



March 23, 2011

Mr. Ming Chao
Environmental Engineer II
NCDENR-DWM-Solid Waste Section
401 Oberlin Road, Suite 150
Raleigh, North Carolina 27605

Permit No.	Date	Document ID No.
33-01	March 28, 2011	13393

RECEIVED
March 25, 2011 via a mail
Solid Waste Section
Raleigh Central Office

Reference: Request for Approval to Construct a Landfill Gas Collection and Control System
Edgecombe County Landfill (Permit No. 33-01)
Tarboro, North Carolina
S&ME Project No. 1054-07-240F

Dear Mr. Chao:

On behalf of Edgecombe County, S&ME, Inc. (S&ME) is submitting a request for approval to construct an active landfill gas collection and control system (LFGCCS) at the Edgecombe County Landfill near Tarboro, North Carolina. Enclosed, please find the system design of the active LFGCCS.

Projected LFG flow rates are based on U.S. EPA LandGEM modeling software results and the results of the LFG pilot test conducted by S&ME personnel in October 2008.

BACKGROUND

Edgecombe County currently operates a construction and demolition (C&D) landfill (Permit No. 33-01) on top of a closed municipal solid waste (MSW) landfill on a tract of land located off of State Road 1601 (2872 Colonial Road) in Edgecombe County, south of Tarboro, North Carolina (**Figure 1**).

The existing LFG system is located in the western and central portion of the landfill and includes 60 passive LFG vents. These vents consist of perforated 6-inch diameter high density polyethylene (HDPE) pipe surrounded by gravel. Twelve (12) of the existing vents (V-1 thru V-9 and V-43 thru V-45) were extended above the ground surface with perforated HDPE pipe to accommodate an additional lift of C&D waste. Five (5) of the existing vents (V-46 thru V-49 and V-60) were extended using perforated schedule 40 PVC pipe surrounded by gravel topped with solid 6-inch diameter HDPE pipe to accommodate an additional lift of waste. The remaining 28 vents extend approximately 2 to 3 feet above the ground surface with solid HDPE pipe and elbows in a "candy cane" configuration.

LFGCC SYSTEM DESIGN

The LFGCCS has been designed under the assumption that LFG will be captured and combusted with a flare system. Once the flare system is installed and actual LFG flow

rates have been quantified, the County may consider other options for beneficial-use of the LFG. The design and construction of the active LFG extraction system will take place in three phases. To reduce installation costs and increase flexibility of the system, above ground piping will be utilized. The main components of each of the three phases are as follows:

- **Phase I** includes 16 existing passive vents connected to the system, above grade lateral and header pipes with valves and blind flanges, condensate sumps, above grade air and condensate lines, an 800 SCFM open flare, and a 5,000-gallon condensate tank. This phase will produce an estimated average total LFG flow rate of ~160 standard cubic feet per minute (scfm).
- **Phase II** includes installing eight (8) new vertical extraction wells and connecting them to the system constructed in Phase I. The estimated average total flow from Phase I and Phase II combined (24 wells) is ~240 scfm.
- **Phase III** includes connecting an additional 12 existing vents to the system and making the header pipe a closed loop. The estimated average total flow from all three phases combined (36 wells) is ~360 scfm.

The estimated average total flow is the LFG flow expected after the active LFG extraction system has operated for several months. The LFGCCS system design layouts are presented in **Figures 2 through 4**.

The flare system that is installed with Phase I will be used for all three phases; will include two fan blowers; and will have the ability to operate in the 100 to 400 scfm range. The flare will have flare tips that can be changed if the flow exceeds 400 scfm. The recommended system design includes a digital/paper chart recorder, a flow meter, and a self-calibrating methane analyzer. The flare system is depicted in **Figure 5**.

The new vertical LFG extraction wells installed as part of Phase II will collect LFG from both the MSW waste and the C&D waste. The wells will extend from the ground surface to approximately 10 feet above the bottom of the landfill (see detail on **Figure 5**). As C&D waste placement operations continue, existing wells will be extended to collect LFG from both the MSW and the C&D waste.

