

Corrective Action Report

NDIC Site #6 – NW¼-SW¼-S11-T156N-R103W
Bonetrail, Williams County, North Dakota

June 10, 2016

Terracon Project No. M1167061



Prepared for:

NDIC Oil and Gas Division
Bismarck, North Dakota

Prepared by:

Terracon Consultants, Inc.
West Fargo, North Dakota

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials



June 10, 2016

Mr. Cody VanderBusch
Reclamation Specialist
NDIC Oil and Gas Division
600 East Boulevard Avenue Dept. 405
Bismarck, ND 58505-0840
Office 701-328-8020
Cell 701-391-1959

Re: Corrective Action Report
NDIC Site #6 - NW¼-SW¼-S11-T156N-R103W
Bonetraill, Williams County, North Dakota
Terracon Project No. M1167061

Dear Mr. VanderBusch:

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed Corrective Action Report (CAR) which summarizes sealing of the seismic borehole that had groundwater emanating along the annulus causing surface impacts along the east side of 149th Avenue Northwest (NW) southwest of Bonetraill, Williams County, North Dakota. Prior to proceeding with borehole sealing activities at the site, Terracon prepared a Corrective Action Plan (CAP) dated October 20, 2015 (revised February 5, 2016) which was submitted to North Dakota Industrial Commission (NDIC) Oil and Gas Division for review and approval. Terracon conducted the scope of services discussed in general correspondence with NDIC and outlined in the CAP in general accordance with our Master Service Agreement (reference number 110.7-15-004) dated September 1, 2015 and your notice to proceed dated February 8, 2016.

At this time, groundwater continues to emanate from the borehole due to an assumed shallow aquifer and high groundwater surface. Impacts to the site have been repaired from borehole sealing activities to minimize surficial impacts. Please refer to the report for details.

Terracon appreciates this opportunity to provide our services to NDIC Oil and Gas Division. Should you have questions or require additional information, please do not hesitate to contact our office.

Sincerely,
Terracon Consultants, Inc.

Jacqueline M. Finck
Staff Geologist

Dan C. Nebel
Approved Project Reviewer



Terracon Consultants, Inc. 860 9th Street NE, Unit K West Fargo, North Dakota 58078
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1.0 INTRODUCTION 1
 1.1 Corrective Action.....1

2.0 DISCUSSION..... 2
 2.1 Seismic Borehole Sealing and Site Reclamation2

3.0 CONCLUSIONS 3

4.0 RECOMMENDATIONS..... 3

5.0 STANDARD OF CARE 3

APPENDIX A - EXHIBITS

- Exhibit 1 – Topographic Map
- Exhibit 2 – Site Diagram

APPENDIX B – PHOTOLOG

CORRECTIVE ACTION REPORT
NDIC Site #6 – NW¼-SW¼-S11-T156N-R103W
BONETRAILL, WILLIAMS COUNTY, NORTH DAKOTA

Terracon Project No. M1167061
June 10, 2016

1.0 INTRODUCTION

The site is located in the northwest ¼ (NW¼) of the southwest ¼ (SW¼) of Section 11 (Sec 11), Township 156 North (T156N), Range 103 West (R103W) near Bonetraill, Williams County, North Dakota. Terracon understood the site is located in the east right-of-way of 149th Avenue NW approximately 1,950 feet north of County Road 8. Terracon also understood the borehole was reported to have been previously sealed; however, groundwater started emanating from the annulus several years after the initial sealing. An access agreement was obtained and notification made with Williams County. Terracon completed a site reconnaissance visit prior to borehole sealing activities on Thursday March 3, 2016.

1.1 Corrective Action

A CAP was prepared by Terracon dated October 20, 2015 (revised February 5, 2016) to manage remediation activities and the sealing of the seismic borehole. The CAP was approved by the NDIC on February 8, 2016. The CAP and general correspondence with NDIC proposed the following response actions:

- Based upon data obtained through visual site assessment, abandoned seismic boreholes required sealing. Terracon would seal the abandoned boreholes in accordance with North Dakota Department of Health (NDDoH) water well abandonment guidelines outlined in Article 33-18 of the North Dakota Administrative Code (NDAC) by restoring, as far as possible, the geological conditions which existed before the boreholes were drilled.
- Each borehole would be made free of all loose material that could cause bridging during decommissioning by over-drilling using solid/hollow stem auger or air/mud rotary drilling techniques.
- If water is present, the water in the borehole will be disinfected to 100 parts per million (ppm) chlorine concentration. A 100 ppm chlorine concentration will require two pounds of laundry bleach or 1.2 pounds of calcium hypochlorite per one thousand gallons of water.
- Following completion of disinfecting activities, the borehole will be filled with an appropriate plugging material to a depth not less than three feet below grade surface. Neat cement or a cement/bentonite mixture may be used throughout the entire length of the borehole. Grout will be injected at the bottom of the hole using a pressure grouting

technique or gravity-fed with a *tremie*’ pipe forcing grout and fluids present upwards. This will be done in one continuous operation in such a fashion as to prevent any voids or air pockets from forming; side-discharge *tremie*’ pipe will be placed in the hole and slowly pulled up as the grout reaches the bottom of the *tremie*’ pipe. Concrete or topsoil will be used as a cap for the remainder of the borehole to the surface.

- Cuttings from the drilling operations will be thin spread on the site.
- Install wooden piling walls around the cased borehole, enclosing it to establish a hydraulic head. Once a hydraulic head is reached, the enclosed area will be filled with bentonite pellets to seal the borehole.

2.0 DISCUSSION

2.1 Seismic Borehole Sealing and Site Reclamation

Terracon was on-site March 21 and 29, 2016, May 4 and 18, 2016, and June 6, 2016 to complete and review sealing activities for the seismic borehole in the east right-of-way of 149th Ave NW and to repair impacts from activities. On March 21, 2016, Terracon inserted an eight inch polyvinyl chloride (PVC) casing to a depth of approximately 16 feet below grade surface (bgs) and inserted bentonite and cement in the annulus of the borehole. Due to groundwater continuing to flow, Terracon visited the site on March 29, 2016 and inserted a six inch PVC inner casing. After reviewing video from a downhole camera, groundwater movement from inside the casings were not observed, suggesting groundwater was emanating from an aquifer above the bottom of the casings. On May 4, 2016, Terracon visited the site to review sealing activities and to discuss the option of drain tiling groundwater discharge to the nearest water source. Terracon visited the site on May 18, 2016 to install wooden piling walls surrounding the cased borehole to establish a hydraulic head. Bentonite pellets were then placed into the enclosed area in attempt to seal the borehole. Groundwater continued to emanate from the borehole and overflowed the wooden piling walls due to the hydraulic head being above the enclosed area. Terracon arrived on-site June 6, 2016 to repair impacts from attempted sealing activities for the seismic borehole. Please refer to the table below (Table 1) for details of the borehole. The approximate location of the borehole can be found in Appendix A – Exhibit 2.

