Easterly, Jennifer S - DNR

From: Mike Noel [mnoel@geotransinc.com]
Sent: Friday, December 22, 2006 2:43 PM
To: Easterly, Jennifer S - DNR
Cc: sbarg@cityofripon.com; olavarri@cooperindustries.com; schorle.bernard@epa.gov; Dan Morgan; Kevin Lincicum; Archiquette, Leland D - DNR
Subject: Re: Gas system changes at Ripon landfill
Attachments: 12212006 Final Design Addendum#1.pdf

Jennie,
Attached is an Addendum to the gas piping design addressing your comments. Let me know if you have any questions.

Wishing you a Merry Christmas
Mike

Michael R. Noel
GeoTrans, Inc.
175 N. Corporate Drive, Suite 100
Brookfield, WI 53045
262-792-1282 phone
262-792-1310 fax
mnoel@geotransinc.com

>>> "Easterly, Jennifer S - DNR" <Jennifer.Easterly@Wisconsin.gov> 12/14/2006 4:58:24 PM >>>

Nelson and Mike,
Attached is a conditional approval of the modifications to the landfill gas extraction system pilot at the Ripon landfill. Please provide the info I have requested and then I can issue a notice to proceed.

<<ripon landfill gas system modification.doc>>
Happy Holidays!

Jennie Easterly

Jennie Easterly
Hydrogeologist
Remediation and Redevelopment Program
Wisconsin Department of Natural Resources
Oshkosh Service Center
625 East County Road Y, Suite 700
Oshkosh, WI. 54901

(☎) phone: (920) 303-5447
(☎) fax: (920) 424-4404
(✉) e-mail: jennifer.easterly@wisconsin.gov

ADDENDUM #1
ENGINEERING DESIGN PLANS AND SPECIFICATIONS
PERMANENT CONVEYANCE PIPING
ACTIVE LANDFILL GAS EXTRACTION SYSTEM
HWY FF/NN LANDFILL
WDNR LICENSE # 467, BRRTS # 02-20-000915
RIPON, WISCONSIN

December 22, 2006

Prepared For:

FF/NN PRP Group

Prepared By:

GeoTrans, Inc.
175 N. Corporate Drive, Suite 100
Brookfield, Wisconsin 53045

Project No. 1011.004

Michael R. Noel, P.G., Vice-President
Principal Hydrogeologist

Daniel L. Morgan, P.E., Associate
Senior Engineer

TABLE OF CONTENTS

1.0 REASON FOR ADDENDUM

Comments on the Final Design were received from the WDNR and are listed below in italics, followed by a response. Modifications to the Final Design documents incorporating the required changes were made, and the revised documents are attached.

1. *The underground gas piping that is not within the waste mass needs to have double containment from the edge of the landfill to the drip tank per NR 504.08(2)(L), Wis. Adm. Code. In addition, the drip tank should also have dual containment.*

New buried piping not within the waste mass area will be double contained. The existing manifold will be moved south and west to be relocated within the waste mass area. The single two-inch diameter pipe downstream of the manifold will be double contained from the point it leaves the waste mass area to the drip tank. The drip tank will have dual containment. The capacity of the drip tank was increased to 120 gallons to allow use of readily available double walled polyethylene tanks.

2. *The vertical pipe within the drip tank should be designed with a vertical baffle to help create a pressure drop for the gas from the inlet to the outlet. This change will allow the condensate time to drop into the tank and not be drawn directly across the 4 inch diameter tee pipe and not be drawn back in the blower system. The PRP Group may need to install a larger diameter pipe as the condensate knockout and separate pipe for condensate removal and monitoring.*

The vertical pipe within the drip tank has been redesigned with a vertical baffle. The three foot vertical drop will be adequate to allow the condensate to fall into the drip tank. The drip tank will be located immediately south and west of the existing trailer to allow the existing two-inch diameter flexible hose from the trailer to connect to the tank riser.

3. *The drip tank should have no drains on the bottom or sides*

The specified double wall tank has no drains on the bottom or sides.

4. *What is the plan if the geofabric above the sand layer is accidentally torn during trenching? Please explain the plan if this does happen.*

A note (3) has been added to Figure 2 to provide instructions on repair of the geofabric (geotextile) if it is damaged during pipe installation. In addition, pages 02776-9 and 02776-10 from the 1996 construction specifications, the product data sheet for GEOTEX 401 (1 page), and the generic specifications for "Geotextiles for Gas Collection and Venting System" (7 pages) with sewn seam instructions (page 026600-4) and sewing thread (page 026600-6) are included for reference.

5. *After the system is installed but prior to backfilling the trenches, complete a pressure test for leaks. Any leaks detected must be repaired and the system retested. Please provide the testing results and any repairs made.*

Camlock type caps with test fittings will be provided for use at each well head for testing. A three-inch diameter tee with a vertical pipe to two feet above grade has been added immediately upstream of the manifold for each of the three vacuum legs to allow individual leg testing. The existing valves at the manifold will be replaced if they do not test tight. A pressure or vacuum test will be performed on each leg (or segment thereof at the contractor's option) prior to trench backfilling. Low pressure/vacuum testing will be sufficient (5 psi/ 5 feet of water). Hydrostatic testing will be allowable. Any test failures will be investigated and the leaks repaired and retested. The engineer will witness the testing and report the results to the WDNR.

6. *The gas system should be pressure tested every 2 years to check for leaks.*

All test fittings will be stored on site to allow testing every two years.

7. *After this system is up and running, the drip tank should be checked at least on a weekly basis in the beginning, due to the unknown amount of condensate that will be collected. If it is determined that not much condensate is accumulating, monthly checks of the drip tanks contents will be acceptable. The condensate liquid will need to be tested to determine the appropriate way to dispose of the condensate in the drip tank.*

Weekly drip tank level checks will be performed and recorded. Level check frequency will be adjusted based on amount of condensate found and time of year. Level recording sheets will be included in reporting to the WDNR. Laboratory analyses to verify that the condensate is non-hazardous will be performed. Laboratory analytical results will be reported to the WDNR.

