quarter groundwater monitoring activities conducted on December 7, 2011 as well as remediation activities conducted on December 8, 2011 at the J-4-2 pipeline release (Site) in Lea County, New Mexico (Figure 1). The field activities described herein were performed with the purpose of monitoring groundwater flow and quality conditions and assessing the presence of light non-aqueous phase liquid (LNAPL) hydrocarbons in the Site subsurface. The data collected herein were used to develop groundwater elevation maps, an analytical results map, and light non-aqueous phase liquid (LNAPL) versus time and groundwater elevation graphs to evaluate current conditions at the Site.

## **2. Site Location and Background**

The Site is located in the northeastern quarter of the northwestern quarter (Unit C) of Section 27, Township 19 South, Range 35 East approximately 3 miles south of the intersection of US Highway 82 and State Highway 483. This area is sparsely populated and land use is primarily associated with livestock grazing and oil and gas extraction and conveyance.

Based on findings from previous Site investigations, a natural gas condensate release was reported at the Site on August 3, 2005. Environmental Plus Incorporated (EPI) of Eunice, New Mexico, performed initial Site investigation activities. EPI reported that the spill was limited to an approximate area of 2,800 square feet and it did not migrate to any surface water features. EPI installed monitoring wells MW-1, MW-2, and MW-3 as a part of the initial soil and groundwater characterization effort in February 2006. Monitoring wells MW-4, MW-6, MW-7, and MW-8 were installed in September 2006 as part of a Site investigation completed by American Environmental Consulting. Installation of monitoring well MW-5 was not completed during this event due to refusal encountered while advancing the borehole. Groundwater samples collected in 2006 from the newly installed wells indicated that dissolved phase petroleum hydrocarbons and chloride had impacted groundwater at the Site in the vicinity of monitoring wells MW-1 and MW-2. In addition, light non-aqueous phase liquid (LNAPL) was detected at monitoring wells MW-1 and MW-2.

## **3. Groundwater Monitoring**

This section describes the groundwater field and laboratory activities performed during the fourth quarter 2011 monitoring event. Monitoring activities included Site-wide groundwater gauging, LNAPL measurements, and groundwater sampling. Figure 2 illustrates the groundwater monitoring network utilized to perform these activities at the Site.

### 3.1 Groundwater and LNAPL Elevation Monitoring

Groundwater and LNAPL levels were measured in order to evaluate hydraulic characteristics and provide information regarding seasonal and annual fluctuations in groundwater elevations at the Site. During the fourth quarter 2011, groundwater levels were measured at seven Site monitoring well locations.

Groundwater levels were measured on the north side of the well casing to the nearest 0.01-foot using an oil-water interface probe (IP). Measured groundwater levels are presented in Table 1. Groundwater level data were later converted to elevation (feet above mean sea level [AMSL]). LNAPL levels, where indicated by the IP, were also recorded on the field data sheets.

Groundwater elevation measurements collected during the reporting period as well as historical elevations are presented in Table 1 and a fourth quarter 2011 groundwater elevation contour map is illustrated on Figure 3. Groundwater elevations ranged from 3,705.49 feet AMSL at monitoring well MW-8 to 3,709.87 feet AMSL at monitoring wells MW-1 and MW-6. As illustrated on Figure 3, groundwater flow at the Site generally trends to the southeast with a downward gradient of approximately 0.006 foot per foot between monitoring wells MW-1 and MW-8.

LNAPL was detected at MW-1 (0.20-feet) and MW-2 (0.28-feet) with measured thicknesses indicated in parenthesis.

### 3.2 Groundwater Quality Monitoring

Prior to collecting groundwater samples, groundwater levels and total well depth were measured at each of the Site monitoring wells, as previously described. Subsequently, a minimum of three well casing volumes of groundwater were purged from the subject well prior to collecting groundwater samples. Groundwater samples were collected using dedicated polyethylene bailers, placed in clean laboratory supplied containers for the selected analytical methods and packed in an ice-filled cooler and maintained at approximately four (4) degrees Celsius (°C) for transportation. Groundwater samples were then shipped under chain-of-custody procedures to Accutest Laboratories (Accutest) in Wheat Ridge, Colorado, for analysis.

Water quality samples were collected from five of seven wells. MW-1 and MW-2 were not sampled due to the presence LNAPL detected in the well casing. Water quality samples were submitted to be analyzed for benzene, toluene, ethylbenzene, and xylene (BTEX) by United States Environmental Protection Agency (USEPA) Method 8260B and chloride by USEPA Method 300.

Table 2 summarizes BTEX and chloride concentrations in groundwater samples collected during the December 2011 event. Laboratory analytical reports for the event are included in Appendix A and analytical results are summarized on Figure 4. The groundwater samples collected from the Site monitoring wells did not contain concentrations of dissolved phase BTEX above laboratory reporting limits. Chloride was detected in all five of the sampled wells with concentrations ranging from 348 milligrams per liter (mg/L) in MW-8 to 2,230 mg/L in MW-3.

