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March 23, 2016

Ms. Janet K. Macdonald, P.G.
North Carolina Department of Environmental Quality
Division of Waste Management - Superfund Section
1646 Mail Service Center
Raleigh, North Carolina 27699-1646

Reference: **Construction Completion Report – Groundwater Extraction Remedy**
UMICORE CSM NA – NONCD0002833
Maxton, Scotland County, North Carolina

Dear Ms. Macdonald:

As required by the Administrative Agreement (docket number 09-SF-311) entered into by Umicore USA Inc. (Umicore), Duncklee & Dunham, PC (Duncklee & Dunham) and the North Carolina Department of Environmental Quality, Division of Waste Management, Superfund Section, Inactive Hazardous Sites Branch, this letter report is the *Construction Completion Report- Groundwater Extraction Remedy*. This report provides the details of the design and construction of the groundwater-extraction system completed at the site. The *Pre-Construction Report- Groundwater Extraction Remedy*, including the Engineering Plan, was submitted to IHSB on July 8, 2015. The site location is shown on Figure 1.

The remedy addressed by the Interim RAP Addendum is the extraction of cobalt-contaminated groundwater from the extended portion of the plume that follows preferential pathways from the source area to the western property boundary and off-site toward the Laurinburg-Maxton Airport Commission (LMAC) water supply Well #8. Duncklee & Dunham completed an engineering design for this system as described in the Pre-Construction Report for this remedy. The following is a summary of activities completed to initiate the groundwater-extraction remedy and activities that will be used to monitor the effectiveness of this system.

1 System Summary

Duncklee & Dunham designed the groundwater extraction system to control and mitigate a plume of cobalt-contaminated groundwater that extends from the source area to just past the western Umicore property line. Mitigation will be accomplished by a combination of hydraulic control and the removal of cobalt mass from the groundwater. The extracted groundwater is collected from the wells through a network of piping and is discharged to the LMAC sewer system for treatment and disposal.

The water that is discharged into LMAC's sanitary sewer is regulated under an industrial-users pretreatment permit (IUP). A copy of this IUP is in the *Quarter 24 Status Report, Remedial Action Progress Report and Work Plan Amendment*, dated October 12, 2015.

Duncklee & Dunham based a significant portion of the extraction system design on the results of multiple groundwater modeling scenario runs. We designed the configuration of the system using the modeling scenario that proved to be most effective at control and mitigation of the plume while at the same time minimized pumping volumes, rates, and time to achieve plume remediation.

Many details of the system design and construction are described in the Engineering Design Plan, which is in the Pre-Construction Report. This report does not repeat the details where construction of the system is consistent with the engineering plan. The information provided in this report consists of substantial changes from the engineering plan with additional descriptions and construction details of the as-built configuration of the system.

2 Quarterly Progress Reports

Duncklee & Dunham has certified and submitted reports to the IHSB on the status of remedial activities in conjunction with the Quarterly Progress Reports. These reports consist of the *Quarter 24 Status Report, Remedial Action Progress Report and Work Plan Amendment*, dated October 12, 2015, and the *Quarter 25 Status Report, Remedial Action Progress Report, and Work Plan*, dated January 19, 2016.

3 As-Built Plans, Specifications, and Remediation Process

3.1 Groundwater Modeling and Network Configuration

As shown in the Pre-Construction Report, Duncklee & Dunham contracted with South Atlantic Environmental Drilling and Construction Company (SAEDACCO) to construct extraction well EW-1 as a protective measure to limit further plume migration toward LMAC Well #8. We measured the aquifer response to the pumping of this extraction well to further evaluate aquifer characteristics used in groundwater modeling studies for the design of the full extraction system. At that time, SAEDACCO constructed much of the water discharge network, electrical system and other infrastructure for the full extraction system to support EW-1 as well as the full extraction remedy.

Duncklee & Dunham used the data collected from the pumping of well EW-1, as well as geological, water quality, hydraulic-profile tool with groundwater sampling (HPT-GWS), and hydrogeologic data collected from the surrounding monitoring well network to oversee groundwater modeling studies by Eagle Resources, P.A. We used these modeling results to develop the extraction-system configuration, including well locations and pumping rates that would be the most effective in terms of water-extraction volumes, duration of extraction operations, and cost to remediate this portion of the contaminant plume. Screen shots of the MODFLOW scenario used for final design of the extraction system are in the *Quarter 24 Status Report, Remedial Action Progress Report and Work Plan Amendment*, dated October 12, 2015.

The Engineering Plan described an extraction-well network of up to seven wells: five initial wells consisting of three wells pumping from the intermediate portion of the aquifer and two wells from the intermediate and deep portion, with an additional two wells installed at depths to be determined. These wells are oriented along the axis of the plume.

We continued to refine the extraction-well locations and design configurations prior to construction, based on the hydraulic performance of EW-1 and further groundwater modeling. SAEDACCO has constructed a total of eight extraction wells, including EW-1, to date. SAEDACCO installed additional infrastructure to support two additional extraction wells that may be needed in the future as remediation progresses based on groundwater modeling. The locations of the extraction wells, piping and electrical power lines as constructed are shown on Figure 2. The locations of these extraction wells are approximately the same as those presented in the Engineering Plan, although the positions of certain wells were shifted slightly based on later modeling runs.

The extraction wells are connected to electrical power through two control panels and to two water-discharge networks, one of which was previously installed with EW-1. The two control panels are centrally located near EW-1 and are covered by a lockable metal building. The collection systems consists of two-inch Schedule 40 PVC piping that extends from the individual wells to a collection manifold. The manifold connected to wells EW-1 through EW-5 is constructed of four-inch Schedule 40 PVC, and the manifold connected to wells EW-6 through EW-8 is constructed of two-inch Schedule 40 PVC. A digital flowmeter/totalizer, as shown in the Pre-Construction Report, is located between each manifold and the discharge point to the sewer system to monitor the overall volume of discharge by the system. The discharge point for wells EW-1 through EW-5 is a manhole located on an access road along the Umicore/LMAC property boundary, and the discharge point for wells EW-6 through EW-8 is a manhole located near the western fence line of the Umicore property. All aboveground piping is protected with heat-trace wire, insulation, and aluminum protective casings. Details of the discharge-point connection were provided in the Pre-Construction Report. Extraction-well schematics are shown on Figures 3 through 6 and the as-built configuration of the electrical, groundwater-collection and discharge systems are shown on Figures 7 and 8.

Duncklee & Dunham also used the results of the HPT-GWS and groundwater modeling to establish well-screen intervals, pump elevations, and pumping rates. We will use various combinations of operable wells and pumping rates through the different phases of the remedial program. Not all of the extraction wells will operate during all the phases of the remedy. The pumping rates and schedule for each well have been set to maximize the effectiveness of the overall extraction system through the remedial period and will be adjusted as system performance data become available. Well-construction tables and lithology logs that contain information on extraction wells are included in the *Quarter 24 Status Report, Remedial Action Progress Report and Workplan Amendment* dated October 12, 2015.

3.2 Well Construction Summary

3.2.1 Wells EW-2 through EW-5

SAEDACCO constructed extraction wells EW-2 through -5 in July 2015. Well construction permits for these wells are included in Appendix A. These wells pump groundwater to the POTW through piping and a manifold system installed during EW-1 construction. SAEDACCO constructed EW-2, -3 and -4 to a depth of 50 feet below land surface (bls). Each well consists of 20 feet of six-inch diameter, 0.02-inch slotted Schedule 80 PVC v-wire well screen, and 30 feet of six-inch, Schedule 40 PVC riser. SAEDACCO constructed EW-5 to a depth of 60 feet bls. This well consists of 30 feet of six-inch diameter, 0.02-inch slotted Schedule 80 PVC v-wire well screen and 30 feet of six-inch, Schedule 40 PVC riser.

Duncklee & Dunham set the intakes of the pumps in EW-2, -3, and -4 at approximately 44 feet bls, and at approximately 55 feet bls in EW-5. As discussed in the Engineering Plan, we lowered the intake depth of the pump in EW-1 to a depth of 55 feet bls to extract water from the lower sands as one of the two deep wells of the completed extraction system. The intake of the pump in EW-1 was initially set at 39 feet bls to function as a preventive measure extraction point at the commencement of system operation.

Duncklee & Dunham supervised the development of each extraction well. SAEDACCO developed the wells with an air-lift pump and pumped the development water through a bag filter before discharging the water into the LMAC pretreatment system for disposal. SAEDACCO mobilized to the site a second time to redevelop these wells in an attempt to increase their yield. During this mobilization, SAEDACCO used an air-lift pump and a 6-inch surge block. The wells were developed until the water became visibly clear and then the wells were surged with the surge block. This process continued until the turbidity in the wells subsided before a minimum of approximately 200 gallons was purged from the wells.

3.2.2 Wells EW-6 through EW-8

EW-6 through -8 pump groundwater through piping to a separate manifold system, and then to the POTW through a manhole connection at a separate manhole (Figure 2). This manhole is located within a separate sewer right-of-way and is closer to the Umicore facility. SAEDACCO constructed EW-6 to a depth of 55 feet bls, EW-7 to a depth of 72 feet bls, and EW-8 to a depth of 61 feet bls. Wells EW-6 and EW-8 consist of 20 feet of six-inch diameter, 0.02 inch slotted Schedule 80 PVC v-wire well screen, 35 and 41 feet of six-inch, Schedule 40 PVC riser, respectively. EW-7 consists of 30 feet of six-inch diameter, 0.02-inch slotted Schedule 80 PVC v-wire well screen and 42 feet of six-inch, Schedule 40 PVC riser. Well construction permits for these wells are in Appendix A.