Table1: Borehole Sealing Records

Borehole ID	Location	Latitude	Longitude	Date Completed	Sealing Material	Depth (ft)
Flowing Borehole	NW¼ of the SW¼ of S11-T156N-R103W	48.348155°	-103.906368°	N/A	Bentonite Grout	0-16

3.0 CONCLUSIONS

Terracon inserted a casing approximately 16 feet bgs and filled the annulus with bentonite. A second casing was later installed inside the existing casing. Terracon created an enclosed area made of wooden piling walls around the cased borehole to obtain a hydraulic head. Bentonite pellets were added as the flow of water slowed in an attempt to stop the groundwater flow. The assumed shallow aquifer was unable to be sealed due to the high water table and the hydraulic head being above the enclosed area.

4.0 RECOMMENDATIONS

Terracon explored the option of drain tiling the groundwater discharge to the nearest water source with NDIC due to groundwater emanating from an assumed shallow aquifer and high water table to reclaim the right-of-way along the east side of 149th Ave NW from saturated soil conditions. Based on historical aerial photography and average annual precipitation provided by the Nation Oceanic and Atmospheric Administration (NOAA), the assumed high water table appears to reflect the current wet cycle experienced by the region. Terracon recommends additional assessment to address saturated surface impacts to the site due to seasonally high water tables.

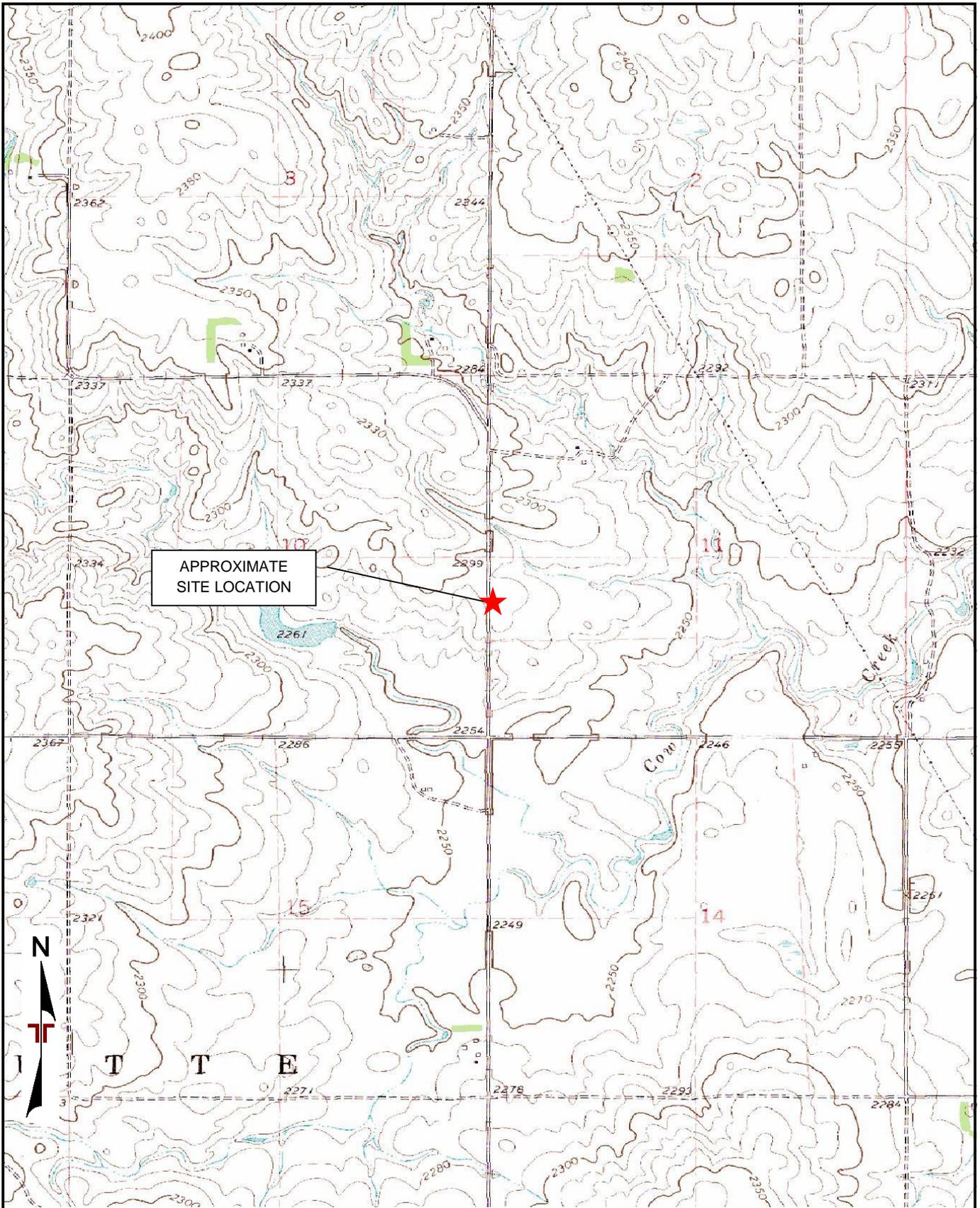
5.0 STANDARD OF CARE

Terracon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time. Terracon makes no warranties, either express or implied, regarding the findings, conclusions, or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report. These corrective action services were performed in accordance with the scope of work agreed with you, our client, as reflected in our Corrective Action Plan and were not restricted by ASTM E1903-11.

APPENDIX A – EXHIBITS

Exhibit 1 – Topographic Map

Exhibit 2 – Site Diagram



Project Manager:	LHS
Drawn by:	JMF
Checked by:	LHS
Approved by:	DCN
Project No.:	M1167061
Scale:	1"=2,000'
File Name:	M1167061.pdf
Date:	5/20/2016

Terracon
 860 9th St. NE Unit K
 West Fargo, ND 58078

TOPOGRAPHIC MAP
NDIC Site #6 – Flowing Borehole 149th Avenue NW Bonetrail, ND

Exhibit
1

● BOREHOLE

Flowing
Borehole



100 feet



© 2015 Microsoft Corporation

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

Project Manager: LHS	Project No. M1167061
Drawn by: JMF	Scale: AS SHOWN
Checked by: LHS	File Name: M1167061.pdf
Approved by: DCN	Date: 5/20/2016

Terracon
860 9th St. NE Unit K
West Fargo, ND 58078

SITE DIAGRAM

NDIC Site #6 - Flowing Borehole
149th Avenue NW
Bonetrail, ND

Exhibit
2

APPENDIX B – PHOTOLOG



Photo #1 View (looking northeast) of borehole (March 2016).



Photo #2 View (looking south) at impacts of a borehole (March 2016).



Photo #3 Measuring the width, approximately 6 feet, of borehole (March 2016).



Photo #4 Measuring the depth, approximately 16 feet below grade surface, of borehole (March 2016).



Photo #5 View (looking south) of borehole after being grouted and cased (March 2016).



Photo #6 View (looking west) of borehole after being grouted and cased (March 2016).