ATTACHMENT 1
REVISED BILL OF MATERIALS

REVISED EXHIBIT 1

21-Dec-06
1011.004

Bill of Material for Active Landfill Gas Extraction System Winterization
All PVC items schedule 40

Items - Well Head	Number
3-inch PVC horizontal slip coupling	9
3-inch PVC horizontal 3-5 foot thread one end make up nipple	9
3-inch black plastic/aluminum male camlock X female NPPT threaded	9
5-foot long X 3-inch diameter hose with female camlock fittings each end	9
Items - Vertical Stick Ups for Buried 3-inch diameter horizontal piping	
2'-3" vertical 3-inch diameter PVC pipe threaded one end	9
3-inch black plastic/aluminum male camlock X female NPPT threaded	9
3-inch diameter PVC 90 degree elbows - slip joint	9
3-inch black plastic/aluminum female camlock cap with test fitting	***9***
Items - Horizontal Buried Piping	
Linear Feet 3-inch diameter pipe w/slip couplings	2300
NOTE: Lay piping downhill from wells to vacuum blower trailer	
45-degree 3-inch PVC wyes for junctions - slip joint	9
Steel wire, 12 gage roll, linear feet	2300
Items - Relocated Manifold on Existing Waste Mass Area	
3-inch diameter PVC 90 degree elbows - slip joint	3
3-inch diameter PVC 45 degree elbows - slip joint	3
3-inch PVC horizontal slip coupling	3
8-inch concrete blocks	12
2.5-foot long by 24-inch diameter concrete/galvanized corrugated/plastic vertical pipes	3
24-inch diameter covers with ballast	3
3-inch PVC tee plus 4-foot vertical riser plus cap plus test fitting	***3***
Items - 120 Double Wall Gallon Drip Tank	
120-gallon double wall drip tank	***1***
Linear Feet 2-inch diameter PVC pipe	***60***
Linear Feet 4-inch diameter PVC pipe	***67***
Alternate, use 2-inch fabricated double wall pipe	***60***
4-inch diamter PVC tee	***2***
Make up fitting to connect to existing 2-inch FERNCO fitting from trailer	***1***
4-inch diameter PVC cap with test fitting	***1***

ATTACHMENT 2
DOUBLE WALL DRIP TANK REFERENCES

CartXpress

Categories

All products
Above Ground Plastic & Fiberglas-> (732)
Cylindrical Open Top Tanks-> (54)
Rectangular Open Top Tanks-> (426)
Open Top Cone Bottom Tanks-> (57)
Open Top Cone Bottom Tanks w/ In-> (27)
Vertical Premium (45)
Vertical Water Tanks (15)
PCO Tanks (6)
Cone Bottom Tank with Dome Top & (24)
Horizontal Leg Tank w/ bands (16)
Horizontal Saddle Tanks w/ stand (19)
Pickup Truck Tanks (3)
Gemini Dual Containment Tanks-> (30)
Storage Accessories-> (26)
Little Gem (10)
Tank Fittings and Accessories
Fiberplast-Seismic & Extreme Ser

120 Gallon Gemini Tank

[1933440]

$665.00

1933440
120 Gallon dual containment tank
System with 142 gallon containment.
33" Dia. x 44" Height
Standard Wt. 62 lb.

enlarge

Reviews | Add to Wish List

Quantity: 1

Add to Cart

Shopping Cart

0 items

My Wishlist

0 items

What's New?

035 Gallon Polyethylene Continuous Level Indicator
$214.00

Quick Find

Use keywords to find the product you are looking for.
Advanced Search

Tell A Friend

Tell someone you know about this product.

Reviews

Write a review on this product!

Notifications

Notify me of updates to **120 Gallon Gemini Tank**

Information

Shipping & Returns
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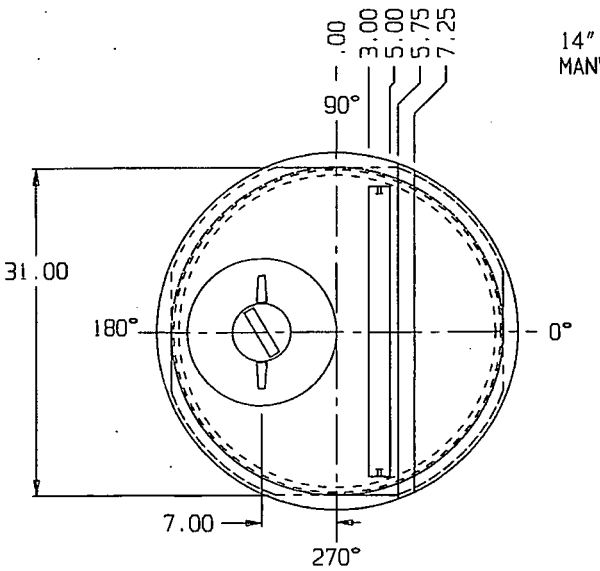
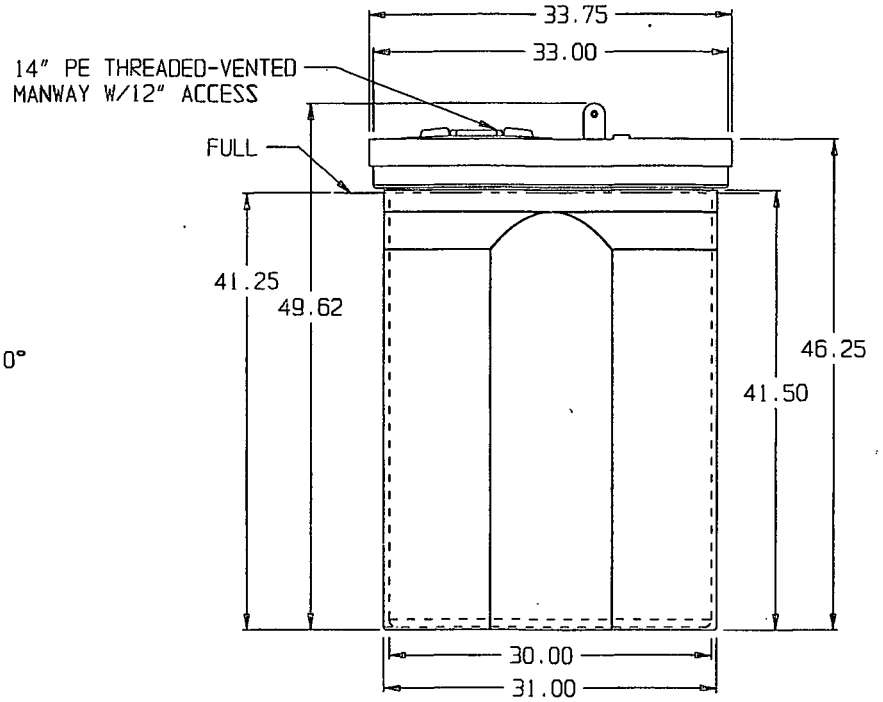
Conditions of Use
Links
Order Tracking
What is VAT?
Contact Us





