2R - 56

REPORTS

DATE:

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2007

2R0056

Whole Earth Environmental, Inc.
2103 Arbor Cove
Katy, Tx. 77494
281.394.2050
whearth@msn.com

2007 FEB 12 AM 10 58

February 6, 2007

NMOCD
1220 So. Saint Francis Dr.
Sante Fe, NM 87505

Attn: Glenn von Gonten

Re: AVALON HILLS 7 FED. COM # 3 DELINEATION PROJECT
SECTION 7, TOWNSHIP 21 SOUTH, RANGE 27 EAST, EDDY COUNTY
NEW MEXICO
2R0056

Dear Glenn:

We have completed the steps outlined within your approval letter of October 23, 2006 relating to the above referenced project. The results obtained to date may at best be considered ambiguous. Devon Energy is committed to devoting the required resources necessary to assess groundwater quality at this location. Through this letter we request permission from the NMOCD to continue our efforts to define site impact and background groundwater conditions.

You may recall that in our initial investigation, we were only able to complete three delineation wells at five attempted locations. The two unsuccessful delineation sites failed due to drilling encountering open voids at depth. The data collected after our well purging efforts at the three active monitor wells has not, in our opinion, clearly defined the background quality of the groundwater.

Included with this letter is a map presenting proposed monitoring well locations and a table presenting laboratory analytical results for the three (MW-1, MW-2 and MW-4) completed monitoring wells.

Data Discussion

MW-1

This well is situated within five feet of the former Avalon Hills 7 Fed Com #3 wellhead. Originally drilled to a depth of 100' below ground surface (bgs), we went through a thin (12') saturated lens of red-bed into a silty sand zone atop a void. The well was plugged back to a total depth of 77' bgs. The thin 12' saturated interval is being purged and monitored by this well. The recharge rate from this interval was measured to be 0.16 gallons per hour, effectively limiting groundwater recovery and delaying sample collection. The total dissolved BTEX (benzene, toluene, ethylbenzene and xylenes) concentration in the recovered fluids has dropped from the originally detected 15,497 ppm (parts per million) to 87.5 ppm with relatively low volumes of fluid purged from the well bore. The chloride concentration range remains near the originally detected level of approximately 50,000 ppm. It should be noted that this thin, low yield saturated interval may actually be a relic of the original well control

issue and therefore may not provide an accurate representation of the conditions in naturally occurring saturated intervals in the area. Because of the low yield and limited thickness of this potentially artificially saturated interval, the exposure risk from this impact may also be relatively low.

The original plan was to actively pump the fluids from this well bore to remove the source of impact. However, due to the slow recharge rate, this plan may not be appropriate for this thin saturated interval.

MW-2

The first 60' of the lithology was tight red clay underlain by thin lenses of sandstone and limestone. This well was bored to a total depth of 97' and plugged back and completed at 87'. Pumping at a rate of ninety gallons per hour had no influence on the fluid level within the well bore. Based on this, we can assume that the recharge rate is higher than the pumping rate. Approximately 400 gallons of groundwater has been recovered from this well. Analytical testing has not detected dissolved BTEX. The chloride concentration detected in the well has remained steadily between 370 and 390 ppm.

MW's-3 & 3A

Both wells were drilled to the south and east of the wellhead and terminated into voids. You will note, from the drilling logs contained within the original report, that the morphology of the soils is completely different between each well though the sites were separated by only a few hundred feet. The heterogeneity of the near surface deposits is apparent in these borings. This heterogeneity makes well to well lithologic correlation difficult at best. This demonstrated heterogeneity also supports the idea that the thin, low yield saturated interval being monitored in MW-1 may indeed be a relic of the original well control issue and an isolated interval of impact.

MW-4

MW-4 was drilled approximately 900' in the (based on topography) down-gradient direction of the Avalon Hills 7 wellhead. The well was bored to a total depth of 100' and the well was installed with the bottom of the well screen set at 98'. Pumping at a rate of ninety gallons per hour had no influence on the fluid level within the well bore. Based on this, we can assume that the recharge rate is higher than the pumping rate. Approximately 400 gallons of groundwater has been recovered from this well. The chloride concentration has stayed consistently in the approximately 1,200 ppm range after the initially detected concentration of 797 ppm. This concentration is higher than what we are presently assuming to be the background chloride concentration detected at MW-2.