Photo #7 View (looking southeast) of grouted and cased borehole (March 2016).



Photo #8 View (looking north) of second casing and hole created for the piping (March 2016).



Photo #9 View (looking northeast) of second casing and piping inserted for water flow to help with erosion (March 2016).



Photo #10 View at hole made on the south side of casing for downhole camera (March 2016).



Photo #11 View (looking southeast) of installed wooden piling walls around cased borehole (May 2016).



Photo #12 View at closed trap door attached to the wooden piling walls (May 2016).



Photo #13 View (looking northeast) of impacts after removing the wooden piling walls (May 2016).



Photo #14 View (looking south) of impacts after removing the wooden piling walls (June 2016).



Photo #15 View (looking northwest) of the trench dug for proper drainage (June 2016).



Photo #16 View (looking northeast) of trench and topsoil placed around borehole (June 2016).



Photo #17 View of seed disbursement on topsoil (June 2016).



Photo #18 View (looking south) of completed reclamation activities of borehole (June 2016).

Corrective Action Report

NDIC Site #6 – S¹/₂-S33-T157N-R102W
Bonetrail, Williams County, North Dakota

June 2, 2016

Terracon Project No. M6167004



Prepared for:

NDIC Oil and Gas Division
Bismarck, North Dakota

Prepared by:

Terracon Consultants, Inc.
West Fargo, North Dakota

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials



June 2, 2016

Mr. Cody VanderBusch
Reclamation Specialist
NDIC Oil and Gas Division
600 East Boulevard Avenue Dept. 405
Bismarck, ND 58505-0840
Office 701-328-8020
Cell 701-391-1959

Re: Corrective Action Report
NDIC Site #6 S½-S33-T157N-R102W
Bonetraill, Williams County, North Dakota
Terracon Project No. M6167004

Dear Mr. VanderBusch:

Terracon Consultants, Inc. (Terracon) is pleased to submit the enclosed Corrective Action Report (CAR) which summarizes sealing of seismic boreholes that had groundwater emanating along the annulus causing surface impacts to agricultural cropland southwest of Bonetraill, Williams County, North Dakota. Prior to proceeding with borehole sealing activities at the site, Terracon prepared a Corrective Action Plan (CAP) dated October 20, 2015 (revised February 5, 2016) which was submitted to North Dakota Industrial Commission (NDIC) Oil and Gas Division for review and approval. Terracon conducted the scope of services outlined in the CAP in general accordance with our Master Service Agreement (reference number 110.7-15-004) dated September 1, 2015 and your notice to proceed dated February 8, 2016.

Based on the oversight activities, seismic boreholes have been sealed, but due to an assumed shallow aquifer and high groundwater surface, groundwater continues to emanate from the vicinity of borehole. Impacts to the site have been repaired from dewatering and borehole sealing activities to minimize surficial impacts to cropland. Please refer to the report for details.

Terracon appreciates this opportunity to provide our services to NDIC Oil and Gas Division. Should you have questions or require additional information, please do not hesitate to contact our office.

Sincerely,
Terracon Consultants, Inc.

Jacqueline M. Finck
Staff Geologist

Dan C. Nebel
Approved Project Reviewer



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1.0 INTRODUCTION 1
 1.1 Corrective Action.....1

2.0 DISCUSSION..... 2
 2.1 Seismic Borehole Sealing and Reclamation2

3.0 CONCLUSIONS 2

4.0 RECOMMENDATIONS..... 3

5.0 STANDARD OF CARE 3

APPENDIX A - EXHIBITS

- Exhibit 1 – Topographic Map
- Exhibit 2 – Site Diagram

APPENDIX B – PHOTOLOG

CORRECTIVE ACTION REPORT
NDIC Site #6 – S½-S33-T157N-R102W
BONETRAILL, WILLIAMS COUNTY, NORTH DAKOTA

Terracon Project No. M6167004
June 2, 2016

1.0 INTRODUCTION

The site is located in the south ½ (S½) of Section 33 (Sec 33), Township 157 North (T157N), Range 102 West (R102W) near Bonetrail, Williams County, North Dakota. Terracon understood the site is located on parcels of land owned by Mr. Michael Berg (Parcel Number 54157020033010 and 54157020033020). An access agreement was obtained with the respective landowner.

1.1 Corrective Action

A CAP was prepared by Terracon dated October 20, 2015 (revised February 5, 2016) to manage remediation activities and the plugging of the seismic boreholes. The CAP was approved by the NDIC on February 8, 2016. The CAP proposed the following response actions:

- Based upon data obtained through visual site assessment, three abandoned seismic boreholes required sealing. Terracon would seal the abandoned boreholes in accordance with North Dakota Department of Health (NDDoH) water well abandonment guidelines outlined in Article 33-18 of the North Dakota Administrative Code (NDAC) by restoring, as far as possible, the geological conditions which existed before the boreholes were drilled.
- Each borehole would be made free of all loose material that could cause bridging during decommissioning by over-drilling using solid/hollow stem auger or air/mud rotary drilling techniques.
- If water is present, the water in the borehole will be disinfected to 100 parts per million (ppm) chlorine concentration. A 100 ppm chlorine concentration will require two pounds of laundry bleach or 1.2 pounds of calcium hypochlorite per one thousand gallons of water.
- Following completion of disinfecting activities, the borehole will be filled with an appropriate plugging material to a depth not less than three feet below grade surface. Neat cement or a cement/bentonite mixture may be used throughout the entire length of the borehole. Grout will be injected at the bottom of the hole using a pressure grouting technique or gravity-fed with a *tremie*' pipe forcing grout and fluids present upwards. This will be done in one continuous operation in such a fashion as to prevent voids or air pockets from forming; side-discharge *tremie*' pipe will be placed in the hole and slowly

pulled up as the grout reaches the bottom of the *tremie*’ pipe. Concrete or topsoil will be used as a cap for the remainder of the borehole to the surface.

- Cuttings from the drilling operations will be thin spread on the site.

2.0 DISCUSSION

2.1 Seismic Borehole Sealing and Reclamation

Terracon was on-site March 3, 4, and 7, 2016 to complete sealing activities for the three seismic boreholes. The areas around the three boreholes were dewatered in fall of 2015 to pinpoint the location of each seismic borehole. Terracon subcontracted Absorbent and Safety Solutions (ABS) to level out stockpiled soil from the dewatering activities in proximity to borehole Berg 3 to complete drilling activities. During sealing activities, ABS excavated in proximity of borehole Berg 1 in a last attempt to pinpoint the borehole. Terracon and ABS were unable to pinpoint the exact location. Please refer to the table below (Table 1) for details of each borehole. Approximate locations of each borehole can be found in Appendix A – Exhibit 2.

