# NM1 - 50

# BORING PLAN(S)

# 2010-2011

## Jones, Brad A., EMNRD

**From:** Don Baldwin <don.baldwin@geomatengineering.com>
**Sent:** Wednesday, July 27, 2011 9:07 AM
**To:** Jones, Brad A., EMNRD
**Subject:** Crowe Blanco Well Abondonment

Brad,

Richard Cheney asked me to speak with you regarding the monitor well at Crowe Blanco where the screen and bentonite seal extend above the confined water level. The well number is MW-2.

Should we abandon the well by grouting or cementing it? Or can it be left in place?

If it is necessary to abandon the well, we would like the drillers to do it today before they leave the site. I realize this is rather short notice, but we thought it would save a mobilization if we end up abandoning the well.

Thanks,

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell

## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Wednesday, July 13, 2011 9:47 AM
**To:** 'Don Baldwin'; Powell, Brandon, EMNRD
**Cc:** 'Richard'
**Subject:** RE: Crowe Blanco Drilling Schedule

Don,

Thank you for the update. Please contact Mr. Brandon Powell of OCD's Aztec District Office (Office: 505-334-6178 ext. 116 or Mobile: 505- 320-0200) and myself if there are any scheduling changes and updates.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

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**From:** Don Baldwin [mailto:don.baldwin@geomatengineering.com]
**Sent:** Monday, July 11, 2011 10:08 AM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Richard'
**Subject:** Crowe Blanco Drilling Schedule

Brad,

GEOMAT has Enviro-Drill scheduled to begin drilling the additional borings/monitor wells at the Crowe Blanco site on Monday, July 18, 2011. We don't have a time scheduled yet, but it is typically around 10 a.m. the first day.

Thanks,

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell

## Jones, Brad A., EMNRD

**From:** Don Baldwin <don.baldwin@geomatengineering.com>
**Sent:** Monday, July 11, 2011 10:08 AM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Richard'
**Subject:** Crowe Blanco Drilling Schedule

Brad,

GEOMAT has Enviro-Drill scheduled to begin drilling the additional borings/monitor wells at the Crowe Blanco site on Monday, July 18, 2011. We don't have a time scheduled yet, but it is typically around 10 a.m. the first day.

Thanks,

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell

## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Thursday, June 23, 2011 3:17 PM
**To:** 'Marcella Marquez'; Powell, Brandon, EMNRD
**Cc:** 'richard@c-w-e.com'; 'Don Baldwin'
**Subject:** RE: GEOMAT Work Plan for Crowe Blanco
**Attachments:** GEOMAT Work Plan_Rev 7.pdf; 2011 6-23 Blanco Boing Plan Approval.pdf

Marcella,

Please see the attached… it is the boring plan and approval. Hardcopies of the approval have been placed in the mail. Please notify Brandon Powell (OCD District Office - Aztec) and myself prior to initiating any drilling.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

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**From:** Don Baldwin [mailto:don.baldwin@geomatengineering.com]
**Sent:** Thursday, June 23, 2011 1:37 PM
**To:** Jones, Brad A., EMNRD
**Subject:** GEOMAT Work Plan for Crowe Blanco

Brad,

Please find attached GEOMAT's Work Plan for installing three additional monitor wells at the Crowe Blanco site. Please review it and let Richard or myself know if you have any questions or need additional information.

Thanks,

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell

New Mexico Energy, Minerals and Natural Resources Department



June 23, 2011

Ms. Marcella Marquez
Industrial Ecosystems, Inc.
49 CR 3150
Aztec, New Mexico 87410

**RE: Boring Plan – Proposed Work Plan**
**Commercial Surface Waste Management Facility**
**Crowe Blanco, LLC – Blanco Landfarm**
**Facility Location: W/2 and SW/4 SE/4 of Section 16, Township 29 North, Range 9 West NMPM**
**San Juan County, New Mexico**

Dear Ms. Marquez:

The Oil Conservation Division (OCD) has received Crowe Blanco, LLC's boring plan proposal, dated June 17, 2011, to further investigate and characterize the uppermost aquifer and subsurface geology for a proposed commercial surface waste facility permit (Blanco Landfarm) located in the W/2 and SW/4, SE/4 of Section 16, Township 29 North, Range 9 West NMPM, San Juan County, New Mexico. The OCD has reviewed the proposal and determined that the proposal is adequate to proceed with the additional site investigation.

The OCD agrees that the proposed three (3) additional boring/monitoring well locations appear adequate. However, if the hydrogeologic conditions cannot be determined, additional borings or monitoring wells may be needed. It should be understood that if a monitoring well is constructed, it shall be bailed until fully developed.

The OCD appreciates your cooperation in providing a boring plan for review, in order to determine if the submitted application and the proposed site are suitable for approval. If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3487 or brad.a.jones@state.nm.us.

Sincerely,

Brad A. Jones
Environmental Engineer

BAJ/baj

cc: OCD District III Office, Aztec
Richard Cheney, Cheney-Walters-Echols, Inc., Farmington, NM
Donald Baldwin, GEOMAT, Inc., Farmington, NM

GEOMAT INC
915 Malta Avenue ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

June 17, 2011
GEOMAT Proposal No. 102-06-17 Rev. 7

**Richard P. Cheney, P.E.**
Cheney-Walters-Echols, Inc.
909 West Apache Street
Farmington, New Mexico 87401

RE: Proposed Work Plan
Additional Monitor Wells Installation
Crowe Blanco Properties, LLC – Operated by IEI
Blanco, New Mexico

GEOMAT Inc. (GEOMAT) is pleased to submit this Work Plan for the installation of three additional groundwater monitor wells (MW-8, MW-9 and MW-10) at the proposed Crowe Blanco Properties, LLC facility near Blanco, New Mexico.

The purpose of these additional wells is to further evaluate the depth of groundwater beneath the site. The water level data from the additional wells will be plotted on the potentiometric surface map and will be used to help characterize different portions of the site based on depth to groundwater.

Our scope of work follows:

- Using subcontracted drilling services, GEOMAT will drill three boreholes at the approximate locations described below and depicted on the attached Site Plan.
    - One boring (MW-8) will be located near the northern boundary of the site approximately 100 feet south of U.S. Highway 64 and 500 feet west of County Road 4445 at a ground surface elevation of approximately 5756 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 110 feet below ground surface, whichever is shallower.
    - A second boring (MW-9) will be located near the western boundary of the site roughly 1,200 feet south of existing well MW-2 and 800 feet north of MW-6. The ground surface elevation at this location is approximately 5715 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 55 feet below ground surface, whichever is shallower.
    - A third boring (MW-10) will be located near the eastern boundary of the site roughly 1,200 feet north of County Road 4450 and 1,700 feet southeast of

existing well MW-4. The ground surface elevation at this location is approximately 5778 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 110 feet below ground surface, whichever is shallower.

- The borings will be drilled using continuous-flight, hollow-stem auger and/or air-rotary equipment. Continuous core samples of the subsurface materials will be obtained from each boring during drilling. A geologist from our office will monitor the drilling operations and prepare a continuous log of each boring.

- Moisture-bearing zones encountered during drilling will be evaluated to determine whether they are viable water-producing zones. Drilling will be halted upon encountering a moist zone and the borehole pumped or bailed dry. The boring will be allowed to sit overnight to allow time for any infiltration of water to occur.

- Borings in which groundwater is encountered will be completed as permanent monitor wells as described in the attached Work Plan submitted by our drilling subcontractor, Enviro-Drill Inc. (EDI). If a confined aquifer is encountered, the well will be constructed such that the bentonite seal is installed at the depth at which water was initially encountered during drilling.

- The static water level in each well will be measured using an electronic water-level indicator. Water levels will be determined relative to the top of casing (TOC) on the north side of each well casing.

- The natural ground surface elevation will be determined at the location of each well. Any manipulation of the natural ground surface elevation by cutting or filling will be documented. The difference between the TOC and natural ground surface elevations will be used to determine the depth to groundwater below natural ground surface at each well.

- The water-level data will be used to determine the potentiometric surface using the Strike and Dip Geologist's Three-Point Method.

It is anticipated that the drilling and monitor well installation will take five to seven days to complete. GEOMAT will notify NMOCD one week prior to commencing the work.

Thank you for the opportunity to work with you on this project. If you have any questions or need additional information, please let us know.

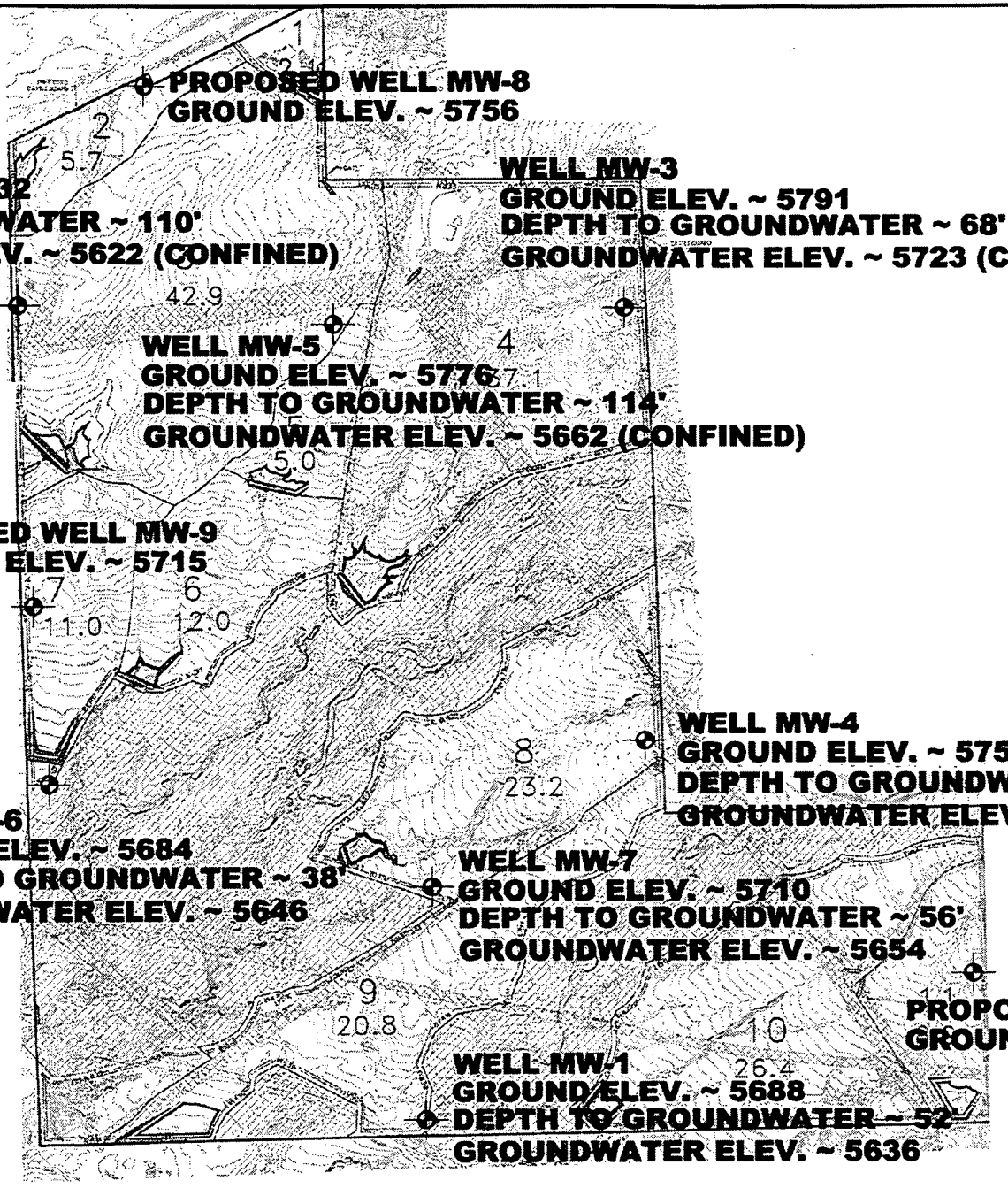
Respectfully submitted,
GEOMAT Inc.

Donald R. Baldwin

Donald R. Baldwin
Geologist

Attachments: Site Plan – Proposed Monitor Well Locations
EDI Work Plan

cc: Brad A. Jones, NMOCD




REVISED: 6/17/11

| | | |
|---|---|---|
| Approximate<br>Not to Scale | SITE PLAN<br>Monitor Well Locations (approximate)<br>GEOMAT Project No. 102-1162 | PROJECT<br>Crowe Blanco Properties, LLC<br>Operated by IEI<br>Blanco, New Mexico |

GEOMAT INC

Geomat
EDI Ref. No. 2380PH157 Revision 3

WORK PLAN

EDI will complete the proposed project by continuously coring all boreholes to total depth utilizing an HQ wireline coring system. The diameter of the borehole will be 4-inches, allowing for the placement of a 2-inch monitor system if groundwater is encountered. This will eliminate the need for borehole reaming.

EDI will utilize air-coring methods "with foam injection" on a limited basis for borehole stability or to facilitate removal of cuttings from boreholes, especially at deeper depths. The foam will be an environmentally safe, non-hydrocarbon based product. The cores will be placed in wax-covered HQ cardboard core boxes, with 10 feet of core in each box. The cores will be retained by Geomat field personnel.

If no groundwater is encountered in the borehole, EDI will abandon it by tremming a bentonite/cement mixture from bottom to top to avoid bridging and to keep surface water from migrating down the borehole.

If groundwater is encountered, EDI will set a permanent 2-inch monitor well in the borehole, with 20 feet of pre-packed, 0.010 slotted screen. Fifteen feet of screen will be placed below the water table, and 5-feet above the water table. A 10/20 silica sand pack will be placed around the pre-pack screen to two feet above the screened interval. A bentonite plug seal four feet thick will be placed on top of the sand pack, with the remaining annulus filled with a bentonite/cement grout to surface. The surface completion will consist of a 5-foot by 4-inch steel lockable shroud, set 3-feet below surface and 2-feet above in a 4'x4'x4" concrete pad with three bollards placed in a triangular formation to protect the well. The well will be developed by bailing to remove sediment.

## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Thursday, April 28, 2011 6:09 PM
**To:** Powell, Brandon, EMNRD
**Subject:** FW: GEOMAT Notice of Drilling
**Attachments:** Crowe Blanco Access Maps.pdf

FYI....