Duncklee & Dunham set the intakes of the pump at approximately 50 feet bls in EW-6, at approximately 55 feet bls in EW-7, and at approximately 55 feet bls in EW-8.

Duncklee & Dunham supervised the development of each extraction well. SAEDACCO developed the wells using an air-lift pump along with a 6” surge block. The wells were developed until the water became visibly clear and then the wells were surged with the surge block. This process continued until the turbidity in the wells subsided before a minimum of approximately 200 gallons was purged from the wells.

3.3 Groundwater-Extraction Pumps

The groundwater extraction pumps in EW-2, -3, -4, -6, -7 and -8 are Grundfos submersible pumps, model 40S15-5®, powered by Franklin Motors, model number 2343262604. The pumps each have a 1.5-Hp motor and operate at a speed of 3,450 rpm. The pumps are designed to deliver 25 gpm at a total discharge head (TDH) of 120 feet. The materials of construction of each pump body are AISI 304 stainless steel, and each pump is equipped with 9 impellers. The motor is 3-phase, 230 volt, with a power output of 1.1 kW at a running amp draw of 2.8 amps (maximum in-rush draw of 3.2 amps).

The groundwater-extraction pump in EW-5 is a Grundfos submersible pump, model 25S15-9®, powered by Franklin Motors, model number 2343262604. The pump has a 2-Hp motor and operates at a speed of 3,450 rpm. The pump is designed to deliver 26.7 gpm at a total discharge head (TDH) of 171 feet. The material of construction of the pump body are AISI 304 stainless steel, and the pump is equipped with 9 impellers.

The motor is 3-phase, 230 volt, with a power output of 1.4 kW at a running amp draw of 7.3 amps (maximum in-rush draw of 8 amps). The pump is currently installed in the well such that the intake is at a depth of approximately 55 feet bls, which is approximately 25 feet below the top of the screen.

All extraction pumps are equipped with internal motor-starter thermal overload that will shut the motors off in the event of an increase in motor temperature due to low water level in the well. The pumps extract groundwater through 1¼-inch piping from each well that connects to a two-inch PVC pipe at the well head. Each well is equipped with two flow-check valves, ball valve, pressure gauge, sample port and digital flow meter to control and monitor effluent water. Operational data (pump running status and total system flow) are monitored by Duncklee & Dunham through a remote telemetry system installed in one of the control panels. More detailed descriptions of the system equipment are provided below. Schematics of the extraction piping, manifold, flow meter, sanitary sewer connection and electrical supply are depicted on Figure 7 and 8.

3.4 System Controls and Telemetry

As shown in the Pre-Construction Report, all of the extraction wells are connected to a central-system control panel. Electrical service is provided to the wells through two control panels, from which they can be individually managed. The design details of each control panel were provided in the Pre-Construction Report.

The system has a telemetry system integrated into each control panel that provides the ability to both monitor the performance and manage the extraction system remotely as well as at the site. Duncklee & Dunham receives daily email messages from the control/telemonitoring system (CTS) on system operating status, flow rate in gpm, and total flow in gallons. These emails are saved in the project folder on the company network and are used to generate monthly discharge monitoring reports that are submitted to LMAC as required by the IUP. Monitoring of these reports is also useful for indicating when site visits may be necessary to adjust or repair pumps and other equipment.

3.5 System Monitoring

Details of the system monitoring are in the Pre-Construction Report. In summary, Duncklee & Dunham will collect samples from the extraction wells and select monitoring wells in the area on a bi-monthly basis to monitor system performance, and also conduct routine maintenance activities, if needed. We will conduct periodic groundwater sampling events, which will include the sampling of select monitoring wells and measuring depth-to-water in all monitoring wells to monitor system performance and how the contaminant plume responds to the extraction system. The frequency of system-monitoring activities may increase or decrease in the future and depends on the concentrations and consistency of previous test results.

In addition, the IUP requires daily flow monitoring and quarterly testing for select water parameters. The flow measurements are collected through the CTS emails. Water quality parameters are collected at the site through a composite sampler that extracts water samples from the two main trunk discharge lines. The composite samples are collected over a 24-hour period. Sample ports are also available for manual sampling from the individual wells and the manifolds as needed. The frequency of system monitoring associated with IUP compliance is not expected to change over time.

The progress of groundwater remediation will be evaluated from water samples collected from both the extraction wells and the surrounding monitoring wells on a prescribed periodic schedule. The results of this monitoring will be incorporated into groundwater-modeling updates as the remediation progresses to compare the field results with the predictions of the model.

This eight-well groundwater extraction system has been constructed in substantial conformance with the Engineering Plan presented in the Pre-Construction Report. The well locations were shifted slightly as shown on Figure 2 based on later groundwater-modeling refinements. There have been slight variations in well construction and pump specifications as detailed in this report, implemented to enhance system performance (see below). As shown in the Engineering Plan, additional wells may be added to the system in the future to enhance recovery of contaminated groundwater and to improve hydraulic control of the plume, if needed. Future progress reporting associated with extraction-system performance will be included in quarterly status reports submitted to the DEQ.

4 Summary of Major Variances from Final Design Plans

The Groundwater Extraction Remedy Engineering Design Plan (Appendix C of the Pre-Construction Report) discussed the construction of four more extraction wells following installation of EW-1 as part of the initial five-well extraction system, with two wells added at a later date (for a total of seven wells). Final system designed consisted of a total of eight extraction wells, connected to two separate manifolds and discharging into two separate manholes.

The Design Plan also specified groundwater from all wells except EW-1would be extracted through 1.5-Hp 25S15-9 Grundfos or similar pumps, each set at a depth of about 40 feet bls to deliver 22 gpm at a TDH of 197 feet. The pumps installed in wells EW-2, 3, 4, 6, 7, and 8 are rated to deliver 25 gpm at a TDH of 120 feet. The groundwater-extraction pump in EW-5 is a Grundfos submersible pump, model 25S15-9®, powered by Franklin Motors, model number 2343262604. The pump has a 2-Hp motor and operates at a speed of 3,450 rpm. The pump delivers 26.7 gpm at a TDH of 171 feet.

The Design Plan called for the connection of seven wells through one single manifold connection for discharge to the sanitary sewer through one manhole connection. Actual system connection to the sanitary sewer was through two separate manifolds that discharge to the sanitary sewer system through two manhole connections. One manifold connection involves five wells (EW-1 through EW-5) with discharge to the manhole described in the Design Plan, and the other manhole connection involves three wells (EW-6 through EW-8) with connections for two additional extraction wells, if needed, and discharge to a manhole located near the western fence line of the Umicore property.

SAEDACCO installed a metal building approximately 10 feet by 13 feet by 8 feet in size with a lockable door that encloses the central control panel, which all of the electrical controls and EOS system. This was added to the work scope to help protect extraction-system controls from the elements and provide security for the control panel.

5 Summary of Problems Encountered During Construction

The following is a summary of problems encountered during system construction and operation, along with the corrective actions taken:

- Interruptions in groundwater flow through the manifold connected to wells EW-1-EW-5 were observed on several occasions following connection of the four additional wells to the manifold, particularly when the pump in EW-1 was off. Duncklee & Dunham identified the cause of this problem as excessive pressure loss in the piping as it flowed out of the manifold under gravity head, as well as a potentially faulty flow meter. To correct this problem, Duncklee & Dunham:
    - installed additional check valves on the discharge lines from each well,
    - installed a P-trap and vacuum relief valve upstream of the flow meter/totalizer to decrease the pressure drop in the pipe, and
    - replaced the flow meter

  These corrective actions appear to have corrected the problem. Duncklee & Dunham also installed a P-trap and vacuum relief valve on the manifold connected to wells EW-6-EW-8 to prevent this problem from occurring in this system.

- The groundwater pump in EW-1 periodically shut off on numerous occasions after the additional wells were installed and connected to the manifold, resulting in faulty flow total readings from the meter installed on the discharge line. Duncklee & Dunham identified the problem as moisture build-up in the VFD controller enclosure during periods of precipitation and high humidity, which caused a short in the motor. Duncklee & Dunham removed the VFD controller and installed a ball valve and flow meter on the discharge pipe from the well to control flow from the well. This appears to have corrected the problem -- the pump has run continuously since the VFD removal.

6 Construction Completion Report Certification

Appendix B of this document includes the executed REC program document certification forms (DC-I/DC-II) and the work-phase completion form WPC-V. These certifications were signed by Umicore as the Remediating Party, Duncklee & Dunham as the Registered Environmental Consultant, and David L. Duncklee as the Registered Site Manager.

Please contact Dave Duncklee at dave@dunckleedunham.com or (919) 858-9898 if you have any questions.

Sincerely,

Duncklee & Dunham, P.C.