All unused, existing vents will be capped and the surface repaired to prevent “short circuiting” of the active LFG extraction system. Five existing vents (V-46 through V-49 and V-60) have been extended using PVC piping in anticipation of another lift of C&D waste. To prevent “short circuiting” of these vents, the PVC extensions will be removed and replaced with HDPE pipe welded into place.

We estimate that the LFG extraction system will generate approximately 35 gallons per day of condensate per 100 scfm of LFG flow (approximately 3,780 gallons per month at 360 scfm). The 5,000 gallon condensate tank will provide more than one month of condensate storage at the LFG flow rate of 360 scfm estimated for the Phase III design.

The actual production rate of condensate is based on the LFG flow rate and the amount of water in the waste. The higher the LFG flow rate and the higher the water content, the more condensate is produced.

Pumping liquids from gas wells may dramatically increase the amount of LFG collected. Based on the depth-to-water readings and LFG flows during the pump testing, S&ME does not propose to install downwell pumps in the existing passive vents at this time. However, they may be needed in the future. The pumps can be added any time during or following installation of the LFG system, as necessary. S&ME personnel will observe subsurface conditions during installation of the eight new vertical extraction wells included as part of the Phase II design. If significant water is observed in these wells, downwell pumps may be recommended. This may increase the total amount of liquids that would need to be managed.

The County will follow typical bid procedure to procure the necessary equipment and construction services associated with the LFGCCS. S&ME personnel will perform site visits during the system installation as part of the construction quality assurance (CQA) to insure that the system is installed according to the plans and specifications. Following completion of the LFGCCS installation and construction observations, S&ME will prepare record drawings of the LFGCCS as it was installed.

CLOSING

If there are any questions regarding our request for approval to construct the LFGCCS at the Edgecombe County Landfill please call us at (919) 872-2660 at your earliest convenience.

Sincerely,

S&ME, Inc.