Table1: Borehole Sealing Records

Borehole ID	Location	Latitude	Longitude	Date Completed	Sealing Material	Depth (ft)
Berg 1	SE¼ of S33-T157N-R102W	48.378564°	-103.880077°	N/A	N/A	N/A
Berg 2	SW¼ of S33-T157N-R102W	48.373209°	-103.872000°	3/8/2016	Holeplug®	0-10
					Bentonite Grout	0-65
Berg 3	SE¼ of S33-T157N-R102W	48.232717°	-103.310843°	3/7/2016	Holeplug®	0-10
					Bentonite Grout	10-155

ABS arrived on-site Monday April 4, 2016 to repair impacts from dewatering, locating, and sealing activities for seismic boreholes Berg 1, 2, and 3. Terracon visited the site on Wednesday May 4, 2016 to review completion of sealed seismic boreholes and to discuss the option of drain tiling each borehole to the nearest water source.

3.0 CONCLUSIONS

Terracon sealed the deep aquifers in two abandoned seismic boreholes (Berg 2 and 3) by over-drilling to approximately 65 to 155 feet below grade surface (bgs) and filling with bentonite grout. The approximate upper 10 feet of each borehole was back-drilled and filled with Holeplug®. The assumed shallow aquifer was not sealed due to the high water table. After multiple attempts, seismic borehole Berg 1 was not pinpointed, therefore could not be sealed.

4.0 RECOMMENDATIONS

Terracon explored the option of drain tiling each borehole to the nearest water source due to water emanating from the assumed shallow aquifer and high water table to further reclaim saturated agricultural cropland. Based on historical aerial photography and average annual precipitation provided by the National Oceanic and Atmospheric Administration (NOAA), the assumed high water table appears to reflect the current wet cycle experienced by the region. Terracon recommends additional assessment to address saturated surface impacts to the site due to seasonally high water tables.

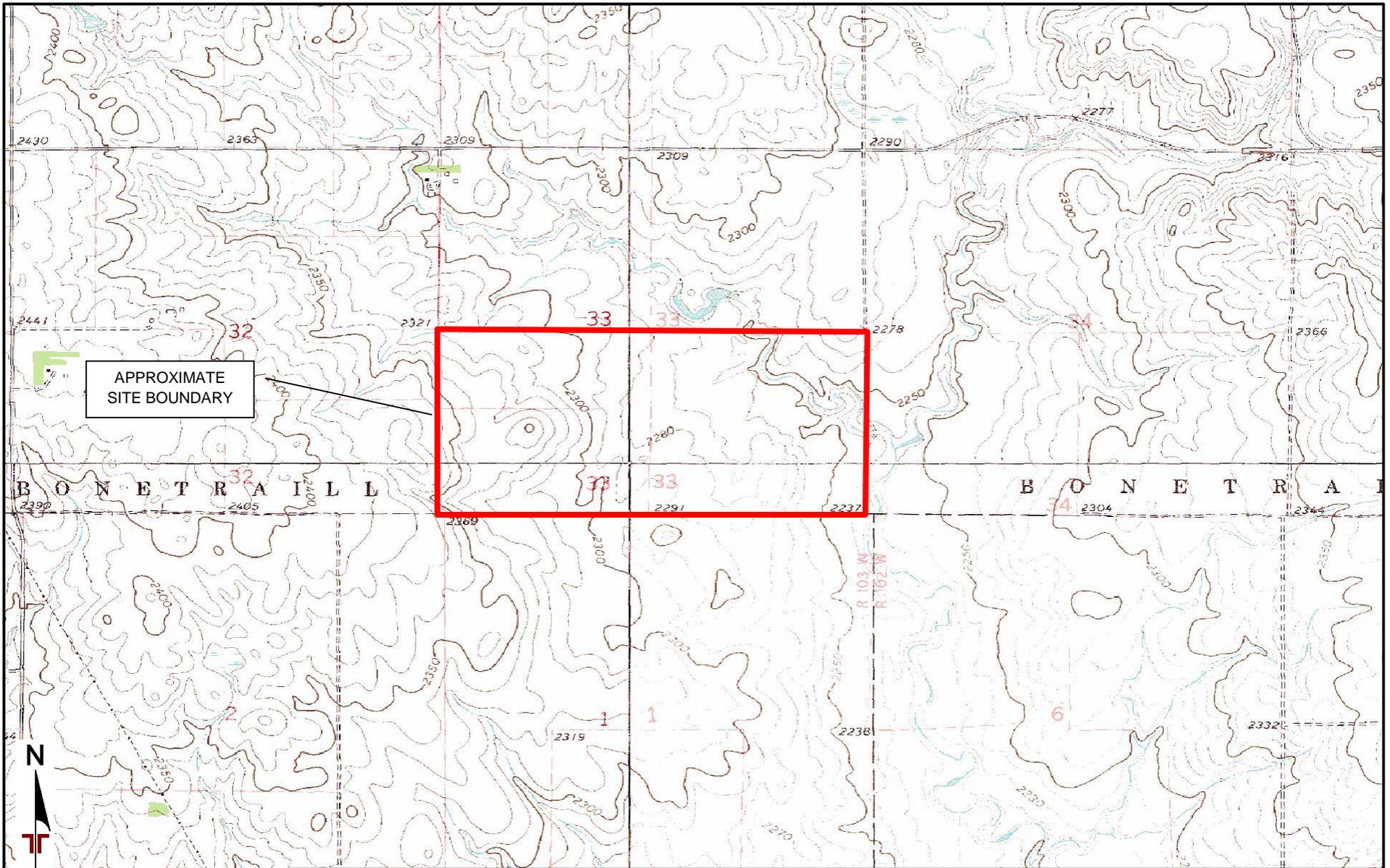
5.0 STANDARD OF CARE

Terracon's services were performed in a manner consistent with generally accepted practices of the profession undertaken in similar studies in the same geographical area during the same time. Terracon makes no warranties, either express or implied, regarding the findings, conclusions, or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies, or other third parties supplying information used in the preparation of the report. These corrective action services were performed in accordance with the scope of work agreed with you, our client, as reflected in our Corrective Action Plan and were not restricted by ASTM E1903-11.

APPENDIX A – EXHIBITS

Exhibit 1 – Topographic Map

Exhibit 2 – Site Diagram



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY
 QUADRANGLES INCLUDE: WEST BONETRAILL, ND (1/1/1974), BONETRAILL, ND (1/1/1974), BONETRAILL SW, ND (1/1/1974) and BONETRAILL SE, ND (1/1/1974).
 DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager: LHS	Project No. M6167004
Drawn by: JMF	Scale: 1"=2,000'
Checked by: LHS	File Name: M6167004.pdf
Approved by: DCN	Date: 5/19/2016

Terracon
 6701 4th St SW
 Minot, ND 58701-7608

TOPOGRAPHIC MAP

Corrective Action Plan NDIC #6
 S1/2 S33-T157N-R102W
 Williston, ND

Exhibit
1



● BOREHOLE

Berg 1

Berg 3

Berg 2

500 feet

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bing

AERIAL PHOTOGRAPHY PROVIDED BY MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

Project Manager:	LHS
Drawn by:	JMF
Checked by:	LHS
Approved by:	DCN

Project No.	M6167004
Scale:	AS SHOWN
File Name:	M6167004.pdf
Date:	5/19/2016

Terracon

6701 4th St SW
Minot, ND 58701-7608

SITE DIAGRAM

Corrective Action Plan NDIC #6
S1/2 S33-T157N-R102W
Williston, ND

Exhibit

2

APPENDIX B – PHOTOLOG



Photo #1 View (looking east) of borehole Berg 2 (Sept. 2015).