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**From:** Don Baldwin [mailto:don.baldwin@geomatengineering.com]
**Sent:** Thursday, April 28, 2011 4:32 PM
**To:** Jones, Brad A., EMNRD
**Subject:** GEOMAT Notice of Drilling

Brad,

GEOMAT is scheduled to meet Enviro-Drill at the Crowe Blanco site next Monday, May 2, 2011 at about 10:00 a.m. to begin drilling for the two (possibly three) additional monitor wells.

Please find attached two maps showing how to get to the Crowe Blanco site. From the intersection of US 64 & US 550 in Bloomfield, NM, travel east on US 64 for 11.1 miles to County Road 4445. Turn right (south) onto CR 4445 and the site is spread out in front of you in all its glory.

I will be meeting the drillers just off the highway in the first comfortable pullout off of CR 4445. I believe we will begin drilling at MW-6, and we will have to look at how to best access that location once the drillers arrive. Once we begin drilling, it should be easy to find the drill rig on the site. My cell phone is (505) 860-9400, if anyone needs to contact me.

Let me know if you need any additional information.

Thanks,

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell

## Jones, Brad A., EMNRD

**From:** Don Baldwin <don.baldwin@geomatengineering.com>
**Sent:** Thursday, April 28, 2011 4:32 PM
**To:** Jones, Brad A., EMNRD
**Subject:** GEOMAT Notice of Drilling
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Let me know if you need any additional information.

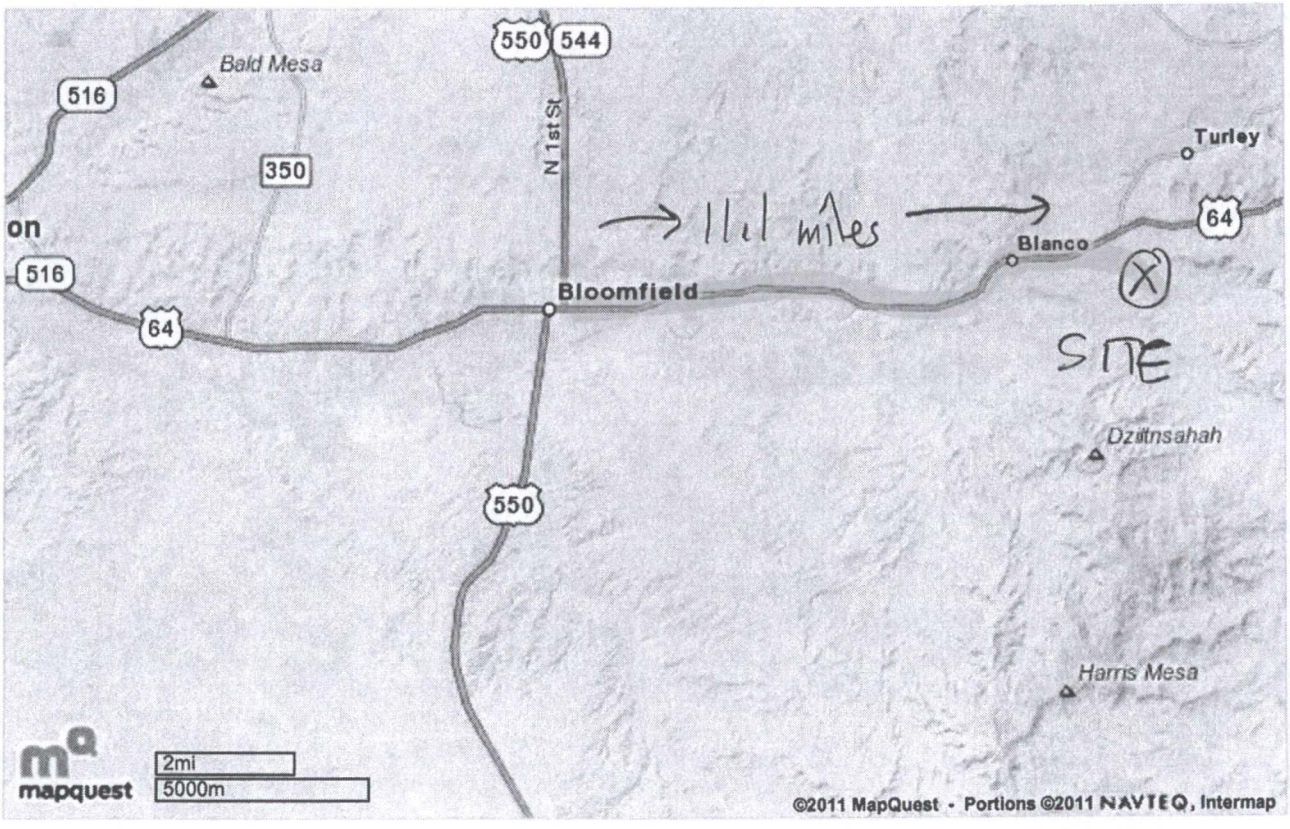
Thanks,

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell

mapquest

This map doesn't contain any items.

Notes



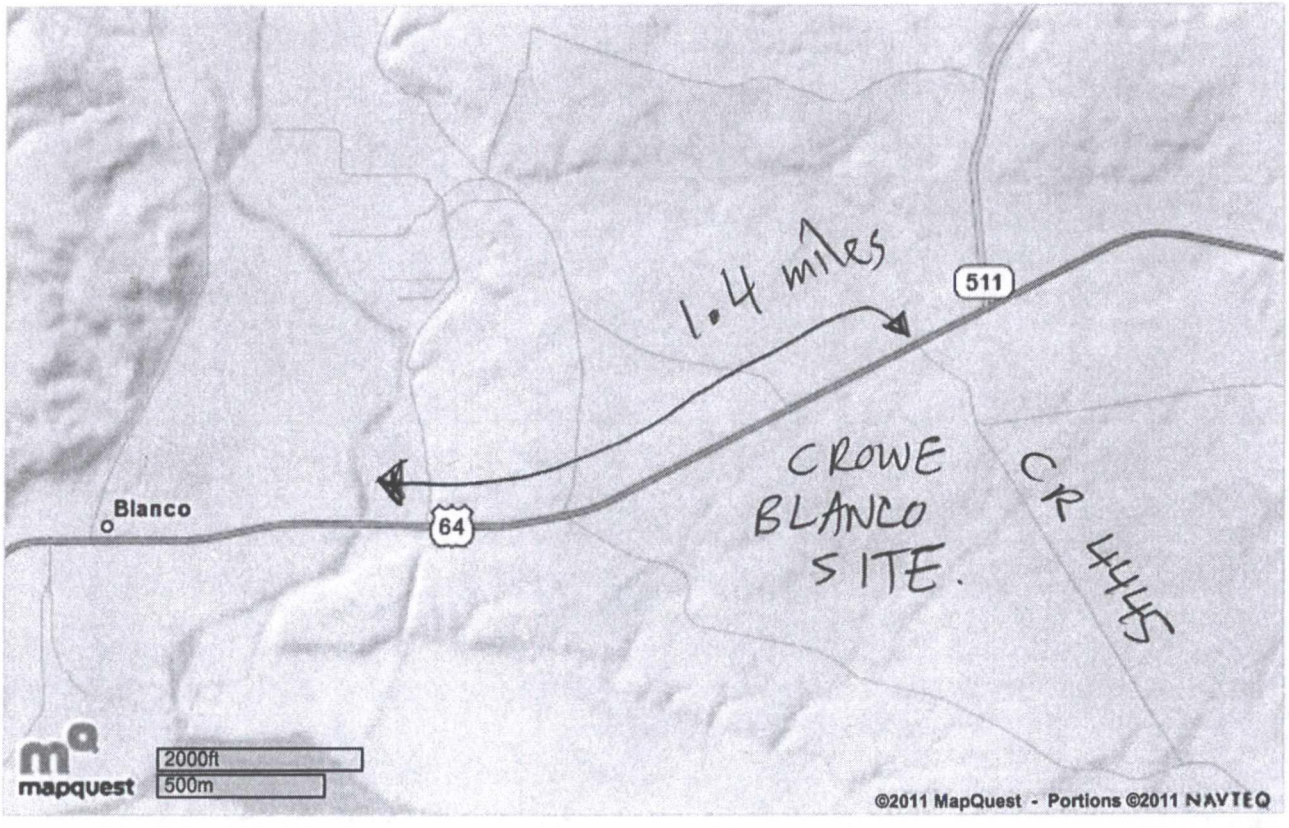



From intersection of US 64 & US 550 in Bloomfield, go East on 64 ~11.1 miles. Go South on CR 4445 ~ 1/2 mile to access drilling locations.

mapquest

This map doesn't contain any items.

Notes






Crowe Blanco site is 11.1 miles E of Bloomfield

or 1.4 miles E of the San Juan River bridge on the east side of Blanco.

## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Thursday, April 21, 2011 5:17 PM
**To:** 'Don Baldwin'; richard@c-w-e.com
**Cc:** Powell, Brandon, EMNRD
**Subject:** RE: GEOMAT Revised Work Plan
**Attachments:** Work Plan_Rev 6.pdf

The Oil Conservation Division (OCD) has reviewed the attached document and determined that the boring plan proposal is adequate to proceed with the site investigation. It should be understood that if a monitoring well is constructed, it shall be bailed until fully developed. Please provide directions and maps to the proposed site and a confirmed start time and date for the drilling activities. The OCD appreciates the efforts of Cheney-Walters-Echols, Inc. and GEOMAT in considering OCD's recommendations to the proposal. If you have any questions regarding this matter, please do not hesitate to contact me.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

---

**From:** Don Baldwin [mailto:don.baldwin@geomatengineering.com]
**Sent:** Thursday, April 21, 2011 3:43 PM
**To:** richard@c-w-e.com
**Cc:** Jones, Brad A., EMNRD
**Subject:** GEOMAT Revised Work Plan

Gentlemen,

Attached is our revised Work Plan for installing additional monitor wells at the Crowe Blanco site.

The total depth of each proposed well has been changed from 110 feet to 120 feet. The proposed location of MW-7 was moved slightly to the southeast on the Site Plan, and the ground surface elevation changed accordingly.

Please let us know if you have any questions or need additional information.

Thanks,

Don Baldwin
Geologist
GEOMAT

(505) 327-7928 office
(505) 860-9400 cell

GEOMAT INC
915 Malta Avenue ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

April 20, 2011
GEOMAT Proposal No. 102-06-17 Rev. 6

**Richard P. Cheney, P.E.**
Cheney-Walters-Echols, Inc.
909 West Apache Street
Farmington, New Mexico 87401

RE: Proposed Work Plan
Additional Monitor Wells Installation
Crowe Blanco Properties, LLC – Operated by IEI
Blanco, New Mexico

GEOMAT Inc. (GEOMAT) is pleased to submit this Work Plan for the installation of two additional groundwater monitor wells (MW-6 and MW-7) and possibly a third well (MW-8) at the proposed Crowe Blanco Properties, LLC facility near Blanco, New Mexico.

The purpose of these additional wells is to further evaluate the depth of groundwater beneath the site. The water level data from the additional wells will be plotted on the potentiometric surface map and will be used to help characterize different portions of the site based on depth to groundwater.

Our scope of work follows:

- Using subcontracted drilling services, GEOMAT will drill two boreholes at the approximate locations described below and depicted on the attached Site Plan.
    - One boring (MW-6) will be located near the western boundary of the site approximately 2,000 feet south of existing well MW-2 at a ground surface elevation of approximately 5683 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 120 feet below ground surface, whichever is shallower.
    - A second boring (MW-7) will be located on the south-central portion of the site roughly 1,000 feet north of existing well MW-1 and 2,000 feet south of MW-5. The ground surface elevation at this location is approximately 5713 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 120 feet below ground surface, whichever is shallower.
- Depending on the groundwater conditions encountered during the drilling of MW-6 and MW-7, a third boring (MW-8) may be drilled near the eastern boundary of the site roughly halfway between existing wells MW-3 and MW-4 at a ground surface elevation of approximately 5758 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 120 feet below ground surface, whichever is shallower.

- The borings will be drilled using air-rotary equipment. Continuous core samples of the subsurface materials will be obtained from each boring during drilling. A geologist from our office will monitor the drilling operations and prepare a continuous log of each boring.

- Moisture-bearing zones encountered during drilling will be evaluated to determine whether they are viable water-producing zones. Drilling will be halted upon encountering a moist zone and the borehole pumped or bailed dry. The boring will be allowed to sit overnight to allow time for any infiltration of water to occur.

- Borings in which groundwater is encountered will be completed as permanent monitor wells as described in the attached Work Plan submitted by our drilling subcontractor, Enviro-Drill Inc. (EDI). If a confined aquifer is encountered, the well will be constructed such that the bentonite seal is installed at the depth at which water was initially encountered during drilling.

- The static water level in each well will be measured using an electronic water-level indicator. Water levels will be determined relative to the top of casing (TOC) on the north side of each well casing.

- The natural ground surface elevation will be determined at the location of each well. Any manipulation of the natural ground surface elevation by cutting or filling will be documented. The difference between the TOC and natural ground surface elevations will be used to determine the depth to groundwater below natural ground surface at each well.

- The water-level data will be used to determine the potentiometric surface using the Strike and Dip Geologist's Three-Point Method.

It is anticipated that the drilling and monitor well installation will take five to seven days to complete. GEOMAT will notify NMOCD one week prior to commencing the work.

Thank you for the opportunity to work with you on this project. If you have any questions or need additional information, please let us know.