Groundwater depth in all 3 wells is similar. The groundwater recharge rate in wells MW-2 and MW-4 significantly exceed the recharge rate for MW-1. It is still not clear if there is a hydraulic connection between the saturated intervals monitored in these three wells. The chloride concentrations in MW-2 and MW-4 are significantly lower than the concentration detected in MW-1. The high rate of recharge in MW-2 and MW-4 is indicative of the degree of water saturation and permeability encountered in these wells. The low recharge rate in MW-1 indicates a much lower permeability and possibly less water saturation in the monitored interval. Based on this, it is suspected that there is not a permeability or porosity connection between MW-1 and the two other wells. The fluid in MW-1 is believed to possibly be a relic of the well control incident and the chloride concentrations in MW-2 and MW-4 likely represent background and/or some minor impact from the well control incident.

Additional Investigation

Before installing additional water wells, we recommended that a groundwater potentiometric surface map be developed to determine a general local groundwater flow gradient as well as provide a check to see if there is a saturated interval correlation between the wells. Groundwater samples collected from the three monitoring wells were analyzed for dissolved anions and cations to determine the geochemical relationship of the water saturated intervals to each other.

The analysis indicated a hydraulic connection. We propose advancing at least two additional monitoring wells at the approximate locations shown on the attached satellite photograph. Proposed location MW-5 is situated up-gradient to the north and east of the well pad and should provide data on the background chloride concentrations within the monitored groundwater. The second well (MW-6) is proposed to be drilled at a location slightly north and west of MW-4 in order to give some additional data to be compared to the results seen at MW-4.

We propose to sample the wells on a periodic basis with a minimum of 100 gallons being purged from all wells except MW-1, where we will remove as much fluid as the formation will allow. We will report back to you within two weeks of receipt of the final laboratory analytical results with further recommendations and conclusions.

Thank you again for your interest in the project. We very much look forward to working with you to obtain a better understanding of the site.

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	Monitor Well # 4 BTEX (ppm)			
	Benzene	Toluene	Ethylbenzene	Xylene
08/01/06	N/D	N/D	N/D	N/D

	Monitor Well # 2 BTEX (ppm)			
	Benzene	Toluene	Ethylbenzene	Xylene
08/01/06	N/D	N/D	N/D	N/D

Notes:

1. *Monitor wells 2 and 4 each had a minimum of 100 gallons of fluid removed prior to each sampling event*
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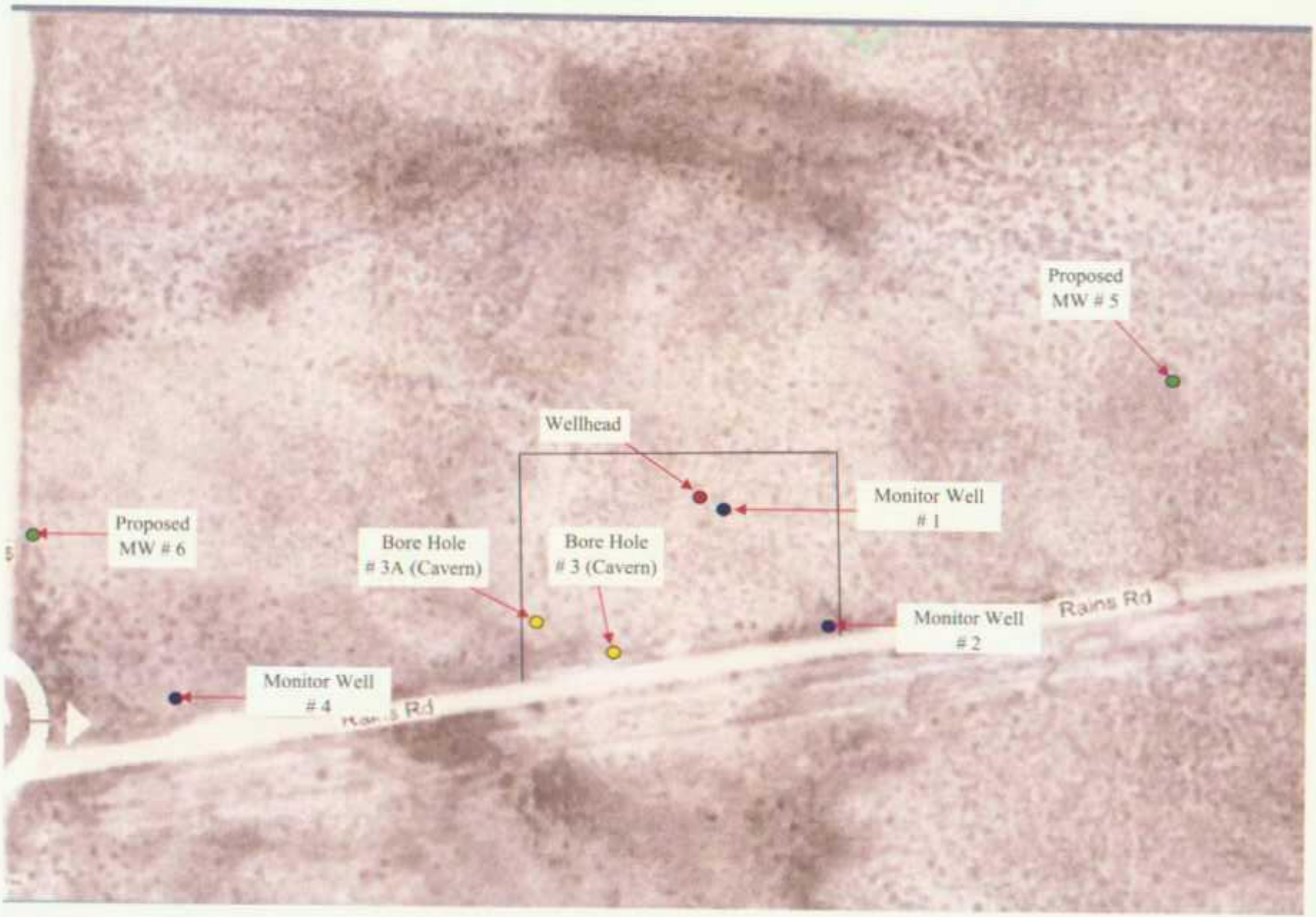
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MW-4

MW-4 was drilled approximately 900' in the (based on topography) down-gradient direction of the Avalon Hills 7 wellhead. The well was bored to a total depth of 100' and the well was installed with the bottom of the well screen set at 98'. Pumping at a rate of ninety gallons per hour had no influence on the fluid level within the well bore. Based on this, we can assume that the recharge rate is higher than the pumping rate. Approximately 400 gallons of groundwater has been recovered from this well. The chloride concentration has stayed consistently in the approximately 1,200 ppm range after the initially detected concentration of 797 ppm. This concentration is higher than what we are presently assuming to be the background chloride concentration detected at MW-2.

Groundwater depth in all 3 wells is similar. The groundwater recharge rate in wells MW-2 and MW-4 significantly exceed the recharge rate for MW-1. It is still not clear if there is a hydraulic connection between the saturated intervals monitored in these three wells. The chloride concentrations in MW-2 and MW-4 are significantly lower than the concentration detected in MW-1. The high rate of recharge in MW-2 and MW-4 is indicative of the degree of water saturation and permeability encountered in these wells. The low recharge rate in MW-1 indicates a much lower permeability and possibly less water saturation in the monitored interval. Based on this, it is suspected that there is not a permeability or porosity connection between MW-1 and the two other wells. The fluid in MW-1 is believed to possibly be a relic of the well control incident and the chloride concentrations in MW-2 and MW-4 likely represent background and/or some minor impact from the well control incident.

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Before installing additional water wells, we recommended that a groundwater potentiometric surface map be developed to determine a general local groundwater flow gradient as well as provide a check to see if there is a saturated interval correlation between the wells. Groundwater samples collected from the three monitoring wells were analyzed for dissolved anions and cations to determine the geochemical relationship of the water saturated intervals to each other.

The analysis indicated a hydraulic connection. We propose advancing at least two additional monitoring wells at the approximate locations shown on the attached satellite photograph. Proposed location MW-5 is situated up-gradient to the north and east of the well pad and should provide data on the background chloride concentrations within the monitored groundwater. The second well (MW-6) is proposed to be drilled at a location slightly north and west of MW-4 in order to give some additional data to be compared to the results seen at MW-4.

