

SECTION 1.0

PERSONNEL AND QUALIFICATIONS

1.0 Overview

This construction QA/QC plan is intended to provide information regarding the methods, tests, and pass/fail criteria for construction of the geosynthetic lining system in the storage and containment system at the AWMS Niles Injection Site.

2.0 Qualifications of QA/QC Personnel

Individuals serving in the capacity of QA/QC personnel during site construction will have a degree in engineering or a related field or will have prior experience acceptable to the Owner in the performance of the specific task to be overseen. Accordingly, these personnel will be knowledgeable in the manufacturer's recommended field installation QA/QC procedures for any geosynthetic product that is placed in the construction area. Where appropriate, the personnel will have the proper certification and training in the operation of field-measuring equipment.

3.0 Definitions and Use of Terms

The following provides general information regarding specific terms, references, and units as used in the QA/QC Plan.

A. Definitions Relating to QA/QC

In the context of this QA/QC Plan, Construction Quality Assurance and Construction Quality Control are defined as follows:

1. Construction Quality Assurance (CQA): A planned and systematic pattern of means and actions employed to provide confidence that items or services meet contractual and regulatory requirements and will perform as specified in service.
2. Construction Quality Control (CQC): Those actions that provide a means to measure and regulate the characteristics of an item or service to contractual and regulatory requirements.

B. Use of Terms

In the context of this QA/QC Plan, the terms CQA and CQC are used as follows:

CQA refers to measures taken by the Owner to determine if the Contractors are in compliance with the design plans and specifications. CQC refers to measures taken by the Contractor to determine compliance with the requirements for materials and workmanship as stated in the contract drawings and specifications.

D. QA/QC Consultant/Owner's Representative

The QA/QC Consultant/Owner's Representative is responsible for observing and documenting activities related to the permit documents and the QA/QC Plan. The QA/QC Consultant is represented by the on-site QA/QC monitoring personnel as appropriate. In general, the responsibilities and authorities of the QA/QC Consultant include:

- Complete understanding of the permit documents, design plans, and specifications in relation to all aspects of the QA/QC Plan.
- Scheduling, coordinating, and performing QA/QC activities;
- Performing independent on-site observation of the work in progress to assess compliance with the QA/QC Plan, permit documents, design plans, and technical specifications;
- Recognizing and reporting deviations from the QA/QC Plan, permit documents, design plans, and/or specifications to the Engineer and Project Manager.
- Secure documents which approve changes to the QA/QC Plan, permit documents, design plans, and/or specifications;
- Verifying that the QA/QC Consultant's test equipment meets testing and calibration requirements, and that tests are conducted according to standardized procedures defined in the QA/QC Plan;
- Recording and maintaining test data accurately;
- Identifying QA/QC-tested work that should be accepted, rejected, or further evaluated;
- Verifying that corrective measures are implemented;
- Documenting and reporting QA/QC activities;
- Collecting data needed for record documentation and
- Maintaining open lines of communications with other parties involved in the construction.

Certifications shall bear the seal of a Professional Engineer registered in the state of Ohio.

E. Geosynthetics CQA Laboratory

The Geosynthetics CQA Laboratory is responsible for performing the laboratory testing required by the QA/QC Plan to determine specific characteristics of the geosynthetics. The Geosynthetics CQA Laboratory is also responsible for providing adequate documentation of analytical results, test methods followed, and testing equipment used. Work of the Geosynthetics CQA Laboratory will be administered by the QA/QC Consultant. All results should be reported to the QA/QC Consultant.

F. Earthwork Contractor or "Contractor"

The Earthwork Contractor is responsible for moving earth to establish the proposed grades, preparation of the recompacted soil liner, and for the placement of the soil and granular materials composing the soils components of the storage and

5.0 Project Meetings

To achieve a high degree of quality during installation, clear, open channels of communication are essential. The following meetings should be held when appropriate.

- A. **Pre-construction Meeting**
Following the completion of the contract documents and selection of a QA/QC Consultant for the project, a Pre-construction Meeting shall be held. The meeting may be attended by the Project Manager, the QA/QC Consultant's Engineer, the QA/QC Consultant's Inspection personnel, the Geosynthetics Installer's Superintendent, the Earthwork Contractor's Superintendent, and other involved parties.
- B. **Daily Meetings**
A daily meeting shall be held, as necessary, between the QA/QC Consultant, the Geosynthetic Installer, the Earthwork Contractor, the Project Manager, the Owner, and other involved parties. Those attending will discuss, plan, coordinate the work, and QA/QC activities to be completed that day.
- C. **Progress Meetings**
Progress meetings shall be held as necessary. Attendees shall include the Project Manager, the QA/QC Consultant, the Geosynthetic Installer, the Earthwork Contractor, and other involved parties. Those attending will discuss current progress, planned activities for the next week, and new business or revisions to the work. The QA/QC Consultant will log problems, decisions, or questions arising at this meeting.
- D. **Problem or Work Deficiency Meeting**
A special meeting shall be held when and if a problem or deficiency, which would impact the construction schedule, is present or likely to occur. At a minimum, the meeting shall be attended by the affected contractors, the Project Manager, and the QA/QC Consultant. The purpose of the meeting is to define and resolve the problem or work deficiency.

6.0 Qualifications of Key Personnel and Organizations

The following qualifications shall be required of the key personnel and organizations involved in the construction of the storage and containment system.

- A. **QA/QC Consultant**
The QA/QC Consultant shall be pre-qualified and approved by the Owner. The QA/QC Consultant shall be a qualified engineering firm with experience in construction quality assurance and quality control, particularly on projects involving similar storage and containment systems. The QA/QC Consultant shall designate an Engineer who is a Professional Engineer registered in the state of the permitting site. The Engineer shall be solely responsible for the QA/QC personnel and their activities, as well as the preparation of a certification report to certify the project has

The Geomembrane Installer shall designate one representative as the Superintendent, who will represent the Installer on-site and at site meetings. The Superintendent shall be qualified by experience. The Superintendent shall be approved by the Project Manager.

In addition, the Geomembrane Installer shall designate a Master Seamer, who shall not be the Superintendent. The Master Seamer shall be present during all seaming operations and be experienced with extrusion welding, fusion welding, and welding in varying weather conditions.

A. Manufacture of Polyethylene Geomembrane

The Geomembrane Manufacturer shall provide documentation that the material meets the requirements of the design specifications and that adequate quality control measures have been implemented during the manufacturing process.

1. Resin Quality

Prior to the shipment of polyethylene geomembrane material, the Geomembrane Manufacturer shall provide the Project Manager and the QA/QC Consultant with the following information:

- The origin (Resin Supplier's name and resin production plant), identification (brand name, number), and production date of the resin;
- A copy of the quality control certificates issued by the Resin Supplier;
- Reports on the tests conducted by the Manufacturer to verify the quality of the resin used to manufacture the geomembrane rolls and extrudate rods and
- A statement that no reclaimed polymer is added to the resin (however, the use of polymer recycled during the manufacturing process may be permitted if done with appropriate cleanliness and if recycled polymer does not exceed 2 percent by weight).