Andrew M. Rodak, P.E
Senior Engineer

David L. Duncklee, P.G., R.S.M.
Senior Project Manager

Senior Peer Review

Richard A. Kolb, L.G.
Senior Geologist

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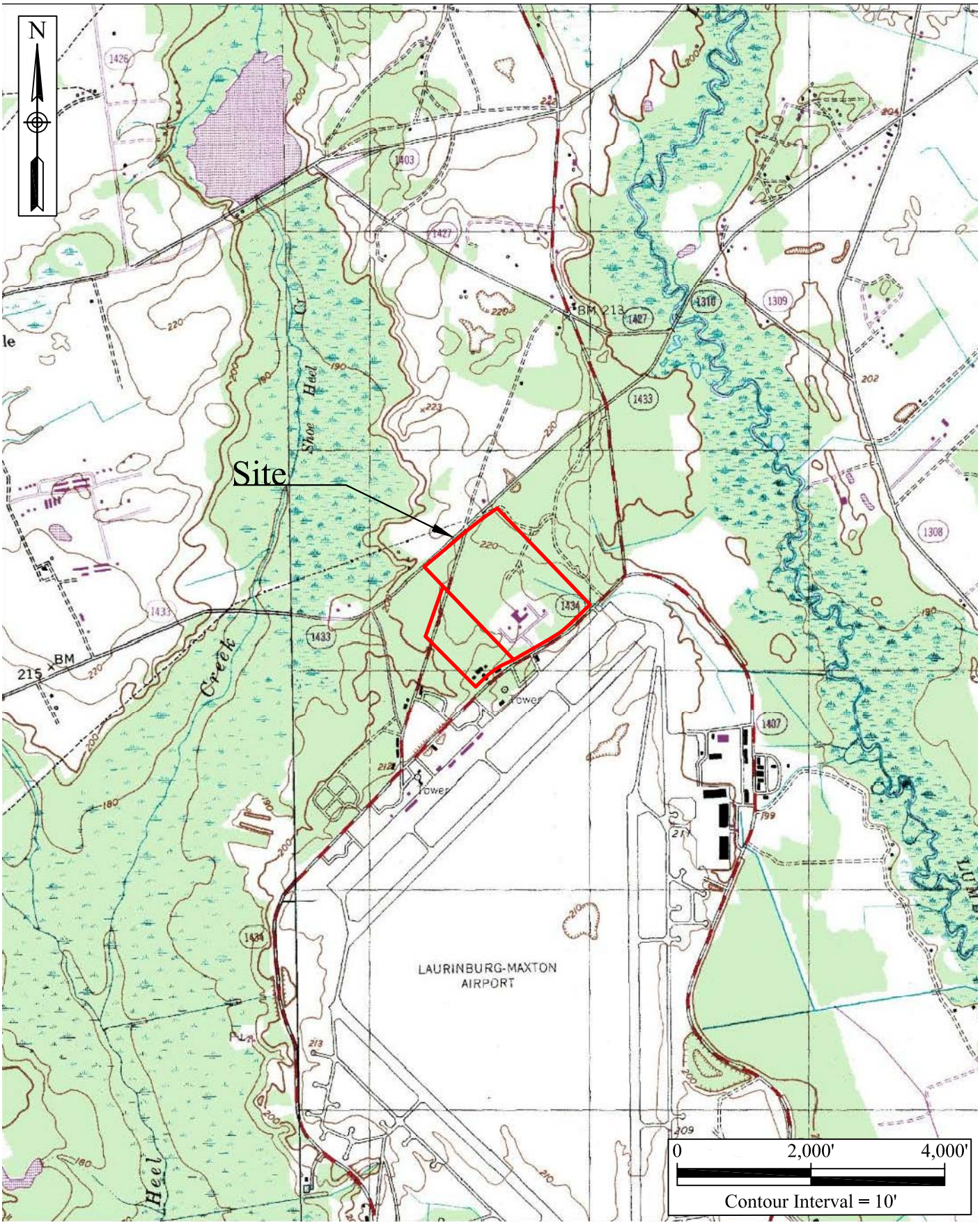

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Site Topographic Map

Umicore Facility
Maxton, North Carolina

Drawn By:	Checked By:	Project Number:	Date:	References:
wmf	AMK	200917	July 2015	USGS Maxton Quad 1982
Scale:	**Size:**	**Layers:**	**Filename:**	
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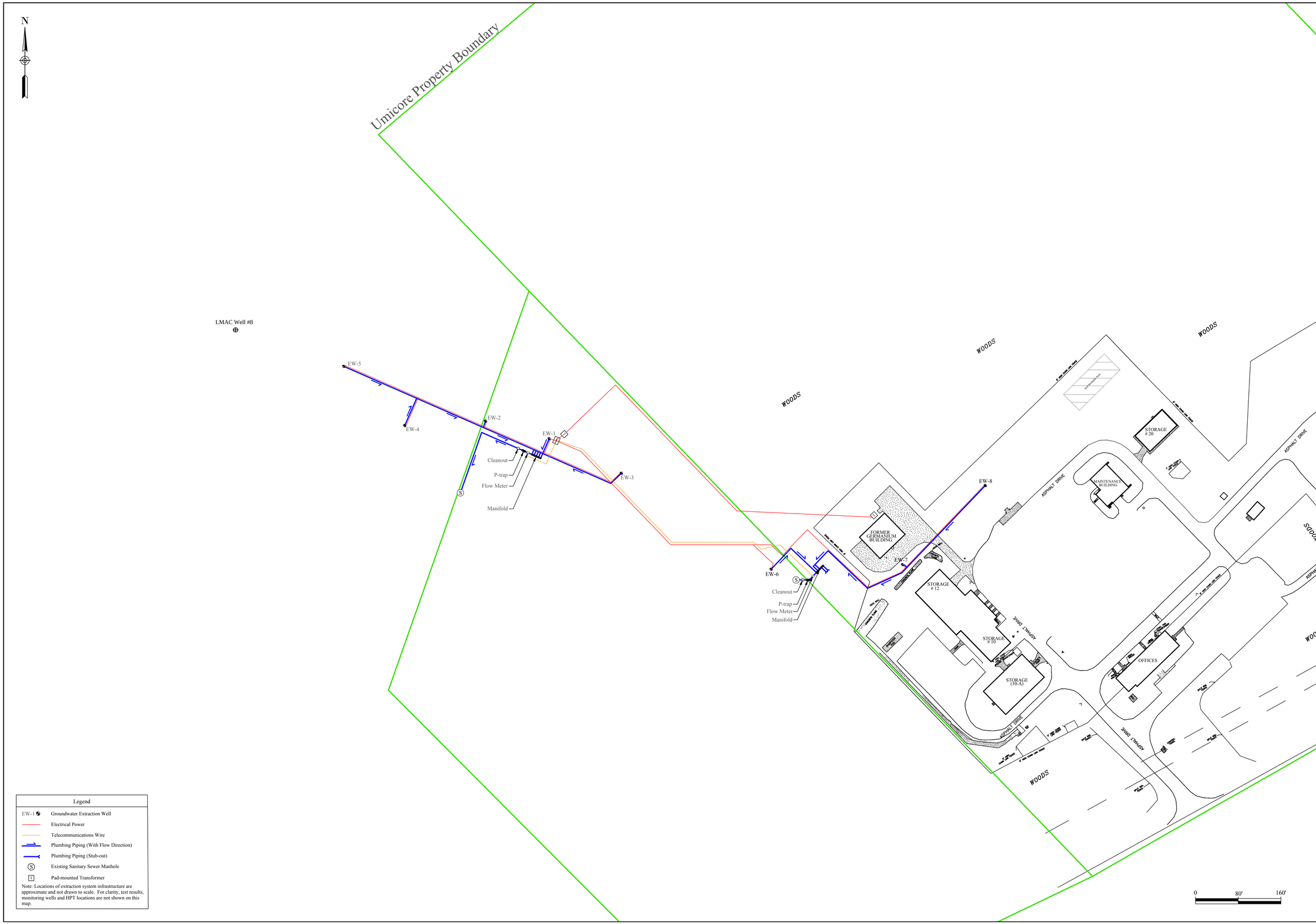
Figure

1



Legend	
EW-1	Groundwater Extraction Well
	Electrical Power
	Telecommunications Wire
	Plumbing Piping (With Flow Direction)
	Plumbing Piping (Stub-out)
S	Existing Sanitary Sewer Manhole
T	Pad-mounted Transformer

Note: Locations of extraction system infrastructure are approximate and not drawn to scale. For clarity, test results, monitoring wells and HPT locations are not shown on this map.