SNYDER INDUSTRIES INC.

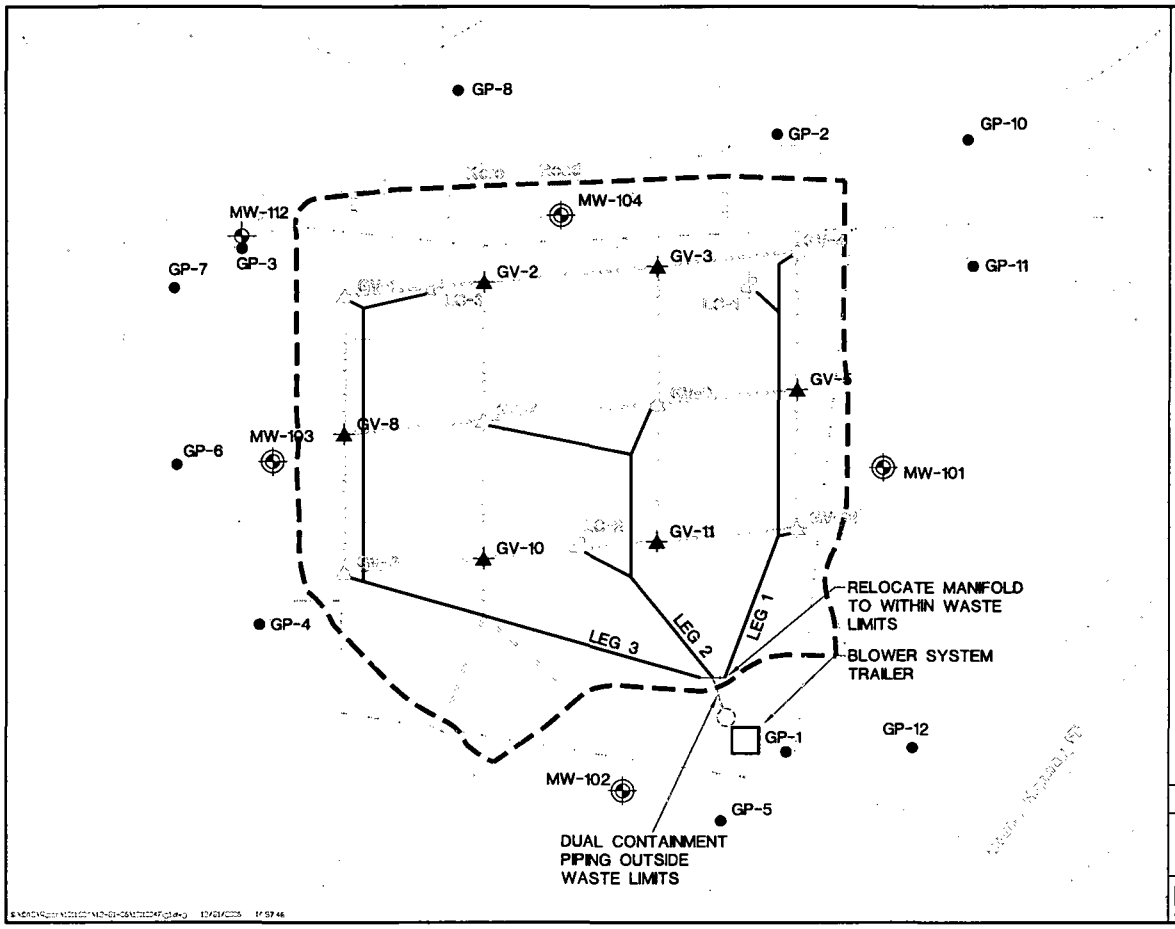
(all dimensions in inches)

* BASE FITTINGS TO BE LEFT INSTALLED AT TIME OF SHIPMENT PER SII PROCEDURE
* Consult Snyder's Guidelines for Use and Installation prior to delivery. Available on-line at www.snydernet.com

120 GALLON CONTAINMENT SYSTEM

TANK ASSEMBLY #: 5980000N97202L
PRIMARY #: 5700000N97202L
HDLPE/NAT/1.9 SPGR
CONTAINMENT #: 5980000N97201L
HDLPE/NAT/1.9 SPGR
REF#: 0000 01/23/04

ATTACHMENT 3
REVISED FIGURE 1
EXISTING ACTIVE LANDFILL GAS EXTRACTION SYSTEM LAYOUT



EXPLANATION

- MW-104 — MONITOR WELL LOCATION, DESIGNATION
- LC-2 — LEACHATE HEAD WELL LOCATION, DESIGNATION
- PROPERTY LINE
- OUTLINE OF CLOSED LANDFILL
- GP-1 — GAS PROBE LOCATION AND DESIGNATION
- GV-9 — GAS VENT LOCATION AND DESIGNATION
- BURIED PASSIVE GAS COLLECTION SYSTEM PIPING
- 3-INCH CORRUGATED HDPE ABOVE-GROUND PIPING
- ACTIVE LANDFILL GAS EXTRACTION POINT

NOTES:

1. CONTOURS ON LANDFILL DO NOT REFLECT CURRENT TOPOGRAPHY.
2. NEW 3" BURIED PVC PIPING ROUTE TO MATCH EXISTING CORRUGATED ABOVE-GROUND PIPING AND FOLLOW NATURAL SLOPE DOWNWARDS TO EQUIPMENT TRAILER TO DRAIN PROPERLY.