Photo #2 View (looking north) of a borehole developed by the landowner (Sept. 2015).



Photo #3 View (looking east) of surface impacts caused by borehole Berg 3 (Sept. 2015).



Photo #4 View (looking east) at borehole Berg 3 (Sept. 2015).



Photo #5 View (looking east) of surface impacts caused by borehole Berg 1 (Sept. 2015).



Photo #6 View of dewatering activities at borehole Berg 3 (Oct. 2015).



Photo #7 View of borehole Berg 3 (Oct. 2015).



Photo #8 View of impacts from dewatering activities at Berg 3 (Oct. 2015).



Photo #9 View of dewatering activities at borehole Berg 2 (Oct. 2015).



Photo #10 View of impacts from dewatering activities at Berg 2 (Oct. 2015).



Photo #11 View of borehole Berg 2 (Oct. 2015).



Photo #12 View (looking west) of dewatering activities at borehole Berg 1 (Oct. 2015).



Photo #13 View (looking west) of dewatering activities at borehole Berg 1 (Oct. 2015).



Photo #14 View of borehole Berg 2 (Feb. 2016).



Photo #15 View (looking north) of borehole Berg 2 (Feb. 2016).



Photo #16 View (looking north) of borehole Berg 3 (Feb. 2016).



Photo #17 View (looking east) of impacts from dewatering activities at Berg 1 (March 2016).



Photo #18 View (looking north) of borehole Berg 2 surface impacts after plugging (March 2016).



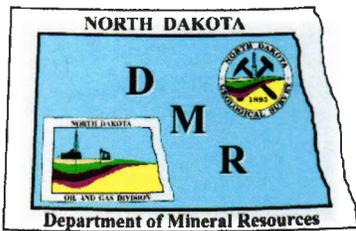
Photo #19 View (looking north) of borehole Berg 2 surface impacts after plugging (March 2016).



Photo #20 View (looking west) of borehole Berg 2 surface impacts after plugging (March 2016).



Photo #21 View (looking east) of borehole Berg 3 surface impacts after plugging (March 2016).



Department of Mineral Resources

Lynn D. Helms -- Director

North Dakota Industrial Commission

www.dmr.nd.gov

July 25, 2014

To: N.D. County Emergency Managers

Re: N.D. Oil and Gas Division – Abandoned Oil and Gas Well Plugging and Site Reclamation Fund (AWPSRF)

The members of the North Dakota Industrial Commission - Department of Mineral Resources – Oil and Gas Division (OGD) appreciate your ongoing efforts regarding the protection of the people and environment of our great State.

As you may know, the mission of the OGD is to encourage and promote the development, production, and utilization of oil and gas in the State in such a manner as will prevent waste, maximize economic recovery, and fully protect the correlative rights of all owners to the end that the landowners, the royalty owners, the producers, and the general public realize the greatest possible good from these vital natural resources.

Keeping this mission in mind, the OGD has been managing the AWPSRF for over 30 years since its creation by the legislature in 1983. We have recently created a new program team, within the OGD, that is responsible to oversee the proper reclamation of these types of sites that ***may result from the illegal dumping of oil-field waste.***

Most importantly, the fund was created and is sustained from oil and gas taxes, penalties from violations, and fees collected by the OGD. The fund is currently capped at \$75 million with \$5 million available per fiscal year. ***Funds are authorized from this fund to pay for projects in instances where no responsible party can be found.***

It is important to understand that in order for the costs of a reclamation project to be eligible for reimbursement from AWPSRF, ***an OGD field inspector must be contacted prior to the conduct of any remedial activity and provided an opportunity to visit and evaluate the site.*** The OGD has contracted with an environmental services provider who can affect the proper assessment and reclamation of these types of sites at the direction of the OGD. Attached to this letter is the contact information for our field inspection staff and their respective offices and an AWPSRF Program review diagram that is used by the OGD to evaluate the suitability of cost reimbursement.

Additional information on new rules and regulations that have been implemented in order to reduce illegal dumping incidents can be found on the OGD website at: <https://www.dmr.nd.gov/oilgas/>

Through the continued management of AWPSRF and the new rules that have been put forth by our Division we will continue to take positive and constructive steps to ensure responsible development and management of our States oil and gas resources.

Please feel free to contact our offices at any time if you have any questions about the AWPSRF program.

Respectfully,

N.D. Department of Mineral Resources:

Fred J. Anderson
GeoTech Support Staff Officer

Funds Request / Complaint Investigation 43-02-03-54 / Discovery by Inspector / Spill Response

AUTHORIZED USE OF FUND?

- 1) Plug an abandoned well
- 2) Reclaim an abandoned oil and gas or injection well site, saltwater disposal pit, drilling fluid pit, or access road put into service after 7/31/1983
- 3) Reclaim an oil and gas related pipeline or associated facility put into service after 7/31/1983
- 4) Reclaim damage from an illegal dumping incident,
- 5) Compensate a mineral owner's royalty share of confiscated oil



DO NOT FUND

LEAK OR SERIOUS THREAT?

Well, equipment, or pipeline leak, or dumping incident is likely to cause a serious threat of pollution or injury to public health or safety



USE AWPSRF Unless responsible party is responding

NO RESPONSIBLE PARTY?

Company cannot be found, has no assets, or cannot be legally required to plug/re-plug/reclaim



COMPLAINT or JUDGMENT ==> RESPONSIBLE PARTY CLEANS UP, PAYS, OR REIMBURSES AWPSRF

NO BOND?

No bond or cost to plug/re-plug/reclaim exceeds the bond amount



CONFISCATE BOND, EQUIPMENT, AND OIL

USE ABANDONED OIL AND GAS WELL PLUGGING AND SITE RECLAMATION FUND (AWPSRF)

North Dakota Industrial Commission
North Dakota Department of Mineral Resources
North Dakota Oil & Gas Division

Lynn Helms
Director



Bruce Hicks
Assistant Director

**Abandoned Oil and Gas Well Plugging and
Site Reclamation Fund Program
(AWPSRF)**

Program Team Contacts:

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Rick Hutchens
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jaxtman@nd.gov

Bob Garbe
Minot District Supervisor
(701) 720-3262
bgarbe@nd.gov



October 20, 2015
Revised February 5, 2016

Mr. Cody VanderBusch
Reclamation Specialist
NDIC Oil and Gas Division
600 East Boulevard Avenue Dept. 405
Bismarck, ND 58505-0840

Office 701-328-8020
Cell 701-391-1959

Re: Corrective Action Plan
NDIC Site #6 – S½ S33-T157N-R102W
Williams County, North Dakota
Terracon Project No. M1157042

Dear Mr. VanderBusch:

Terracon Consultants, Inc. (Terracon) appreciates the opportunity to submit the enclosed Corrective Action Plan (CAP) for the above-referenced site. The following sections provide an outline of the project, Terracon's CAP scope of services, including schedule, and our estimated fee.