Approximate Locations of Extraction System Piping, Electrical and Telecommunications Lines

Umicore Facility
Maxton, North Carolina

Drawn By:	Checked By:	Project Number:	Date:	References:	Scale:	Size:	Layers:
baj/js/rnl		200917	January 2015	Base Map provided by Umicore; Laboratory test results; Surveyor data	1" = 80'	22" x 34"	0,251,282

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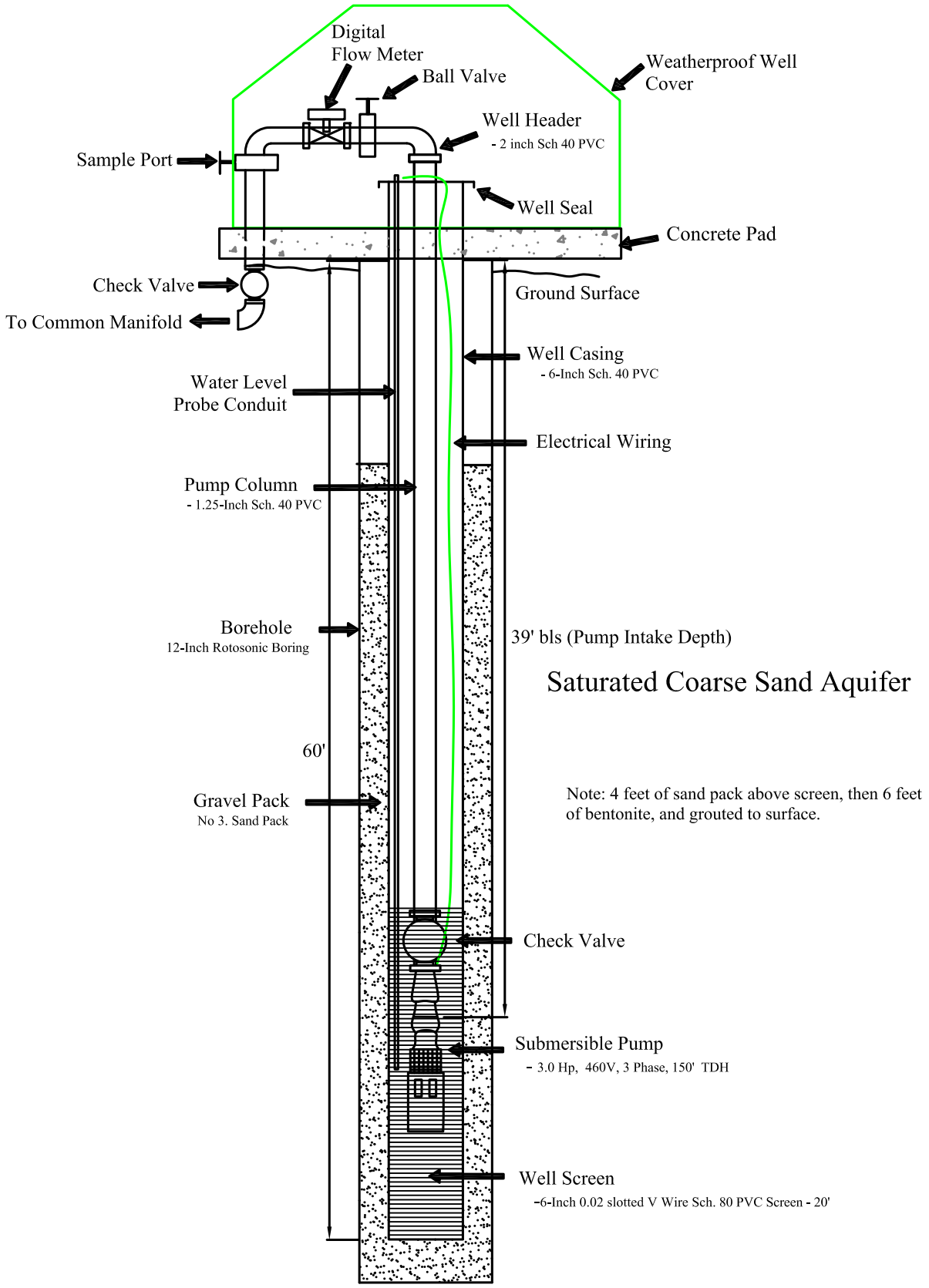
Figure

2



CASED WELL WITH GRAVEL PACK AND SCREEN FOR DEWATERING

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Groundwater Extraction Well EW-1 Schematic

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Maxton, North Carolina

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crk/rnl		200917	February 2016	S & ME, Inc. Stds., Field Notes
Scale: Not to Scale	Size: 8.5" x 11"	Layers: 0,6,7	Filename: P:\Umicore\Maxton - 200917\10 RAP\\OnSite\Pre-Constr Rpt\Figures	

Figure

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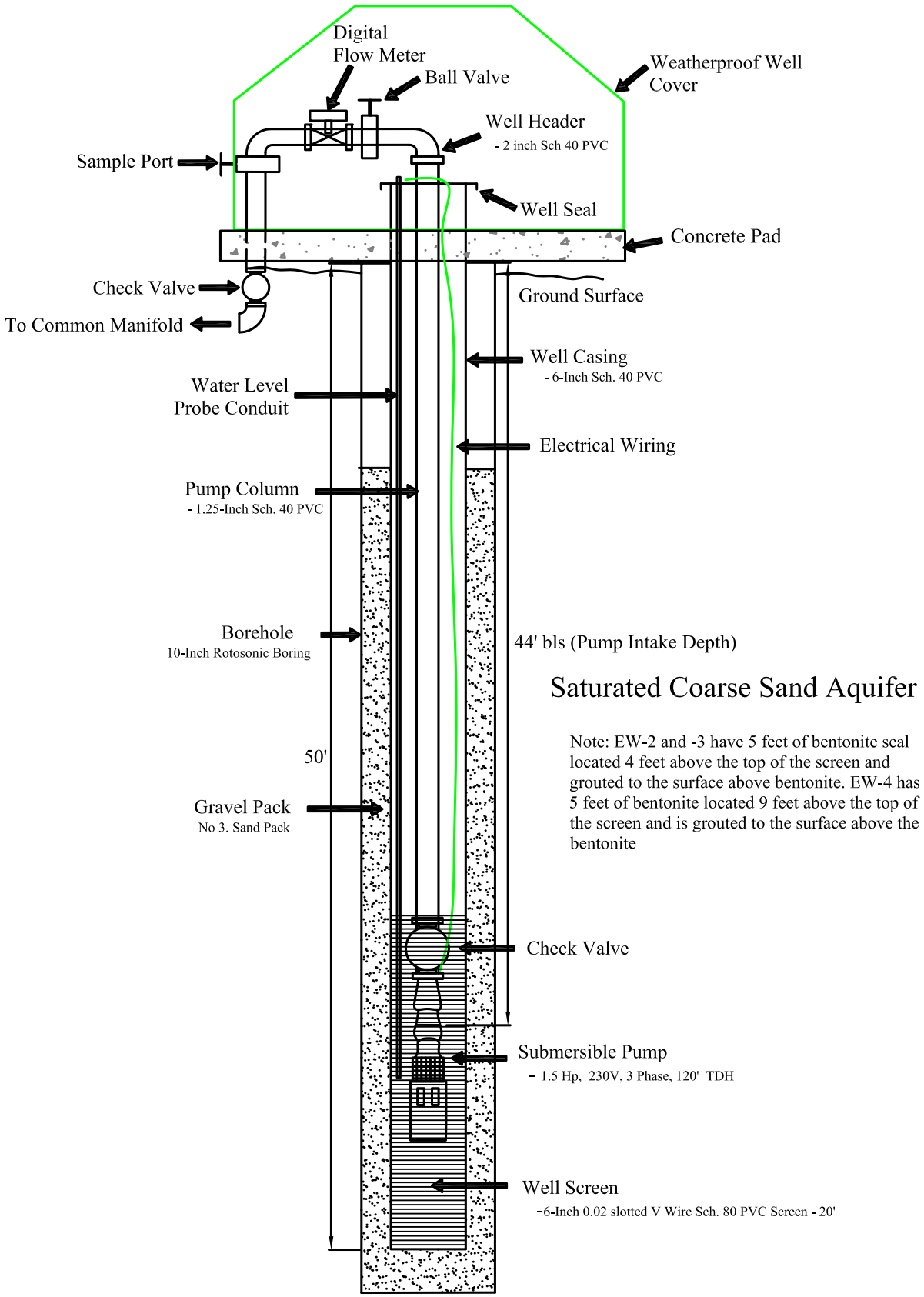

Note: EW-2 and -3 have 5 feet of bentonite seal located 4 feet above the top of the screen and grouted to the surface above bentonite. EW-4 has 5 feet of bentonite located 9 feet above the top of the screen and is grouted to the surface above the bentonite

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Groundwater Extraction Wells EW-2,3,4

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Drawn By:	Checked By:	Project Number:	Date:	References:
amr/rnl	AMK	200917	February 2016	S & ME, Inc. Stds., Field Notes
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Figure