## **4. Remediation Activities**

### **4.1 Vacuum Enhanced LNAPL Recovery**

During the fourth quarter 2011 event, Tasman conducted two 3.5-hour vacuum enhanced LNAPL recovery events at monitoring wells MW-1 and MW-2 utilizing a vacuum truck. Product thickness prior to vacuum recovery was 0.2 feet and 0.28 feet at MW-1 and MW-2, respectively.

Approximately 240 gallons of mixed liquids were recovered from MW-1 and 420 gallons were recovered from MW-2. A total of approximately 30 gallons of LNAPL were recovered during the vacuum event. The recovered liquids were subsequently transported to and disposed of at the DCP Linam Ranch facility.

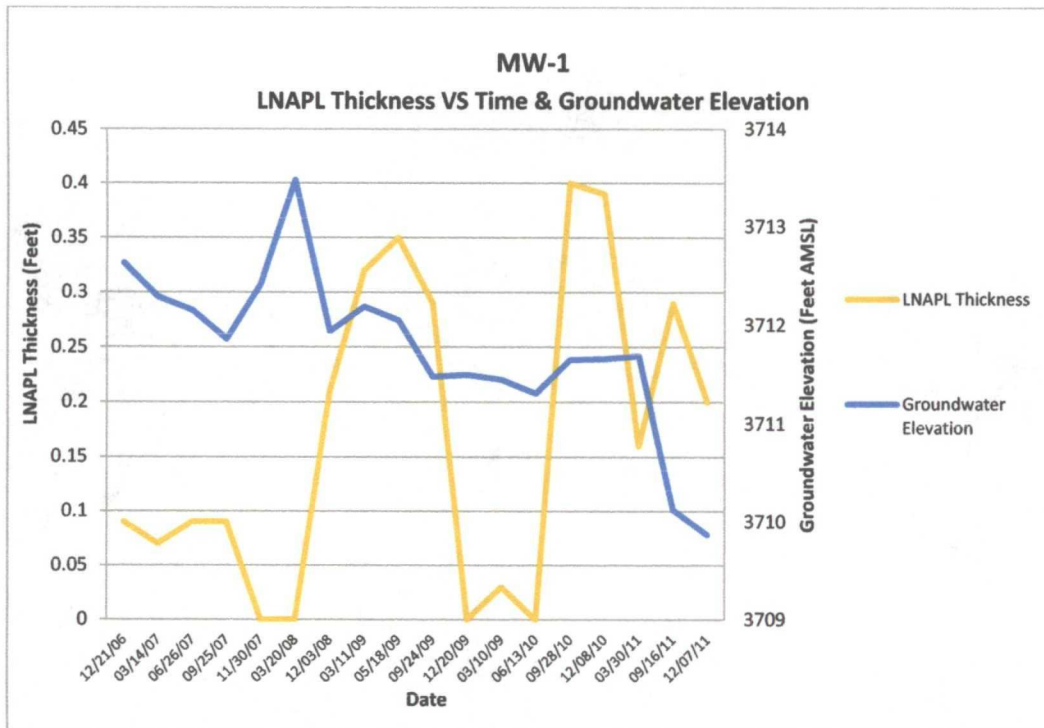
During the vacuum enhanced recovery events at each well, subsurface pressure was measured at the nearby monitoring wells to determine possible vacuum communication. Vacuum was not observed at the nearby wells during either of the vacuum recovery events. Additionally, LNAPL measurements were collected subsequent to the vacuum enhanced recovery events, and no measureable amount of LNAPL was observed in either well.