1.0 PROJECT INFORMATION

Terracon understands the North Dakota Industrial Commission Oil and Gas Division (NDIC) has identified the site located approximately in the S½ of Section 33 Township 155N Range 102W near Bonetrail in Williams County, North Dakota with groundwater emanating along the annulus of abandoned boreholes causing surface impacts. Terracon further understands the boreholes are located on a parcel of land owned by Mr. Michael Berg. The location of the site and indications of the abandoned boreholes are depicted on Exhibits 1 and 2. Terracon understand three boreholes require plugging and one borehole will remain that has been developed for use by the property owner.

If our understanding of the current site conditions is not correct, or if you have additional useful information, please let us know as soon as possible.



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P [701] 282-9633 F [701] 282-9635 terracon.com

Environmental

Facilities

Geotechnical

Materials

2.0 COMMITMENT TO SAFETY

Terracon has a 100% commitment to the safety of its employees. As such, and in accordance with our *Incident and Injury Free*® safety culture, Terracon will develop a health and safety plan in conjunction with Pre-Task Planning to be used by our personnel during field services. Prior to commencement of on-site activities, Terracon will hold a meeting to review health and safety needs for this specific project. At this time, we anticipate performing fieldwork in a United States Environmental Protection Agency (USEPA) Level D work uniform consisting of hard hats, safety glasses, protective gloves, and steel-toed boots. It may become necessary to upgrade this level of protection, at additional cost, while sampling activities are being conducted in the event that petroleum or chemical constituents are encountered in soils or groundwater that present an increased risk for personal exposure.

3.0 SCOPE OF SERVICES

The objective of the CAP is to seal the abandoned boreholes in accordance with North Dakota Department of Health (NDDoH) water well abandonment guidelines outlined in Article 33-18 of the North Dakota Administrative Code by restoring, as far as possible, the geological conditions which existed before the borehole was drilled. The desired product for this CAP is to decommission the boreholes to eliminate surficial physical hazards, prevent contamination of groundwater, maintain aquifer pressure head, prevent intermingling of desirable and undesirable waters, and eliminate the possibility the borehole will be used for purposes other than intended.

Following receipt of your executed Task Order and no later than 48 hours prior to intrusive activities, Terracon will contact North Dakota One Call to arrange for identification of underground utility locations at the above referenced site.

3.1 Location

Terracon will locate each borehole with a preliminary search using visual inspection and physical evidence prior to using excavation equipment. Excavation will be the final procedure used to verify the location of the borehole. Excavation may be accomplished by shovel or larger equipment such as a backhoe depending on success in finding the proximity of the initial site of excavation to where the borehole is discovered or excavation ceases.

3.2 Plugging Procedure

Each borehole will be made free of all loose material that could cause bridging during decommissioning by overdrilling using a solid/hollow stem auger or air/mud rotary drilling techniques.

If water is present, the water in the borehole will be disinfected to 100 parts per million (ppm) chlorine concentration. A 100 ppm chlorine concentration will require two pounds of laundry bleach or 1.2 pounds of calcium hypochlorite per one thousand gallons of water.

Following completion of disinfecting activities, the borehole will be filled with an appropriate plugging material to a depth not less than three feet below grade surface. Neat cement or a cement/bentonite mixture may be used throughout the entire length of the borehole. Grout will be injected at the bottom of the hole using a pressure grouting technique or gravity-fed with a tremie pipe forcing grout and fluids present upwards. This will be done in one continuous operation in such a fashion as to prevent any voids or air pockets from forming; side-discharge *tremie* pipe will be placed in the hole and slowly pulled up as the grout reaches the bottom of the *tremie* pipe. Concrete or topsoil will be used as a cap for the remainder of the borehole to the surface.

Cuttings from the drilling operations will be thin spread on the site.

3.3 Preparation of Report

Upon completion of site activities, a report will be prepared and submitted to the North Dakota Department of Health that will include the following:

- Site plan showing pertinent site features;
- Decommissioning date;
- Personnel on hand;
- Procedures used in the field;
- Plugging materials used;
- Measurements made, depths encountered, fluids pumped,
- Analytical laboratory results;
- Field location of the borehole;
- Water quality analyses results, if any; and,
- Recommendations concerning further action, if necessary.

Terracon is prepared to commence work on this project following notification to proceed. We anticipate completing the field activities in approximately two days per borehole. The report will be available approximately ten business days upon returning from the site. This written report

NDIC Site #6 Work Plan for Corrective Action Plan

NDIC Oil and Gas Division ■ Williams County, North Dakota

October 20, 2015, Revised February 5, 2016 ■ Terracon Project No. PM1157042



will reflect results, findings, and recommendations, and, as such, will take precedence over any verbal reports that Terracon personnel may have provided. The analysis, comments, and recommendations presented in the written report will be based on the information collected as discussed in this work plan.

3.4 General Considerations and Limitations

Terracon's services will be performed in a manner consistent with generally accepted practices of the environmental profession. Terracon makes no warranties, expressed or implied, regarding its services, findings, conclusions or recommendations. Please note that Terracon does not warrant the work of laboratories, regulatory agencies or other third parties supplying information used in the preparation of the report. These CAP services will be performed in accordance with the scope of work agreed with you, our client, as set forth in this work plan.

Findings, conclusions, and recommendations resulting from these services will be based upon information derived from on-site activities and other services performed under this scope of work; such information is subject to change over time. Certain indicators of the presence of hazardous substances, petroleum products, or other constituents may have been latent, inaccessible, unobservable, non-detectable, or not present during these services, and we cannot represent that the site contains no hazardous substances, toxic substances, petroleum products, or other latent conditions beyond those identified during this CAP. Subsurface conditions may vary from those encountered at specific borings or wells or during other surveys, tests, assessments, investigations or exploratory services; the data, interpretations, findings and our recommendations are based solely upon data obtained at the time and within the scope of these services.

4.0 COMPENSATION

The Scope of Services outlined in this work plan will be performed on a time and materials basis estimated at \$37,750.00. Do to the fact that there are several unknowns associated with regard to the availability of groundwater, borehole depth, and exact borehole location at the site, a 20% contingency of \$7,550.00 has been added to the total cost. If, as a result of these services, additional work is required outside the scope of this work plan, you will be contacted, and upon request, proposed costs for additional work will be provided if costs are estimated to exceed \$45,100.00 (20% contingency). Client authorization will be obtained prior to commencement of any additional work outside the scope of this work plan.