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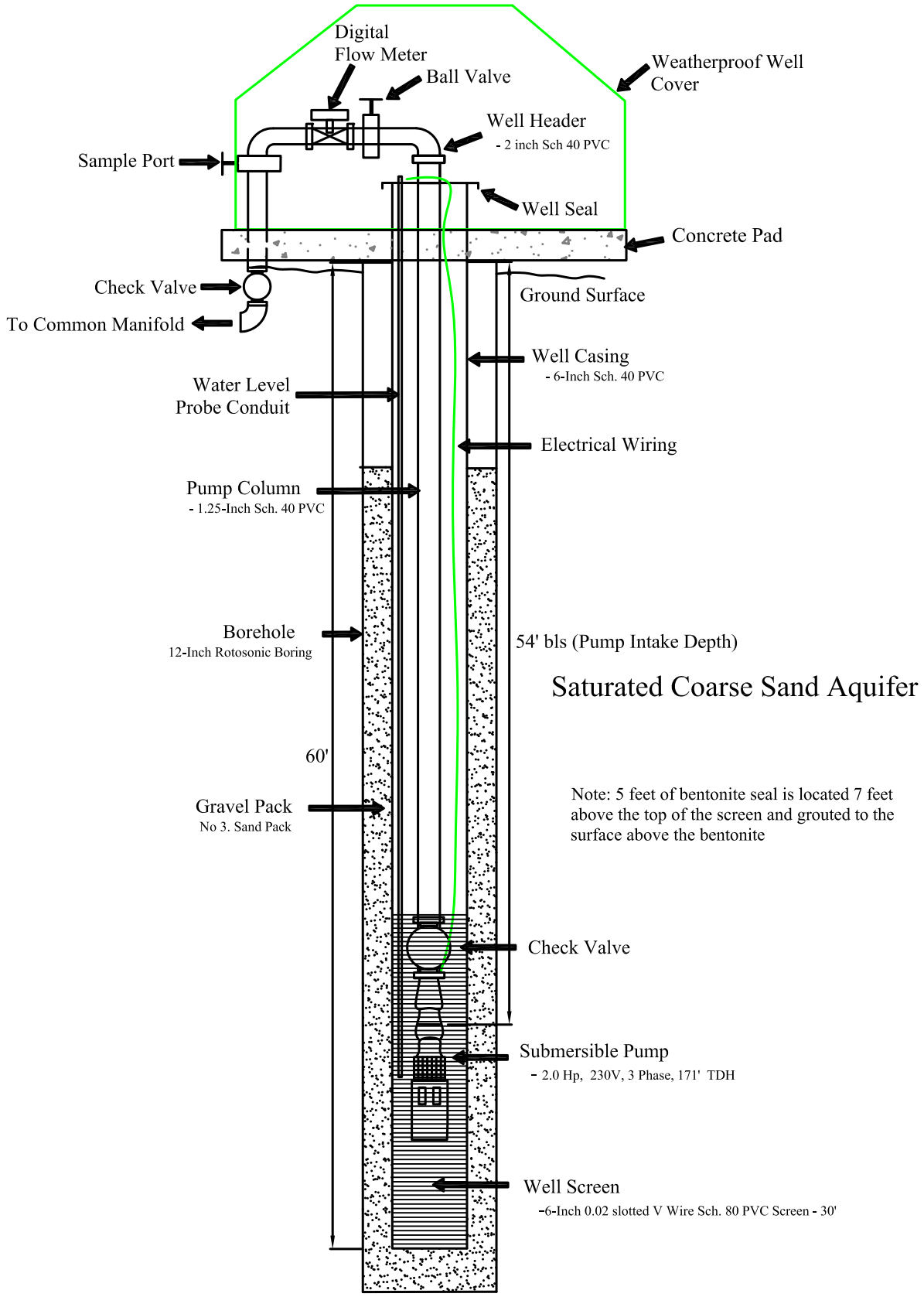

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Groundwater Extraction Well EW-5

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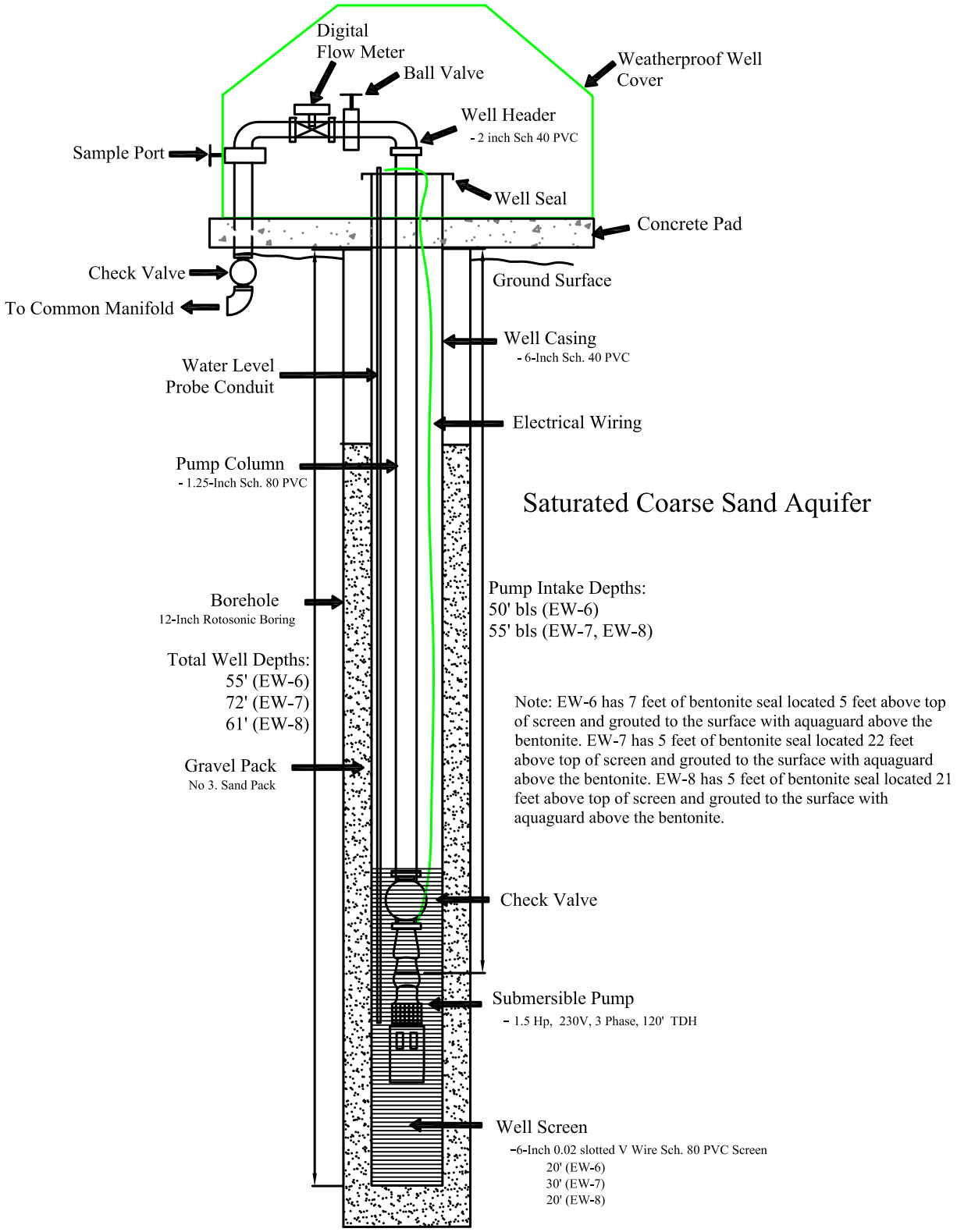
Figure

5



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Groundwater Extraction Wells EW-6,7,8

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Drawn By:	Checked By:	Project Number:	Date:	References:
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Figure
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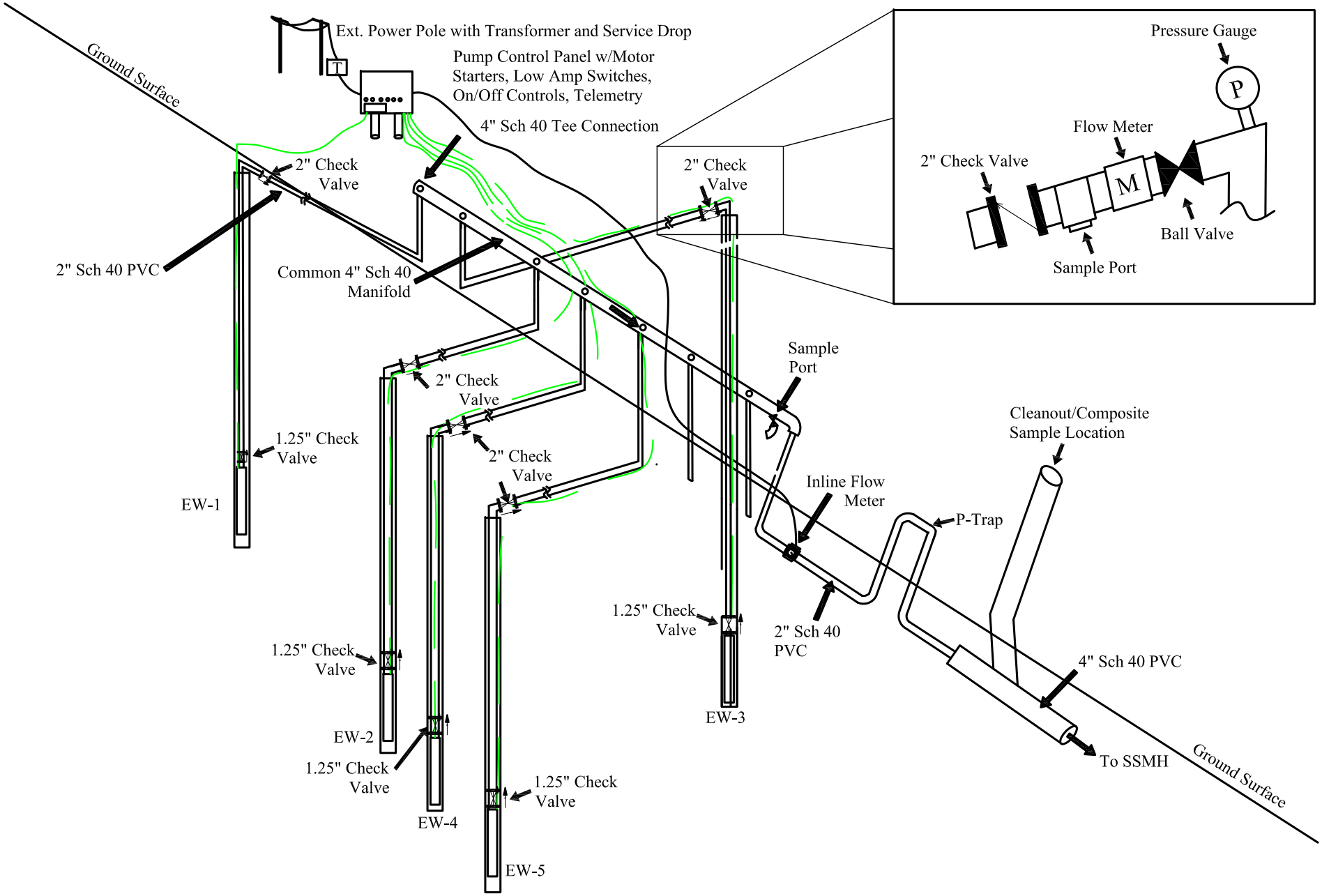