Whit Rawls, P.E.
Project Engineer

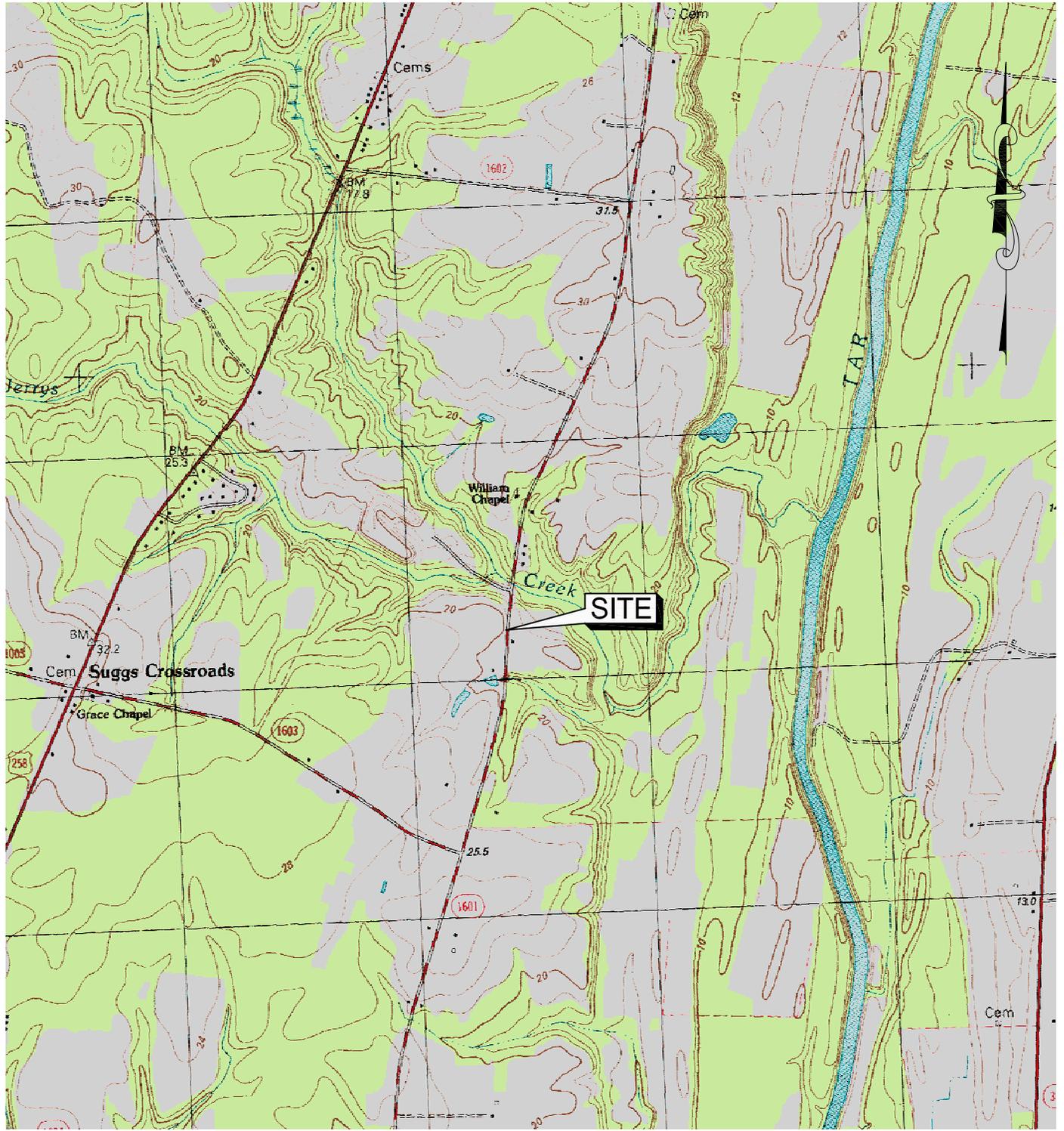

Samuel P. Watts, P.G.
Senior Project Manager

Attachments:

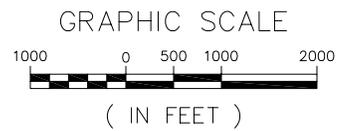
- Figure 1: Site Vicinity Map
- Figure 2: Phase I - LFGCCS Design Layout
- Figure 3: Phase II – LFGCCS Design Layout
- Figure 4: Phase III – LFGCCS Design Layout
- Figure 5: LFGCCS Details

cc: Mr. Lorenzo Carmon – Edgecombe County Manager
Mr. Mike Cummings – Edgecombe County Solid Waste Manager

S:\PROJECTS\2007\07-240F Edgemombe - On-Call Svcs 2010-2011\CAD\A2232.dwg, FIG1, 3/23/2011 2:50:07 PM, 1:1