NDIC Site #6 Work Plan for Corrective Action Plan

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ESTIMATED COSTS	
Consulting Costs (includes project management, travel and field services, and report preparation)	
Drilling Services (includes over-drilling, disinfecting, and plugging three boreholes to maximum depth up to 200') and Equipment Mobilization (up to two trips)	
Location and Excavation Services (includes landscaping repair)	
Expenses	
	Estimated Cost
	20% Contingency
	Total Estimated Cost

Subcontractor and other direct costs include a 15% handling fee. The project cost summary is based on the scope of services outlined in this work plan. This work plan and cost estimate were prepared based on the following assumptions:

- NDIC will provide to Terracon, prior to mobilization, legal right of entry to the site (and other areas if required) to conduct the scope of services.
- NDIC will notify Terracon, prior to mobilization, of any restrictions, special site access requirements, or known potentially hazardous conditions at the site (e.g., hazardous materials or processes, specialized protective equipment requirements, unsound structural conditions, etc.).
- The estimated cost assumes that the proposed scope of work can be completed during one mobilization.
- Utilities on private land that are not located by public companies will be located by property owner/operator.
- Work can be performed during normal business hours (Monday through Friday, 7:00 am to 7:00 pm).
- Traffic control services are not required.
- The site is readily accessible by truck-mounted drill rig.
- Transportation and disposal of removed soil cuttings and/or development water and other waste materials are out-of-scope services and not included in this proposal.

If any of these assumptions or conditions are not accurate or change during the project, the stated fee is subject to change. Please contact us immediately if you are aware of any inaccuracies in these assumptions and conditions, so that we may revise the work plan or fee.

NDIC Site #6 Work Plan for Corrective Action Plan

NDIC Oil and Gas Division ■ Williams County, North Dakota

October 20, 2015, Revised February 5, 2016 ■ Terracon Project No. PM1157042



5.0 GENERAL COMMENTS

The proposed scope of work will be completed under the existing Contract dated September 1, 2015 between Terracon and the State of North Dakota. This work plan is valid for 60 days from the date of this work plan. We appreciate the opportunity to provide this proposal and look forward to working with you on this project. If this work plan meets with your approval, please sign the attached Task Order and return a copy to our office via email, fax 701-282-9635, or mail to our Fargo office.

If you should have any questions or comments regarding this proposal, please contact either of the undersigned.

Sincerely,

Terracon Consultants, Inc.

A handwritten signature in blue ink that reads "Leif H. Schonteich".

Leif H. Schonteich
Environmental Department Manager

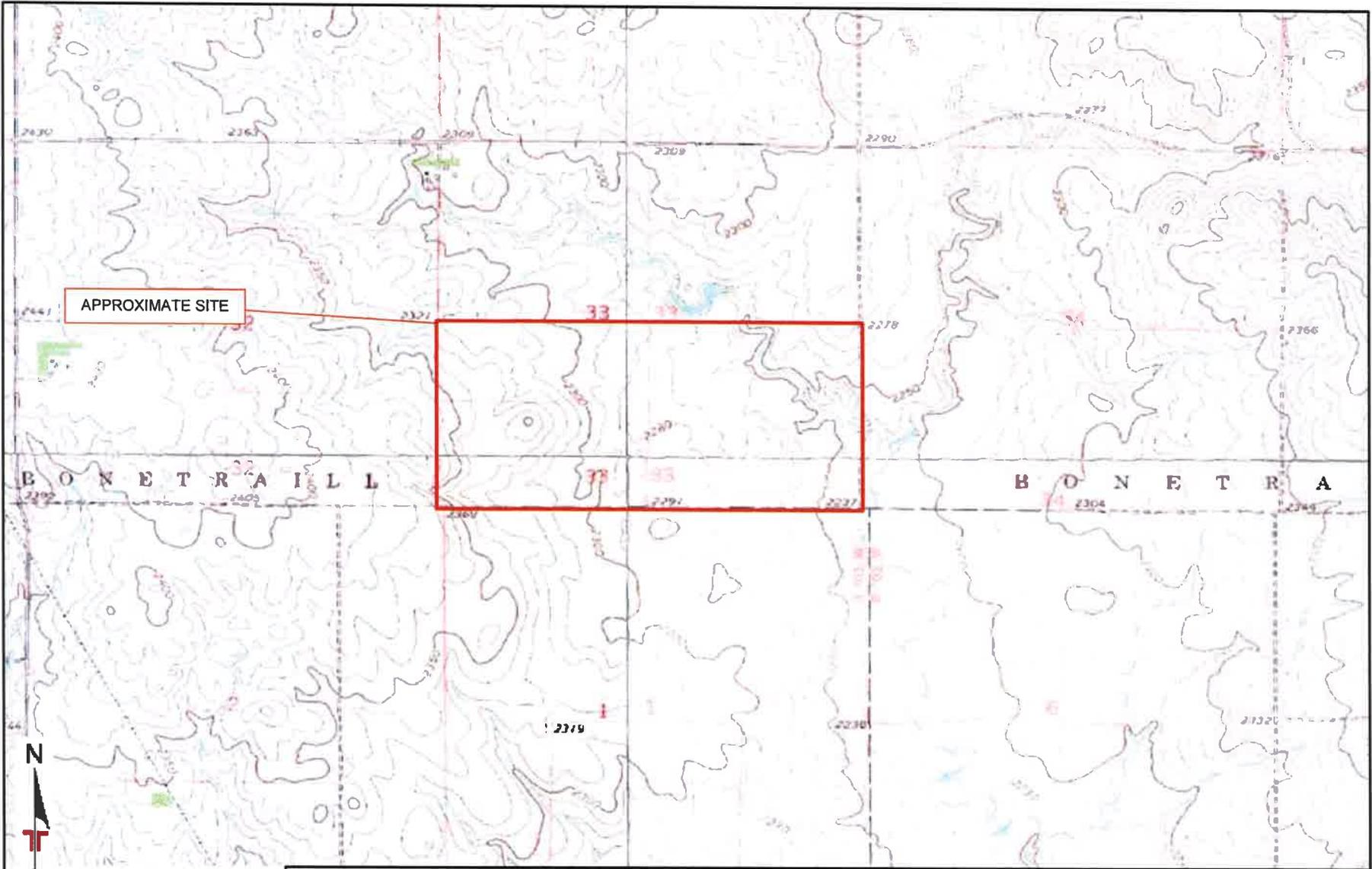
A handwritten signature in blue ink that reads "Dan C. Nebel".

Dan C. Nebel, P.G.
Principal

A handwritten signature in blue ink that reads "Jonathan B. Ellingson".