N

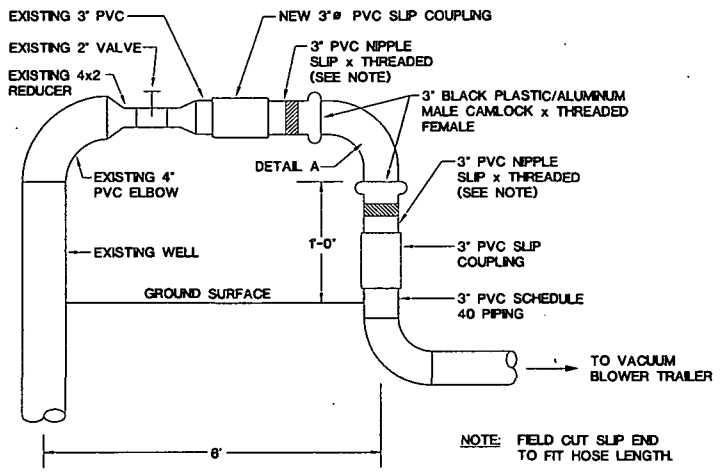
SCALE

0 200

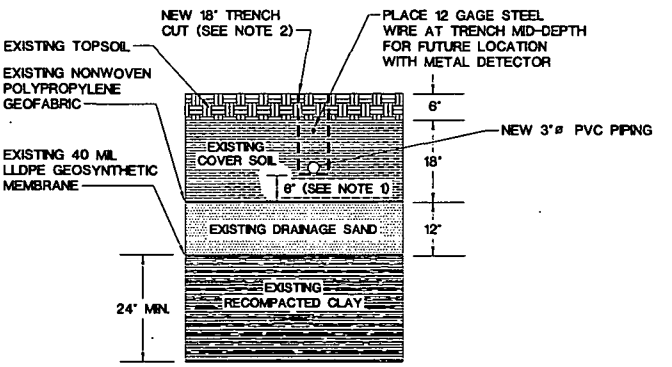
Feet

FF/NN LANDFILL RIPON, WISCONSIN	DATE: 12/21/06
	DESIGNED: DLM
EXISTING ACTIVE LANDFILL GAS EXTRACTION SYSTEM LAYOUT	CHECKED: DLM
	APPROVED: DLM
	DRAWN: HJW
	PROJ.: 1011.004
GeoTrans, Inc.	Figure 1

ATTACHMENT 4
REVISED FIGURE 2
PERMANENT WELL HEAD DETAILS



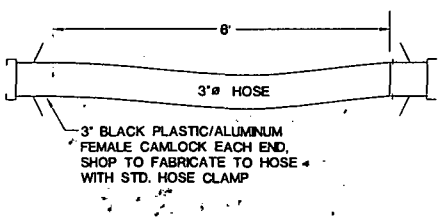
TYPICAL CONNECTION AT EXISTING WELL HEAD



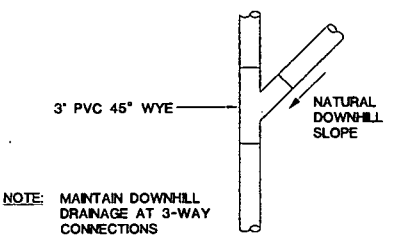
NOTES:

1. MAINTAIN 6" THICK UNDISTURBED COVER SOIL LAYER OVER EXISTING NONWOVEN POLYPROPYLENE FABRIC. SET TRENCHING MACHINE AT 18" DEEP CUT. HAND DIG AT ANY DIPS IN TOPSOIL SURFACE TO AVOID FABRIC DAMAGE.
2. AFTER PLACING NEW 3"ø PVC, FILL TRENCH WITH DISTURBED SOILS AND COMPACT EACH 9" LIFT WITH HAND TAMPER. SEED SURFACE WITH GRASS SEED AND COVER WITH MULCH.
3. IF EXISTING NON-WOVEN POLYPROPYLENE FABRIC IS DAMAGED, HAND EXCAVATE TO EXPOSE DAMAGED AREA PLUS 2 FEET IN ALL DIRECTIONS. APPLY PATCH PER MANUFACTURER'S REQUIREMENTS.

VERTICAL CROSS-SECTION FOR NEW 3" DIAMETER GAS EXTRACTION PIPING



DETAIL A



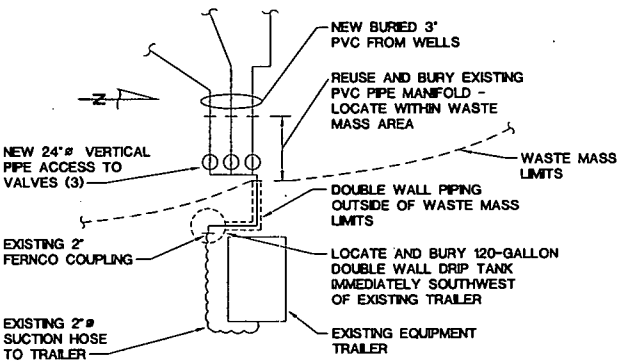
NOTE: MAINTAIN DOWNHILL DRAINAGE AT 3-WAY CONNECTIONS