### **4.2 LNAPL Collection Bailer**

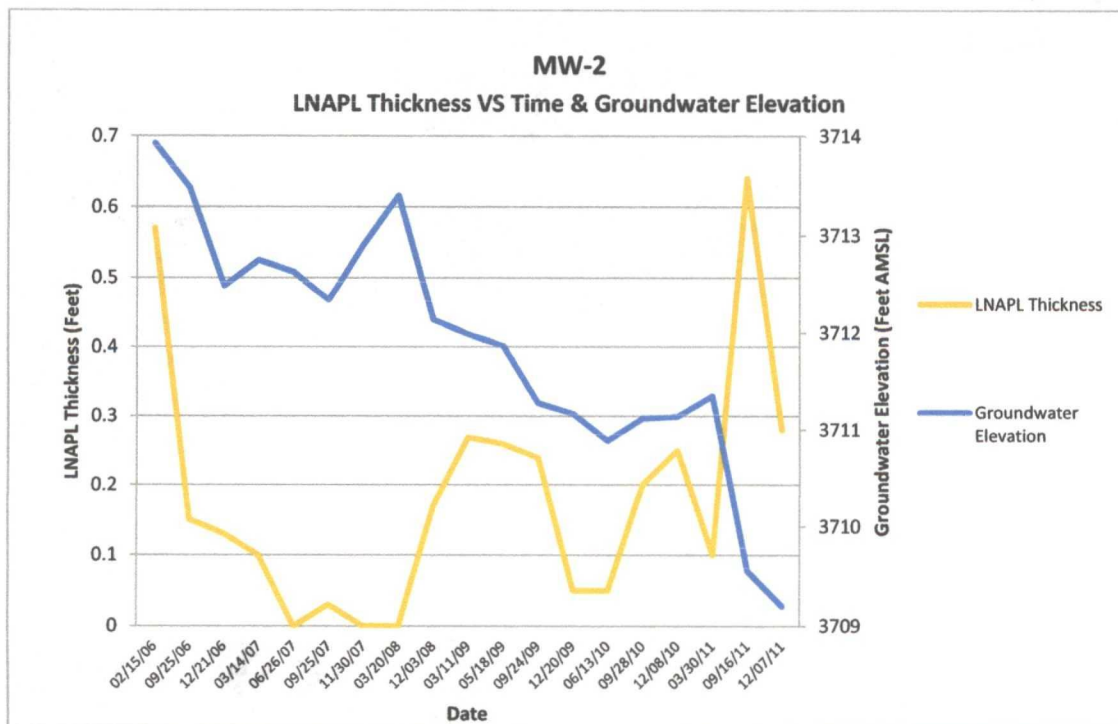
A passive LNAPL collection bailer is installed at monitoring well MW-2. During the fourth quarter 2011 groundwater monitoring event, approximately 0.6 gallons of LNAPL was recovered from the collection bailer. The recovered LNAPL was collected during groundwater sampling activities and transferred to a truck mounted purge water storage tank and subsequently transported to and disposed of at the DCP Linam Ranch facility. The LNAPL collection bailer was subsequently replaced in the monitoring well at the level of the product-water interface.

### **4.3 LNAPL Trends**

As illustrated in the graphs below, the LNAPL thickness in MW-1 and MW-2 does not appear to exhibit any seasonal fluctuation trends or a relationship to groundwater levels.



Groundwater elevations have exhibited a steady decrease in elevation over time, whereas product thickness has fluctuated sporadically over time with no apparent correlation to groundwater elevation.



## 5. Conclusions

While the dissolved phase hydrocarbon impacts did not exceed the regulatory limits in any of the sampled monitoring wells during this event, LNAPL persists at MW-1 and MW-2. Considering the apparent minimal subsurface lateral extent of LNAPL at the Site, the source material does not appear significant in terms of emplaced volume. The persistence of LNAPL in the vicinity of MW-1 and MW-2 (detected at these wells for 5 years) and absence of down gradient free phase and dissolved phase impacts to groundwater indicates that the material is not mobile in the subsurface. Ongoing quarterly activities of groundwater sampling will provide for continued monitoring of Site conditions, BTEX, and LNAPL trends.

Vacuum enhanced recovery at MW-1 and MW-2 was successful in removing 30 gallons of LNAPL from the subsurface. Given the significant volume of material removed, additional recovery events are warranted.

## 6. Recommendations

Based on evaluation of 2011 and historical Site observations and monitoring results, recommendations for future activities include:

- Continue groundwater monitoring and sampling at the monitoring locations illustrated on Figure 2;
- Continue to conduct and evaluate the success of vacuum enhanced recovery of LNAPL at monitoring wells MW-1 and MW-2 for an additional 2 quarters, and;
- Continue use of the LNAPL recovery bailer at MW-2.



## Tables

**TABLE 1**  
**FOURTH QUARTER 2011**  
**SUMMARY OF GROUNDWATER ELEVATION DATA**  
**J-4-2 PIPELINE RELEASE**  
**LEA COUNTY, NEW MEXICO**