At the Owner's discretion and cost, testing may be carried out on the resin by the Geosynthetics QA/QC Laboratory for purposes of verifying conformance. If the results of the Manufacturer and the Geosynthetics QA/QC Laboratory testing differ, the testing will be repeated by the Geosynthetics QA/QC Laboratory, and the Geomembrane Manufacturer will be permitted to monitor this testing. The results of this latter series of tests will prevail, provided that the applicable test methods have been followed.

2. Certification of Property Values

In addition to information regarding the raw material, the Geomembrane Manufacturer shall provide the Project Manager and the QA/QC Consultant with the following prior to shipment of the geomembrane:

- A properties sheet certification including, at a minimum, guaranteed values for all properties specified in GRI GM 13.
- A list of quantities and descriptions of materials other than the base polymer which comprise the geomembrane.

- Rolls that have minor repairable flaws; and
- Rolls without proper identification.

Rolls without proper identification shall be rejected by the Project Manager.

C. Conformance Testing of Geomembrane
Conformance testing is not specified for the Comp Dairy project.

D. Storage
The Installer shall be responsible for the storage of the geomembrane on site. Storage space should protect the geomembrane from theft, vandalism, passage of vehicles, water, and weather. The QA/QC Consultant shall document that storage of the geomembrane provides adequate protection against dirt, vehicle impact, and other sources of damage.

2.0 Geomembrane Installation

The installation of the geomembrane involves three primary tasks; earthwork, placement of geomembrane field panels, and seaming the field panels.

A. Earthwork
The earthwork supporting the geomembrane and anchoring it in place is crucial to the performance of the geomembrane. The Contractor shall inform the Construction Quality Assurance (CQA) Inspector when the surface on which the geomembrane will be installed is suitable for installation. Geomembrane placement may not commence until both the CQA Inspector and the Installer inspect the subgrade and agree that the area under consideration is acceptable.

It is the Installer's responsibility to protect the supporting soil after it has been accepted. After the supporting soil has been accepted by the Installer, it shall be the responsibility of the Installer and the QA/QC Consultant to indicate to the Project Manager any change in the supporting soil condition that may require repair work.

B. Geomembrane Placement
The placement of field panels of geomembrane is the responsibility of the Installer and shall be performed in accordance with the approved layout and the following sections. The geomembrane shall be placed in direct and uniform contact with the underlying recompacted soil or barrier layer.

1. Panel Layout
If requested, prior to installation, the Geomembrane Installer shall provide to the Project Manager and the QA/QC Consultant, a drawing of the facility to be lined showing the proposed panel layout. The QA/QC Consultant shall review the panel layout drawing and verify it is consistent with the accepted state of practice and the QA/QC Plan. The panel layout drawing shall be approved by the QA/QC Consultant's Engineer (QA/QC Engineer).

5. Weather Conditions

Geomembrane placement shall not proceed when sheet temperature measured by placing a thermometer on the surface of the sheet is below 41°F (5°C) or above 104°F (40°C) for extrusion welding and 140°F (60°C) for fusion welding. Deviations from the above temperature criteria shall only occur when authorized by the Project Manager and with the concurrence of the QA/QC Consultant. Geomembrane placement shall not be done during any precipitation, fog, snow, in an area of ponded water, or in the presence of excessive winds.

The QA/QC Consultant shall verify that the above conditions are fulfilled and shall inform the Project Manager if the conditions are not fulfilled.

6. Anchorage System

Anchor trenches shall be excavated by the Earthwork Contractor (unless otherwise specified) to the lines and widths shown on the plans prior to geomembrane placement. The QA/QC Consultant shall verify that anchor trenches have been constructed according to the plans.

Slightly rounded corners will be provided in trenches where the geomembrane adjoins the trench to avoid sharp bends in the geomembrane. Loose soil shall not underlie the geomembrane in the trenches. Seaming shall continue through the anchor trench.

7. Method of Placement

The following is the responsibility of the Geomembrane Installer; the QA/QC Consultant shall document that these conditions are satisfied:

- Equipment used does not damage the geomembrane by handling, traffic, excessive heat, leakage of liquids, or other means;
- The prepared surface underlying the geomembrane has not deteriorated since previous acceptance, and is still acceptable immediately prior to geomembrane placement;
- Geosynthetic material immediately underlying the geomembrane is clean and free of debris;
- Personnel working on the geomembrane do not smoke, wear damaging shoes, or engage in other activities that could damage the geomembrane;
- The method and equipment used to unroll the panels does not cause scratches or crimps in the geomembrane and does not damage the supporting soil;

At the Pre-Construction Meeting, the Geomembrane Installer will provide the QA/QC Consultant with a list of proposed seaming personnel and their professional records. This document will be reviewed and approved by the Project Manager and QA/QC Consultant. Seaming personnel shall meet the requirements listed in Section 1.0 of this QA/QC Plan.

2. Seaming Equipment and Products

Approved processes for field seaming are extrusion seaming and fusion seaming. Proposed alternate processes shall be documented and submitted to the Owner for approval. Only seaming equipment which has been specifically approved by make and model shall be used. The Installer shall submit seaming equipment documentation to the Project Manager and the QA/QC Consultant for approval.

The following is the responsibility of the Installer; the QA/QC Consultant shall verify that these conditions are met:

- The Installer maintains on-site the number of spare operable seaming apparatus decided at the Pre-Construction Meeting;
- Equipment used for seaming is not likely to damage the geomembrane;
- The extruder is purged prior to beginning a seam until heat-degraded extrudate has been removed from the barrel;
- For cross seams, the edge of the cross seam is ground to a smooth incline (top and bottom) prior to seaming;
- The electric generator is placed on a flat smooth base and a rub sheet such that no damage occurs to the geomembrane; and
- A smooth insulating plate, scrub sheet or fabric is placed beneath the hot seaming apparatus after usage.

4. Weather Conditions for Seaming

The required weather conditions for seaming are as follows:

- The sheet temperatures shall be measured with the thermometer on the surface of the geomembrane sheet.
- Unless authorized in writing by the Project Manager, no seaming shall be attempted at a sheet temperature below 41° F (5°C) or above 104°F (40°C) for extrusion welding and 140°F (60°C) for fusion welding.
- The geomembrane shall be dry and protected from wind.

If the Installer wishes to use methods which may allow seaming at sheet temperatures below 41°F (5°C) or above 104°F (40°C) for extrusion welding and 140°F (60°C) for fusion welding, the Installer shall provide adverse weather welding procedures which shall be reviewed and approved by the QA/QC Consultant, and certify in writing that the installation crew has been trained to perform adverse weather welding. The installer shall also demonstrate through trial welding that the overall quality of the geomembrane is not adversely affected.