PLAN TYPICAL 3-PIPE JOINT

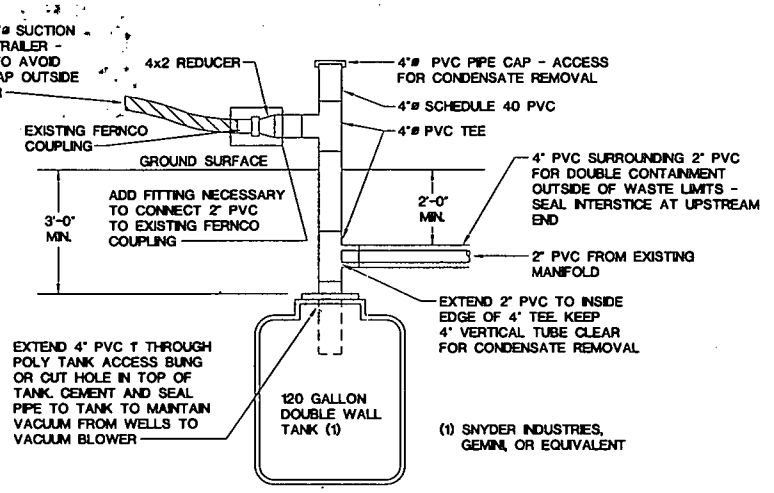
FF/NN LANDFILL RIPON, WISCONSIN	DATE: 12/21/06
	DESIGNED: DLM
2006 ACTIVE LANDFILL GAS EXTRACTION SYSTEM WINTERIZATION - WELL HEAD DETAILS	CHECKED: DLM
	APPROVED: DLM
	DRAWN: HJW
	PROJ.: 1011.004
GeoTrans, Inc.	Figure 2

S:\CAD\Ripon\1011.004\12-21-06\1011004Fig2.dwg 12/21/2006 15:29:54

ATTACHMENT 5
REVISED FIGURE 3
DRIP TANK DETAILS



DRIP TANK LOCATION PLAN



NOTE: LOCATE 120-GALLON POLY TANK AT LOW POINT OF GROUND SURFACE NEAR VACUUM BLOWER TRAILER - LOCATE FOR EASE OF CONNECTION TO EXISTING VACUUM HOSE.

120-GALLON DRIP TANK ELEVATION

FF/NN LANDFILL RIPON, WISCONSIN	DATE: 12/22/06 DESIGNED: DLM
2006 ACTIVE LANDFILL GAS EXTRACTION SYSTEM WINTERIZATION - DRIP TANK DETAILS	CHECKED: DLM APPROVED: DLM DRAWN: HJW PROJ.: 1011.004
GeoTrans, Inc.	Figure 3

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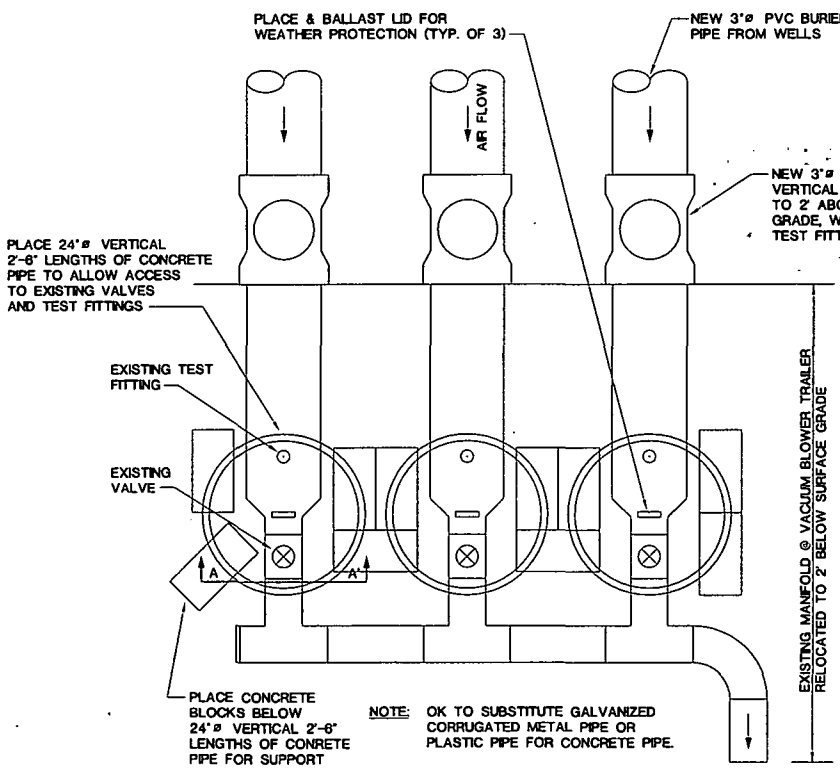
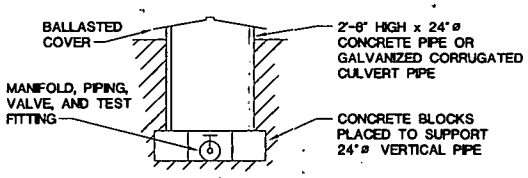
ATTACHMENT 6
FIGURE 4
MANIFOLD DETAILS



MANIFOLD RELOCATION PLAN



ELEVATION A-A'

FF/NN LANDFILL RIPON, WISCONSIN	DATE: 12/22/06
	DESIGNED: DLM
2006 ACTIVE LANDFILL GAS EXTRACTION SYSTEM WINTERIZATION - MANIFOLD DETAILS	CHECKED: DLM
	APPROVED: DLM
	DRAWN: HJW
	PROJ.: 1011.004
GeoTrans, Inc.	Figure 4

S:\CAD\Ripon\1011.004\12-21-06\1011004Fig4.dwg 12/22/2006 09:44:27

ATTACHMENT 7
SPECIFICATION REFERENCES
FOR
REPAIR OF GEOFABRIC

2.02 GEOTEXTILES

A. General Requirements

1. The geotextile shall be rot-proof, non-biodegradable and water permeable. Further it shall be resistant to mold, mildew, vermin, and normal handling abuses during construction. The fabric shall be Synthetic Industries nonwoven polypropylene 401, or equal.