Location	Date	Depth to Groundwater (1) (feet)	Depth to Product (1) (feet)	Free Phase Hydrocarbon Thickness (feet)	Total Depth (2) (feet)	TOC Elevation (3) (feet amsl)	Groundwater Elevation (feet amsl)	Change in Groundwater Elevation Since Previous Event (4) (feet)
MW-1*	12/08/10			0.39			3711.66	0.01
MW-1*	03/30/11	28.88	28.72	0.16			3711.69	0.03
MW-1*	06/11/11	29.5	29.31	0.19			3711.09	-0.60
MW-1*	09/16/11	30.54	30.25	0.29	43.05	3740.45	3710.13	-0.96
MW-1*	12/07/11	30.73	30.53	0.2	43.05	3740.45	3709.87	-0.26
MW-2*	12/08/10			0.25			3711.14	0.02
MW-2*	03/30/11	29.35	29.25	0.1			3711.35	0.21
MW-2*	06/11/11	30.55	30.35	0.2			3710.22	-1.13
MW-2*	09/16/11	31.54	30.90	0.64	43.30	3740.62	3709.56	-0.66
MW-2*	12/07/11	31.63	31.35	0.28	43.30	3740.62	3709.20	-0.36
MW-3	12/08/10						3711.25	0.01
MW-3	03/30/11	28.14					3711.25	0.00
MW-3	06/11/11	28.76					3710.63	-0.62
MW-3	09/16/11	29.62			35.20	3739.39	3709.77	-0.86
MW-3	12/07/11	30.1			35.20	3739.39	3709.29	-0.48
MW-4	12/08/10						3711.72	0.08
MW-4	03/30/11	28.47					3711.77	0.05
MW-4	06/11/11	29.12					3711.12	-0.65
MW-4	09/16/11	29.91			37.95	3740.24	3710.33	-0.79
MW-4	12/07/11	30.46			37.95	3740.24	3709.78	-0.55
MW-6	12/08/10						3710.71	0.15
MW-6	03/30/11	29.05					3710.91	0.20
MW-6	06/11/11	29.81					3710.15	-0.76
MW-6	09/16/11	30.55			34.31	3739.96	3709.41	-0.74
MW-6	12/07/11	30.09			34.31	3739.96	3709.87	0.46
MW-7	12/08/10						3708.28	0.05
MW-7	03/30/11	32.37					3708.36	0.08
MW-7	06/11/11	33.14					3707.59	-0.77
MW-7	09/16/11	33.76			40.41	3740.73	3706.97	-0.62
MW-7	12/07/11	34.04			40.41	3740.73	3706.69	-0.28
MW-8	12/08/10						3706.70	0.08
MW-8	03/30/11	30.63					3706.69	-0.01
MW-8	06/11/11	31.32					3706.00	-0.69
MW-8	09/16/11	31.67			38.58	3737.32	3705.65	-1.04
MW-8	12/07/11	31.83			38.58	3737.32	3705.49	-0.16
Average Change in groundwater elevation since the previous monitoring event								-0.23

**Notes:**

- 1- Depths measured from the north edge of the well casing.
  - 2- Total depths were collected and recorded during the fourth quarter 2011 monitoring event. Total depths were not collected in wells that had LNAPL.
  - 3- TOC elevations for monitoring wells MW-4, MW-5, MW-6, MW-7, & MW-8 were calculated by adding the PVC stick-up length (in feet) to the surveyed ground surface elevations (in feet amsl).
  - 4- Changes in groundwater elevation calculated by subtracting the measurement collected during the previous monitoring event from the measurement collected during the most recent monitoring event.
- Monitoring well location MW-5 was not installed due to geologic refusal that was encountered during drilling activities.
- Data presented for all other well locations includes previous four sampling events, when available. Historic groundwater elevation data for these locations are available upon request.