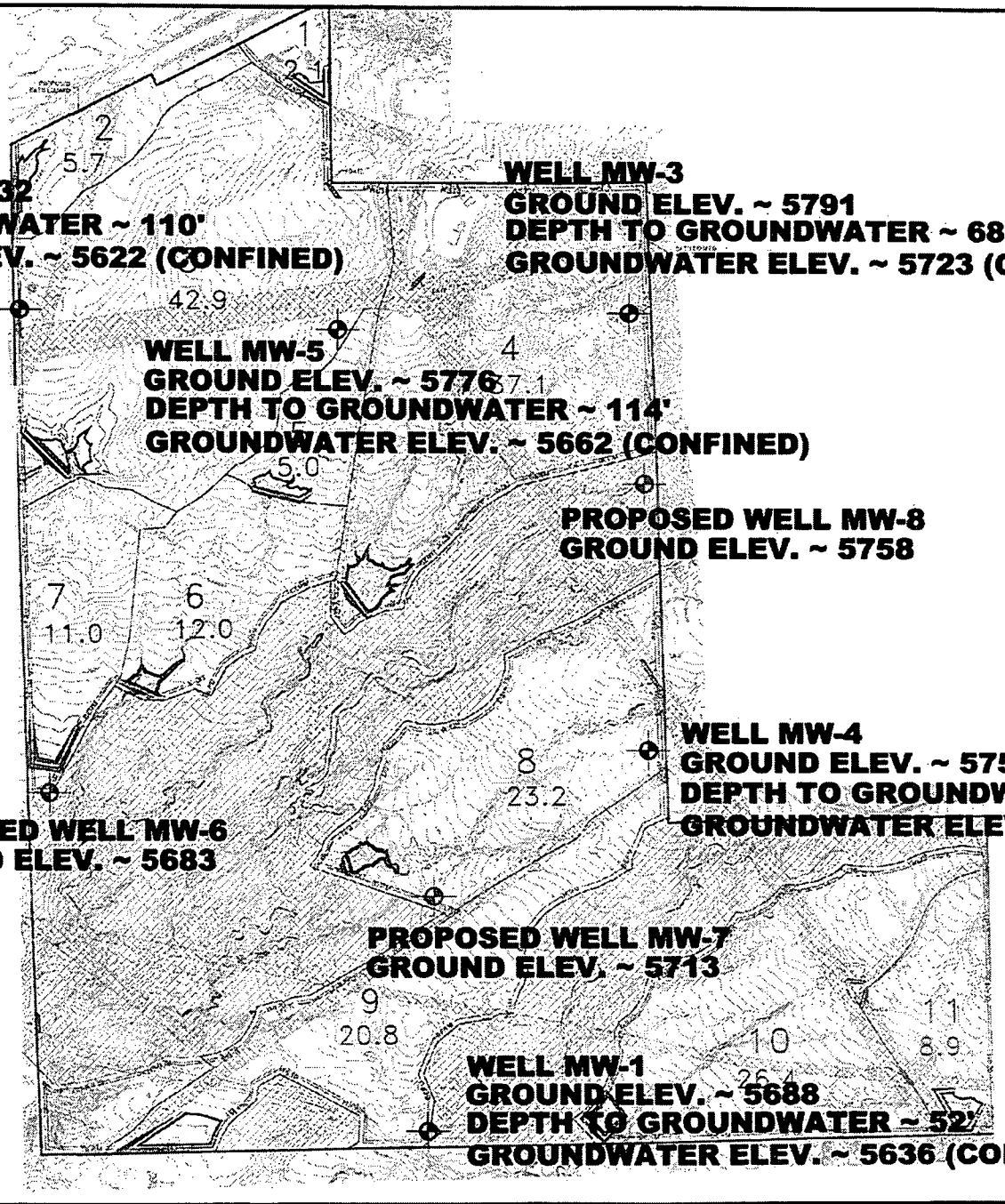
Respectfully submitted,
GEOMAT Inc.

Donald R. Baldwin

Donald R. Baldwin
Geologist

Attachments: Site Plan – Proposed Monitor Well Locations
EDI Work Plan

cc: Brad A. Jones, NMOCD




| | | |
|---|---|---|
| Approximate<br>Not to Scale | SITE PLAN<br>Monitor Well Locations (approximate)<br>GEOMAT Project No. 102-1162 | PROJECT<br>Crowe Blanco Properties, LLC<br>Operated by IEI<br>Blanco, New Mexico |

GEOMAT INC

Geomat
EDI Ref. No. 2380PH157 Revision 3

**WORK PLAN**

EDI will complete the proposed project by continuously coring all boreholes to total depth utilizing an HQ wireline coring system. The diameter of the borehole will be 4-inches, allowing for the placement of a 2-inch monitor system if groundwater is encountered. This will eliminate the need for borehole reaming.

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April 20, 2011
GEOMAT Proposal No. 102-06-17 Rev. 6

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Blanco, New Mexico

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    - One boring (MW-6) will be located near the western boundary of the site approximately 2,000 feet south of existing well MW-2 at a ground surface elevation of approximately 5683 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 120 feet below ground surface, whichever is shallower.
    - A second boring (MW-7) will be located on the south-central portion of the site roughly 1,000 feet north of existing well MW-1 and 2,000 feet south of MW-5. The ground surface elevation at this location is approximately 5713 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 120 feet below ground surface, whichever is shallower.
- Depending on the groundwater conditions encountered during the drilling of MW-6 and MW-7, a third boring (MW-8) may be drilled near the eastern boundary of the site roughly halfway between existing wells MW-3 and MW-4 at a ground surface elevation of approximately 5758 feet. This boring will be advanced to a depth of 15 feet below the depth at which groundwater is encountered during drilling, or, if groundwater is not encountered, to a total depth of 120 feet below ground surface, whichever is shallower.

- The borings will be drilled using air-rotary equipment. Continuous core samples of the subsurface materials will be obtained from each boring during drilling. A geologist from our office will monitor the drilling operations and prepare a continuous log of each boring.

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Thank you for the opportunity to work with you on this project. If you have any questions or need additional information, please let us know.

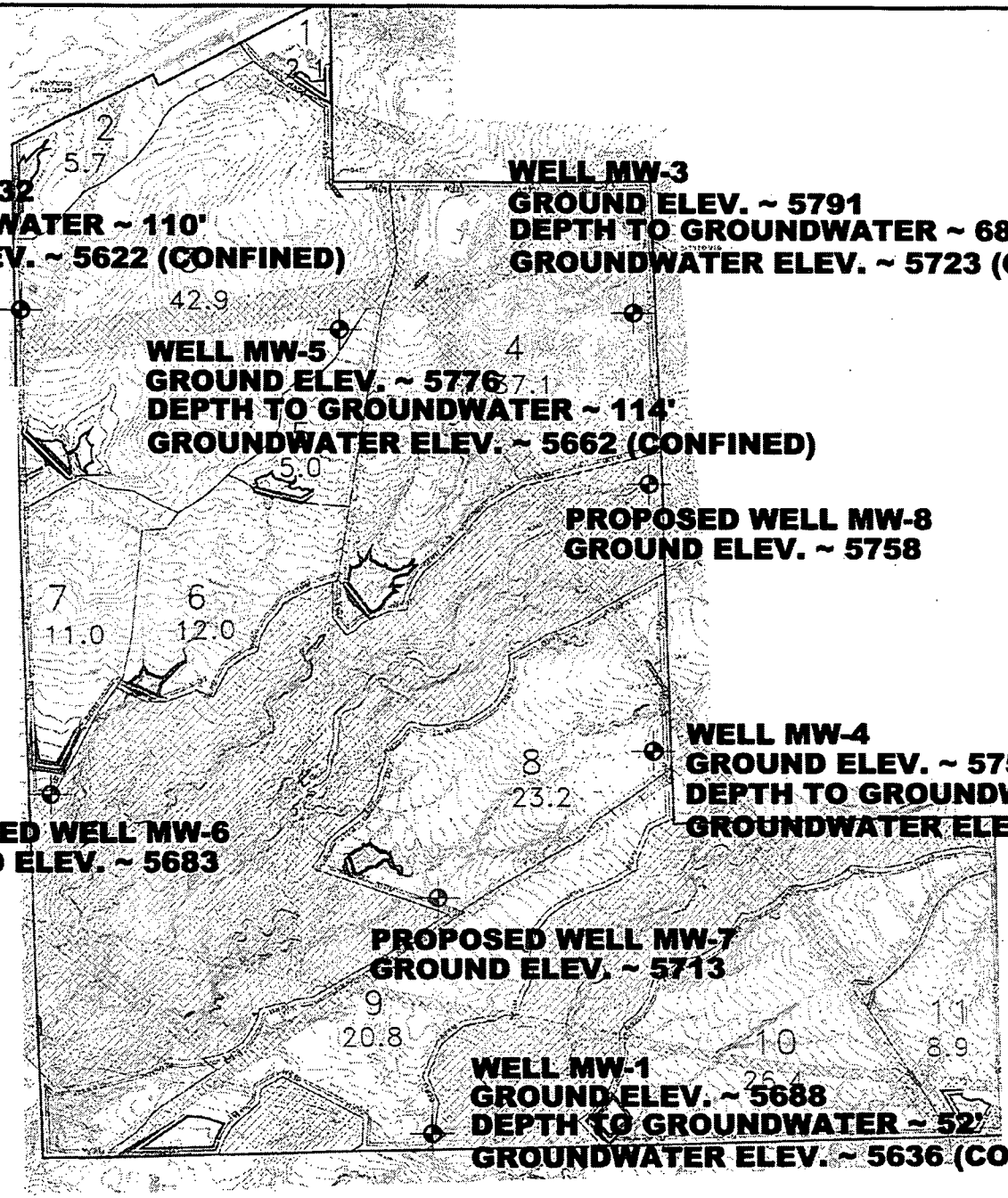
Respectfully submitted,
GEOMAT Inc.

Donald R. Baldwin

Donald R. Baldwin
Geologist

Attachments: Site Plan – Proposed Monitor Well Locations
EDI Work Plan

cc: Brad A. Jones, NMOCD




| | | |
|---|---|---|
| Approximate<br>Not to Scale | SITE PLAN<br>Monitor Well Locations (approximate)<br>GEOMAT Project No. 102-1162 | PROJECT<br>Crowe Blanco Properties, LLC<br>Operated by IEI<br>Blanco, New Mexico |

GEOMAT INC

Geomat
EDI Ref. No. 2380PH157 Revision 3

**WORK PLAN**

EDI will complete the proposed project by continuously coring all boreholes to total depth utilizing an HQ wireline coring system. The diameter of the borehole will be 4-inches, allowing for the placement of a 2-inch monitor system if groundwater is encountered. This will eliminate the need for borehole reaming.

EDI will utilize air-coring methods "with foam injection" on a limited basis for borehole stability or to facilitate removal of cuttings from boreholes, especially at deeper depths. The foam will be an environmentally safe, non-hydrocarbon based product. The cores will be placed in wax-covered HQ cardboard core boxes, with 10 feet of core in each box. The cores will be retained by Geomat field personnel.

If no groundwater is encountered in the borehole, EDI will abandon it by tremming a bentonite/cement mixture from bottom to top to avoid bridging and to keep surface water from migrating down the borehole.

If groundwater is encountered, EDI will set a permanent 2-inch monitor well in the borehole, with 20 feet of pre-packed, 0.010 slotted screen. Fifteen feet of screen will be placed below the water table, and 5-feet above the water table. A 10/20 silica sand pack will be placed around the pre-pack screen to two feet above the screened interval. A bentonite plug seal four feet thick will be placed on top of the sand pack, with the remaining annulus filled with a bentonite/cement grout to surface. The surface completion will consist of a 5-foot by 4-inch steel lockable shroud, set 3-feet below surface and 2-feet above in a 4'x4'x4" concrete pad with three bollards placed in a triangular formation to protect the well. The well will be developed by bailing to remove sediment.

## Jones, Brad A., EMNRD

**From:** Powell, Brandon, EMNRD
**Sent:** Friday, February 11, 2011 10:11 AM
**To:** Jones, Brad A., EMNRD
**Subject:** drilling update

Brad-

I was going to go by the Crowe Blanco LF drilling yesterday. I called before hand and they reported they were stuck between 43' & 45' on the second well so I didn't go by. The reported that on Wednesday afternoon they sheared off on the second hole and had to pull out and get their equipment re-setup. They reported on the first hole they encountered water at 114' and set screen from 114' to 134'.

They called me this morning to report they got un-stuck and last night they had got down to approx. 80+ft.

Thank You
Brandon Powell
Environmental Specialist
New Mexico Oil Conservation
1000 Rio Brazos Rd, Aztec NM 87410
Office: (505) 334-6178 ext. 115
E-mail: Brandon.Powell@state.nm.us

## Jones, Brad A., EMNRD

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Tuesday, February 01, 2011 4:55 PM
**To:** Jones, Brad A., EMNRD; Powell, Brandon, EMNRD
**Cc:** 'Terry Lattin'
**Subject:** Boring Plan

Brad/Brandon:

Don Baldwin will be the Geologist onsite on the 7th, his cell phone #: (505) 860-9400.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

## Jones, Brad A., EMNRD

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Tuesday, February 01, 2011 3:32 PM
**To:** Powell, Brandon, EMNRD
**Cc:** Jones, Brad A., EMNRD

Brandon:

As per George with GeoMat, the drillers are supposed to begin drilling @ 11:30 on the 7th.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

**Jones, Brad A., EMNRD**

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Tuesday, February 01, 2011 3:22 PM
**To:** Jones, Brad A., EMNRD
**Cc:** Powell, Brandon, EMNRD
**Subject:** RE: Boring Plan

Brad:

I spoke to Brandon to make arrangements for oversight and also notified him that Gary Cleaver will be IEI's onsite representative. Gary's cell phone #: (505) 419-1340.

I will let Brandon know what time the drillers are expected to begin the work as soon as I am given that information.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

---

**From:** Jones, Brad A., EMNRD [mailto:brad.a.jones@state.nm.us]
**Sent:** Tuesday, February 01, 2011 2:17 PM
**To:** Marcella Marquez
**Cc:** Powell, Brandon, EMNRD
**Subject:** RE: Boring Plan

Marcella,

I have been selected for jury duty for a district court hearing next Tues, Wed, and Thursday and will probably be unavailable most of the week. Please contact Brandon Powell in the District Office to make arrangements for oversight and provide both Brandon and myself the contact information (name and cell phone #) of the person that will be your representative at the Crowe Blanco site that Brandon and I can contact and receive updates on the status, results, and conditions of the site investigation work.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

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**From:** Marcella Marquez [mailto:marcella@industrialecosystems.com]
**Sent:** Tuesday, February 01, 2011 1:22 PM

**To:** Jones, Brad A., EMNRD
**Subject:** Boring Plan

Brad:

I wanted to let you know that the drillers were scheduled to drill the other two wells on 02/14/11, but have changed the date to 02/07/11.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

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Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
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*Fax: (505) 476-3462*

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***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

## Jones, Brad A., EMNRD

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**Subject:** Boring Plan

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***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Thursday, January 27, 2011 5:16 PM
**To:** 'Marcella Marquez'; Powell, Brandon, EMNRD
**Cc:** richard@c-w-e.com; 'Don Baldwin'
**Subject:** RE: Work Plan Attached with Change
**Attachments:** 2011 1-27 Blanco Boing Plan Approval.pdf; Work Plan_Rev 5.pdf

Marcella,

Please see the attached… it is the revised boring plan and approval. Hardcopies of the approval have been placed in the mail.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

---

**From:** Don Baldwin [mailto:don.baldwin@geomatengineering.com]
**Sent:** Thursday, January 27, 2011 4:07 PM
**To:** Jones, Brad A., EMNRD
**Cc:** richard@c-w-e.com
**Subject:** Work Plan Attached with Change

Brad,

Sorry, I clicked Send instead of Attach on that last email!