2. Unless otherwise noted on the Drawings, geotextiles suppliers shall furnish materials whose "Minimum Average Roll Values", as defined by the Federal Highway Administration (FHWA), meet or exceed the criteria listed below under Geotextile Properties. The geotextiles provided by the supplier shall meet or exceed the property values specified and shall be stock products; i.e., unless authorized, the supplier shall not furnish products specially manufactured to meet the specification of this project.

3. The products shall be comprised of polymeric yarns, or fibers, or welded or drawn strands oriented into a stable network which retains its structure during handling, placement, and long-term service. Geotextiles shall be capable of withstanding direct exposure to sunlight for 30 days with no measurable deterioration.

4. During shipment and storage, the geotextiles shall be protected from ultraviolet light exposure, precipitation or other inundation, mud, dirt, dust, puncture, cutting or any other damaging or deleterious conditions.

B. Geotextile Properties: If one particular side of the geotextile is to be placed against the soil to be filtered, that side shall be so marked.

C. Labeling:

1. Geotextiles shall be supplied in rolls wrapped in relatively impermeable and opaque protective covers. Geotextile and rolls shall be marked or tagged with the following information:

   a. Manufacturer's name.
   b. Product identification.
   c. Lot number.
   d. Roll number.
   e. Roll dimensions.
   f. Date of manufacture.

2. Additionally, if any special placement is required, it shall be so marked on the geotextile itself, e.g., "This Side Up".

2.03 GEOTEXTILE PIPE WRAPS

The geotextile fabric shall consist of either knitted, woven, or nonwoven fibers of polyester, polypropylene, stabilized nylons, polyethylene or polyvinylidene chloride. Slit film woven fabrics shall not be used for this work. The fabric shall meet the following requirements.

Test	Method	Value[1]
Grab Tensile Strength (lbs)	ASTM D-4632	35 minimum
Mullen Burst (lbs/in^2)	ASTM D-3786	60 minimum
Equivalent Opening Size	Corps of Engineers CW-02215-77	30-140
Water Flow Rate (gal/min/ft^2) at 50 mm Constant Head	(2)	100 minimum

[1] All numerical values represent minimum/maximum average roll values (i.e., the average of minimum test results on any roll in a lot should meet or exceed the minimum values in the table).

[2] Water Flow Rate in gal/min/ft^2 shall be determined by multiplying Permittivity in sec^{-1} as determined by ASTM D-4491 by a conversion factor of 74.

Knitted fabrics shall be constructed from continuous yarn. Nonwoven fabrics may be needle-punched, heat-bonded, resin-bonded, or combinations thereof. Woven fabrics shall be constructed from monofilament of multifilament yarns.

Geotextile wraps of knitted construction shall form a seamless sleeve which fits tightly over the pipe. Geotextile wraps constructed from either woven or nonwoven fabric shall be tightly wrapped on the pipe and shall be securely fixed to the pipe.

The geotextile fabric rolls shall be clearly marked to identify the type of fabric.

The contractor shall furnish the engineer at the time of delivery of the geotextile fabric a manufacturer's Certificate of Compliance that the geotextile fabric as furnished meets the above requirements. Samples of the fabric for testing may be obtained from the job site as determined by the engineer.

PRODUCT DATA SHEET

GEOTEX® 401

GEOTEX 401 is a polypropylene, staple fiber, needlepunched nonwoven geotextile produced by Propex, and will meet the following Minimum Average Roll Values (MARV) when tested in accordance with the methods listed below. The fibers are needled to form a stable network that retains dimensional stability relative to each other. The geotextile is resistant to ultraviolet degradation and to biological and chemical environments normally found in soils.

GEOTEX 401 conforms to the property values listed below.[1] Propex performs internal Manufacturing Quality Control (MQC) tests that have been accredited by the Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP).

		MARV[2]	
PROPERTY	TEST METHOD	ENGLISH	METRIC
Mechanical			
Grab Tensile Strength	ASTM D-4632	115 lbs	512 N
Grab Elongation	ASTM D-4632	50%	50%
Puncture Strength	ASTM D-4833	65 lbs	289 N
Mullen Burst	ASTM D-3786	210 psi	1448 kPa
Trapezoidal Tear	ASTM D-4533	50 lbs	222 N
Endurance			
UV Resistance	ASTM D-4355	70%	70%
Hydraulic			
Apparent Opening Size (AOS)[3]	ASTM D-4751	70 US Std. Sieve	0.212 mm
Permittivity	ASTM D-4491	2.0 sec^{-1}	2.0 sec^{-1}
Water Flow Rate	ASTM D-4491	140 gpm/ft^2	5704 $l/min/m^2$
Roll Sizes		12.5 ft x 360 ft 15 ft x 360 ft	3.81 m x 109.8 m 4.57 m x 109.8 m

NOTES:
1. The property values listed above are effective 08/2006 and are subject to change without notice.
2. Values shown are in weaker principal direction. Minimum average roll values (MARV) are calculated as the typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any samples taken from quality assurance testing will exceed the value reported.
3. Maximum average roll value.

PROPEX GEOSYNTHETICS | THE ADVANTAGE CREATORS.™

Propex Inc.
6025 Lee Highway, Suite 425
PO Box 22788
Chattanooga, TN 37422

PH: 423 899 0444
PH: 800 621 1273
FAX: 423 899 7619
www.geotextile.com

SECTION 02 66 00.02 [02142]

GEOTEXTILE FOR GAS COLLECTION AND VENTING SYSTEM

This guide specification has been prepared by Propex Inc. to assist design professionals in the preparation of a specification section covering nonwoven geotextiles in waste containment applications for gas collection and venting. It may be used as the basis for developing either a project specification or an office master specification. Since it has been prepared according to the principles established in the Manual of Practice published by The Construction Specifications Institute (CSI) including the use of section numbers and titles from the 2004 Edition of MasterFormat, this guide specification may be used in conjunction with most commercially available master specifications sections with minor editing.