- Sample locations are shown on Figure 2 and a groundwater elevation contour map is shown on Figure 3.
- amsl - feet above mean sea level.

TOC - top of casing

\* Groundwater elevation was corrected for product thickness using the following calculation:

$\text{Groundwater elevation} = (\text{TOC Elevation} - \text{Measured Depth to Water}) + (\text{LNAPL Thickness in Well} * \text{LNAPL Density})$ <p>LNAPL density was assumed to be approximately 0.75 grams per cubic centimeter</p>
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**TABLE 2**  
**FOURTH QUARTER 2011**  
**SUMMARY OF BTEX AND CHLORIDE CONCENTRATIONS IN GROUNDWATER**  
**J-4-2 PIPELINE RELEASE**  
**LEA COUNTY, NEW MEXICO**

Location Identification	Sample Date	Benzene (mg/l)	Toluene (mg/l)	Ethylbenzene (mg/l)	Total Xylenes (mg/l)	Chlorides (mg/l)	Comments
New Mexico Water Quality Control Commission Groundwater Standards (mg/L)		0.01	0.75	0.75	0.62	250*	
MW-1	12/8/2010	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-1	3/30/2011	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-1	9/16/2011	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-1	12/7/2011	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-2	12/8/2010	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-2	3/30/2011	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-2	9/16/2011	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-2	12/7/2011	LNAPL	LNAPL	LNAPL	LNAPL	LNAPL	
MW-3	12/8/2010	<0.001	<0.002	<0.002	<0.004	2530	
MW-3	3/30/2011	<0.001	<0.002	<0.002	<0.002	2230	
MW-3	6/11/2011	<0.001	<0.002	<0.002	<0.004	2210	
MW-3	9/16/2011	<0.001	<0.002	<0.002	<0.004	2190	Duplicate sample collected
MW-3	12/7/2011	<0.001	<0.002	<0.002	<0.004	2230	Duplicate sample collected
MW-4	12/8/2010	<0.001	<0.002	<0.002	<0.004	2740	
MW-4	3/30/2011	<0.001	<0.002	<0.002	<0.002	2300	
MW-4	6/11/2011	<0.001	<0.002	<0.002	<0.004	2230	
MW-4	9/16/2011	<0.001	<0.002	<0.002	<0.004	1980	
MW-4	12/7/2011	<0.001	<0.002	<0.002	<0.004	2010	
MW-6	12/8/2010	<0.001	<0.002	<0.002	<0.004	513	
MW-6	3/30/2011	<0.001	<0.002	<0.002	<0.002	491	
MW-6	6/11/2011	<0.001	<0.002	<0.002	<0.004	503	
MW-6	9/16/2011	<0.001	<0.002	<0.002	<0.004	476	
MW-6	12/7/2011	<0.001	<0.002	<0.002	<0.004	526	
MW-7	12/8/2010	<0.001	<0.002	<0.002	<0.004	1180	
MW-7	3/30/2011	<0.001	<0.002	<0.002	<0.002	1210	
MW-7	6/11/2011	<0.001	<0.002	<0.002	<0.004	1210	
MW-7	9/16/2011	<0.001	<0.002	<0.002	<0.004	1170	
MW-7	12/7/2011	<0.001	<0.002	<0.002	<0.004	1200	
MW-8	12/8/2010	<0.001	<0.002	<0.002	<0.004	336	
MW-8	3/30/2011	<0.001	<0.002	<0.002	<0.002	383	
MW-8	6/11/2011	<0.001	<0.002	<0.002	<0.004	454	
MW-8	9/16/2011	<0.001	<0.002	<0.002	<0.004	368	
MW-8	12/7/2011	<0.001	<0.002	<0.002	<0.004	348	