Here is the Work Plan with the discussion about anticipating possible moist zones at shallower depths in the proposed borings.

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell

New Mexico Energy, Minerals and Natural Resources Department

**Susana Martinez**
Governor

**Harrison H. Schmitt**
Cabinet Secretary-Designate

**Daniel Sanchez**
Acting Division Director
**Oil Conservation Division**

January 27, 2011

Ms. Marcella Marquez
Industrial Ecosystems, Inc.
49 CR 3150
Aztec, New Mexico 87410

**RE: Boring Plan – Proposed Work Plan**
**Commercial Surface Waste Management Facility**
**Crowe Blanco, LLC – Blanco Landfarm**
**Facility Location: W/2 and SW/4 SE/4 of Section 16, Township 29 North, Range 9 West NMPM**
**San Juan County, New Mexico**

Dear Ms. Marquez:

The Oil Conservation Division (OCD) has received Crowe Blanco, LLC's revised boring plan proposal, dated January 27, 2011, to further investigate and characterize the uppermost aquifer and subsurface geology for a proposed commercial surface waste facility permit (Blanco Landfarm) located in the W/2 and SW/4, SE/4 of Section 16, Township 29 North, Range 9 West NMPM, San Juan County, New Mexico. The OCD has reviewed the proposal and determined that the proposal is adequate to proceed with the additional site investigation.

The OCD agrees that the proposed the two (2) additional boring/monitoring well locations appear adequate. However, if the hydrogeologic conditions cannot be determined, additional borings or monitoring wells may be needed. It should be understood that if a monitoring well is constructed, it shall be bailed until fully developed.

The OCD appreciates your cooperation in providing a boring plan for review, in order to determine if the submitted application and the proposed site are suitable for approval. If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3487 or brad.a.jones@state.nm.us.

Sincerely,

Brad A. Jones
Environmental Engineer

BAJ/baj

cc: OCD District III Office, Aztec
Richard Cheney, Cheney-Walters-Echols, Inc., Farmington, NM
Donald Baldwin, GEOMAT, Inc., Farmington, NM

GEOMAT INC
915 Malta Avenue ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

January 27, 2011
GEOMAT Proposal No. 102-06-17 Rev. 5

**Richard P. Cheney, P.E.**
Cheney-Walters-Echols, Inc.
909 West Apache Street
Farmington, New Mexico 87401

RE: Proposed Work Plan
Additional Monitor Wells Installation
Crowe Blanco LLC Landfarm – Operated by IEI
Blanco, New Mexico

GEOMAT Inc. (GEOMAT) is pleased to submit this amended Work Plan for the installation of two additional groundwater monitor wells at the proposed Crowe Blanco LLC Landfarm facility operated by Industrial Ecosystems to be located near Blanco, New Mexico.

The purpose of the two additional wells is to further evaluate the direction of groundwater flow beneath the site. The additional data will be used to evaluate whether the three existing wells intercept the same aquifer. The data will then be used to develop a groundwater potentiometric surface (water table) map indicating the elevation and direction of groundwater flow at the facility site.

Our scope of work follows:

- Using subcontracted drilling services, GEOMAT will drill two boreholes at the approximate locations described below and depicted on the attached Exhibit 1 – Proposed Monitor Well Locations.
    - One boring will be located near the eastern boundary of the site roughly midway between existing wells MW-1 and MW-3 at a ground surface elevation of approximately 5756 feet. This boring will be advanced to a total depth of 130 feet below ground surface. In the event that the water table encountered in MW-3 is a different aquifer than that in MW-1 and MW-2, elevated moisture contents and/or groundwater could be expected to occur at depths on the order of 25 to 35 feet at this location. Moisture conditions at these depths will be carefully evaluated during drilling to help evaluate whether a separate aquifer exists.

- A second boring will be located on the northern portion of the site approximately midway between existing wells MW-2 and MW-3 at a ground surface elevation of approximately 5775 feet. This boring will be advanced to a total depth of approximately 150 feet below ground surface. In the event that the water table encountered in MW-3 is a different aquifer than that in MW-1 and MW-2, elevated moisture contents and/or groundwater could be expected to occur at depths on the order of 45 to 55 feet at this location. Moisture conditions at these depths will be carefully evaluated during drilling to help evaluate whether a separate aquifer exists.

- The borings will be drilled using air-rotary equipment. Continuous core samples of the subsurface materials will be obtained from each boring during drilling. A geologist from our office will monitor the drilling operations and prepare a continuous log of each boring.

- Moisture-bearing zones encountered during drilling will be evaluated to determine whether they are viable water-producing zones. Drilling will be halted upon encountering a moist zone and the borehole pumped or bailed dry. The boring will be allowed to sit overnight to allow time for any infiltration of water to occur.

- Borings in which groundwater is encountered will be completed as permanent monitor wells as described in the attached Work Plan submitted by our drilling subcontractor, Enviro-Drill Inc. (EDI). If a confined aquifer is encountered, the well will be constructed such that the bentonite seal is installed at the depth at which water was initially encountered during drilling.

- The static water level in each well will be measured using an electronic water-level indicator. Water levels will be determined relative to the top of casing (TOC) on the north side of each well casing.

- The natural ground surface elevation will be determined at the location of each well. Any manipulation of the natural ground surface elevation by cutting or filling will be documented. The natural ground surface elevation at the three existing wells will be verified. The difference between the TOC and natural ground surface elevations will be used to determine the depth to groundwater below natural ground surface at each of the five wells.

- The water-level data will be used to determine the potentiometric surface using the Strike and Dip Geologist's Three-Point Method.

It is anticipated that the drilling and monitor well installation will take five to six days to complete. GEOMAT will notify NMOCD one week prior to commencing the work.

Thank you for the opportunity to work with you on this project. If you have any questions or need additional information, please let us know.

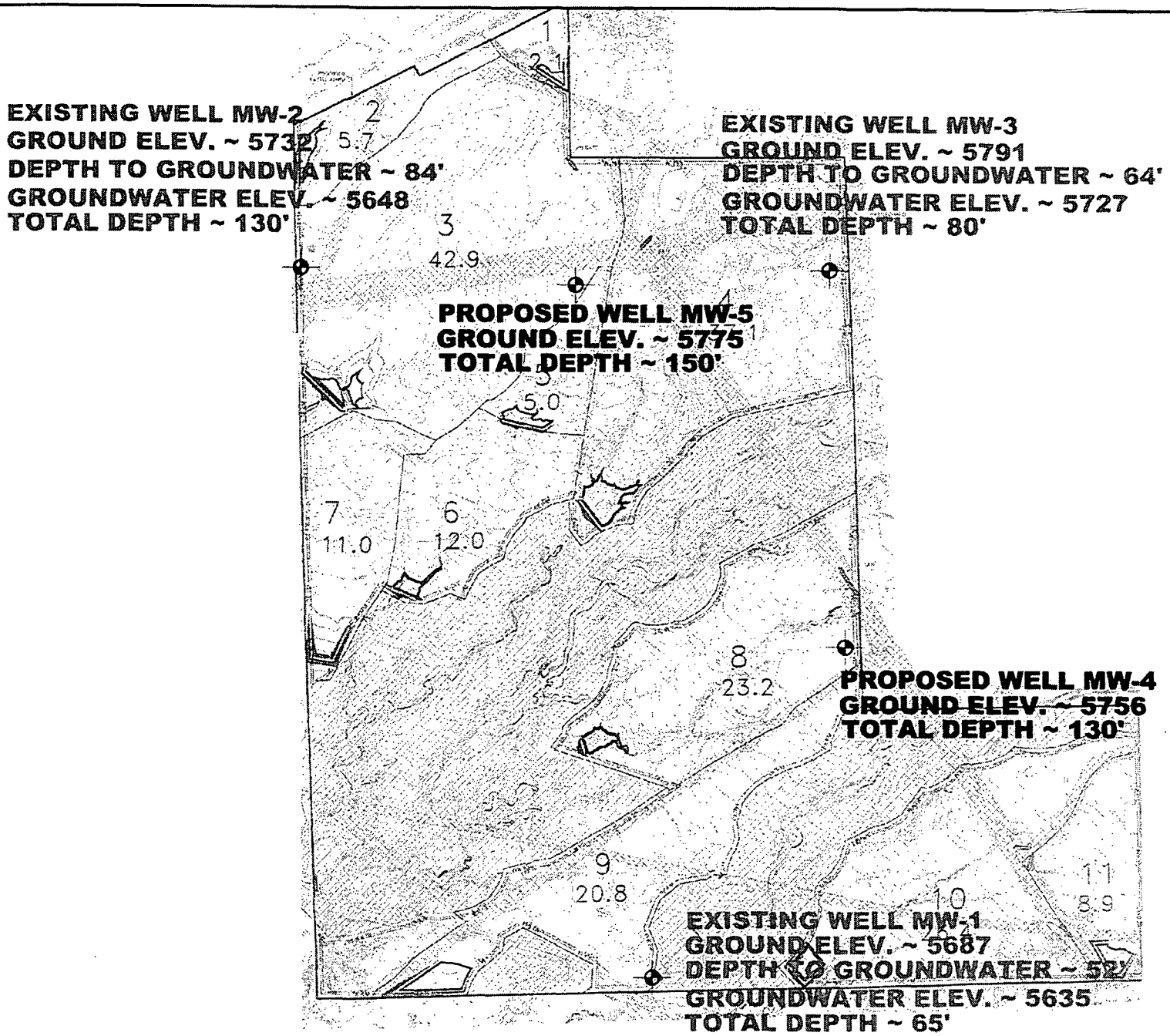
Respectfully submitted,
GEOMAT Inc.

Donald R. Baldwin

Donald R. Baldwin
Geologist

Attachments: Exhibit 1 – Proposed Monitor Well Locations
EDI Work Plan

cc: Brad A. Jones, NMOCD




| | | |
|---|---|---|
| Approximate<br>Not to Scale | VICINITY MAP<br>Monitor Well Locations (approximate)<br>GEOMAT Project No. 102-1162 | PROJECT<br>IEI Blanco Landfarm<br>Exhibit 1 - Proposed Monitor Well Locations<br>Blanco, New Mexico |

GEOMAT INC

Geomat
EDI Ref. No. 2380P1115 / Revision 3

WORK PLAN

EDI will complete the proposed project by continuously coring all boreholes to total depth utilizing an HQ wireline coring system. The diameter of the borehole will be 4-inches, allowing for the placement of a 2-inch monitor system if groundwater is encountered. This will eliminate the need for borehole reaming.

EDI will utilize air-coring methods "with foam injection" on a limited basis for borehole stability or to facilitate removal of cuttings from boreholes, especially at deeper depths. The foam will be an environmentally safe, non-hydrocarbon based product. The cores will be placed in wax-covered HQ cardboard core boxes, with 10 feet of core in each box. The cores will be retained by Geomat field personnel.

If no groundwater is encountered in the borehole, EDI will abandon it by tramming a bentonite/cement mixture from bottom to top to avoid bridging and to keep surface water from migrating down the borehole.

If groundwater is encountered, EDI will set a permanent 2-inch monitor well in the borehole, with 20 feet of pre-packed, 0.010 slotted screen. Fifteen feet of screen will be placed below the water table, and 5-feet above the water table. A 10/20 silica sand pack will be placed around the pre-pack screen to two feet above the screened interval. A bentonite plug seal four feet thick will be placed on top of the sand pack, with the remaining annulus filled with a bentonite/cement grout to surface. The surface completion will consist of a 5-foot by 4-inch steel lockable shroud, set 3-feet below surface and 2-feet above in a 4'x4'x4" concrete pad with three bollards placed in a triangular formation to protect the well. The well will be developed by bailing to remove sediment.

## Jones, Brad A., EMNRD

**From:** Richard <richard@c-w-e.com>
**Sent:** Tuesday, January 25, 2011 11:01 AM
**To:** Marcella Marquez; Jones, Brad A., EMNRD
**Subject:** Crowe Blanco/IES supplemental drilling

Brad:

As previously discussed , I am transmitting a supplemental drilling plan for two more wells at the above referenced proposed facility. If this is acceptable we propose to start the drilling on February 14th, 2011.