5. Overlapping and Temporary Bonding

The following shall be the responsibility of the Installer and verified by the QA/QC Consultant:

- As a general guidance, the panels of geomembrane have a finished overlap of a minimum of 3 inches (75 mm) for extrusion seaming and 4 inches (100 mm) for fusion seaming, but in any event sufficient overlap will be provided to allow peel tests to be performed on the seam;
- No solvent or adhesive is used unless the product is approved in writing by the Owner (samples will be submitted to the Owner for testing and evaluation); and
- The procedure used to temporarily bond adjacent panels together does not damage the geomembrane (in particular, the temperature of hot air at the nozzle of any spot seaming apparatus is controlled such that the geomembrane is not damaged).

The QA/QC Consultant shall log all appropriate temperatures and conditions, and shall log and report to the Project Manager any deviation.

Unless otherwise specified, the general seaming procedure used by the Installer shall be as follows:

- For fusion seaming, a movable protective layer of plastic may be required to be placed directly below each overlap of geomembrane that is to be seamed. This is to help prevent any moisture build-up between the sheets to be seamed.
- If required, a firm substrate will be provided by using a flat board or similar hard surface directly under the seam overlap to achieve proper support.
- Wrinkles at the seam overlaps will be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut wrinkles will be seamed and any portion where the overlap is inadequate will then be patched with an oval or round patch of the same geomembrane extending a minimum of 6 inches (150 mm) beyond the cut in all directions.
- Seaming will extend to the outside edge of panels to be placed in the anchor trench.
- No field seaming shall take place without the Master Seamer being present.

The QA/QC Consultant shall verify that the above seaming procedures are followed, and shall inform the Project Manager if they are not.

8. Non-Destructive Seam Continuity Testing

The Installer shall non-destructively test field seams over their full length using a vacuum test unit (for extrusion seams only), air pressure test, or other approved method. The testing shall be carried out to the accepted standards of the industry. The purpose of non-destructive tests is to check the continuity of seams. It does not provide any information on seam strength. Continuity testing shall be carried out on 100 percent of the seams as the seaming work progresses, not at the completion of all field seaming, unless otherwise approved by the Project Manager. The Installer shall complete any required repairs in accordance with Subsection 2.D.

a. Air Pressure Testing:

Unless otherwise specified, the general air pressure testing procedure used by the Installer shall be as follows:

- Seal both ends of the test channel with a heat gun or other acceptable clamping method.

- All sections shall be retested and repaired in accordance with Subsection 2D.

c. Vacuum Testing

Unless otherwise specified, the general vacuum testing procedure used by the Installer shall be as follows:

- Turn on the vacuum pump to reduce the vacuum box to approximately 5 psi (0.35 kg/cm³).
- Apply a generous amount of liquid soap and water solution to the area to be tested.
- Place the vacuum box over the area to be tested and apply sufficient downward pressure to "seat" the seal strip against the liner.
- Close the bleed valve and open the vacuum valve.
- Ensure that a leak tight seal is created.
- For a period of not less than 5 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
- If no bubbles appear after 5 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inch (75 mm) overlap, and repeat the process.

d. Non-Complying Vacuum Test

In the event of a non-complying vacuum test, the following procedure shall be followed:

- Mark all areas where soap bubbles appear and repair the marked areas.
- Retest repaired areas.

e. QA/QC Responsibilities

The QA/QC Consultant shall:

- Document all continuity testing;
- Record location, date, test unit number, name of tester, and outcome of all testing; and,

The Installer will not be informed in advance of the locations where the seam samples will be taken.

b. Sampling Procedure

Samples shall be cut by the Installer as the seaming progresses in order to have passing test results before the geomembrane is covered by another material. The QA/QC Consultant shall:

- Observe sample cutting;
- Assign a number to each sample, and mark it accordingly;
- Record the sample location on the layout drawing; and
- Record the reason for taking the sample at this location, if not taken due to statistical routine.

All holes in the geomembrane resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described in Subsection 2.D.2 of this Plan. The continuity of the new seams in the repaired area will be tested according to Subsection 2.C.8.

c. Size of Samples

At a given sampling location, samples shall be taken by the Installer. The sample shall be cut into three parts and distributed as follows:

- One portion to the QA/QC Consultant for archive storage, 12 inches x 12 inches (30 cm x 30 cm);
- One portion for peel and shear testing in the field, 12 inches x 18 inches (30 cm x 45 cm); and
- At the discretion of the QA/QC engineer and CQA Consultant, one portion for shipment to an independent testing laboratory, 12 inches x 12 inches (30 cm x 30 cm) assuming passing field testing results.

Final determination of the sample sizes shall be made at the Pre-Construction Meeting.

d. Field Testing

Ten (10) one-inch (25 mm) wide specimens shall be removed from the field sample and tested in the field with a tensiometer. Five (5) specimens shall be tested in peel and five (5) in shear; all specimens

- The Installer can trace the seaming path to an intermediate location (at least 10 ft (3 m) from the point of the failed test in each direction) and take a small sample for an additional field test at each location. If these samples pass destructive testing, then the seam is reconstructed between these locations (see Subsection 2.D.2 for repair procedures). If the additional testing fails, then the process shall be repeated to establish the zone to be reconstructed.

All acceptable seams must be bounded by two passing destructive tests. In cases exceeding 150 feet of reconstructed seam length, a sample shall be taken from the zone in which the seam has been reconstructed. This sample must pass destructive testing or the procedure outlined here must be repeated. The QA/QC Consultant shall document all actions taken in conjunction with destructive test failures.

D. Defects and Repairs

Seams and non-seam areas of the geomembrane shall be examined by the QA/QC Consultant for identification of defects, holes, blisters, undispersed raw materials and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect defects, the surface of the geomembrane will be clean at the time of examination. The geomembrane surface shall be swept or washed by the Installer if the amount of dust or mud inhibits examination.

1. Evaluation

Each suspect location both in seam and non-seam areas shall be non-destructively tested using the methods described in Subsection 2.C.8 as appropriate. Each location that fails the non-destructive testing shall be marked with an identification code by the QA/QC Consultant and repaired by the Installer. Work shall not proceed with any materials which will cover locations which have been repaired until laboratory test results with passing values are available.

2. Repair Procedures

Any portion of the geomembrane exhibiting a flaw, or failing a destructive test, or non-destructive test, shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be approved by the Project Manager and QA/QC Consultant. The procedures available include:

- Patching

- Apply a new piece of geomembrane sheet over, and at least 6 inches (150 mm) beyond the limits of a defect. The patch shall be extrusion seamed to the underlying geomembrane. This method should be used to repair large holes, tears,

test is achieved. The QA/QC Consultant shall observe non-destructive testing of repairs and shall record the date of the repair and test outcome.