**Notes:**

- 1.) The environmental cleanup standards for water that are applicable to this site are the New Mexico Water Quality Control Commission (NMWQCC) Groundwater Standards.
- 2.) Monitoring well location MW-5 was not installed due to geologic refusal that was encountered during drilling activities.
- 3.) Data presented for all other well locations includes previous four sampling events, when available. Historic groundwater analytical results for these locations are available upon request.

Sample locations are shown on Figure 2 and analytical results are illustrated on Figure 4.

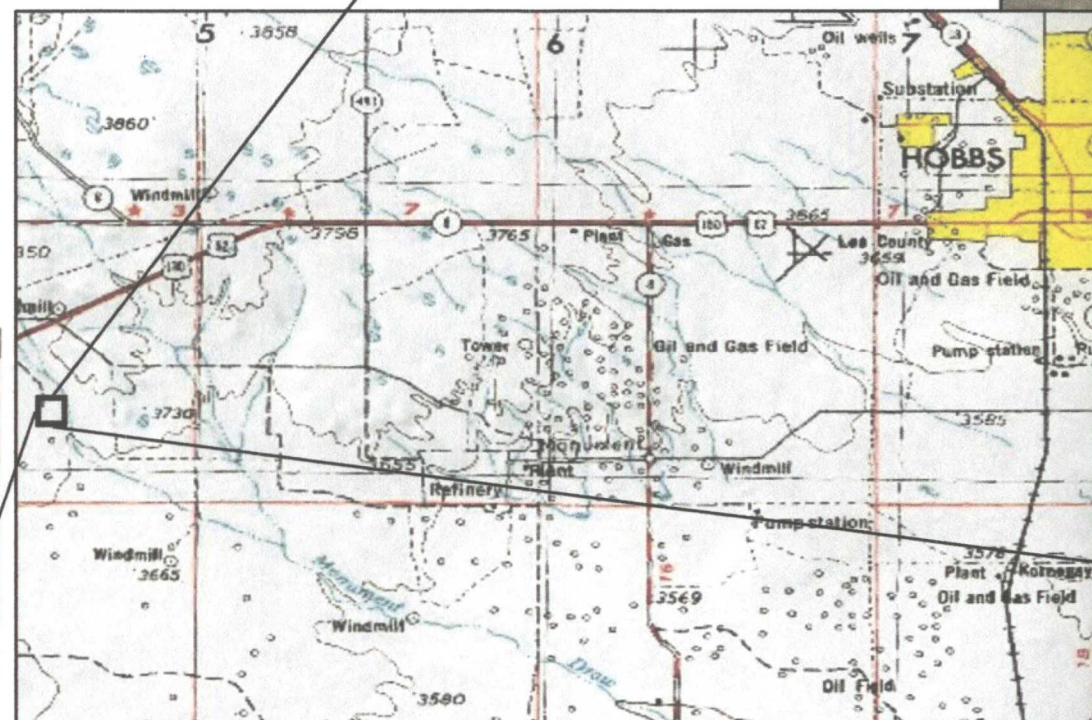
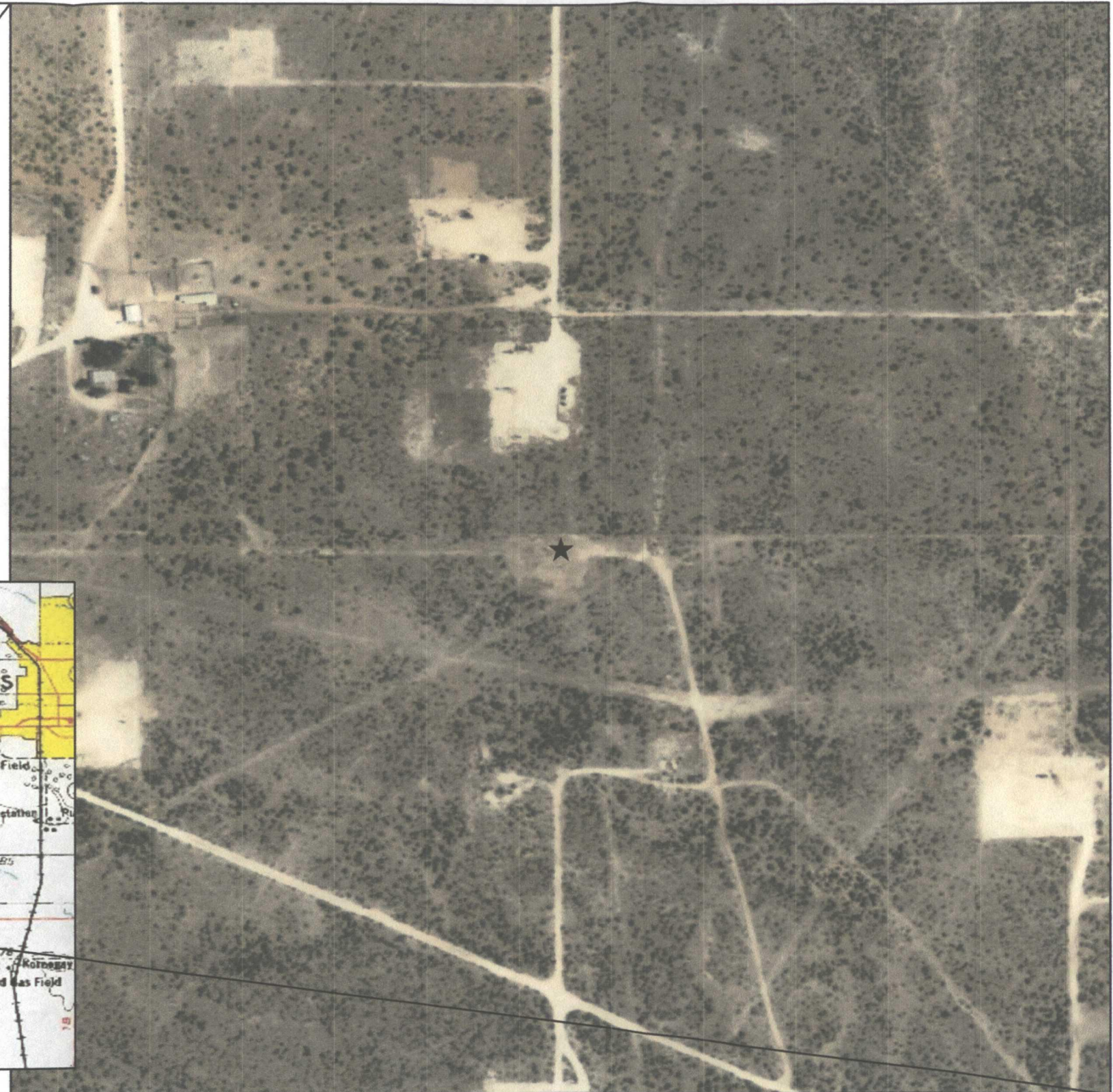
\* Chlorides are subject to the National Secondary Drinking Water Regulations (NSDWR) secondary maximum contaminant levels (SMCLs) and not an enforceably regulated constituent. The 250 mg/L standard is established only as a guideline to assist public water systems in managing their drinking water for aesthetic considerations, such as taste, color, and odor.