Richard Cheney

## Jones, Brad A., EMNRD

**From:** Richard <richard@c-w-e.com>
**Sent:** Wednesday, January 19, 2011 9:39 AM
**To:** Jones, Brad A., EMNRD
**Subject:** Amended hole logs.pdf
**Attachments:** Amended hole logs.pdf

Brad

Attached are the amended drill logs for proposed Blanco land farm

Richard

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

# Borehole MW-1



| | | | |
|---|---|---|---|
| Project Name: | Blanco Landfarm | Date Drilled: | 12/8/2010 |
| Project Number: | 102-1162 | Latitude: | 36.71803° |
| Client: | Cheney-Walters-Echols | Longitude: | -107.78701° |
| Site Location: | Blanco, New Mexico | Elevation: | 5690 |
| Rig Type: | CME - 75 | Boring Location: | See Site Plan |
| Drilling Method: | 8" O.D. HSA/HQ Core | Groundwater Depth: | Approx. 51.7 ft during drilling |
| Sampling Method: | 2" split spoon/HQ core | Logged By: | LC |
| Hammer Weight: | 140 lbs | Remarks: | None |
| Hammer Fall: | 30 inches | | |

| Laboratory Results: Dry Density (pcf) | % Passing #200 Sieve | Plasticity Index | Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1 | SILTY SAND, tan to brown, loose to medium dense, slightly damp to damp |
| | | | | | | | | | 2 | |
| | | | | | | | | | 3 | |
| | | | | | | | SM | | 4 | |
| | | | | 1-1-1-2 | SS 24 | | | | 5 | |
| | | | | | | | | | 6 | |
| | | | | 6-7-10-12 | SS 24 | | | | 7 | |
| | | | | | | | | | 8 | SANDY LEAN CLAY, tan, medium stiff to stiff, damp |
| | | | | 12-13-14-16 | SS 24 | | | | 9 | |
| | | | | | | | | | 10 | |
| | | | | 12-13-16-14 | SS 24 | | | | 11 | contains variable amounts of fine sand |
| | | | | | | | | | 12 | |
| | | | | 9-12-13-14 | SS 24 | | | | 13 | |
| | | | | | | | | | 14 | |
| | | | | 10-11-12-14 | SS 24 | | | | 15 | |
| | | | | | | | | | 16 | |
| | | | | 13-17-19-19 | SS 24 | | CL | | 17 | |
| | | | | | | | | | 18 | |
| | | | | 11-12-12-14 | SS 24 | | | | 19 | |
| | | | | | | | | | 20 | |
| | | | | | HQ 24 | | | | 21 | |
| | | | | | | | | | 22 | switched from auger to HQ coring equipment at approximately 21 feet |
| | | | | | HQ 84 | | | | 23 | |
| | | | | | | | | | 24 | |
| | | | | | | | | | 25 | |
| | | | | | | | | | 26 | recovered sandy lean clay in core barrel |
| | | | | | | | | | 27 | |
| | | | | | | | | | 28 | SAND, tan, fine- to coarse-grained, medium dense, slightly damp |
| | | | | | | | SP | | 29 | |
| | | | | | | | | | 30 | |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

# Borehole MW-1



Project Name: Blanco Landfarm
Project Number: 102-1162
Client: Cheney-Walters-Echols
Site Location: Blanco, New Mexico
Rig Type: CME - 75
Drilling Method: 8" O.D. HSA/HQ Core
Sampling Method: 2" split spoon/HQ core
Hammer Weight: 140 lbs
Hammer Fall: 30 inches

Date Drilled: 12/8/2010
Latitude: 36.71803°
Longitude: -107.78701°
Elevation: 5690
Boring Location: See Site Plan
Groundwater Depth: Approx. 51.7 ft during drilling
Logged By: LC
Remarks: None

| Laboratory Results: Dry Density (pcf) | % Passing #200 Sieve | Plasticity Index | Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HQ 120 | | SP | | 31 | SAND, tan, fine- to coarse-grained, medium dense, slightly damp |
| | | | | 1-0-0-12 | SS 24 | | | | 40 | switched from HQ coring equipment to auger at approximately 40 feet |
| | | | | 22-32-36-31 | SS 24 | | | | 43 | trace gravel |
| | | | | 26-37-42-50/5" | SS 23 | | | | 45 | |
| | | | | 50/5" | SS 5 | | GP | | 47 | GRAVEL with sand, dense, damp to moist (no sample) |
| | | | | 18-14-17-18 | SS 24 | | SP | | 49 | SAND, tan, fine- to coarse-grained, medium dense, slightly damp |
| | | | | 12-14-18-19 | SS 24 | | | | 50 | hard drililng - no sample |
| | | | | | | | | | 51 | Groundwater at approximately 51.7 feet during drilling |
| | | | | | | | | | 52 | ▽ |
| | | | | | | | | | 53 | drilling stopped at 52 feet on 11/29/2010 |
| | | | | | | | | | 54 | water level 51.7 feet on 11/30/2010 |
| | | | | | | | | | 55 | resumed on 12/8/2010 |
| | | | | | | | RK | | 60 | |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

# Borehole MW-1



| | | | |
|---|---|---|---|
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| Project Number: | 102-1162 | Latitude: | 36.71803° |
| Client: | Cheney-Walters-Echols | Longitude: | -107.78701° |
| Site Location: | Blanco, New Mexico | Elevation: | 5690 |
| Rig Type: | CME - 75 | Boring Location: | See Site Plan |
| Drilling Method: | 8" O.D. HSA/HQ Core | Groundwater Depth: | Approx. 51.7 ft during drilling |
| Sampling Method: | 2" split spoon/HQ core | Logged By: | LC |
| Hammer Weight: | 140 lbs | Remarks: | None |
| Hammer Fall: | 30 inches | | |

| Laboratory Results: Dry Density (pcf) | Laboratory Results: % Passing #200 Sieve | Laboratory Results: Plasticity Index | Laboratory Results: Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | RK | | 61<br>62<br>63<br>64<br>65 | SANDSTONE, gray, fine-grained, highly weathered, soft, weakly cemented<br>moderately weathered, moderately hard, moderately cemented |
| | | | | 50/5" | SS 5 | | | | 66<br>67<br>68<br>69<br>70<br>71<br>72<br>73<br>74<br>75<br>76<br>77<br>78<br>79<br>80<br>81<br>82<br>83<br>84<br>85<br>86<br>87<br>88<br>89<br>90 | Total Depth 65.4 feet |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

GEOMAT INC.
915 Malta Avenue
Farmington, NM 87401
Tel (505) 327-7928
Fax (505) 326-5721

# Borehole MW-2



Project Name: Blanco Landfarm
Project Number: 102-1162
Client: Cheney-Walters-Echols
Site Location: Blanco, New Mexico
Rig Type: CME - 75
Drilling Method: 8" O.D. HSA/HQ Core
Sampling Method: 2" split spoon/HQ core
Hammer Weight: 140 lbs
Hammer Fall: 30 inches

Date Drilled: 12/3/2010
Latitude: 36.72739°
Longitude: -107.79256°
Elevation: 5730
Boring Location: See Site Plan
Groundwater Depth: Approx. 110 ft during drilling
Logged By: LC
Remarks: None

| Laboratory Results: Dry Density (pcf) | % Passing #200 Sieve | Plasticity Index | Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | 1 | SILTY SAND, tan, fine- to coarse-grained, loose to medium dense, damp |
| | | | | | | | | | 2 | |
| | | | | | | | | | 3 | |
| | | | | | | | | | 4 | |
| | | | | | | | | | 5 | |
| | | | | 5-6-4-4 | SS 24 | | | | 6 | slightly damp |
| | | | | | | | | | 7 | |
| | | | | 4-5-4-7 | SS 24 | | | | 8 | layers/lenses of clayey sand 3" to 4" thick tan, slightly damp |
| | | | | | | | | | 9 | |
| | | | | 5-10-12-15 | SS 24 | | | | 10 | |
| | | | | | | | | | 11 | |
| | | | | 12-21-17-21 | SS 24 | | | | 12 | |
| | | | | | | | | | 13 | |
| | | | | 15-10-9-9 | SS 24 | | | | 14 | |
| | | | | | | | | | 15 | |
| | | | | 9-8-7-8 | SS 24 | | SM | | 16 | |
| | | | | | | | | | 17 | |
| | | | | 9-5-6-6 | SS 24 | | | | 18 | |
| | | | | | | | | | 19 | |
| | | | | 8-13-11-15 | SS 24 | | | | 20 | |
| | | | | | | | | | 21 | |
| | | | | 12-13-15-16 | SS 24 | | | | 22 | |
| | | | | | | | | | 23 | |
| | | | | 9-14-15-19 | SS 24 | | | | 24 | |
| | | | | | | | | | 25 | |
| | | | | 14-13-16-18 | SS 24 | | | | 26 | |
| | | | | | | | | | 27 | |
| | | | | 12-11-11-15 | SS 24 | | | | 28 | |
| | | | | | | | | | 29 | |
| | | | | 10-17-19-18 | SS 24 | | | | 30 | |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

GEOMAT INC.
915 Malta Avenue
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Tel (505) 327-7928
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# Borehole MW-2



| | | | |
|---|---|---|---|
| Project Name: | Blanco Landfarm | Date Drilled: | 12/3/2010 |
| Project Number: | 102-1162 | Latitude: | 36.72739° |
| Client: | Cheney-Walters-Echols | Longitude: | -107.79256° |
| Site Location: | Blanco, New Mexico | Elevation: | 5730 |
| Rig Type: | CME - 75 | Boring Location: | See Site Plan |
| Drilling Method: | 8" O.D. HSA/HQ Core | Groundwater Depth: | Approx. 110 ft during drilling |
| Sampling Method: | 2" split spoon/HQ core | Logged By: | LC |
| Hammer Weight: | 140 lbs | Remarks: | None |
| Hammer Fall: | 30 inches | | |

| Laboratory Results | | | | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry Density (pcf) | % Passing #200 Sieve | Plasticity Index | Moisture Content (%) | | | | | | | |
| | | | | 15-16-14-19 | SS 24 | | | | 31 | SILTY SAND, tan, fine- to coarse-grained, loose to medium dense, damp |
| | | | | 10-10-8-10 | SS 24 | | | | 32 | |
| | | | | | | | | | 33 | |
| | | | | 9-11-11-11 | SS 24 | | | | 34 | |
| | | | | | | | | | 35 | |
| | | | | 11-12-16-13 | SS 24 | | | | 36 | |
| | | | | | | | | | 37 | |
| | | | | 9-14-17-15 | SS 24 | | | | 38 | |
| | | | | | | | | | 39 | |
| | | | | 14-15-15-15 | SS 24 | | | | 40 | |
| | | | | | | | | | 41 | |
| | | | | 13-12-12-6 | SS 24 | | SM | | 42 | |
| | | | | | | | | | 43 | coarse-grained, slightly damp |
| | | | | 3-4-9-12 | SS 24 | | | | 44 | |
| | | | | | | | | | 45 | |
| | | | | 10-8-10-15 | SS 24 | | | | 46 | |
| | | | | | | | | | 47 | |
| | | | | 8-6-11-15 | SS 24 | | | | 48 | tan to white, fine- to coarse-grained, medium dense, damp |
| | | | | | | | | | 49 | |
| | | | | 30-45-39-50/2" | SS 20 | | | | 50 | |
| | | | | | | | | | 51 | layers/lenses of clayey sand 3" to 6" thick |
| | | | | | | | | | 52 | damp to moist |
| | | | | | | | | | 53 | |
| | | | | | | | GP | | 54 | GRAVEL with cobbles |
| | | | | | | | | | 55 | hard drilling - no sample |
| | | | | 6-21-36-50/4" | SS 22 | | CL | | 56 | SANDY LEAN CLAY, gray, soft, moist |
| | | | | | | | | | 57 | SHALE to SILTSTONE, gray, highly weathered, slightly damp |
| | | | | 41-50/4" | SS 10 | | RK | | 58 | |
| | | | | | | | | | 59 | contains variable amounts of silt- and/or fine sand-size particles |
| | | | | | | | | | 60 | grades between shale and siltstone |

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# Borehole MW-2



| | | | |
|---|---|---|---|
| Project Name: | Blanco Landfarm | Date Drilled: | 12/3/2010 |
| Project Number: | 102-1162 | Latitude: | 36.72739° |
| Client: | Cheney-Walters-Echols | Longitude: | -107.79256° |
| Site Location: | Blanco, New Mexico | Elevation: | 5730 |
| Rig Type: | CME - 75 | Boring Location: | See Site Plan |
| Drilling Method: | 8" O.D. HSA/HQ Core | Groundwater Depth: | Approx. 110 ft during drilling |
| Sampling Method: | 2" split spoon/HQ core | Logged By: | LC |
| Hammer Weight: | 140 lbs | Remarks: | None |
| Hammer Fall: | 30 inches | | |

| Laboratory Results: Dry Density (pcf) | % Passing #200 Sieve | Plasticity Index | Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HQ 120 | | | | 61 | blue-gray, slightly damp |
| | | | | | | | | | 62 | switched from auger to HQ coring equipment at approximately 59 feet |
| | | | | | | | | | 63 | SHALE to SILTSTONE, gray, highly weathered, slightly damp |
| | | | | | | | | | 64 | |
| | | | | | | | | | 65 | contains variable amounts of silt- and/or fine sand-size particles |
| | | | | | | | | | 66 | grades between shale and siltstone |
| | | | | | | | | | 67 | gray |
| | | | | | | | | | 68 | no core recovery 60' to 70' due to cored cobble stuck in bit |
| | | | | | | | | | 69 | |
| | | | | | HQ 120 | | | | 70 | |
| | | | | | | | | | 71 | |
| | | | | | | | | | 72 | |
| | | | | | | | | | 73 | |
| | | | | | | | | | 74 | |
| | | | | | | | RK | | 75 | no core recovery 70' to 80' |
| | | | | | | | | | 76 | |
| | | | | | | | | | 77 | |
| | | | | | | | | | 78 | lost circulation 77' to 80' |
| | | | | | | | | | 79 | |
| | | | | | HQ 120 | | | | 80 | |
| | | | | | | | | | 81 | regained circulation |
| | | | | | | | | | 82 | |
| | | | | | | | | | 83 | |
| | | | | | | | | | 84 | |
| | | | | | | | | | 85 | |
| | | | | | | | | | 86 | no core recovery 80' to 90' |
| | | | | | | | | | 87 | |
| | | | | | | | | | 88 | |
| | | | | | | | | | 89 | |
| | | | | | | | | | 90 | |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

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# Borehole MW-2



Project Name: Blanco Landfarm
Project Number: 102-1162
Client: Cheney-Walters-Echols
Site Location: Blanco, New Mexico
Rig Type: CME - 75
Drilling Method: 8" O.D. HSA/HQ Core
Sampling Method: 2" split spoon/HQ core
Hammer Weight: 140 lbs
Hammer Fall: 30 inches

Date Drilled: 12/3/2010
Latitude: 36.72739°
Longitude: -107.79256°
Elevation: 5730
Boring Location: See Site Plan
Groundwater Depth: Approx. 110 ft during drilling
Logged By: LC
Remarks: None

| Laboratory Results: Dry Density (pcf) | % Passing #200 Sieve | Plasticity Index | Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HQ 120 | | RK | | 91–98 | SHALE to SILTSTONE, gray, highly weathered, slightly damp<br>contains variable amounts of silt- and/or fine sand-size particles<br>grades between shale and siltstone<br>90' to 100' --> HQ core recovery = 15%, RQD = 6% |
| | | | | | HQ 120 | | RK | | 99–120 | SANDSTONE, light gray, fine-grained, slightly weathered, moderately hard, moderately cemented, slightly damp<br>100' to 110' --> HQ core recovery = 98%, RQD = 70%<br>slightly damp<br>wet<br>groundwater at approximately 110 feet during drilling<br>110' to 120' --> HQ core recovery = 75%, RQD = 41% |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

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# Borehole MW-2



Project Name: Blanco Landfarm
Project Number: 102-1162
Client: Cheney-Walters-Echols
Site Location: Blanco, New Mexico
Rig Type: CME - 75
Drilling Method: 8" O.D. HSA/HQ Core
Sampling Method: 2" split spoon/HQ core
Hammer Weight: 140 lbs
Hammer Fall: 30 inches