4. **Large Wrinkles**
When seaming of the geomembrane is completed (or when seaming of a large area of the geomembrane is completed) and prior to placing overlying materials, the QA/QC Consultant shall observe the geomembrane wrinkles. The QA/QC Consultant will indicate to the Project Manager which wrinkles should be cut and resealed by the Installer. The seam thus produced will be tested like any other repair.
5. **Backfilling of Anchor Trench**
Anchor trenches will be adequately drained, to prevent ponding or otherwise softening of the adjacent soils while the trench is open. Anchor trenches shall be backfilled and compacted as soon as possible. Care shall be taken when backfilling the trenches to prevent any damage to the geosynthetics. The QA/QC Consultant shall observe the backfilling operation and advise the Project Manager of any problems.
6. **Liner System Certification/Acceptance**
The Installer and the Manufacturer shall retain ownership and responsibility for the geosynthetics in the facility until acceptance by the Owner. The liner system shall be accepted by the Owner when:
 - The installation is finished;
 - Verification of the adequacy of seams and repairs, including associated testing, is complete;
 - Installer's representative furnishes the Project Manager with certification that the geomembrane was installed in accordance with the Manufacturer's recommendations as well as the design plans and specifications; and
 - All documentation of installation is completed including the QA/QC Consultant's final report.

The QA/QC Consultant shall provide certification that installation was performed in accordance with this QA/QC Plan for the project except as noted to the Permit Engineer or Project Manager. If material availability allows, the QA/QC Consultant may collect a material sample for inclusion in the certification report.

7. **Materials in Contact with the Geomembranes**
The quality assurance procedures indicated in this Subsection are only intended to verify that the installation of these materials does not damage the

TABLE 2-1

FIELD SEAM STRENGTH REQUIREMENTS

HDPE Geomembrane

PROPERTY	TEST METHOD	VALUE (see note 1)	UNITS
1. Bonded Seam Shear Strength (see note 1)	ASTM D4437	80	ppi
2. Peel Adhesion (Fusion)	ASTM D4437	60	ppi
3. Peel Adhesion (Extrusion)	ASTM D4437	52	ppi

LLDPE Geomembrane

PROPERTY	TEST METHOD	VALUE (see note 1)	UNITS
1. Bonded Seam Shear Strength (see note 1)	ASTM D4437	60	ppi
2. Peel Adhesion (Fusion)	ASTM D4437	50	ppi
3. Peel Adhesion (Extrusion)	ASTM D4437	44	ppi

Notes:

1. Sample must fail in Film Tear Bond (FTB); PI < 25% (as applicable). If manufacturer standards are more restrictive, they shall supersede the specified values noted herein

3.0 Execution

A. Shipment and Storage

During shipment and storage, the geotextile shall be protected from ultraviolet light exposure, precipitation, snow or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions. Geotextile rolls shall be wrapped in plastic sheets or otherwise protected. Wrappings protecting the geotextile rolls should be removed less than one hour prior to unrolling the geotextile. Geotextiles shall not be exposed to precipitation prior to being installed. Wet geotextiles are heavy which makes them difficult to deploy and can also effect liner welding when the geomembrane is adjacent to the geotextile. During cold weather, geotextiles must be protected from freezing.

The QA/QC Consultant shall observe rolls upon delivery and prior to installation, any deviation from the above requirements shall be reported to the Project Manager. Any damaged rolls shall be rejected and replaced at no cost to the Owner.

The Owner will only accept rolls delivered by flatbed trailer.

A. Installation and Handling

The Installer shall handle geotextiles in such a manner as to minimize damage and shall comply with the following:

1. After the wrapping has been removed, a geotextile shall not be exposed to sunlight for more than the time specified by the Geotextile Manufacturer.
2. On slopes, the geotextiles shall be securely anchored and then rolled down the slope in such a manner as to continually keep the geotextile panel in tension.
3. In the presence of wind, geotextiles shall be weighted with sandbags or the equivalent. Sandbags shall be installed during the placement and shall remain until replaced with the appropriate overlying material.
4. Sandbags shall be filled with the fine grained material and must be handled with care to prevent rupture.
5. Geotextiles shall be kept continually under tension to minimize the presence of wrinkles in the geotextile.
6. Geotextiles shall be cut using an approved geotextile cutter only (i.e., an upward cutting hook blade). If in place, special care must be taken to protect other materials from damage which could be caused by the cutting of the geotextiles.
7. The Installer shall take necessary precautions to prevent damage to the underlying layers during placement of the geotextile.

2. Allow minimal slippage of the geotextile on underlying layers;
3. Equipment used for placing the overlying material shall not be driven directly on the geotextile;
4. A minimum thickness of 1 foot (30 cm) of soil must be maintained between a light, low ground pressure equipment and the geotextile;
5. A minimum thickness of 2 feet (61 cm) of soil must be maintained between rubber-tired vehicles and the geotextile unless approved by the Design Engineer and Owner; and,
6. In heavily trafficked areas such as access ramps, soil thickness shall be at least 3 feet (1 m).

Any deviation shall be noted by the QA/QC Consultant and reported to the Project Manager.

SECTION 4.0
GEOCOMPOSITES

1.0 General

A. Description

The work covered in this section shall consist of furnishing the labor, materials, tools, equipment, and incidentals necessary to perform all work required to install geocomposite layer in the storage and containment system.

B. Definitions

1. Geosynthetic Quality Assurance Laboratory - the individual or firm responsible for conducting tests on samples of geosynthetics taken from the site. The Geosynthetic Quality Assurance Laboratory must be independent from the Owner, Manufacturer, Resin Supplier, and Installer, and cannot be provided by any party involved with the manufacture, fabrication, or installation of any of the geosynthetic components. The Geosynthetic Quality Assurance Laboratory shall be selected by the Owner and approved by the QA/QC Consultant.
2. Installer - the individual or firm responsible for the unloading, field handling, inspection, sampling, storage, protection, placement, seaming, repair, and all other site aspects of the geonet and geocomposite installation.
3. Manufacturer - the individual or firm responsible for production of geonet, geotextile and/or geocomposite.
4. Resin Supplier - the individuals or firms who produce and deliver HDPE resin to the Manufacturer.

C. Manufacturing Quality Control

Testing shall be carried out by the Manufacturers and Resin Supplier to demonstrate that the raw material, geonet and geocomposite meet the product specification. The Manufacturers shall provide the following information:

1. Copies of the QC certificates issued by the Resin Supplier, including the origin, identification and production dates of the resin.
2. Copies of the QC certificates issued by the geotextile Manufacturer.
3. A list of guaranteed minimum average roll values for the geotextile used in the production of the geocomposite.
4. Copies of the QC certificates issued by the geonet and geocomposite Manufacturer.
5. A list of the guaranteed minimum physical properties for the geonet and geocomposite to be supplied.

accordance with Sections 3.E.3 and 3.F.3. All flawed materials shall be stored in a separate location to insure that they are not inadvertently installed.

Any material damaged during shipment to the site shall be replaced by the Manufacturer at no cost to the Owner. Any material damaged by Installer's failure to properly handle, store and/or protect the material shall be replaced by the Installer at no cost to the Owner.

B. Storage

The Owner will provide a storage location for the material as close as possible to the area of deployment. Geonets shall be stored in their original, unopened, wrapped covers in a clean, dry area. Geonet materials will be unwrapped no more than one hour prior to installation and will not be exposed to ultraviolet light for more than 30 days.