LNAPL = Light Non-Aqueous Phase Liquid

mg/L = milligrams per liter.

## Figures





NEW MEXICO

SANTA FE

SITE LOCATION

DESIGNED BY: B. Humphrey  
DRAWN BY: J. Clonts  
SHEET CHK'D BY: \_\_\_\_\_  
CROSS CHK'D BY: \_\_\_\_\_  
APPROVED BY: \_\_\_\_\_  
APPROVED BY: \_\_\_\_\_



Tasman Geosciences, LLC  
5690 Webster St.  
Arvada, CO 8002  
720-988-2024

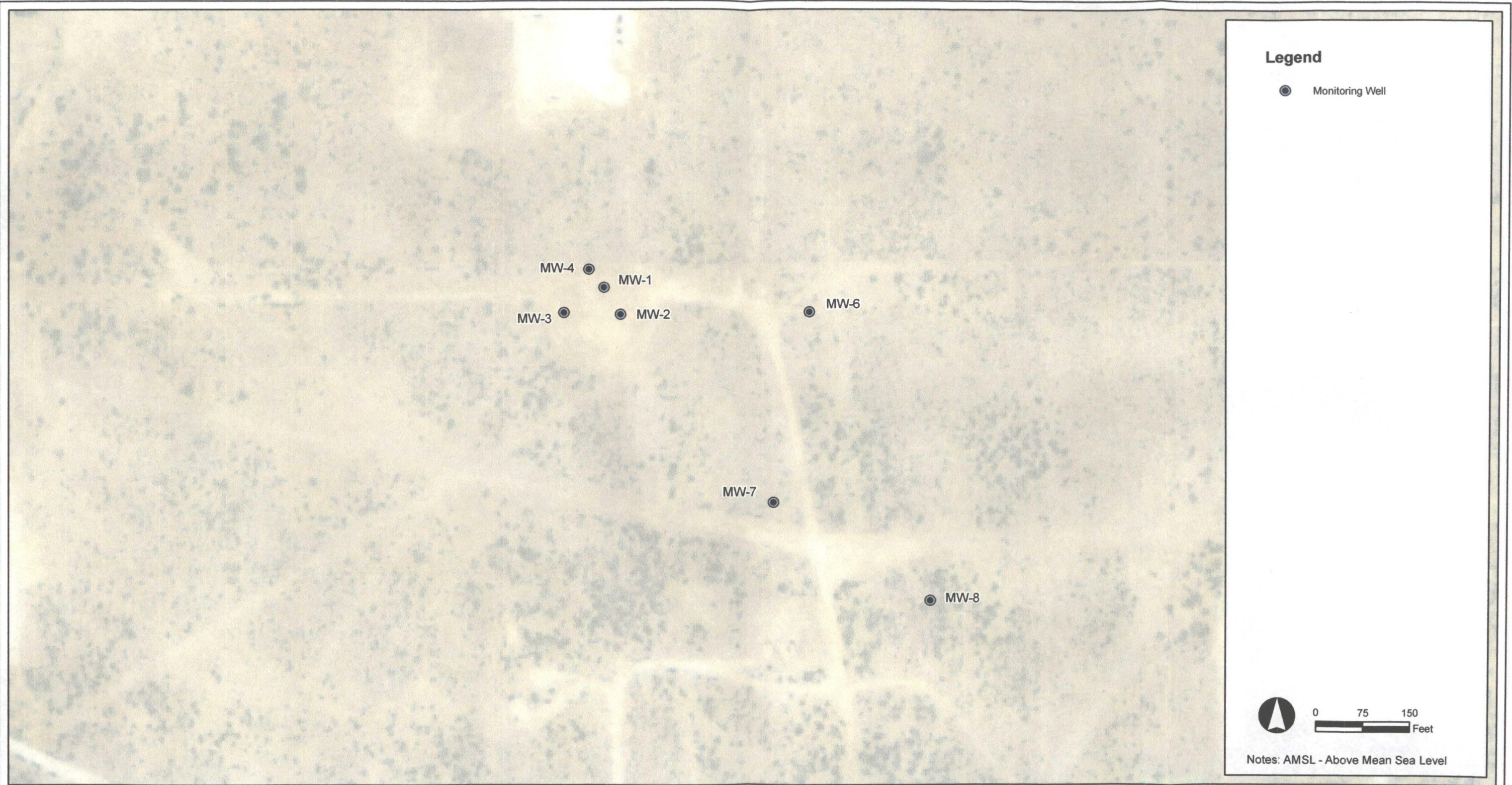
## J-4-2 PIPELINE RELEASE

*Fourth Quarter 2011 Groundwater Monitoring  
Summary Report*

SITE LOCATION

FIGURE  
1





DESIGNED BY: B. Humphrey  
DRAWN BY: J. Clonts  
SHEET CHK'D BY: \_\_\_\_\_  
CROSS CHK'D BY: \_\_\_\_\_  
APPROVED BY: \_\_\_\_\_  
APPROVED BY: \_\_\_\_\_