We propose to sample the wells on a periodic basis with a minimum of 100 gallons being purged from all wells except MW-1, where we will remove as much fluid as the formation will allow. We will report back to you within two weeks of receipt of the final laboratory analytical results with further recommendations and conclusions.

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cc: C. Biagi, Devon Energy, OKC, OK

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08/01/06	N/D	N/D	N/D	N/D

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	Benzene	Toluene	Ethylbenzene	Xylene
08/01/06	N/D	N/D	N/D	N/D

Notes:

1. *Monitor wells 2 and 4 each had a minimum of 100 gallons of fluid removed prior to each sampling event*
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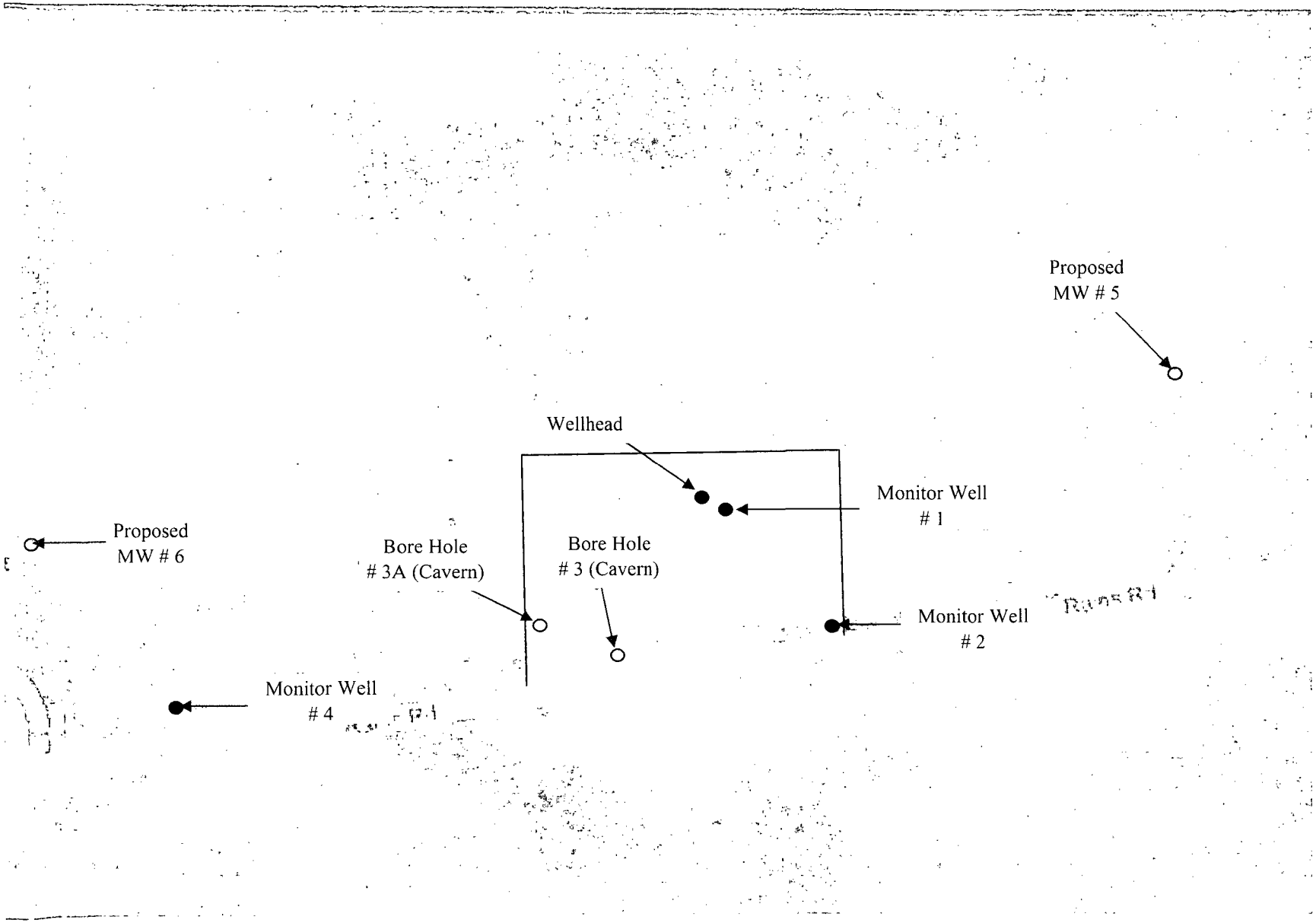
Proposed
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Wellhead
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1
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Bore Hole
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Oil Conservation Division
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MW-1