Geocomposites shall also be stored in their original, unopened, wrapped covers such that they are protected from precipitation and ultraviolet light exposure and are free of dirt, dust or cuttings when they are installed. Geocomposite drainage materials shall be adequately pliable to allow for proper deployment.

D. Pre-Installation Inspection

Immediately prior to installation, the QA/QC Consultant shall verify that the geocomposites are free of dirt and dust. If the materials are judged to be dirty or dusty, they shall be cleaned by the Installer prior to installation.

E. Installation of Geocomposites

1. The Installer shall comply with the following:

- a. On slopes, the geocomposites shall be secured at the top of the slope as shown on the Drawings. The geocomposites shall then be rolled down the slope in such a manner as to continually keep the geocomposite sheet in tension to minimize folds and wrinkles.
- b. In the presence of wind, all geocomposites shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with other material.
- c. The Installer shall take all necessary precautions to prevent damage to underlying layers during placement of the geocomposite.
- d. During placement and joining of geocomposites, care shall be taken not to entrap stones, mud or dirt that could cause clogging of the drainage system and/or damage any adjacent geosynthetic materials.
- e. Geocomposites shall be cut with an approved cutter, i.e., hook blade. Care shall be taken to prevent damage to underlying materials.

3. Repairs

The damaged portion of the geocomposite will be inspected by the QA/QC Consultant. If the damaged area exceeds 3 feet by 3 feet, the roll will be cut, the damaged area removed, and a butt joint formed (where permitted) or the entire roll will be replaced. Unless otherwise approved by the QA/QC Consultant, the geocomposite will be repaired as follows if the damaged area is smaller than 3 feet by 3 feet:

- a. If the geonet is undamaged, a geotextile patch extending 12 inches beyond the edges of the damaged area shall be thermally bonded in place.
- b. If the geonet is damaged, the damaged geonet shall be removed. A section of geonet shall be cut to replace the removed geonet. The geonet patch shall be tied to the existing geonet using plastic fasteners secured at 6-inch intervals, with a staggered double row formation (i.e., the first row of fasteners shall be spaced at 12-inch intervals; the second set of fasteners shall be offset a maximum of 12 inches deep and spaced at 12-inch intervals, staggered in relation to the first row). A geotextile patch extending 12 inches beyond the edges of the damaged area shall be thermally bonded in place.

G. Placement of Cover Materials

The composite liner system must be protected from the intrusion of objects during construction and operation. The Earthwork Contractor shall place all cover materials in such a manner to ensure:

1. the geocomposite, underlying liner materials, and overlying geotextiles are not damaged.
2. there is minimal slippage of the geocomposite on underlying layers.
3. no excess tensile stresses develop in the geocomposite.

MEMORANDUM OF LEASE

Made as of the 14th day of December, 2011, by and between GEARMAR PROPERTIES, INC., an Ohio corporation, as landlord ("Landlord") and AMERICAN WATER MANAGEMENT SERVICES, LLC, an Ohio limited liability company, as tenant ("Tenant").

WITNESSETH:

WHEREAS, as of the date hereof, Landlord and Tenant entered into a certain Lease Agreement (the "Lease"); and

WHEREAS, Landlord and Tenant desire to enter into this Memorandum of Lease to set forth certain terms and conditions of the Lease.

NOW THEREFORE, intending to be legally bound hereby, Landlord and Tenant set forth the following information with respect to the Lease:

1. Landlord: The name of the Landlord is GEARMAR PROPERTIES, INC.
2. Tenant: The name of the Tenant is AMERICAN WATER MANAGEMENT SERVICES, LLC.
3. Addresses: The addresses set forth in the Lease as addressed of the parties are:

LANDLORD: Gearmar Properties, Inc. _____
 PO 209
 Portersville, PA 16051

TENANT: One American Way
 Warren Ohio , 44484

4. Date: The Lease is dated as of the December 14, 2011 (the "Effective Date").
5. Term Commencement: The term of the Lease commences on the Effective Date, and continues thereafter until the injection well(s) on the Leased Premises is legally closed.
6. Premises: Tenant has the exclusive right to operate one or more Class II salt water disposal wells on the property of Landlord described on Exhibit "A". Tenant shall have exclusive surface rights over only that portion of the Property as is described or depicted on Exhibit B as the Operations Areas, attached hereto and incorporated by reference herein plus the exclusive area for Rail Lines, Rail Access and Pipelines all as provided in the Lease (the "Leased Premises"), together with the non-exclusive easements and licenses granted to Lessee in the Lease including but not limited to Rail Lines, Siding and Switches, all road ways and other areas for ingress and egress and parking. The Leased Premises shall comprise approximately 5.2 acres for both Wells plus the exclusive area of the Rail Lines,

Rail Access and Pipelines.

WITNESS the due execution hereof.

WITNESSES:

William S. Decker
Dean Gearhart

LANDLORD:

GEARMAR PROPERTIES, INC.

By: William E. Marsteller
Print Name: WILLIAM E. MARSTELLER
Title: PRESIDENT

TENANT:

AMERICAN WATER MANAGEMENT
SERVICES, LLC.

By: Kenneth J. McMahon
Print Name: Kenneth J. McMahon
Title: PRESIDENT

This instrument prepared by:
Jay M. Skolnick, Esq.
Nadler, Nadler & Burdman Co., LPA
20 Federal Plaza West, Suite 600
Youngstown, Ohio 44503

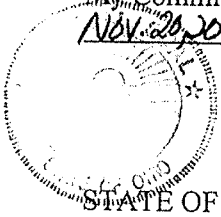
STATE OF OHIO)
) SS:
COUNTY OF Trumbull)

BEFORE ME, a Notary Public, in and for said County and State, personally appeared the above named ~~William Marshall~~ known to me to be the President, of GEARMAR PROPERTIES, INC. which executed the foregoing instrument, who acknowledged that he did sign said instrument for and on behalf of said corporation, being thereunto duly authorized by said corporation; that the same is his free act and deed and the free act and deed of said corporation.

IN TESTIMONY WHEREOF, I have hereunto set my hand and official seal at American Water Mng., this 17th day of December, 2011.

My Commission expires:

Nov. 20, 2013



JUDITH M. STYKA, NOTARY PUBLIC
State of Ohio
My Commission Expires November 20, 2013

Judith M. Styka
Notary Public

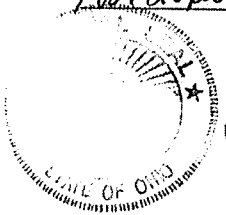
STATE OF OHIO)
) SS:
COUNTY OF Trumbull)

BEFORE ME, a Notary Public, in and for said County and State, personally appeared the above named ~~Kenneth J. Miller~~ known to me to be the President of AMERICAN WATGER MANAGEMENT SERVICES, LLC, the company which executed the foregoing instrument, who acknowledged that he did sign said instrument for and on behalf of said company, being thereunto duly authorized by said company; that the same is his free act and deed and the free act and deed of said company.