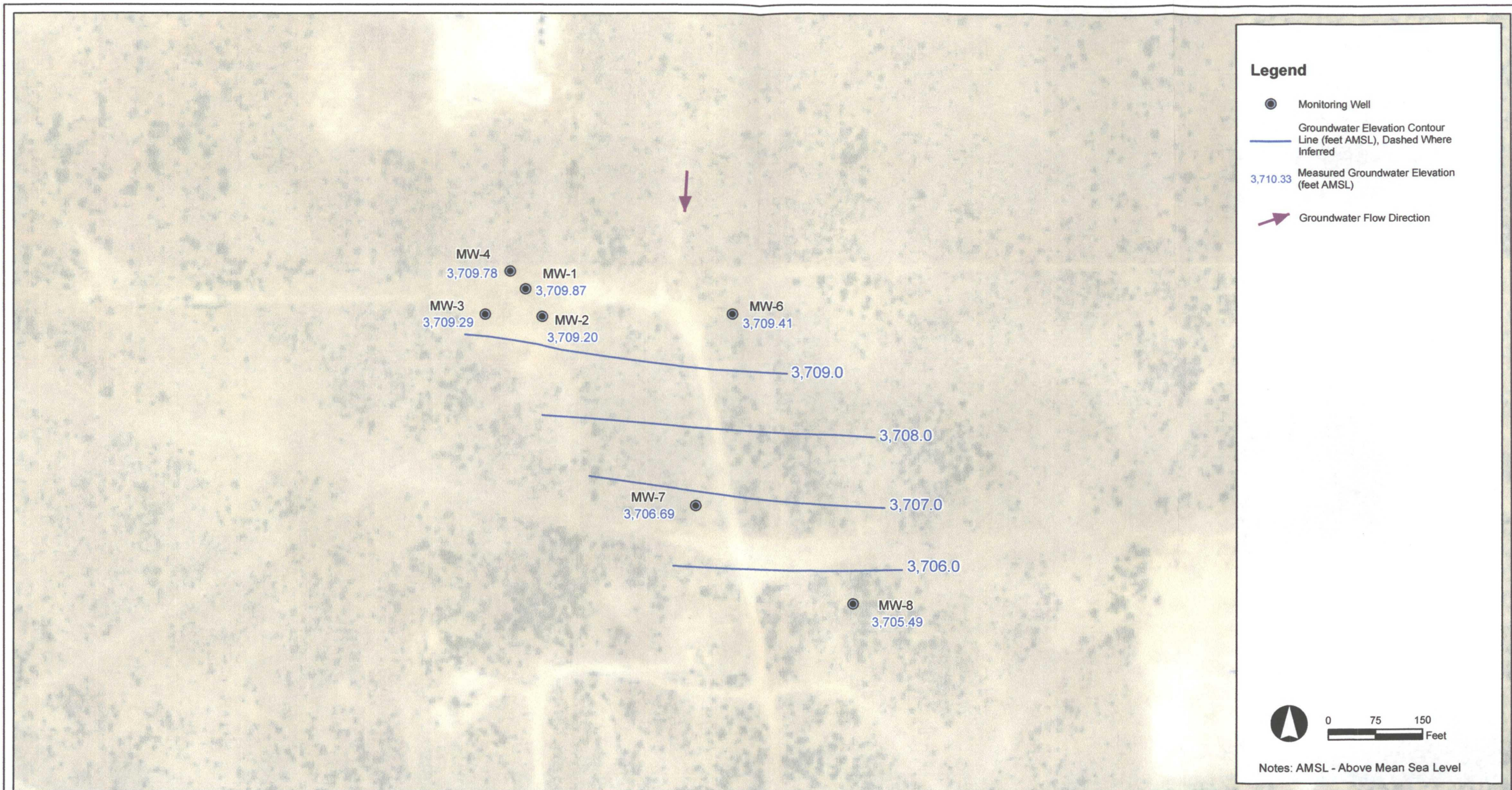
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Arvada, CO 8002  
720-988-2024

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Summary Report*

SITE MAP

FIGURE  
2





DESIGNED BY: C. Wasko

DRAWN BY: J. Clonts

SHEET CHK'D BY: \_\_\_\_\_

CROSS CHK'D BY: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_



Tasman Geosciences, LLC  
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**GROUNWATER ELEVATION  
CONTOUR MAP  
(DECEMBER 7, 2011)**

**FIGURE  
3**



MW-4		
Compound	9/16/2011 (mg/L)	12/7/2011 (mg/L)
Benzene	<0.001	<0.001
Toluene	<0.002	<0.002
Ethylbenzene	<0.002	<0.002
Total Xylenes	<0.004	<0.004
Chlorides	1980	2010

MW-3		
Compound	9/16/2011 (mg/L)	12/7/2011 (mg/L)
Benzene	<0.001	<0.001
Toluene	<0.002	<0.002
Ethylbenzene	<0.002	<0.002
Total Xylenes	<0.004	<0.004
Chlorides	2190	2230

MW-6		
Compound	9/16/2011 (mg/L)	12/7/2011 (mg/L)
Benzene	<0.001	<0.001
Toluene	<0.002	<0.002
Ethylbenzene	<0.002	<0.002
Total Xylenes	<0.004	<0.004
Chlorides	476	526

MW-7		
Compound	9/16/2011 (mg/L)	12/7/2011 (mg/L)
Benzene	<0.001	<0.001
Toluene	<0.002	<0.002
Ethylbenzene	<0.002	<0.002
Total Xylenes	<0.004	<0.004
Chlorides	1170	1200

MW-8		
Compound	9/16/2011 (mg/L)	12/7/2011 (mg/L)
Benzene	<0.001	<0.001
Toluene	<0.002	<0.002
Ethylbenzene	<0.002	<0.002
Total Xylenes	<0.004	<0.004
Chlorides	368	348

MW-1  
(0.20)

MW-2  
(0.28)

- Legend**
- Monitoring Well
  - (0.29) Measured LNAPL thickness in feet

Notes:

All aqueous analytical results are presented in milligrams per liter (mg/L)

LNAPL - Light Non Aqueous Phase Liquid



DESIGNED BY: C. Wasko

DRAWN BY: J. Clonts

SHEET CHK'D BY: \_\_\_\_\_

CROSS CHK'D BY: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_

APPROVED BY: \_\_\_\_\_



Tasman Geosciences, LLC  
5690 Webster St.  
Arvada, CO 8002  
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**J-4-2 PIPELINE RELEASE**

*Fourth Quarter 2011 Groundwater Monitoring  
Summary Report*

ANALYTICAL RESULTS MAP

FIGURE  
4



**Appendix A**  
**Laboratory Analytical Report**