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The first 60' of the lithology was tight red clay underlain by thin lenses of sandstone and limestone. This well was bored to a total depth of 97' and plugged back and completed at 87'. Pumping at a rate of ninety gallons per hour had no influence on the fluid level within the well bore. Based on this, we can assume that the recharge rate is higher than the pumping rate. Approximately 400 gallons of groundwater has been recovered from this well. Analytical testing has not detected dissolved BTEX. The chloride concentration detected in the well has remained steadily between 370 and 390 ppm.

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Additional Investigation

Before installing additional water wells, we recommend that a groundwater potentiometric surface map be developed to determine a general local groundwater flow gradient as well as provide a check to see if there is a saturated interval correlation between the wells. Groundwater samples collected from the three monitoring wells should be analyzed for dissolved anions and cations to determine the geochemical relationship of the water saturated intervals to each other.

If this analysis indicates a hydraulic connection then we propose advancing at least two additional monitoring wells at the approximate locations shown on the attached satellite photograph. Proposed location MW-5 is situated up-gradient to the north and east of the well pad and should provide data on the background chloride concentrations within the monitored groundwater. The second well (MW-6) is proposed to be drilled at a location slightly north and west of MW-4 in order to give some additional data to be compared to the results seen at MW-4.

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Proposed
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Wellhead
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Additional Investigation

Before installing additional water wells, we recommend that a groundwater potentiometric surface map be developed to determine a general local groundwater flow gradient as well as provide a check to see if there is a saturated interval correlation between the wells. Groundwater samples collected from the three monitoring wells should be analyzed for dissolved anions and cations to determine the geochemical relationship of the water saturated intervals to each other.

If this analysis indicates a hydraulic connection then we propose advancing at least two additional monitoring wells at the approximate locations shown on the attached satellite photograph. Proposed location MW-5 is situated up-gradient to the north and east of the well pad and should provide data on the background chloride concentrations within the monitored groundwater. The second well (MW-6) is proposed to be drilled at a location slightly north and west of MW-4 in order to give some additional data to be compared to the results seen at MW-4.

We propose to sample the wells on a periodic basis with a minimum of 100 gallons being purged from all wells except MW-1, where we will remove as much fluid as the formation will allow. We will report back to you within two weeks of receipt of the final laboratory analytical results with further recommendations and conclusions.

Thank you again for your interest in the project. We very much look forward to working with you to obtain a better understanding of the site.

Warmest personal regards,

Mike Griffin
President
Whole Earth Environmental, Inc.

Attachments

cc: C. Biagi, Devon Energy, OKC, OK

Devon Energy Company
Avalon Hills Monitoring Project
Laboratory Analytical Result Summary

	Chlorides (ppm)		
	MW-1	MW-2	MW-4
08/01/06	52,800	372	797
10/29/06	34,984		
10/31/06	48,185	384	1,220
11/19/06	51,000	370	1,200
11/26/06	50,000	390	1,200