IN TESTIMONY WHEREOF, I have hereunto set my hand and official seal at American Water Mng., this 19th day of December, 2011.

My Commission expires:

Nov. 20, 2013



JUDITH M. STYKA, NOTARY PUBLIC
State of Ohio
My Commission Expires November 20, 2013

Judith M. Styka
Notary Public

Exhibit "A"

Parcel One:

Situated in the Township of Weathersfield, County of Trumbull and State of Ohio, and being known as Permanent Parcel No. 24-310900 by the Auditor of the County of Trumbull, State of Ohio, the same consisting of 22.8935 acres.

Parcel Two:

Situated in the Township of Weathersfield, County of Trumbull and State of Ohio, and being known as Permanent Parcel No. 24-311300 by the Auditor of the County of Trumbull, State of Ohio, the same consisting of 101.7372 acres.



American Water Management Services, LLC

One American Way • Warren, OH 44484-5555 • Phone: (330) 856-8800 • Fax: (330) 856-8480

December 23, 2011

Mr. Tom Tomastik, Geologist
Division of Mineral Resources Management
Ohio Department of Natural Resources
Fountain Square, 2045 Morse Road
Columbus, Ohio 43229-6693

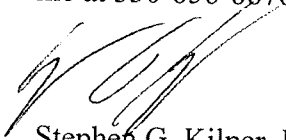
**Re: Submittal of Salt Water Injection Well Permit Application
AWMS No. 1 - Niles Injection Site
American Water Management Services, LLC - Owner Number 8905**

Dear Tom:

Enclosed please find the subject application for Salt Water Injection Well AWMS No. 1 proposed to be located in Section No. 9, Weathersfield Township, Trumbull County, Ohio, by American Water Management Services, LLC (AWMS). Concurrent with the submittal of this application, AWMS is submitting an application for a second salt water injection well, AWMS No. 2, at the same site. The two proposed injection wells will share above ground unloading, storage, treatment, and other necessary facilities.

The application includes the required forms, exhibits, figures, maps, affidavits, and other information that we believe is required, along with the application fee of \$1000.

Thank you for your time and assistance during our preparation of this application. Please contact me at 330-856-8876 or skilper@avalonholdings.com with any questions.


Stephen G. Kilper, PE
Vice President

SGK:akm\2248

cc: Ken McMahan, AWMS (w/encl)
Gearmar Industries (w/encl)
Dwight Williams, KU Resources

RECEIVED

DEC 27 2011

Application
Proposed Saltwater Injection Well AWMS No. 1
Niles Injection Site
Weathersfield Township, Trumbull County
American Water Management Services, LLC
December 23, 2011

Application Package Contents

- Application Fee (original only)
- Form 1 - Application for Permit
- Form 210 - Supplement to Application for Salt Water Injection
- Exhibits 1 and 2 to Form 210
- Well Construction Detail
- Saltwater Injection Well Affidavit
- Form 4 - Restoration Plan (duplicate)
- Figure 1 - Area of Review Map
- Figure 2 - Niles Injection Site Proposed Layout
- Figure 3 - Layout and Construction Details, Storage Impoundment
- Figure 4 – Layout and Construction Details, Unloading Pad and Storage Tank Containment
- Plat Map (original plus two copies)
- Geosynthetic Materials Quality Assurance/Quality Control Plan
- Memorandum of Lease

RECEIVED

DEC 27 2011

Geologic Review for Class II Wells

Application No. aPATT020308

SWIW: (Salt Water Injection Well)

Proposed Well Depth: 4700 feet

Proposed Injection Zone: Newburg

Study area investigated ~ 15 mile radius centered on the proposed well location for all maps except the gravity and magnetic maps, which used 30 mile radius.

Trumbull County, Weathersfield Twp.

Gravity Bouguer Anomaly

- The Gravity Bouguer Anomaly map shows a NE-SW trending gravity low approximately 16 miles SE of the permit application.

Gravity Free Air

- The free air map shows a NE-SW gravity low approximately 20 miles SE of the permit application.

Magnetic First Derivative

- Nothing of note.

Magnetic Second Derivative

- Nothing of note.

Magnetic Reduce Dipole

- The Magnetic Reduce Dipole map shows a NW-SE trending low approximately 24 miles to the NW of the permit application.

Precambrian Structure from PG-23

- There are no faults or major anomalies shown on this map.

Knox Structure

- There are no faults or major anomalies shown on this map.

Trenton Structure

- There are no faults or major anomalies shown on this map.

EGSP Onondaga Structure

- The permit application is situated within a NE-SW trending closed low on the Onondaga structure map.

MRCSP Onondaga Structure

- There are no major anomalies shown on this map.

EGSP Berea Structure

- The permit application is located adjacent to a NE-SW trending closed low. A N-S trending structural nose is also present approximately 6 miles SE of the permit application. The North Star #1 well is located over this feature. A NE-SW trending high is present approximately 2 miles east of the permit application.

Mississippian/Pennsylvanian Unconformity Surface

- The Mississippian-Pennsylvanian unconformity is not contoured at the permit application, but numerous irregularities on this unconformity surface are present in the study area.

Middle Kittanning Coal Structure

- Unit not present.

Upper Freeport Coal Structure

- Unit not present.

Pittsburgh Coal Structure

- Unit not present.

Bedrock Geology

- The top of bedrock for the permit application is the Mississippian Logan and Cuyahoga Formations.

Bedrock Topography

- The bedrock topography map shows the permit application is located within a bedrock topographic high surrounded by 3 valleys. Thus, the proposed location is immediately adjacent to the intersection of three strong bedrock topographic valleys – oriented N-S, NE-SW, and NW-SE. The North Star #1 is located within one of these NW-SE trends approximately 6 miles south.

EGSP Aerial Photo Lineament

- Numerous lineaments generally less than 1 mile in length have been interpreted from aerial photos by Gray and others (1982) throughout the study area of the permit application with 2 dominant directions oriented northwest-southeast and northeast-southwest.

EGSP LANDSAT Lineament

- A N-S trending lineament is present about 1 mile east of the permit application.

Mason Lineament

- A NW-SE trending lineament is present approximately 1 ½ miles south of the permit application. This lineament named the Blairsville-Broadtop lineament by Mason (1999) is adjacent to the Northstar #1 well.
- A NW-SE trending lineament parallel to the Blairsville-Broadtop lineament is present 11 miles NE of the permit application.
- Three other lineaments are present west of the permit application.

Oil and gas fields

- Production in the study area is in the Berea, Devonian Shale, “Big Lime” and Clinton. The permit application is within the North Ellsworth Cons. Field that produces from the Clinton.

Earthquakes

- There have been 13 earthquake epicenters that have occurred within the 30 mile study area in the vicinity of Youngstown. The nearest is about 5 miles SE of the permit application. All of these earthquake epicenters occurred in 2011 and 2012. The largest had a magnitude of 4.