Date Drilled: 12/3/2010
Latitude: 36.72739°
Longitude: -107.79256°
Elevation: 5730
Boring Location: See Site Plan
Groundwater Depth: Approx. 110 ft during drilling
Logged By: LC
Remarks: None

| Laboratory Results: Dry Density (pcf) | Laboratory Results: % Passing #200 Sieve | Laboratory Results: Plasticity Index | Laboratory Results: Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HQ 120 | | RK | | 121<br>122<br>123<br>124<br>125<br>126<br>127<br>128<br>129<br>130 | SANDSTONE, light gray, fine-grained, slightly weathered, moderately hard, moderately cemented, slightly damp<br><br>120' to 130' --> HQ core recovery = 68%, RQD = 52%<br><br>lost circulation |
| | | | | | | | | | 131<br>132<br>133<br>134<br>135<br>136<br>137<br>138<br>139<br>140<br>141<br>142<br>143<br>144<br>145<br>146<br>147<br>148<br>149<br>150 | Total Depth 130 feet |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

GEOMAT 102-1162.GPJ GEOMAT.GDT 01/13/11

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# Borehole MW-3



| | | | |
|---|---|---|---|
| Project Name: | Blanco Landfarm | Date Drilled: | 12/7/2010 |
| Project Number: | 102-1162 | Latitude: | 36.72721° |
| Client: | Cheney-Walters-Echols | Longitude: | -107.78402° |
| Site Location: | Blanco, New Mexico | Elevation: | 5790 |
| Rig Type: | CME - 75 | Boring Location: | See Site Plan |
| Drilling Method: | 8" O.D. HSA/HQ Core | Groundwater Depth: | Approx. 68 ft during drilling |
| Sampling Method: | 4" continuous barrel/HQ core | Logged By: | LC |
| Hammer Weight: | N/A | Remarks: | 0' - 30' sampled with 5' continuous sampler |
| Hammer Fall: | N/A | | |

| Laboratory Results | | | | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| Dry Density (pcf) | % Passing #200 Sieve | Plasticity Index | Moisture Content (%) | | | | | | | |
| | | | | | SS 60 | | SM | | 1 | SILTY SAND, tan, fine-grained, loose, damp |
| | | | | | | | | | 2 | |
| | | | | | | | | | 3 | |
| | | | | | | | | | 4 | |
| | | | | | | | | | 5 | |
| | | | | | SS 60 | | ML | | 6 | SILT, light gray, soft to medium stiff, slightly damp<br>contains trace of water-soluble salts |
| | | | | | | | | | 7 | |
| | | | | | | | | | 8 | |
| | | | | | | | SC | | 9 | CLAYEY SAND, gray to tan, fine-grained, medium dense, damp |
| | | | | | SS 60 | | | | 10 | |
| | | | | | | | | | 11 | |
| | | | | | | | RK | | 12 | SILTSTONE, gray to green-gray, highly weathered, soft, damp |
| | | | | | | | | | 13 | |
| | | | | | | | | | 14 | |
| | | | | | SS 60 | | | | 15 | |
| | | | | | | | | | 16 | |
| | | | | | | | | | 17 | slightly damp to damp |
| | | | | | | | | | 18 | |
| | | | | | | | | | 19 | |
| | | | | | SS 60 | | | | 20 | |
| | | | | | | | | | 21 | green-gray, slightly damp |
| | | | | | | | | | 22 | |
| | | | | | | | | | 23 | |
| | | | | | | | | | 24 | |
| | | | | | SS 60 | | RK | | 25 | SANDSTONE, tan, fine- to coarse-grained, highly weathered, moderately soft, weakly to moderately cemented, slightly damp |
| | | | | | | | | | 26 | |
| | | | | | | | | | 27 | |
| | | | | | | | | | 28 | contains layers/lenses of shale/siltstone 2" to 4" thick<br>slightly damp |
| | | | | | | | | | 29 | |
| | | | | | | | | | 30 | |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

GEOMAT 102-1162.GPJ GEOMAT.GDT 01/13/11

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# Borehole MW-3



Project Name: Blanco Landfarm
Project Number: 102-1162
Client: Cheney-Walters-Echols
Site Location: Blanco, New Mexico
Rig Type: CME - 75
Drilling Method: 8" O.D. HSA/HQ Core
Sampling Method: 4" continuous barrel/HQ core
Hammer Weight: N/A
Hammer Fall: N/A

Date Drilled: 12/7/2010
Latitude: 36.72721°
Longitude: -107.78402°
Elevation: 5790
Boring Location: See Site Plan
Groundwater Depth: Approx. 68 ft during drilling
Logged By: LC
Remarks: 0' - 30' sampled with 5' continuous sampler

| Laboratory Results: Dry Density (pcf) | Laboratory Results: % Passing #200 Sieve | Laboratory Results: Plasticity Index | Laboratory Results: Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HQ 60 | | | | 31 | SANDSTONE, tan, fine- to coarse-grained, highly weathered, moderately soft, weakly to moderately cemented, slightly damp |
| | | | | | | | | | 32 | |
| | | | | | | | | | 33 | switched from auger to HQ coring equipment at 30 feet |
| | | | | | | | | | 34 | |
| | | | | | | | | | 35 | |
| | | | | | | | | | 36 | 30' to 40' --> HQ core recovery = 52%, RQD = 22% |
| | | | | | | | | | 37 | |
| | | | | | | | | | 38 | |
| | | | | | | | | | 39 | |
| | | | | | | | | | 40 | |
| | | | | | HQ 120 | | | | 41 | moderately weathered, moderately hard |
| | | | | | | | | | 42 | |
| | | | | | | | | | 43 | color change to white |
| | | | | | | | | | 44 | |
| | | | | | | | RK | | 45 | |
| | | | | | | | | | 46 | 40' to 50' --> HQ core recovery = 83%, RQD = 41% |
| | | | | | | | | | 47 | Layer/lens of gray shale 2" to 3" thick |
| | | | | | | | | | 48 | |
| | | | | | | | | | 49 | |
| | | | | | | | | | 50 | |
| | | | | | HQ 120 | | | | 51 | gray, soft to moderately hard, damp |
| | | | | | | | | | 52 | |
| | | | | | | | | | 53 | |
| | | | | | | | | | 54 | |
| | | | | | | | | | 55 | |
| | | | | | | | | | 56 | 50' to 60' --> HQ core recovery = 73%, RQD = 27% |
| | | | | | | | | | 57 | |
| | | | | | | | | | 58 | Layer/lens of carbonaceous shale 2" to 3" thick |
| | | | | | | | | | 59 | |
| | | | | | | | | | 60 | |

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# Borehole MW-3



Project Name: Blanco Landfarm
Project Number: 102-1162
Client: Cheney-Walters-Echols
Site Location: Blanco, New Mexico
Rig Type: CME - 75
Drilling Method: 8" O.D. HSA/HQ Core
Sampling Method: 4" continuous barrel/HQ core
Hammer Weight: N/A
Hammer Fall: N/A

Date Drilled: 12/7/2010
Latitude: 36.72721°
Longitude: -107.78402°
Elevation: 5790
Boring Location: See Site Plan
Groundwater Depth: Approx. 68 ft during drilling
Logged By: LC
Remarks: 0' - 30' sampled with 5' continuous sampler

| Laboratory Results: Dry Density (pcf) | Laboratory Results: % Passing #200 Sieve | Laboratory Results: Plasticity Index | Laboratory Results: Moisture Content (%) | Blows per 6" | Sample Type & Length (in) | Recovery | USCS | Soil Symbol | Depth (ft) | Soil Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | HQ 120 | | | | 61 | SANDSTONE, tan, fine- to coarse-grained, highly weathered, moderately soft, weakly to moderately cemented, slightly damp |
| | | | | | | | | | 62 | |
| | | | | | | | | | 63 | |
| | | | | | | | | | 64 | |
| | | | | | | | | | 65 | |
| | | | | | | | | | 66 | 60' to 70' --> HQ core recovery = 84%, RQD = 23% |
| | | | | | | | | | 67 | Layers/lenses of gray shale |
| | | | | | | | | | 68 | ▽ Groundwater at approximately 68 feet during drilling |
| | | | | | | | | | 69 | |
| | | | | | HQ 120 | | RK | | 70 | |
| | | | | | | | | | 71 | |
| | | | | | | | | | 72 | |
| | | | | | | | | | 73 | |
| | | | | | | | | | 74 | |
| | | | | | | | | | 75 | |
| | | | | | | | | | 76 | 70' to 80' --> HQ core recovery = 48%, RQD = 25% |
| | | | | | | | | | 77 | |
| | | | | | | | | | 78 | |
| | | | | | | | | | 79 | |
| | | | | | | | | | 80 | |
| | | | | | | | | | 81 | Total Depth 80 feet |
| | | | | | | | | | 82 | |
| | | | | | | | | | 83 | |
| | | | | | | | | | 84 | |
| | | | | | | | | | 85 | |
| | | | | | | | | | 86 | |
| | | | | | | | | | 87 | |
| | | | | | | | | | 88 | |
| | | | | | | | | | 89 | |
| | | | | | | | | | 90 | |

A = Auger Cuttings GRAB = Hand Sample MC = Modified California (Ring Sample) SS = Split Spoon HQ = 2.5" Rock Core

## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Tuesday, January 11, 2011 5:11 PM
**To:** 'Richard'
**Subject:** RE: Blanco land farm

Richard,

The map forwarded from Mr. Lewis Hare of your office only provided the surface/top of concrete pad elevation (I'm unsure which one it represents - please clarify) and the top of casing (TOC) elevation for each monitoring well installed at the proposed landfarm site. In order for OCD to provide comment, we will need the lithologic log, the depth to ground water, and the ground water elevation for each monitoring well. Without this information, the OCD is unable to comment or consider the proposed locations for the additional monitoring wells/borings. Please provide the necessary information.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

---

**From:** Richard [mailto:richard@c-w-e.com]
**Sent:** Tuesday, January 11, 2011 2:30 PM
**To:** Jones, Brad A., EMNRD
**Subject:** Blanco land farm

Brad:

Subsequent to our conversation, I drew a map depicting the potentionmetric surface and superimposed it on the topographic map. I am having our draftsman forward it to you. It looks to follow the surface pretty well. If there is an anomaly, it appears to me to be in the No 2 well that has an artesian effect. I would appreciate your comments and insight an both the map and the proposed new wells

Richard Cheney

## Jones, Brad A., EMNRD

**From:** Richard <richard@c-w-e.com>
**Sent:** Tuesday, January 11, 2011 2:30 PM
**To:** Jones, Brad A., EMNRD
**Subject:** Blanco land farm

Brad:

Subsequent to our conversation, I drew a map depicting the potentionmetric surface and superimposed it on the topographic map. I am having our draftsman forward it to you. It looks to follow the surface pretty well. If there is an anomaly, it appears to me to be in the No 2 well that has an artesian effect. I would appreciate your comments and insight an both the map and the proposed new wells

Richard Cheney

## Jones, Brad A., EMNRD

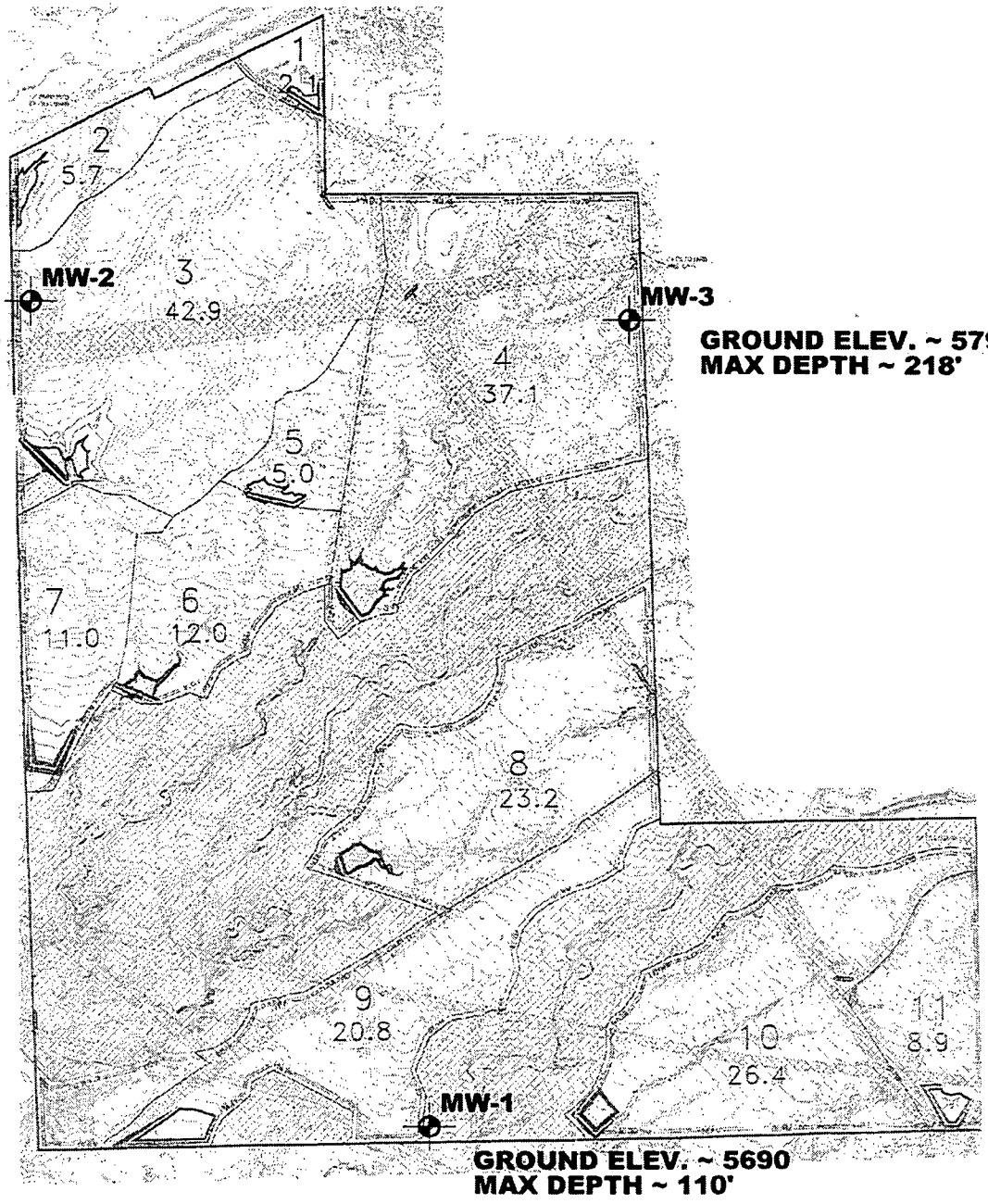
**From:** Lewis Hare <lewis@c-w-e.com>
**Sent:** Tuesday, January 11, 2011 2:26 PM
**To:** Jones, Brad A., EMNRD
**Subject:** Blanco Land Farm : 9467SET SITE NIC 011111.pdf
**Attachments:** Lewis Hare.vcf; 9467SET SITE NIC 011111.pdf

Here is the drawing Richard Cheney asked me to send you.