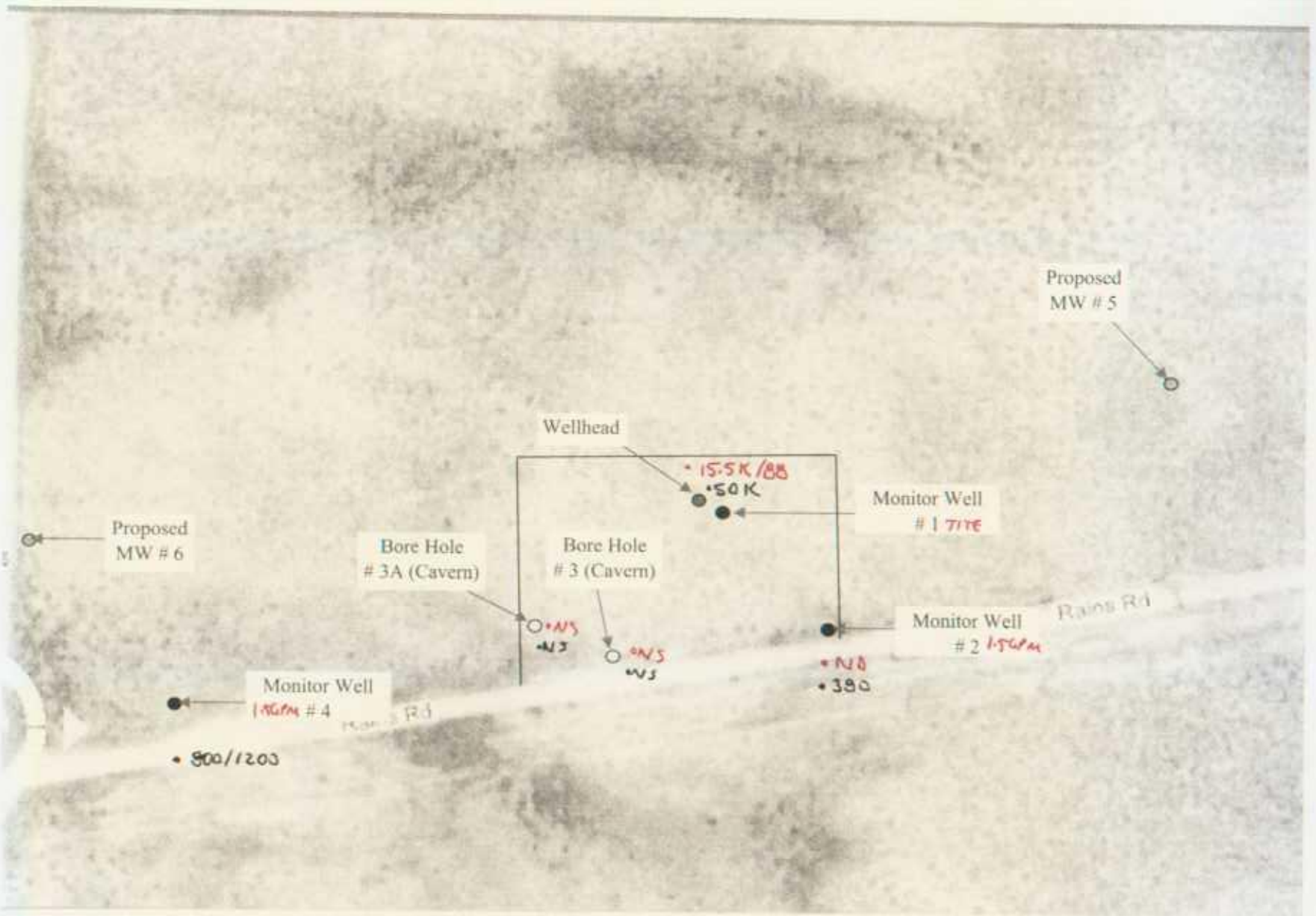
	Monitor Well # 1 BTEX (ppm)			
	Benzene	Toluene	Ethylbenzene	Xylene
08/01/06	2,540.00	10,200.00	2,740.00	17.00
10/31/06	1.83	3.26	0.26	1.75
11/19/06	6.10	22.00	0.77	9.40
11/26/06	4.00	20.00	0.57	6.50
GW Stds.	0.01	0.75	0.75	0.62

	Monitor Well # 4 BTEX (ppm)			
	Benzene	Toluene	Ethylbenzene	Xylene
08/01/06	N/D	N/D	N/D	N/D

	Monitor Well # 2 BTEX (ppm)			
	Benzene	Toluene	Ethylbenzene	Xylene
08/01/06	N/D	N/D	N/D	N/D

Notes:

1. *Monitor wells 2 and 4 each had a minimum of 100 gallons of fluid removed prior to each sampling event*
2. *Monitor well no. 1 had a minimum of two bore volumes removed prior to each sampling event*


N
Proposed
MW # 5
Wellhead
• 15.5K/88
•50K
Monitor Well
1 TITE
Proposed
MW # 6
Bore Hole
3A (Cavern)
Bore Hole
3 (Cavern)
Monitor Well
2 1.5GPM
Raine Rd
•NS
•NS
•NS
•NS
•NS
•380
Monitor Well
1.5GPM # 4
• 900/1200
• BTEX
• Cl⁻