Injection Wells

- There are 12 SWD (active salt water disposal) wells within the 30 mile study area that are injecting in the Clinton, “Newburg,” and Cambrian. The nearest SWD well is approximately 6 miles to the NW of the permit application.

To summarize, the deep structure maps indicate no faults in the study area. It should be noted that there is limited deep (Cambrian-Ordovician) well control in this county to identify deep structures. This location is to the north and right on trend with the strong Mahoning River Valley lineament, named the Blairsville-Broadtop lineament by Mason (1999), which lineament is also adjacent to the North Star #1 well. The location is also adjacent to three bedrock topographic valleys. Thirteen earthquakes have occurred within the study area since 2010, the nearest is about 5 miles to the SE. This permit application is targeting the Newburg, which is over 4,000 feet above the Precambrian.

Tomastik, Tom

From: Steve Kilper [skilper@avalonholdings.com]
Sent: Monday, January 02, 2012 2:08 PM
To: Tomastik, Tom
Cc: 'Dwight Williams'; 'Don Kreager'
Subject: Salt Water Injection Wells AWMS Nos. 1 and 2

Tom:

In light of the events in Youngstown this weekend, can you call me to discuss the well applications we submitted last week? My cell phone is 330-618-0259. We would like to discuss what our options are relative to the applications until there is a resolution to the earthquake issue.

Thanks

Steve

Stephen G. Kilper, PE
President
American Landfill Management, Inc.
American Construction Supply, Inc.
One American Way
Warren, Ohio 44484
Office: 330-856-8876
Fax: 330-856-8483
Cell: 330-618-0259
email: skilper@avalonholdings.com
web: www.lastmat.com

*Steve -
American Water
Management
Services -
(330) 618-0259*

1/3/2012



Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

SCOTT A. ZODY, INTERIM DIRECTOR

November 14, 2011

Mr. Dwight Williams
KU Resources, Inc.
641 West Market Street
Akron, Ohio 44303

**RE: Proposed SWIW preliminary review, New well, Weathersfield Township,
Trumbull County, Ohio**

Dear Mr. Williams:

Pursuant to your request, the Division of Oil and Gas Resources Management has conducted preliminary area of review to determine the feasibility of injecting fluid into the above-captioned well at volumes greater than 200 barrels per day per year (within a ½ mile radius) into the **Newburg dolomite**. An evaluation of the area of review indicates that injection into the **Newburg dolomite** is feasible at volumes greater than 200 barrels per day.

The cost of the saltwater injection well permit is \$1000.00. Enclosed are the application forms for a saltwater injection well.

If you have any further questions regarding this matter, please feel free to contact me at (614) 265-1032.

Sincerely,

A handwritten signature in cursive script that reads "Tom Tomastik".

Tom Tomastik, Geologist
UIC Section
Division of Oil and Gas Resources Management
2045 Morse Road, H-3
Columbus, Ohio 43229-6693

Tomastik, Tom

From: Dwight Williams [dwilliams@kuresources.com]
Sent: Friday, November 11, 2011 2:21 PM
To: Tomastik, Tom
Subject: FW: Preliminary area of reviews

Tom,

I know you have a lot going on, but I was curious if you had had a chance to review the information I had sent earlier in the week?

Additionally, were you going to forward us an injection well application package?

Dwight D. Williams, PG
KU Resources, Inc.
641 West Market Street
Akron, Ohio 44303
dwilliams@kuresources.com

Phone: 330-869-0618
Fax: 330-253-4522
Cell: 330-310-6192
www.kuresources.com.

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From: Dwight Williams [mailto:dwilliams@kuresources.com]
Sent: Tuesday, November 08, 2011 12:17 PM
To: 'Tomastik, Tom'
Cc: 'Steve Kilper'
Subject: RE: Preliminary area of reviews

Tom,

With respect to the Trumbull County, Weathersfield Twp. Section 9 site, the proposed location of the Newburg Injection Well is 41.195228/-80.775096. We met with Steve Ochs at the site Friday, October 4, 2011. His general impression was favorable. Let me know what you think. Thanks.

Dwight D. Williams, PG
KU Resources, Inc.
641 West Market Street
Akron, Ohio 44303
dwilliams@kuresources.com

Phone: 330-869-0618
Fax: 330-253-4522
Cell: 330-310-6192
www.kuresources.com.

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11/14/2011

the sender and delete it from your system. Thank you.

From: Tomastik, Tom [mailto:Tom.Tomastik@dnr.state.oh.us]
Sent: Monday, October 31, 2011 2:36 PM
To: dwilliams@kuresources.com
Subject: Preliminary area of reviews

Dwight:

I have done these preliminary area of reviews for Trumbull County, Weathersfield Twp. Section 9; Trumbull County, Vienna Twp., Lot 40; and Mahoning County, Youngstown Twp., Lot 1304. If you are going into the Knox through the Mt. Simon, there should not be a problem. If you are interested in the Newburg of the Lockport, I will need more specific location information as there are a number of existing Clinton wells that will fall within the area of reviews and I will need a precise location for the 1/2 mile AOR. Additionally, in Trumbull County Weathersfield Twp., there are a number of directional Clinton wells that may impact a Newburg completion. The Knox through Mt Simon seems to be successful for D & L Energy in these areas for disposal, but a problem in this area is the allegations of seismic active caused by the D & L Energy's Northstar #1 well in Youngstown Twp. We have required additional downhole testing but we do not see any correlation, but others feel there is a connection between the injection well and seismic activity. We you apply in this area you may end up in a public meeting with a lot of folks objecting to a permit to inject. I have already received an objection to D & L Energy's Northstar #5 well in Hubbard Twp. of Trumbull County.

Tom Tomastik, Geologist 4
Division of Oil and Gas Resources Management
2045 Morse Road, H-3
Columbus, Ohio 43229-6693
(614) 265-1032

11/14/2011

Search: None
Member Login
What's New
Videos
Photos



OHIO Geological Survey Emergency Oil and Gas Well Locator

Zoom to: SURF V

- Zoom In
- Zoom Out
- Reset Zoom to Full Extent
- Zoom to Last Extent
- Pan
- Identify Feature
- Measure Distance
- Set Map Units
- Query Database
- Buffer Selected Features
- Select Features by Rectangle
- Clear Selection
- Tool Help
- Print Layer



OHIO Geological Survey: Well Center #: 01000011, Well Order #: 01000011

LINKS

- Emergency 1245
- Oil and Gas Links
- Producting x.ah. 00
- UIC well: 0012
- Approved well: 004
- Approved locations
- Operator's well
- Storage tanks: 001

Buildings

- Residential areas
- Also see: 00007
- 00007
- 00007
- 00007
- 00007

Technical Menu

Auto Refresh

Help

Home Layers are scale dependent.
The values you enter for zooming in
to certain scales in your screen by view.
amt

- A new layer
- A new layer type
- A new layer type
- A new layer type
- A new layer type