Extraction Well Schematic System - EW-1-EW-5

Umicore Facility
Maxton, North Carolina

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crk/amr/rnl		200917	February 2016	S & ME, Inc. Std. Drawing
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Figure 7

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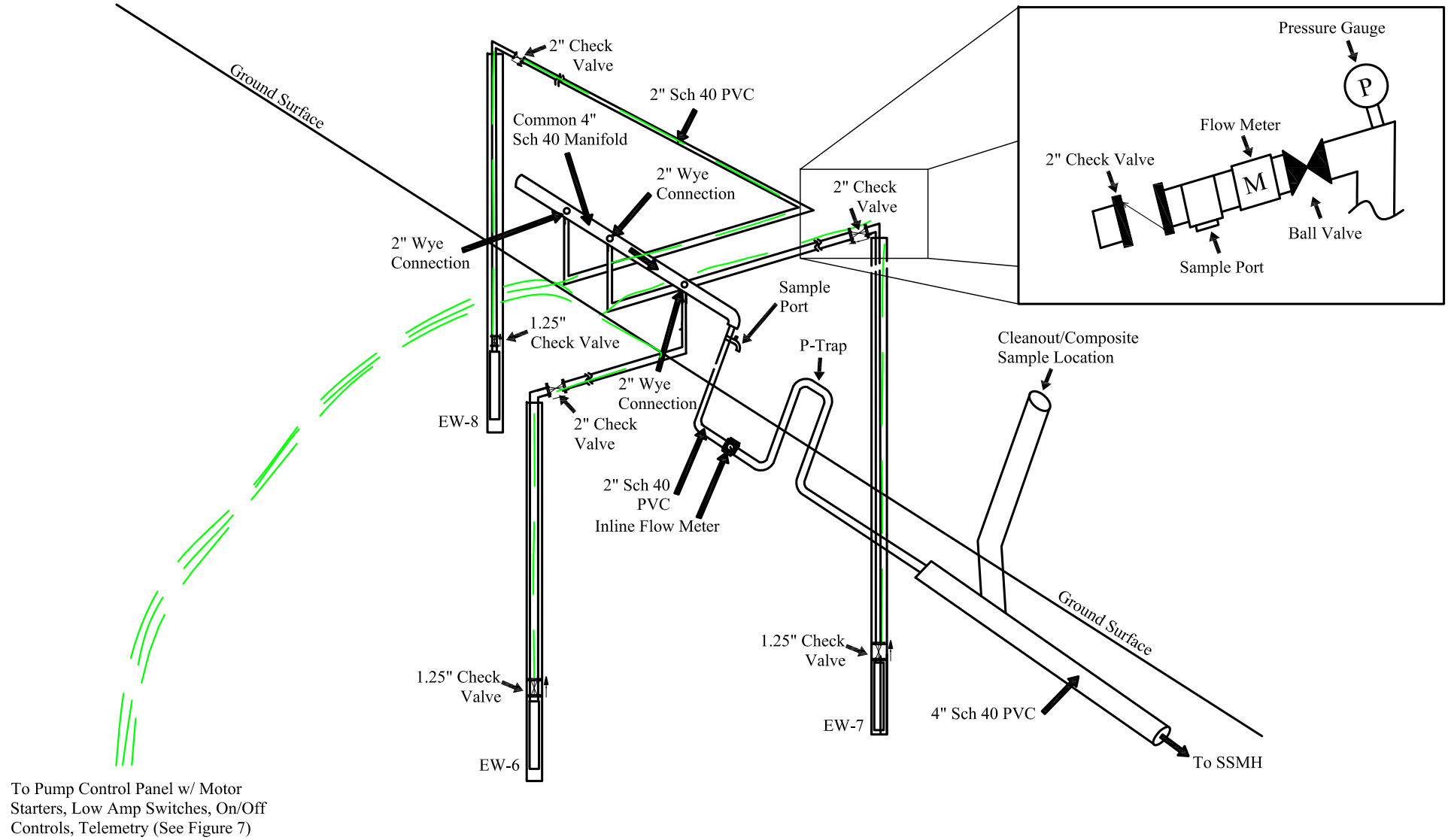

8

Figure

Extraction Well Schematic System - EW-6-EW-8

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Maxton, North Carolina

Drawn By:	Checked By:	Project Number:	Date:	Reference:
rnl	AMK	200917	February 2016	S & ME, Inc. Std. Drawing
Scale: Not to Scale	Size: 8.5" x 11"	Layers: 0,7	Filename: P:\Umicore\Maxton - 200917\8 Field-Techn\8.8 CAD and GIS Maps\OnSite\Extraction Wells EW-6-8	

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Appendix A

NCDENR
North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

July 7, 2015

Mr. Theron Grim
Umicore USA, Incorporated
3600 Glenwood Avenue
Suite 250
Raleigh, North Carolina 27612

SUBJECT: Well Construction Permit No. WR0600065
Three (3) recovery wells: Umincore property
Airport Rd. (P.I.N. #: 0102620100301)
Maxton, Scotland County

Mr. Grim:

In accordance with the application prepared by Duncklee & Dunham, PC dated 6 July 2015 and received in the Fayetteville Regional Office via email on 6 July 2015; we are forwarding herewith Recovery Well Construction Permit No. WR0600065 dated 7 July 2015 issued to Umicore USA Incorporated for the construction of three (3) recovery wells located on a parcel of property adjacent to 17182 Airbase road, in Maxton, North Carolina owned by Umicore USA Incorporated and identified above.

This Permit will be effective from the date of its issuance for one year and shall be subject to the conditions and limitations as specified therein.

Please note that according to North Carolina Administrative Code, Title 15A, Subchapter 2C, Section .0105 (g), "it is the responsibility of the well owner or his agent to see that a permit is secured prior to the beginning of construction of any well for which a permit is required."

Issuance of this permit does not constitute approval of the subject wells for reimbursement from Trust Funds.

If any parts, requirements, or limitations contained in this Permit are unacceptable to you, you have the right to an adjudicatory hearing before a hearing officer upon written demand to the Director within 30 days following receipt of this Permit, identifying the specific issues to be contended. Unless such demand is made, this Permit shall be final and binding.

Sincerely,

Jim Barger

FOR Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs

cc: FRO Files
Scotland County Health Department
Duncklee & Dunham – Matt Flinchum
Eric Smith – DWR/NDPU/GP

NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES – WATER QUALITY PROGRAMS
PERMIT FOR THE CONSTRUCTION OF A RECOVERY WELL OR WELL SYSTEM

In accordance with the provisions of Article 7, Chapter 87, North Carolina General Statutes, and other applicable Laws, Rules and Regulations.

PERMISSION IS HEREBY GRANTED TO

UMICORE USA INCORPORATED

FOR THE CONSTRUCTION OF A RECOVERY WELL SYSTEM consisting of three (3) recovery wells owned by Umicore USA Incorporated located at 3600 Glenwood Avenue, Raleigh, North Carolina. The recovery wells will be located on a parcel of property owned by Umicore USA Incorporated adjacent to the Umicore facility located at 17182 Airbase Road, Maxton, North Carolina in Scotland County (P.I.N. #: 0102620100301). This Permit is issued in accordance with the application received on 6 July 2015, in conformity with specifications and supporting data, all of which are filed with the Department of Environment and Natural Resources and are considered integral parts of this Permit.

This Permit is for **well construction only**, and does not waive any provision or requirement of any other applicable law or regulation. Construction of any well under this Permit shall be in strict compliance with the North Carolina Well Construction Regulations and Standards (15A NCAC 02C .0100), and other State and Local Laws and regulations pertaining to well construction.

If any requirements or limitations specified in this Permit are unacceptable, you have a right to an adjudicatory hearing upon written request within 30 days of receipt of this Permit. The request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714. Unless such a demand is made, this Permit is final and binding.

This Permit will be effective for one year from the date of its issuance and shall be subject to other specified conditions, limitations, or exceptions as follows:

1. Issuance of this Permit does not obligate reimbursement from State trust funds, if these wells are being installed as part of an investigation for contamination from an underground storage tank or dry cleaner incident.
2. Issuance of this Permit does not supersede any other agreement, permit, or requirement issued by another agency.
3. The well(s) shall be located and constructed as shown on the attachments submitted as part of the Permit application.
4. Each well shall have a Well Contractor Identification Plate in accordance with 15A NCAC 02C .0108(o).
5. Well construction records (GW-1) for each well shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well completion.
6. When the well is discontinued or abandoned, it shall be abandoned in accordance with 15A NCAC 02C .0113 and a well abandonment record (GW-30) shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well abandonment.