If you have any problems or questions, please contact our office.

Thank you,

Lewis Hare
Cheney-Walters-Echols Inc.
909 W. Apache,
Farmington, New Mexico
(505)327-3303 fax (505)327-1474
lewis@c-w-e.com




**GROUND ELEV. ~ 5734**
**MAX DEPTH ~ 154'**

**GROUND ELEV. ~ 5798**
**MAX DEPTH ~ 218'**

**GROUND ELEV. ~ 5690**
**MAX DEPTH ~ 110'**

Approximate

Not to Scale

SITE PLAN

Monitor Well Locations (approximate)

GEOMAT Project No. 102-1162

PROJECT

IEI Blanco Landfarm
Exhibit 1 - Proposed Monitor Well Locations
Blanco, New Mexico

GEOMAT INC

Geomat
EDI Ref. No. 2380PH157 Revision 3

**WORK PLAN**

EDI will complete the proposed project by continuously coring all boreholes to total depth utilizing an HQ wireline coring system. The diameter of the borehole will be 4-inches, allowing for the placement of a 2-inch monitor system if groundwater is encountered. This will eliminate the need for borehole reaming.

EDI will utilize air-coring methods "with foam injection" on a limited basis for borehole stability or to facilitate removal of cuttings from boreholes, especially at deeper depths. The foam will be an environmentally safe, non-hydrocarbon based product. The cores will be placed in wax-covered HQ cardboard core boxes, with 10 feet of core in each box. The cores will be retained by Geomat field personnel.

If no groundwater is encountered in the borehole, EDI will abandon it by tremming a bentonite/cement mixture from bottom to top to avoid bridging and to keep surface water from migrating down the borehole.

If groundwater is encountered, EDI will set a permanent 2-inch monitor well in the borehole, with 20 feet of pre-packed, 0.010 slotted screen. Fifteen feet of screen will be placed below the water table, and 5-feet above the water table. A 10/20 silica sand pack will be placed around the pre-pack screen to two feet above the screened interval. A bentonite plug seal four feet thick will be placed on top of the sand pack, with the remaining annulus filled with a bentonite/cement grout to surface. The surface completion will consist of a 5-foot by 4-inch steel lockable shroud, set 3-feet below surface and 2-feet above in a 4'x4'x4" concrete pad with three bollards placed in a triangular formation to protect the well. The well will be developed by bailing to remove sediment.

## Jones, Brad A., EMNRD

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Wednesday, November 24, 2010 11:01 AM
**To:** Jones, Brad A., EMNRD; Powell, Brandon, EMNRD
**Cc:** 'Terry Lattin'
**Subject:** Drilling to Begin 11/29/10

**Importance:** High

Brad/Brandon:

As per George Madrid w/GeoMat the drilling should begin on Monday around 10:30-11:00 am. They will begin drilling the MW-1, the well on the South end of the property. Brad: I know that you would've liked for them to drill the well on the NE side, but they need to drill the shallowest one first so they can test out their compressor to see if they will need to rent a larger one for the deeper wells.

The Geologist on-site will be Larry Senova w/GeoMat, his cell # (505) 801-8219. Brad: I told George that you will be calling Larry to go over the specifics of the drilling with him.

Brandon: Terry will meet you at the Largo turnoff at 10:15, his cell # (505) 860-2885.

Please let me know if you have any questions or if additional information is needed.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Thursday, November 18, 2010 4:01 PM
**To:** Powell, Brandon, EMNRD
**Subject:** FW: IEI Wells / Boring Plan
**Attachments:** IEI Wells_Work Plan Rev 1.pdf

**Importance:** High

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**From:** Marcella Marquez [mailto:marcella@industrialecosystems.com]
**Sent:** Thursday, October 28, 2010 1:18 PM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Terry Lattin'; richard@c-w-e.com
**Subject:** FW: IEI Wells / Boring Plan
**Importance:** High

Brad:

Attached please find the revised boring plan which includes the changes/modifications you requested:

- The plan depths for MW-2 and MW-3 were changed from 144' and 208' to 154' and 218', respectively. This was so that all three wells would be drilled to the same elevation of 5580.
- It was made clearer in the plan that each moist zone encountered would be evaluated to determine if it could be a water-producing zone.
- It was made clearer in the plan that continuous core samples of the subsurface materials will be obtained.
- The driller's plan was changed to say that foam injection would be used on a limited basis and that the wells would be developed by bailing to remove sediment.

Upon approval of the plan, we would like to schedule the drilling to begin as soon as possible.

A "hard" copy of the plan will also be submitted via mail.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

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GEOMAT INC
915 Malta Avenue ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

October 27, 2010
GEOMAT Proposal No. 102-06-17 Rev 1

**Richard P. Cheney, P.E.**
Cheney-Walters-Echols, Inc.
909 West Apache Street
Farmington, New Mexico 87401

RE: Proposed Work Plan
Monitor Well Installation and Potentiometric Surface Mapping
IEI Blanco Landfarm
Blanco, New Mexico

GEOMAT Inc. (GEOMAT) is pleased to submit this amended Work Plan for the installation of three groundwater monitor wells and subsequent mapping of the potentiometric surface at the proposed Industrial Ecosystems Landfarm facility to be located near Blanco, New Mexico. This Work Plan incorporates comments received via telephone from Brad Jones of NMOCD on October 26, 2010 after his review of the previously submitted Work Plan dated September 14, 2010.

The objective of our services is to obtain water level data from the three proposed monitor wells and use this data to develop a groundwater potentiometric surface (water table) map indicating the elevation and direction of groundwater flow at the facility site.

Our scope of work follows:

- Using subcontracted drilling services, GEOMAT will drill three boreholes at the approximate locations described below and depicted on the attached Exhibit 1 – Proposed Monitor Well Locations.
    - One boring will be located near the southern boundary of the site at a ground surface elevation of approximately 5690 feet. This boring will be advanced to a total depth of 110 feet below ground surface.
    - A second boring will be located near the northwest corner of the site at a ground surface elevation of approximately 5734 feet. This boring will be advanced to a total depth of approximately 154 feet below ground surface.
    - A third boring will be located near the northeast corner of the site at a ground surface elevation of approximately 5798 feet. This boring will be advanced to a total depth of approximately 218 feet below ground surface.
- The borings will be drilled using air-rotary equipment. Continuous core samples of the subsurface materials will be obtained from each boring during drilling. A geologist from our office will monitor the drilling operations and prepare a continuous log of each boring.

- Moisture-bearing zones encountered during drilling will be evaluated to determine whether they are viable water-producing zones. Drilling will be halted upon encountering a moist zone and the borehole pumped or bailed dry. The boring will be allowed to sit overnight to allow time for any infiltration of water to occur.

- Borings in which groundwater is encountered will be completed as a permanent monitor wells as described in the attached Work Plan submitted by our drilling subcontractor, Enviro-Drill Inc. (EDI).

- The static water level in each well will be measured using an electronic water-level indicator. The water-level data will be used to determine the potentiometric surface using the Strike and Dip Geologist's Three-Point Method.

It is anticipated that the drilling and monitor well installation will take ten (10) days to complete.

Thank you for the opportunity to work with you on this project. If you have any questions or need additional information, please let us know.

Respectfully submitted,
GEOMAT Inc.

George A. Madrid, P.E.
President, Principal Engineer

Attachments: Exhibit 1 – Proposed Monitor Well Locations
EDI Work Plan

**Jones, Brad A., EMNRD**

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Thursday, November 18, 2010 3:16 PM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Terry Lattin'; richard@c-w-e.com
**Subject:** FW: Boring Plan

**Importance:** High

Hi Brad:

I hadn't heard back from you on the original email below, so thought I'd better check in.

The drilling company has scheduled to begin work on 11/29/10. We would like for you to be there when they begin the job to ensure there are no issues with the process/procedures they are using.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

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**From:** Marcella Marquez [mailto:marcella@industrialecosystems.com]
**Sent:** Wednesday, November 10, 2010 11:31 AM
**To:** 'Jones, Brad A., EMNRD'
**Cc:** 'richard@c-w-e.com'; 'Terry Lattin'
**Subject:** Boring Plan

Brad:

The drilling company will begin work on 11/29/10 and estimate the job to last approximately 10 days. This is the date they scheduled to avoid the upcoming holidays.

Please let me know if you have any questions or if additional information is needed.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

**Jones, Brad A., EMNRD**

**From:** George Madrid <george.madrid@geomatengineering.com>
**Sent:** Tuesday, November 16, 2010 3:20 PM
**To:** Jones, Brad A., EMNRD
**Cc:** robert@c-w-e.com; Rod Hammer
**Subject:** IEI Monitoring Wells

Brad,
For your information, we are scheduled to start drilling the monitoring wells at the proposed IEI Landfarm site near Blanco on Monday, Nov.29th. We estimate it will take 10 workdays to complete the work. If you have any questions, please let us know.

Thanks.

George A. Madrid, P.E.
GEOMAT
P 505/327-7928
F 505/326-5721

**Jones, Brad A., EMNRD**

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Wednesday, November 10, 2010 11:31 AM
**To:** Jones, Brad A., EMNRD
**Cc:** richard@c-w-e.com; 'Terry Lattin'
**Subject:** Boring Plan

Brad:

The drilling company will begin work on 11/29/10 and estimate the job to last approximately 10 days. This is the date they scheduled to avoid the upcoming holidays.

Please let me know if you have any questions or if additional information is needed.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

## Jones, Brad A., EMNRD

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Wednesday, November 03, 2010 4:18 PM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Terry Lattin'
**Subject:** RE: IEI Wells / Boring Plan

Thanks Brad. I will provide the maps and date/time as soon as we confirm it with the drilling company.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

---

**From:** Jones, Brad A., EMNRD [mailto:brad.a.jones@state.nm.us]
**Sent:** Wednesday, November 03, 2010 4:11 PM
**To:** Marcella Marquez
**Cc:** Terry Lattin; richard@c-w-e.com
**Subject:** RE: IEI Wells / Boring Plan

Marcella,

Please see the attached... it is the boring plan approval. A hardcopy has been placed in the mail. Please provide the information requested in the second paragraph of the approval.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

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**From:** Marcella Marquez [mailto:marcella@industrialecosystems.com]
**Sent:** Thursday, October 28, 2010 1:18 PM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Terry Lattin'; richard@c-w-e.com
**Subject:** FW: IEI Wells / Boring Plan
**Importance:** High

Brad:

Attached please find the revised boring plan which includes the changes/modifications you requested:

- The plan depths for MW-2 and MW-3 were changed from 144' and 208' to 154' and 218', respectively. This was so that all three wells would be drilled to the same elevation of 5580.
- It was made clearer in the plan that each moist zone encountered would be evaluated to determine if it could be a water-producing zone.
- It was made clearer in the plan that continuous core samples of the subsurface materials will be obtained.
- The driller's plan was changed to say that foam injection would be used on a limited basis and that the wells would be developed by bailing to remove sediment.

Upon approval of the plan, we would like to schedule the drilling to begin as soon as possible.

A "hard" copy of the plan will also be submitted via mail.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

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## Jones, Brad A., EMNRD

**From:** Jones, Brad A., EMNRD
**Sent:** Wednesday, November 03, 2010 4:11 PM
**To:** 'Marcella Marquez'
**Cc:** 'Terry Lattin'; richard@c-w-e.com
**Subject:** RE: IEI Wells / Boring Plan
**Attachments:** 2010 11-3 Blanco Boring Plan approval.pdf

Marcella,

Please see the attached... it is the boring plan approval. A hardcopy has been placed in the mail. Please provide the information requested in the second paragraph of the approval.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

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**From:** Marcella Marquez [mailto:marcella@industrialecosystems.com]
**Sent:** Thursday, October 28, 2010 1:18 PM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Terry Lattin'; richard@c-w-e.com
**Subject:** FW: IEI Wells / Boring Plan
**Importance:** High

Brad:

Attached please find the revised boring plan which includes the changes/modifications you requested:

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- It was made clearer in the plan that continuous core samples of the subsurface materials will be obtained.
- The driller's plan was changed to say that foam injection would be used on a limited basis and that the wells would be developed by bailing to remove sediment.

Upon approval of the plan, we would like to schedule the drilling to begin as soon as possible.

A "hard" copy of the plan will also be submitted via mail.

*Thanks,*
*Marcella Marquez, HSE Administrator*
*Industrial Ecosystems, Inc.*
*Phone: (505) 632-1782*
*Fax: (505) 632-1876 or (505) 334-1003*

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New Mexico Energy, Minerals and Natural Resources Department

**Bill Richardson**
Governor

**Jim Noel**
Cabinet Secretary

**Karen W. Garcia**
Deputy Cabinet Secretary

**Mark Fesmire**
Division Director
**Oil Conservation Division**

November 3, 2010

Ms. Marcella Marquez
Industrial Ecosystems, Inc.
49 CR 3150
Aztec, New Mexico 87410

**RE: Boring Plan – Proposed Work Plan**
**Commercial Surface Waste Management Facility**
**Crowe Blanco, LLC – Blanco Landfarm**
**Facility Location: W/2 and SW/4 SE/4 of Section 16, Township 29 North, Range 9 West NMPM**
**San Juan County, New Mexico**

Dear Ms. Marquez:

The Oil Conservation Division (OCD) has received Crowe Blanco, LLC's revised boring plan proposal, dated November 1, 2010, to investigate and characterize the uppermost aquifer and subsurface geology for a proposed commercial surface waste facility permit (Blanco Landfarm) located in the W/2 and SW/4, SE/4 of Section 16, Township 29 North, Range 9 West NMPM, San Juan County, New Mexico. The OCD has reviewed the proposal and determined that the proposal is adequate to proceed with the site investigation.