CONTACTS

WELL SUMMARY

OHIO DIVISION OF GEOLOGICAL SURVEY

Logging Co. Appalachian Well Surveys Core No. Sample No. API Well Number 34155239620000
 Log Types Gamma ray, Neutron, Perforating Depth Control, Perforating Permit Issued 9 1 2009
 County TRUMBULL Township WEATHERSFIELD Quadrangle WARREN Zone N
 Section Lot 5 Tract 16000 Acre (Salt Springs) Twp. Qtr. Surface X 2480215 Y 556570 Bottom X 2481475 Y 557670 NAD27
 Surface Lon -80.755343 Lat 41.181186 Bottom Lon -80.751420 Lat 41.183811 NAD27
 Measured 510' NL & 440' EL OF LOT 5, 16,000 TRACT Surface X 2448756 Y 556601 Bottom X 2449817 Y 557579 NAD83 SPS
 Target: 605'NL & 845'WL OF SEC. 6 Prop TD 5000 Class POOL Tool RTAF
 Landowner CLEVELAND CAN UNIT Acres 47.51 Well No. 1D Date Commenced 2 17 2010
 Owner EVERFLOW EASTERN PTNS L P Well No. Date Completed 2 24 2010
 GL 901 DF KB LTD 5232 DTD 5320 PB Depth Date PB
 TD Form. QUEENSTON FORMATION Prod. Form. CLINTON SAND Status Producing
 IP Natural IP AT 150 MCF & 1 BO Initial Rock Pressure Date Abandoned
 Perforations PI: 4992-5066, # Shots: 106
 Stimulations SI: 4992-5066, Fmtn Cd: 357170, Stim In: CS, Type: H2O, Vol: 2806 Bbl, #Prop: 100000, MBP: 1270, MTP: 1681, MISIP: 1035, 5SIP: 776
 Casing Record COND 11.75 0-48-0, Comment: 0 SRF* 8.62 0-351-0, Comment: 351, Sks: 200 T1 1.5 0-4964-0, Comment: 0 PROD 4 5 0-5286-0, Comment: 0, Sks: 300

Formations

Formation	Top	Bottom	Source	Prod.	Non-Standard	Remarks
BEREA SANDSTONE	89	153	Log	No		
BIG LIME	2905	4786	Log	No		
SALINA GROUP	3411	4475	Log	No		SALT: 3558 TO 4388
LOCKPORT DOLOMITE	4475	4786	Log	No		
NEWBURG DOLOMITE	4668	4750	Driller	No		SHOW OIL, GAS, & WATER
PACKER SHELL	4918	4948	Log	No		
CLINTON SAND	4965	5066	Log	Yes		
QUEENSTON FORMATION	5159		Log	No		

Annual Production

Year	Source	Oil	Gas	Water	Remarks
2009	DMRM	0	0	0	

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WELL SUMMARY

OHIO DIVISION OF GEOLOGICAL SURVEY

Logging Co. Superior Well Services, Nevis Energy Services, Inc Core No. Sample No. API Well Number 34155239200000

Log Types Casing collar locator Gamma ray, Deviation survey, Borehole directional survey, Gamma ray, Neutron Permit Issued 5 30 2008

County TRUMBULL Township WEATHERSFIELD Quadrangle WARREN Zone N

Section Lot 3 Tract Twp. Qtr. Surface X 2475120 Y 556575 Bottom X 2475890 Y 556990 NAD27
 Surface Lon -80.773849 Lat 41.181478 Bottom Lon -80.771022 Lat 41.182575 NAD27

Measured 1805' NL & 525' WL OF LOT 3 Target: 1400' NL & 515' EL OF LOT 3 Surface X 2443896 Y 1163535 Bottom X 2444431 Y 557021 NAD83 SPS

Landowner VIGORITO UNIT Acres 46.55 Prop TD 0 Class POOL Tool RTAF

Owner EVERFLOW EASTERN PTNS L P Well No. 1D Date Commenced 7 31 2008

GL 880 DF 888 KB 890 LTD 5032 DTD 5068 PB Depth 4900 Date Completed 8 8 2008

TD Form. QUEENSTON FORMATION Prod. Form. Status Producing

IP Natural IP AT 100 MCF & 1 BO Initial Rock Pressure Date Abandoned

Perforations PI: 4762-4816, # Shots: 77

Stimulations SI: 4762-4816, Fmtn Cd: 357170, Stim In: CS, Type: H2O, Vol: 122000 Gal, #Prop: 100000, MBP: 1400, MTP: 1689, MISIP: 960, SSIP: 800

Casing Record SRF* 8.62 0-349-0, Comment: 349, Sks: 150 T1 1.5 0-4735-0, Comment: 0 PROD 4.5 0-5035-0, Comment: 0, Sks: 300

Formations

Formation	Top	Bottom	Source	Prod.	Non-Standard	Remarks
SHARON FORMATION	68	146	Log	No		
BEREA SANDSTONE	259	332	Log	No		
BEDFORD SHALE	332	355	Log	No		
OHIO SHALE	355	2755	Log	No		SG & SW @ 2107; WENT ON SOAP
BIG LIME	2755	4550	Log	No		
ORISKANY SANDSTONE	3014	3020	Driller	No		
SALINA GROUP	3216	4256	Log	No		SALT: 3403 TO 4166
LOCKPORT DOLOMITE	4253	4550	Log	No		
NEWBURG DOLOMITE	4458	1550	Driller	No		SALTWATER
PACKER SHELL	4684	4715	Log	No		
CLINTON SAND	4740	4877	Log	No		
QUEENSTON FORMATION	4908		Log	No		

Annual Production

Year	Source	Oil	Gas	Water	Remarks
2008	DMRM	0	0	0	
2009	DMRM	747	18515	136	

Generated : 9:36 AM

Tomastik, Tom

From: Dwight Williams [dwilliams@kuresources.com]
Sent: Monday, October 17, 2011 4:49 PM
To: Tomastik, Tom
Subject: FW: Siting Meeting for Injection Well

Please verify that you received this. Thanks.

Dwight D. Williams, PG
KU Resources, Inc.
641 West Market Street
Akron, Ohio 44303
dwilliams@kuresources.com

Phone: 330-869-0618
Fax: 330-253-4522
Cell: 330-310-6192
www.kuresources.com.

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From: Dwight Williams [mailto:dwilliams@kuresources.com]
Sent: Tuesday, October 11, 2011 8:41 AM
To: 'Tomastik, Tom'
Subject: RE: Siting Meeting for Injection Well

The proposed location is in Trumbull County, Weathersfield Township, Section 9. The proposed injection formations are the Newburg of the Lockport Group and the Mt. Simon Formation. I talked to my client. He has indicated that October 24th, 25th, or 27th works for them. Talk to soon.

Dwight D. Williams, PG
KU Resources, Inc.
641 West Market Street
Akron, Ohio 44303
dwilliams@kuresources.com

A lot of directional wells

Phone: 330-869-0618
Fax: 330-253-4522
Cell: 330-310-6192
www.kuresources.com.

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