Jonathan B. Ellingson
Fargo Office Manager

Attachment: Task Order
Exhibit 1 – Topographic Map
Exhibit 2 – Site Map



TOPOGRAPHIC MAP IMAGE COURTESY OF THE U.S. GEOLOGICAL SURVEY QUADRANGLES INCLUDE: WEST BONETRAIL, ND (1/1/1974), BONETRAIL, ND (1/1/1974), BONETRAIL SW, ND (1/1/1974) and BONETRAIL SE, ND (1/1/1974). DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

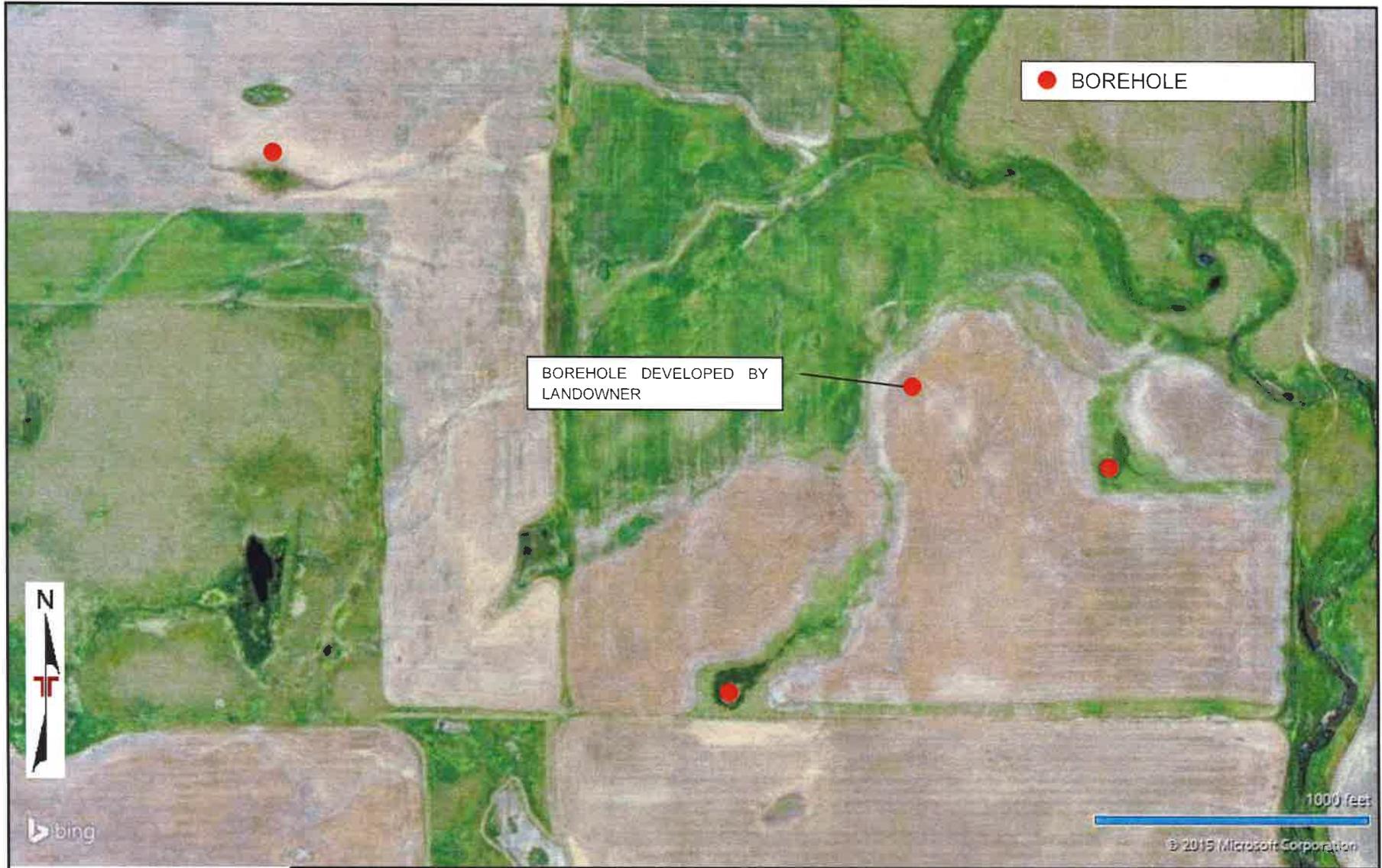
Project Manager: LHS
 Drawn by: LHS
 Checked by: JBE
 Approved by: DCN

Project No. M1157042
 Scale: 1"=24,000 SF
 File Name: NDIC6.pdf
 Date: 10/16/15

Terracon
 4102 7th Avenue North
 Fargo, ND 58102-2923

TOPOGRAPHIC MAP
 NDIC Site #6 - S½ S33-T157N-R102W
 Williams County, North Dakota

Exhibit
 1



AERIAL PHOTOGRAPHY PROVIDED BY
MICROSOFT BING MAPS

DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION
PURPOSES

Project Manager: LHS
 Drawn by: LHS
 Checked by: JBE
 Approved by: DCN

Project No. M1157042
 Scale: AS SHOWN
 File Name: NDIC5.pdf
 Date: 10/16/15

Terracon

4102 7th Avenue North
 Fargo, ND 58102-2923

SITE DIAGRAM

NDIC Site #6 - S½ S33-T157N-R102W
 Williams County, North Dakota

Exhibit
 2

MASTER SERVICES AGREEMENT

TASK ORDER

This **TASK ORDER** is issued under the **MASTER SERVICES AGREEMENT** (dated 09/01/2015, agreement reference number 110.7-15-004) between State of North Dakota ("Client") and Terracon Consultants, Inc. ("Consultant") for Services to be provided by Consultant for Client on the NDIC Site #6 project ("Project"), as described in the Project Information section of the Consultant's Task Order Proposal dated 10/20/2015 revised February 5, 2016 ("Task Order Proposal") unless the Project is otherwise described below or in Exhibit A to this Task Order (which section or Exhibit are incorporated into this Task Order). This Task Order is incorporated into and part of the Master Services Agreement.

1. Project Information

See Corrective Action Plan (Terracon Project No. M1157042) dated October 20, 2015 revised February 5, 2016.

2. Scope of Services

The scope of Services to be provided under this Task Order are described in the Scope of Services section of the Consultant's Task Order Proposal, unless Services are otherwise described below or in Exhibit B to this Task Order.

See Corrective Action Plan (Terracon Project No. M1157042) dated October 20, 2015 revised February 5, 2016.

3. Compensation

Client shall pay compensation for the Services performed at the fees stated in the Task Order Proposal unless fees are otherwise stated below or in Exhibit C to this Task Order.

See Corrective Action Plan (Terracon Project No. M1157042) dated October 20, 2015 revised February 5, 2016.

All terms and conditions of the **Master Services Agreement** shall continue in full force and effect. This Task Order is accepted and Consultant is authorized to proceed.

Consultant: Terracon Consultants, Inc.
By: *Leif H. Schonteich* Date: 2/5/2016
Name/Title: Leif H. Schonteich / Environmental
Department Manager
Address: 4102 7th Ave. N.
Fargo, ND 58102-2923
Phone: (701) 282-9633 Fax: (701) 282-9635
Email: Leif.Schonteich@terracon.com

Client: State of North Dakota
By: _____ Date: _____
Name/Title: Cody VanderBusch / Reclamation Specialist
Address: 600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840
Phone: (701) 328-8020 Fax: _____
Email: cwvanderbusch@nd.gov

Reference Number: M1157042