The OCD agrees that the proposed the boring/monitoring well locations appear adequate for the proposed landfarm. However, if the hydrogeologic conditions cannot be determined, additional borings or monitoring wells may be needed. It should be understood that if a monitoring well is constructed, it shall be bailed until fully developed. Also, please provide OCD with directions and maps to the proposed site and a confirmed start time and date for the drilling activities.

The OCD appreciates your cooperation in providing a boring plan for review, in order to determine if the submitted application and the proposed site are suitable for approval. If there are any questions regarding this matter, please do not hesitate to contact me at (505) 476-3487 or brad.a.jones@state.nm.us.

Sincerely,

Brad A. Jones
Environmental Engineer

BAJ/baj

cc: OCD District III Office, Aztec

**Jones, Brad A., EMNRD**

| | |
|---|---|
| **From:** | Marcella Marquez <marcella@industrialecosystems.com> |
| **Sent:** | Thursday, October 28, 2010 1:18 PM |
| **To:** | Jones, Brad A., EMNRD |
| **Cc:** | 'Terry Lattin'; richard@c-w-e.com |
| **Subject:** | FW: IEI Wells / Boring Plan |
| **Attachments:** | IEI Wells_Work Plan Rev 1.pdf |
| **Importance:** | High |

Brad:

Attached please find the revised boring plan which includes the changes/modifications you requested:

- The plan depths for MW-2 and MW-3 were changed from 144' and 208' to 154' and 218', respectively. This was so that all three wells would be drilled to the same elevation of 5580.
- It was made clearer in the plan that each moist zone encountered would be evaluated to determine if it could be a water-producing zone.
- It was made clearer in the plan that continuous core samples of the subsurface materials will be obtained.
- The driller's plan was changed to say that foam injection would be used on a limited basis and that the wells would be developed by bailing to remove sediment.

Upon approval of the plan, we would like to schedule the drilling to begin as soon as possible.

A "hard" copy of the plan will also be submitted via mail.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

GEOMAT INC
915 Malta Avenue ◆ Farmington, NM 87401 ◆ Tel (505) 327-7928 ◆ Fax (505) 326-5721

October 27, 2010
GEOMAT Proposal No. 102-06-17 Rev 1

**Richard P. Cheney, P.E.**
Cheney-Walters-Echols, Inc.
909 West Apache Street
Farmington, New Mexico 87401

RE: Proposed Work Plan
Monitor Well Installation and Potentiometric Surface Mapping
IEI Blanco Landfarm
Blanco, New Mexico

GEOMAT Inc. (GEOMAT) is pleased to submit this amended Work Plan for the installation of three groundwater monitor wells and subsequent mapping of the potentiometric surface at the proposed Industrial Ecosystems Landfarm facility to be located near Blanco, New Mexico. This Work Plan incorporates comments received via telephone from Brad Jones of NMOCD on October 26, 2010 after his review of the previously submitted Work Plan dated September 14, 2010.

The objective of our services is to obtain water level data from the three proposed monitor wells and use this data to develop a groundwater potentiometric surface (water table) map indicating the elevation and direction of groundwater flow at the facility site.

Our scope of work follows:

- Using subcontracted drilling services, GEOMAT will drill three boreholes at the approximate locations described below and depicted on the attached Exhibit 1 – Proposed Monitor Well Locations.
    - One boring will be located near the southern boundary of the site at a ground surface elevation of approximately 5690 feet. This boring will be advanced to a total depth of 110 feet below ground surface.
    - A second boring will be located near the northwest corner of the site at a ground surface elevation of approximately 5734 feet. This boring will be advanced to a total depth of approximately 154 feet below ground surface.
    - A third boring will be located near the northeast corner of the site at a ground surface elevation of approximately 5798 feet. This boring will be advanced to a total depth of approximately 218 feet below ground surface.
- The borings will be drilled using air-rotary equipment. Continuous core samples of the subsurface materials will be obtained from each boring during drilling. A geologist from our office will monitor the drilling operations and prepare a continuous log of each boring.

- Moisture-bearing zones encountered during drilling will be evaluated to determine whether they are viable water-producing zones. Drilling will be halted upon encountering a moist zone and the borehole pumped or bailed dry. The boring will be allowed to sit overnight to allow time for any infiltration of water to occur.

- Borings in which groundwater is encountered will be completed as a permanent monitor wells as described in the attached Work Plan submitted by our drilling subcontractor, Enviro-Drill Inc. (EDI).

- The static water level in each well will be measured using an electronic water-level indicator. The water-level data will be used to determine the potentiometric surface using the Strike and Dip Geologist's Three-Point Method.

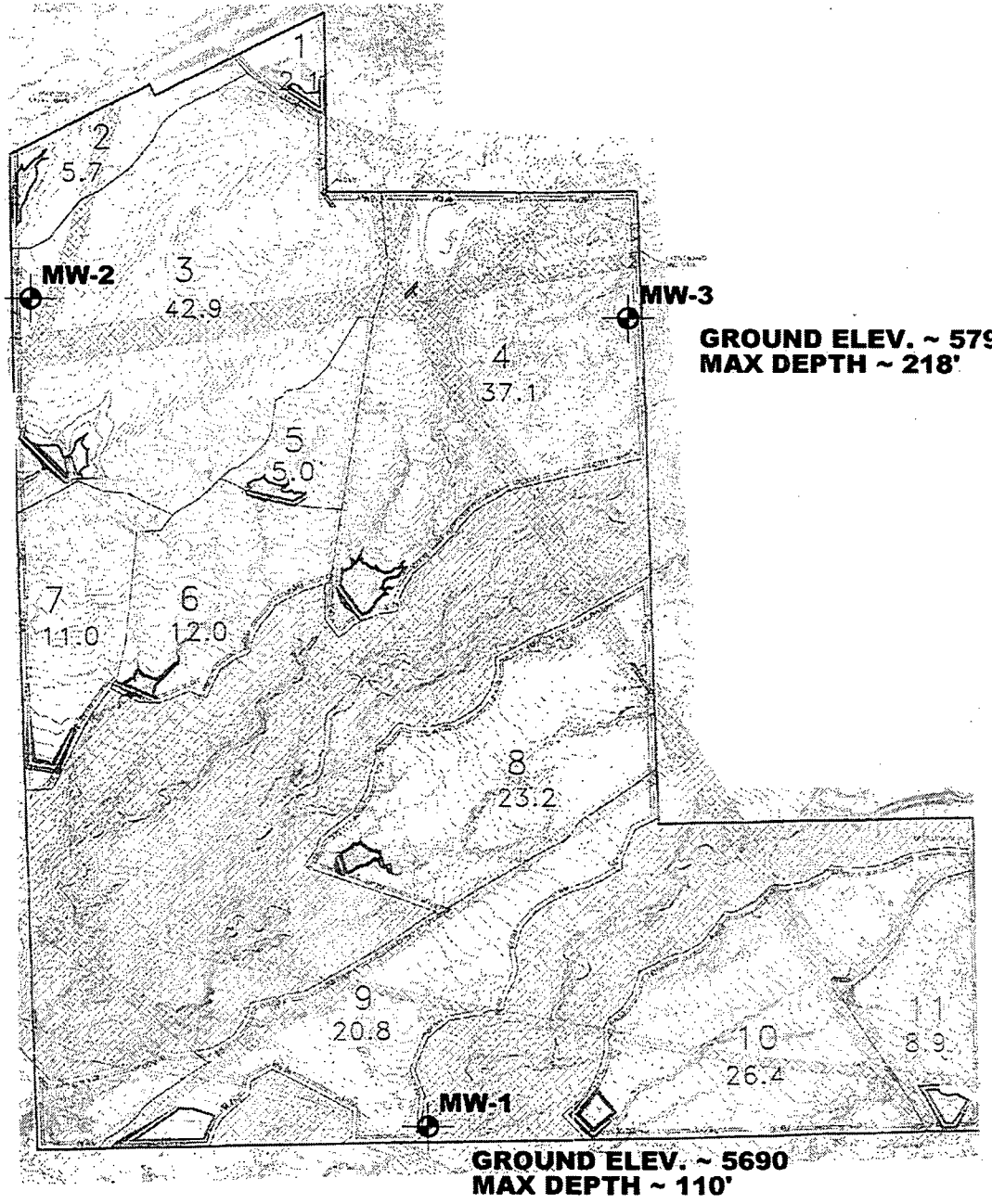
It is anticipated that the drilling and monitor well installation will take ten (10) days to complete.

Thank you for the opportunity to work with you on this project. If you have any questions or need additional information, please let us know.

Respectfully submitted,
GEOMAT Inc.

George A. Madrid, P.E.
President, Principal Engineer

Attachments: Exhibit 1 – Proposed Monitor Well Locations
EDI Work Plan




| | | |
|---|---|---|
| Approximate<br>Not to Scale | SITE PLAN<br>Monitor Well Locations (approximate)<br>GEOMAT Project No. 102-1162 | PROJECT<br>IEI Blanco Landfarm<br>Exhibit 1 - Proposed Monitor Well Locations<br>Blanco, New Mexico |

GEOMAT INC

Geomat
EDI Ref. No. 2380PH157 Revision 3

**WORK PLAN**

EDI will complete the proposed project by continuously coring all boreholes to total depth utilizing an HQ wireline coring system. The diameter of the borehole will be 4-inches, allowing for the placement of a 2-inch monitor system if groundwater is encountered. This will eliminate the need for borehole reaming.

EDI will utilize air-coring methods "with foam injection" on a limited basis for borehole stability or to facilitate removal of cuttings from boreholes, especially at deeper depths. The foam will be an environmentally safe, non-hydrocarbon based product. The cores will be placed in wax-covered HQ cardboard core boxes, with 10 feet of core in each box. The cores will be retained by Geomat field personnel.

If no groundwater is encountered in the borehole, EDI will abandon it by tremming a bentonite/cement mixture from bottom to top to avoid bridging and to keep surface water from migrating down the borehole.

If groundwater is encountered, EDI will set a permanent 2-inch monitor well in the borehole, with 20 feet of pre-packed, 0.010 slotted screen. Fifteen feet of screen will be placed below the water table, and 5-feet above the water table. A 10/20 silica sand pack will be placed around the pre-pack screen to two feet above the screened interval. A bentonite plug seal four feet thick will be placed on top of the sand pack, with the remaining annulus filled with a bentonite/cement grout to surface. The surface completion will consist of a 5-foot by 4-inch steel lockable shroud, set 3-feet below surface and 2-feet above in a 4'x4'x4" concrete pad with three bollards placed in a triangular formation to protect the well. The well will be developed by bailing to remove sediment.

**Jones, Brad A., EMNRD**

**From:** Jones, Brad A., EMNRD
**Sent:** Thursday, August 12, 2010 4:31 PM
**To:** 'Marcella Marquez'; Macquesten, Gail, EMNRD; VonGonten, Glenn, EMNRD
**Cc:** 'Terry Lattin'; 'Ocean Munds-Dry'; richard@c-w-e.com
**Subject:** RE: Confirmation of Meeting Date & Time

Marcella,

Thank you for responding to my request. I have secured the OCD Conference Room for August 26th from 1:30 to 2:30 pm for our meeting. As per our telephone conversation yesterday, I believe that we can complete our discussion regarding siting and the submittal of a boring plan for the proposed Crowe Blanco commercial landfarm permit application.

Brad

***Brad A. Jones***
*Environmental Engineer*
*Environmental Bureau*
*NM Oil Conservation Division*
*1220 S. St. Francis Drive*
*Santa Fe, New Mexico 87505*
*E-mail: brad.a.jones@state.nm.us*
*Office: (505) 476-3487*
*Fax: (505) 476-3462*

---

**From:** Marcella Marquez [mailto:marcella@industrialecosystems.com]
**Sent:** Thursday, August 12, 2010 11:49 AM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Terry Lattin'; 'Ocean Munds-Dry'; richard@c-w-e.com
**Subject:** Confirmation of Meeting Date & Time

Brad:

As per our telephone conversation yesterday, I am sending you this email to confirm our meeting date and time. It looks like everyone can meet on August 26th at 1:30 at your office (1220 S. St. Francis Drive – Santa Fe).

The following individuals are planning on attending on behalf of IEI:

Me-IEI
Terry Lattin-IEI
Jake Hatcher-IEI (may or may not be able to attend)
Richard Cheney, Engineer - Cheney, Walters, Echols
Don Baldwin, Geologist - GeoMet
Ocean Munds-Dry, Associate - Holland & Hart

I would appreciate it if you could also let us know who will be attending on behalf of NMOCD.

*Thanks,*
*Marcella Marquez, HSE Administrator*
*Industrial Ecosystems, Inc.*
*Phone: (505) 632-1782*
*Fax: (505) 632-1876 or (505) 334-1003*

**Jones, Brad A., EMNRD**

**From:** Marcella Marquez <marcella@industrialecosystems.com>
**Sent:** Thursday, August 12, 2010 11:49 AM
**To:** Jones, Brad A., EMNRD
**Cc:** 'Terry Lattin'; 'Ocean Munds-Dry'; richard@c-w-e.com
**Subject:** Confirmation of Meeting Date & Time

Brad:

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Me-IEI
Terry Lattin-IEI
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Richard Cheney, Engineer - Cheney, Walters, Echols
Don Baldwin, Geologist - GeoMet
Ocean Munds-Dry, Associate - Holland & Hart

I would appreciate it if you could also let us know who will be attending on behalf of NMOCD.

***Thanks,***
***Marcella Marquez, HSE Administrator***
***Industrial Ecosystems, Inc.***
***Phone: (505) 632-1782***
***Fax: (505) 632-1876 or (505) 334-1003***

## Jones, Brad A., EMNRD

**From:** Don Baldwin <don.baldwin@geomatengineering.com>
**Sent:** Thursday, August 05, 2010 4:09 PM
**To:** Jones, Brad A., EMNRD
**Subject:** Boring Plan for Blanco Water Treatment Facility

Brad,

GEOMAT is involved with the installation of two monitor wells at the IEI Blanco Water Treatment Facility in Blanco, NM. We understand that a boring plan must be submitted prior to the drilling. Could you please let me know what information you need and how it should be submitted?

Thank you,

Don Baldwin
Geologist
GEOMAT Inc.
(505) 327-7928 office
(505) 860-9400 cell