The following should be noted in using this guide specification:

•Optional text requiring a selection by the user is enclosed within brackets, e.g.: "Section [01 33 00] [_____]."

•Items requiring user input are enclosed within brackets, e.g.: "Section [_____ - _____]."

•Optional paragraphs are separated by an "OR" statement, e.g.:

***** OR *****

This guide specification is available in both hard copy and a variety of electronic formats to suit most popular word processing programs and operating platforms. Please contact Propex Inc. at (800) 621-1273 for additional copies or for information on available electronic formats.

1 GENERAL

1.1 SECTION INCLUDES

A. Geotextile in landfill gas collection and venting system.

1.2 RELATED SECTIONS

Edit the following paragraphs to coordinate with other sections of the Project Manual.

A. Section [31 20 00 – Earth Moving] [_____ - _____].

1.3 UNIT PRICES

Include the following article only for unit price contracts or lump sum contract with unit price adjustments. Delete for lump sum contracts.

A. Method of Measurement: By the square meter (or square yard - as indicated in contract documents) including seams, overlaps, and wastage.

B. Basis of Payment: By the square meter (or square yard - as indicated in contract documents) installed.

1.4 REFERENCES

The following article assumes that the date of each reference standard will be the latest edition as of the date of the project specification. This provision must be defined in Division 1; coordinate with Division 1 statements.

A. AASHTO Test Standards:

1. T 88 – Standard Test Method for Particle Size Analysis of Soils
2. T 90 – Standard Test Method for Determining the Plastic Limit and Plasticity Index of Soils
3. T 99 – Standard Practice for Determination of the Moisture Density Relations of Soils Using a 5.5 lb hammer and 12 in drop (Standard Proctor)

B. American Society for Testing and Materials (ASTM):

1. D 123 – Standard Terminology Relating to Geotextiles
2. D 276 – Standard Test Method for Identification of Fibers in Textiles
3. D 3786 - Standard Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics.
4. D 4354 - Practice for Sampling of Geosynthetics for Testing.
5. D 4355 - Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
6. D 4439 - Terminology for Geotextiles.
7. D 4491 - Test Methods for Water Permeability of Geotextiles by Permittivity.
8. D 4533 - Test Method for Index Trapezoid Tearing Strength of Geotextiles.
9. D 4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles.
10. D 4751 - Test Method for Determining Apparent Opening Size of a Geotextile.
11. D 4759 - Practice for Determining the Specification Conformance of Geosynthetics.
12. D 4833 - Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
13. D 4873 - Guide for Identification, Storage, and Handling of Geotextiles.
14. D 5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.

C. Environmental Protection Agency (EPA) -Technical Guidance Document, Quality Assurance and Quality Control for Waste Containment Facilities.

D. Geosynthetic Accreditation Institute - Laboratory Accreditation Program (GAI-LAP).

1.5 DEFINITIONS

A. Minimum Average Roll Value (MARV): Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.

B. Maximum Average Roll Value (MaxARV): Property value calculated as typical plus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will be below the value reported.

C. Typical Roll Value: Property value calculated from average or mean obtained from test data.

1.6 SUBMITTALS

Edit the following to coordinate with Division 1.

A. Submit under provisions of Section [01 33 00] [_____]:

1. Certification:

a) The Contractor shall provide the Engineer a certificate stating the name of the geotextile manufacturer, product name, style, chemical compositions of filaments or yarns and other pertinent information to fully describe the geotextile.

b) The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.

c) The manufacturer's certificate shall state that the furnished geotextile meets MARV requirements of the specification as evaluated under the manufacturer's quality control program. A person having legal authority to bind the Manufacturer shall attest to the certificate.

2. Manufacturing Quality Control (MQC) test results shall be provided upon request.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Geotextile labeling, shipment and storage shall follow ASTM D 4873.

B. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.

D. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.

E. The protective wrapping shall be maintained during periods of shipment and storage. If the wrapping is damaged prior to installation, the outer wrap of geotextile material must be discarded before installation.

F. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: Site construction damage, extended exposure to ultraviolet (UV) radiation, precipitation, chemicals that are strong acids or strong bases, flames, sparks, temperatures in excess of 71 deg C (160 deg F) and any other environmental condition that might damage the geotextile.

1.8 QUALITY ASSURANCE SAMPLING, TESTING, AND ACCEPTANCE

A. Geotextile:

1. Geotextiles shall be subject to sampling and testing to verify conformance with this specification. Sampling for testing shall be in accordance with ASTM D 4354.

2. Acceptance shall be in accordance with ASTM D 4759 based on testing of either conformance samples obtained using Procedure A of ASTM D 4354, or based on manufacturer's certifications and testing of quality control samples obtained using Procedure B of ASTM D 4354.

B. Sewn Seams (if required):

1. For seams that are to be sewn in the field, the Contractor shall provide at least a 2 meter (6 ft) length of sewn seam for sampling by the Engineer before the geotextile is installed.

2. For seams that are sewn in the factory, the Engineer shall obtain samples of the factory seams at random from and roll of geotextile that is to be used on the project.

3. If seams are to be sewn in both directions, samples of seams from both directions shall be provided.

4. For seams that are field sewn, the seams sewn for sampling shall be sewn using the same equipment and procedures as will be used for the production seams.

5. The seam assembly description shall be submitted by the Contractor along with the sample of the seam. The description shall include the seam type, sewing thread, and stitch density.

2 PRODUCTS

2.1 MANUFACTURERS

A. Propex Inc., Chattanooga, Tennessee, 37422 USA, Phone (800) 621-1273.

Edit the following to coordinate with Division 1.

B. Substitutions: Under provisions of Section [01 25 00] [_____].

2.2 MATERIALS

A. Geotextile:

1. Polypropylene, staple fiber, needlepunched nonwoven, heat set on one side to assure consistent roll width and rollout.