Permit issued the 7th day of July 2015
FOR THE NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Jim Barber 7/7/15

FOR Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs
By Authority of the Environmental Management Commission
Permit No. # WR0600065

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Page

NCDENR
North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

Donald R. van der Vaart
Secretary

July 14, 2015

RECEIVED
JUL 20 2015
BY

Mr. Theron Grim
Umicore USA, Incorporated
3600 Glenwood Avenue
Suite 250
Raleigh, North Carolina 27612

SUBJECT: Well Construction Permit No. WR0600066
Three (3) recovery wells: LMAC property
Airport Rd. (P.I.N. #: 010262 01003A)
Maxton, Scotland County

Mr. Grim:

In accordance with the application prepared by Duncklee & Dunham, PC dated 6 July 2015 and received in the Fayetteville Regional Office via email on 14 July 2015; we are forwarding herewith Recovery Well Construction Permit No. WR0600066 dated 14 July 2015 issued to Umicore USA Incorporated for the construction of three (3) recovery wells located on a parcel of property owned by Laurinburg-Maxton Airport Commission (LMAC) accessed from Jump road, in Maxton, North Carolina as identified above.

This Permit will be effective from the date of its issuance for one year and shall be subject to the conditions and limitations as specified therein.

Please note that according to North Carolina Administrative Code, Title 15A, Subchapter 2C, Section .0105 (g), "it is the responsibility of the well owner or his agent to see that a permit is secured prior to the beginning of construction of any well for which a permit is required."

Issuance of this permit does not constitute approval of the subject wells for reimbursement from Trust Funds.

If any parts, requirements, or limitations contained in this Permit are unacceptable to you, you have the right to an adjudicatory hearing before a hearing officer upon written demand to the Director within 30 days following receipt of this Permit, identifying the specific issues to be contended. Unless such demand is made, this Permit shall be final and binding.

Sincerely,

Jim Barber

FOR Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs

cc: FRO Files
Scotland County Health Department
Duncklee & Dunham – Matt Flinchum
Laurinburg-Maxton Airport Commission
Eric Smith – DWR/NDPU/GP

NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES – WATER QUALITY PROGRAMS
PERMIT FOR THE CONSTRUCTION OF A RECOVERY WELL OR WELL SYSTEM

In accordance with the provisions of Article 7, Chapter 87, North Carolina General Statutes, and other applicable Laws, Rules and Regulations.

PERMISSION IS HEREBY GRANTED TO

UMICORE USA INCORPORATED

FOR THE CONSTRUCTION OF A RECOVERY WELL SYSTEM consisting of three (3) recovery wells owned by Umicore USA Incorporated located at 3600 Glenwood Avenue, Raleigh, North Carolina. The recovery wells will be located on a parcel of property owned by the Laurinburg-Maxton Airport Commission adjacent to property owned by Umicore on Airbase Road, Maxton, North Carolina in Scotland County (P.I.N. #: 010262 01003A). This Permit is issued in accordance with the application received on 14 July 2015, in conformity with specifications and supporting data, all of which are filed with the Department of Environment and Natural Resources and are considered integral parts of this Permit.

This Permit is for **well construction only**, and does not waive any provision or requirement of any other applicable law or regulation. Construction of any well under this Permit shall be in strict compliance with the North Carolina Well Construction Regulations and Standards (15A NCAC 02C .0100), and other State and Local Laws and regulations pertaining to well construction.

If any requirements or limitations specified in this Permit are unacceptable, you have a right to an adjudicatory hearing upon written request within 30 days of receipt of this Permit. The request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714. Unless such a demand is made, this Permit is final and binding.

This Permit will be effective for one year from the date of its issuance and shall be subject to other specified conditions, limitations, or exceptions as follows:

1. Issuance of this Permit does not obligate reimbursement from State trust funds, if these wells are being installed as part of an investigation for contamination from an underground storage tank or dry cleaner incident.
2. Issuance of this Permit does not supersede any other agreement, permit, or requirement issued by another agency.
3. The well(s) shall be located and constructed as shown on the attachments submitted as part of the Permit application.
4. Each well shall have a Well Contractor Identification Plate in accordance with 15A NCAC 02C .0108(o).
5. Well construction records (GW-1) for each well shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well completion.
6. When the well is discontinued or abandoned, it shall be abandoned in accordance with 15A NCAC 02C .0113 and a well abandonment record (GW-30) shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well abandonment.

Permit issued the 14th day of July 2015
FOR THE NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Jim Barber 7/14/15
FOR Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs
By Authority of the Environmental Management Commission
Permit No. # WR0600066

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Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
Governor

DONALD R. VAN DER VAART
Secretary

S. JAY ZIMMERMAN
Director

December 28, 2015

Mr. Theron Grim
Umicore USA, Incorporated
3600 Glenwood Avenue
Suite 250
Raleigh, North Carolina 27612

SUBJECT: Well Construction Permit No. WR0600067
Two (2) recovery wells: Umincore property
Airport Rd. (P.I.N. #: 010262 01001)
Maxton, Scotland County

Mr. Grim:

In accordance with the application prepared by Duncklee & Dunham, PC dated 21 December 2015 and received in the Fayetteville Regional Office via email on 22 December 2015; we are forwarding herewith Recovery Well Construction Permit No. WR0600067 dated 28 December 2015 issued to Umicore USA Incorporated for the construction of two (2) recovery wells located on a parcel of property identified as 17180 Airbase road, in Maxton, North Carolina owned by Umicore USA Incorporated and identified above.

This Permit will be effective from the date of its issuance for one year and shall be subject to the conditions and limitations as specified therein.

Please note that according to North Carolina Administrative Code, Title 15A, Subchapter 2C, Section .0105 (g), "it is the responsibility of the well owner or his agent to see that a permit is secured prior to the beginning of construction of any well for which a permit is required."

Issuance of this permit does not constitute approval of the subject wells for reimbursement from Trust Funds.

If any parts, requirements, or limitations contained in this Permit are unacceptable to you, you have the right to an adjudicatory hearing before a hearing officer upon written demand to the Director within 30 days following receipt of this Permit, identifying the specific issues to be contended. Unless such demand is made, this Permit shall be final and binding.

Sincerely,

Jim Barber

FOR Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs

cc: FRO Files
Scotland County Health Department
Duncklee & Dunham – Matt Flinchum
Eric Smith – DWR/NDPU/GP

NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER RESOURCES – WATER QUALITY PROGRAMS
PERMIT FOR THE CONSTRUCTION OF A RECOVERY WELL OR WELL SYSTEM

In accordance with the provisions of Article 7, Chapter 87, North Carolina General Statutes, and other applicable Laws, Rules and Regulations.

PERMISSION IS HEREBY GRANTED TO

UMICORE USA INCORPORATED

FOR THE CONSTRUCTION OF A RECOVERY WELL SYSTEM consisting of two (2) recovery wells owned by Umicore USA Incorporated located at 3600 Glenwood Avenue, Raleigh, North Carolina. The recovery well will be located on a parcel of property owned by Umicore USA Incorporated facility located at 17180 Airbase Road, Maxton, North Carolina in Scotland County (P.I.N. #: 010262 01001). This Permit is issued in accordance with the application received on 22 December 2015, in conformity with specifications and supporting data, all of which are filed with the Department of Environment and Natural Resources and are considered integral parts of this Permit.

This Permit is for **well construction only**, and does not waive any provision or requirement of any other applicable law or regulation. Construction of any well under this Permit shall be in strict compliance with the North Carolina Well Construction Regulations and Standards (15A NCAC 02C .0100), and other State and Local Laws and regulations pertaining to well construction.

If any requirements or limitations specified in this Permit are unacceptable, you have a right to an adjudicatory hearing upon written request within 30 days of receipt of this Permit. The request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714. Unless such a demand is made, this Permit is final and binding.

This Permit will be effective for one year from the date of its issuance and shall be subject to other specified conditions, limitations, or exceptions as follows:

1. Issuance of this Permit does not obligate reimbursement from State trust funds, if these wells are being installed as part of an investigation for contamination from an underground storage tank or dry cleaner incident.
2. Issuance of this Permit does not supersede any other agreement, permit, or requirement issued by another agency.
3. The well(s) shall be located and constructed as shown on the attachments submitted as part of the Permit application.
4. Each well shall have a Well Contractor Identification Plate in accordance with 15A NCAC 02C .0108(o).
5. Well construction records (GW-1) for each well shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well completion.
6. When the well is discontinued or abandoned, it shall be abandoned in accordance with 15A NCAC 02C .0113 and a well abandonment record (GW-30) shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well abandonment.

Permit issued the 28th day of December 2015
FOR THE NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Jim Barber 12/28/15

FOR Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs
By Authority of the Environmental Management Commission
Permit No. # WR0600067

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Page

Water Resources
ENVIRONMENTAL QUALITY

PAT MCCRORY
Governor

DONALD R. VAN DER VAART
Secretary

S. JAY ZIMMERMAN
Director

December 28, 2015

Mr. Theron Grim
Umicore USA, Incorporated
3600 Glenwood Avenue
Suite 250
Raleigh, North Carolina 27612

SUBJECT: Well Construction Permit No. WR0600068
One (1) recovery well: Umincore property
Airport Rd. (P.I.N. #: 010262 0100301)
Maxton, Scotland County

Mr. Grim:

In accordance with the application prepared by Duncklee & Dunham, PC dated 21 December 2015 and received in the Fayetteville Regional Office via email on 22 December 2015; we are forwarding herewith Recovery Well Construction Permit No. WR0600068 dated 28 December 2015 issued to Umicore USA Incorporated for the construction of one (1) recovery well located on a parcel of property adjacent to 17182 Airbase road, in Maxton, North Carolina owned by Umicore USA Incorporated and identified above.