2. Resistant to ultraviolet degradation and to biological and chemical environments normally found in soils.

Include the following for Type I (GEOTEX® 861) geotextile. Use Type I where it is being used as separator/filter for granular gas collection/transmission media.

3. Minimum Average Roll Values:

Property	Test Method	Units	Property Requirement
Mass Per Unit Area	ASTM D 5261	g/sm (oz/sy)	271 (8.0)
Grab Tensile Strength	ASTM D 4632	N (lbs)	979 (220)
Grab Elongation	ASTM D 4632	percent	50
Puncture Strength	ASTM D 4833	N (lbs)	601 (135)
Mullen Burst	ASTM D 3786	kPa (psi)	2895 (420)
Trapezoidal Tear	ASTM D 4533	N (lbs)	423 (95)
Apparent Opening Size (Maximum Average Roll Value)	ASTM D 4751	mm (US Std. Sieve)	0.180 (80)
Permittivity	ASTM D 4491	sec-1	1.5

Permeability	ASTM D 4491	cm/sec	0.38
Water Flow Rate	ASTM D 4491	l/min/m (gpm/ft^2)	4482 (110)
UV Resistance	ASTM D 4355	percent	70 at 500 hrs

**** OR ****

Include the following for Type II (GEOTEX® 1291) geotextile. Use Type II where the geotextile is being used as a gas transmission media and moderate potential for clogging exists. Although Propex Inc. will make representative gas transmissivity test results available for the information of the designer, site- specific gas transmissivity testing should be performed to verify that the geotextile will convey the design volume of gas at the design overburden pressure with a reasonable factor of safety for uncertainties.

4. Minimum Average Roll Values:

Property	**Test Method**	**Units**	**Property Requirement**
Mass Per Unit Area	ASTM D 5261	g/sm (oz/sy)	407 (12.0)
Thickness	ASTM D 5199	mm (mils)	2.9 (115)
Grab Tensile Strength	ASTM D 4632	N (lbs)	1424 (320)
Grab Elongation	ASTM D 4632	percent	50
Puncture Strength	ASTM D 4833	N (lbs)	934 (210)
Mullen Burst	ASTM D 3786	kPa (psi)	4274 (620)
Trapezoidal Tear	ASTM D 4533	N (lbs)	556 (125)
Apparent Opening Size (Maximum Average Roll Value)	ASTM D 4751	mm (US Std. Sieve)	0.150 (100)
Permittivity	ASTM D 4491	sec-1	0.8
Permeability	ASTM D 4491	cm/sec	0.29
Water Flow Rate	ASTM D 4491	l/min/m^2 (gpm/ft^2)	2445 (60)
UV Resistance	ASTM D 4355	percent	70 at 500 hrs

**** OR ****

Include the following for Type III (GEOTEX® 1701) geotextile. Use Type III where the geotextile is being used as a gas transmission media and a high potential for clogging exists. Although Propex Inc. will make representative gas transmissivity test results available for the information of the designer, site- specific gas transmissivity testing should be performed to verify that the geotextile will convey the design volume of gas at the design overburden pressure with a reasonable factor of safety for uncertainties.

5. Minimum Average Roll Values:

Property	Test Method	Units	Property Requirement
Mass Per Unit Area	ASTM D 5261	g/sm (oz/sy)	542 (16.0)
Thickness	ASTM D 5199	mm (mils)	4.2 (165)
Grab Tensile Strength	ASTM D 4632	N (lbs)	1736 (390)
Grab Elongation	ASTM D 4632	percent	50
Puncture Strength	ASTM D 4833	N (lbs)	1112 (250)
Mullen Burst	ASTM D 3786	kPa (psi)	5515 (800)
Trapezoidal Tear	ASTM D 4533	N (lbs)	690 (155)
Apparent Opening Size (Maximum Average Roll Value)	ASTM D 4751	mm (US Std. Sieve)	0.150 (100)
Permittivity	ASTM D 4491	Sec-1	0.7
Permeability	ASTM D 4491	cm/sec	0.27
Water Flow Rate	ASTM D 4491	l/min/m^2 (gpm/ft^2)	2037 (50)
UV Resistance @ 500 hrs	ASTM D 4355	percent	70 at 500 hrs

6. Quality Control

a) Manufacturing Quality Control: Testing shall be performed at a laboratory accredited by GAI-LAP for tests required for the geotextile, at frequency exceeding ASTM D 4354

B. Sewing Thread (if required)

1. Sewing thread shall consist of high strength polypropylene or polyester (Nylon shall not be used).

2. The thread shall be of a contrasting color to the geotextile.

3 EXECUTION

3.1 PREPARATION

A. Prepare surfaces to receive geotextile to smooth condition as indicated or as directed by Architect/Engineer.

B. Fill depressions; remove debris and obstructions that could damage the geotextile.

3.2 INSTALLATION

A. Install geotextile at elevation and alignment as indicated in the Plans or as directed by Engineer.

B. Install geotextile in accordance with EPA Technical Guidance Document.

C. Protect underlying layers upon which geotextile will be placed.

D. If substrate is soil, use equipment selected to minimize rutting should. Excess rutting will be defined and quantified by the Architect/Engineer.

E. Prevent entrapment of stones, excessive dust, and moisture within and beneath geotextile that could damage geomembrane, causing clogging of drains or filters, or hampers subsequent seaming.

F. On side slopes, anchor geotextile at top, then unroll to prevent wrinkles and folds.

G. Cut geotextile using upward cutting hook blade.

H. Use lightweight woven geotextile between nonwoven geotextile and textured geomembrane to prevent sticking. Remove after positioning geotextile.

I. Use sandbags or equivalent to provide resistance against wind uplift.

3.3 PROTECTION

A. Atmospheric exposure of the geotextile to the elements following laydown shall be limited to 14 days to prevent damage.

B. Vehicles and construction equipment shall not be operated directly over installed geosynthetics without approval of the Engineer.

END OF SECTION