This Permit will be effective from the date of its issuance for one year and shall be subject to the conditions and limitations as specified therein.

Please note that according to North Carolina Administrative Code, Title 15A, Subchapter 2C, Section .0105 (g), "it is the responsibility of the well owner or his agent to see that a permit is secured prior to the beginning of construction of any well for which a permit is required."

Issuance of this permit does not constitute approval of the subject wells for reimbursement from Trust Funds.

If any parts, requirements, or limitations contained in this Permit are unacceptable to you, you have the right to an adjudicatory hearing before a hearing officer upon written demand to the Director within 30 days following receipt of this Permit, identifying the specific issues to be contended. Unless such demand is made, this Permit shall be final and binding.

Sincerely,

Jim Barofsr

For Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs

cc: FRO Files
Scotland County Health Department
Duncklee & Dunham – Matt Flinchum
Eric Smith – DWR/NDPU/GP

NORTH CAROLINA
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER RESOURCES – WATER QUALITY PROGRAMS
PERMIT FOR THE CONSTRUCTION OF A RECOVERY WELL OR WELL SYSTEM

In accordance with the provisions of Article 7, Chapter 87, North Carolina General Statutes, and other applicable Laws, Rules and Regulations.

PERMISSION IS HEREBY GRANTED TO

UMICORE USA INCORPORATED

FOR THE CONSTRUCTION OF A RECOVERY WELL SYSTEM consisting of one (1) recovery well owned by Umicore USA Incorporated located at 3600 Glenwood Avenue, Raleigh, North Carolina. The recovery well will be located on a parcel of property owned by Umicore USA Incorporated adjacent to the Umicore facility located at 17182 Airbase Road, Maxton, North Carolina in Scotland County (P.I.N. #: 010262 0100301). This Permit is issued in accordance with the application received on 22 December 2015, in conformity with specifications and supporting data, all of which are filed with the Department of Environment and Natural Resources and are considered integral parts of this Permit.

This Permit is for **well construction only**, and does not waive any provision or requirement of any other applicable law or regulation. Construction of any well under this Permit shall be in strict compliance with the North Carolina Well Construction Regulations and Standards (15A NCAC 02C .0100), and other State and Local Laws and regulations pertaining to well construction.

If any requirements or limitations specified in this Permit are unacceptable, you have a right to an adjudicatory hearing upon written request within 30 days of receipt of this Permit. The request must be in the form of a written petition conforming to Chapter 150B of the North Carolina General Statutes and filed with the Office of Administrative Hearings, 6714 Mail Service Center, Raleigh, North Carolina 27699-6714. Unless such a demand is made, this Permit is final and binding.

This Permit will be effective for one year from the date of its issuance and shall be subject to other specified conditions, limitations, or exceptions as follows:

1. Issuance of this Permit does not obligate reimbursement from State trust funds, if these wells are being installed as part of an investigation for contamination from an underground storage tank or dry cleaner incident.
2. Issuance of this Permit does not supersede any other agreement, permit, or requirement issued by another agency.
3. The well(s) shall be located and constructed as shown on the attachments submitted as part of the Permit application.
4. Each well shall have a Well Contractor Identification Plate in accordance with 15A NCAC 02C .0108(o).
5. Well construction records (GW-1) for each well shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well completion.
6. When the well is discontinued or abandoned, it shall be abandoned in accordance with 15A NCAC 02C .0113 and a well abandonment record (GW-30) shall be submitted to the Division of Water Resources Information Processing Unit within 30 days of the well abandonment.

Permit issued the 28th day of December 2015
FOR THE NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Jim Barber 12/28/15

FOR Belinda S. Henson, Regional Supervisor
Division of Water Resources – Water Quality Programs
By Authority of the Environmental Management Commission
Permit No. # WR0600068

Appendix B

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 1 OF 2
IHSB SITE NAME UMICORE CSM NA, NONCD0002833
DATE & NAME OF DOCUMENT 03/23/2016 Construction Completion Report - Groundwater Extraction Remedy
TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

REMEDIATING PARTY DOCUMENT CERTIFICATION STATEMENT (.0306(B)(2))

"I certify under penalty of law that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this certification, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

Ravila Gupta
Name of Remediating Party

Signature of Remediating Party

3/28/16
Date

NOTARIZATION

North Carolina (Enter State)

Wake **COUNTY**

I, Cynthia F. Dietrich, a Notary Public of said County and State, do hereby certify that Ravila Gupta did personally appear and sign before me this day, produced proper identification in the form of NC Driver License, was duly sworn or affirmed, and declared that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 28th day of March, 2016.

Notary Public (signature)

(OFFICIAL SEAL)

My commission expires: 7/23/2020

Cynthia F. Dietrich
Notary Public
Wake County
North Carolina
My Commission Expires 7/23/2020

Document Certification Form No. DC - I
(Revised 8/11)

REC PROGRAM DOCUMENT CERTIFICATION FORM - PAGE 2 OF 2
IHSB SITE NAME UMICORE CSM NA, NONCD0002833
DATE & NAME OF DOCUMENT 02/23/2016 Construction Completion Report - Groundwater Extraction Remedy
TYPE OF SUBMITTAL (circle all that apply): Report, Work plan, Work Phase Comp. Statement, Schedule Change

REGISTERED SITE MANAGER CERTIFICATION OF SIGNATURES

As the Registered Environmental Consultant for the Site for which this filing is made, I certify that the signatures included herewith are genuine and authentic original handwritten signatures and/or true, accurate, and complete copies of the genuine and authentic original handwritten signatures of the persons who purport to sign for this filing. I further certify that I have collected through reliable means the originals and/or copies of said signatures from the persons authorized to sign for this filing who, in fact, signed the originals thereof. Those persons and I understand and agree that any copies of signatures have the same legally binding effect as original handwritten signatures, and I certify that any person for whom I am submitting a copy of their signature has provided me with their express consent to submit said copy. Additionally, I certify that I am authorized to attest to the genuineness and authenticity of the signatures, both originals and any copies, being submitted herewith and that by signing below, I do in fact attest to the genuineness and authenticity of all the signatures, both originals and copies, being submitted for this filing.

David L. Duncklee, P.G.
Name of Registered Site Manager

Signature of Registered Site Manager — Date: March 29, 2016

REGISTERED SITE MANAGER DOCUMENT CERTIFICATION STATEMENT (.0306(b)(1))

"I certify under penalty of law that I am personally familiar with the information contained in this submittal, including any and all supporting documents accompanying this certification, and that the material and information contained herein is, to the best of my knowledge and belief, true, accurate and complete and complies with the Inactive Hazardous Sites Response Act N.C.G.S. 130A-310, et seq, and the remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information."

David L. Duncklee
Name of Registered Site Manager

Signature of Registered Site Manager — Date: March 29, 2016

NOTARIZATION

North Carolina (Enter State)

Wake **COUNTY**

I, Shirley M. Williams, a Notary Public of said County and State, do hereby certify that David L. Duncklee did personally appear and sign before me this day, produced proper identification in the form of NC Driver License, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant of the remediating party of the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certifications is true and accurate, and he or she then signed these Certifications in my presence.

WITNESS my hand and official seal this 29th day of March, 2016.

Notary Public (signature) (OFFICIAL SEAL)

My commission expires: 2/25/19

SHIRLEY M WILLIAMS
Notary Public
Wake County
My Commission Expires
02/25/2019
NORTH CAROLINA

Document Certification Form No. DC - II
(Revised 8/11)

CONSTRUCTION COMPLETION CERTIFICATION
15A NCAC 13C.0306(b)(5)(D)

Media (check all that apply): ☐ All Media ☐ Soil ☑ Ground water ☐ Surface water ☐ Sediment

REC is in compliance with <u>both</u> 15A NCAC 13C .0305(b)(2) and .0305(b)(3): [check] ☑

Site Name: UMICORE CSM NA
County: Scotland
Site ID No.: NONCD0002833

Street Address: 17180 Airport Road
Maxton, NC

The construction of the final remedy, which is the subject of this certification has, to the best of my knowledge, been completed in compliance with the Inactive Hazardous Sites Response Act N.C.G.S. 130A-310, et seq. and the remedial action program Rules 15A NCAC 13C .0300. I am aware that there are significant penalties for willfully submitting false, inaccurate or incomplete information.

RSM Signature: David L. Duncklee
Date: March 29, 2016

RSM Name: David L. Duncklee
REC Name: Duncklee & Dunham, PC
REC No.: 00061

Mailing Address: P.O. Box 639
City, State, ZIP: Cary NC 27512

NOTARIZATION

North Carolina (Enter State)

Wake **COUNTY**

I, Shirley M. Williams, a Notary Public of said County and State, do hereby certify that David L. Duncklee did personally appear and sign before me this day, produced proper identification in the form of NC Driver's License, was duly sworn or affirmed, and declared that, he or she is the duly authorized environmental consultant of the remediating party of the property referenced above and that, to the best of his or her knowledge and belief, after thorough investigation, the information contained in the above certification is true and accurate, and he or she then signed this Certification in my presence.

WITNESS my hand and official seal this 29th day of March, 2016.

Notary Public (signature): Shirley M. Williams

(OFFICIAL SEAL)

SHIRLEY M WILLIAMS
Notary Public
Wake County
My Commission Expires
02/25/2019
NORTH CAROLINA

My commission expires: 2/25/19

Work Phase Completion Form No. WPC – V
(Revised 12/13)