SITE



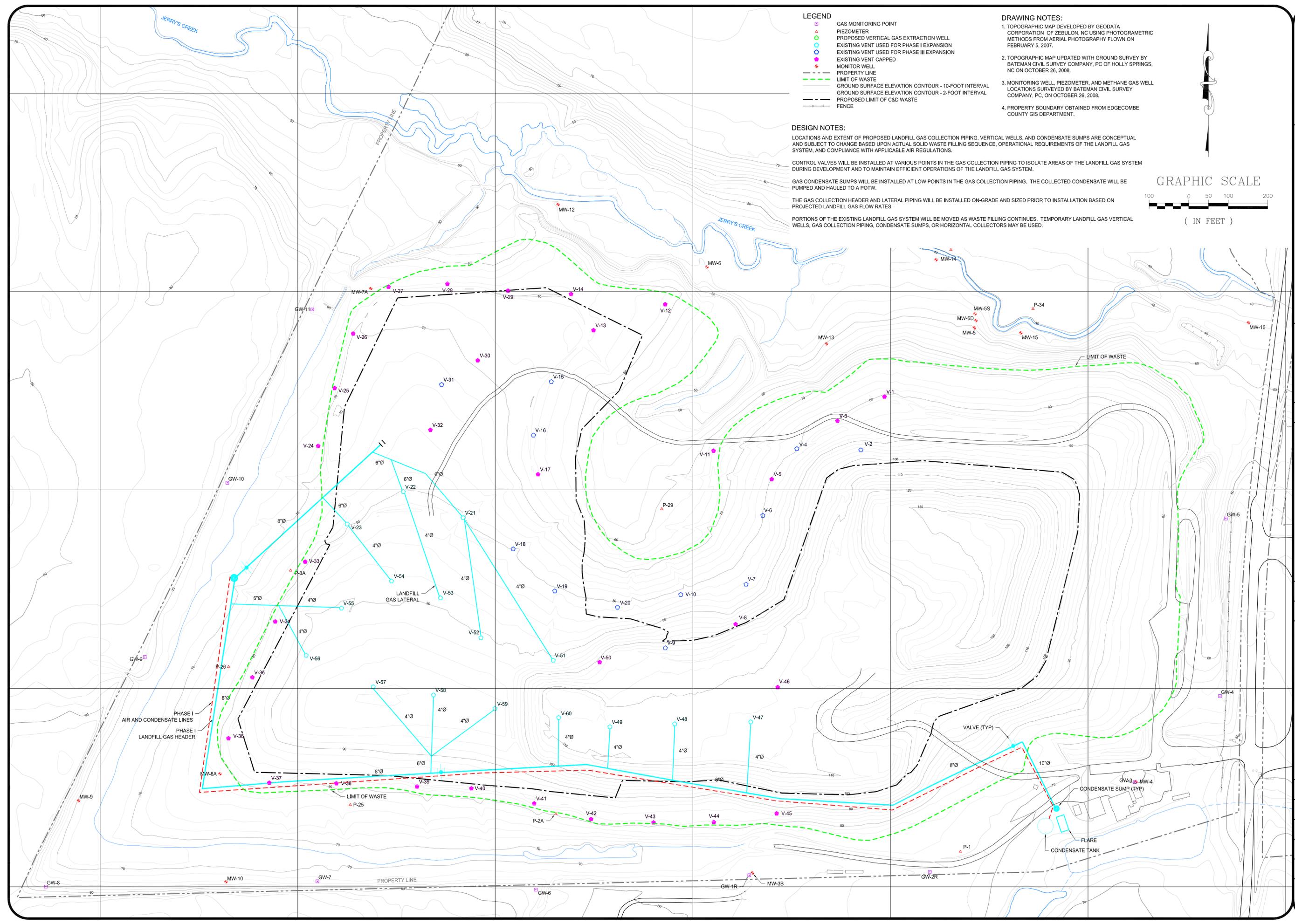
TOPO SOURCE: NCGS DRG
OLD SPARTA NC, DATED 1981
CONTOUR INTERVAL: 2 METERS

SCALE: 1" = 2,000'
DATE: MARCH 2011
DRAWN BY:
PROJECT NO:
1054-07-240F

S&ME
WWW.SMEINC.COM
NC ENGINEER LICENSE #F-0176
3201 SPRING FOREST RD, RALEIGH, NC 27616

VICINITY MAP
EDGECOMBE COUNTY LANDFILL
TARBORO, NORTH CAROLINA

A-2232
FIGURE NO.
1



- LEGEND**
- ▲ GAS MONITORING POINT
 - PIEZOMETER
 - PROPOSED VERTICAL GAS EXTRACTION WELL
 - EXISTING VENT USED FOR PHASE I EXPANSION
 - EXISTING VENT USED FOR PHASE III EXPANSION
 - EXISTING VENT CAPPED
 - MONITOR WELL
 - PROPERTY LINE
 - - - - - LIMIT OF WASTE
 - GROUND SURFACE ELEVATION CONTOUR - 10-FOOT INTERVAL
 - GROUND SURFACE ELEVATION CONTOUR - 2-FOOT INTERVAL
 - PROPOSED LIMIT OF C&D WASTE
 - FENCE

- DRAWING NOTES:**
1. TOPOGRAPHIC MAP DEVELOPED BY GEODATA CORPORATION OF ZEBULON, NC USING PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY FLOWN ON FEBRUARY 5, 2007.
 2. TOPOGRAPHIC MAP UPDATED WITH GROUND SURVEY BY BATEMAN CIVIL SURVEY COMPANY, PC OF HOLLY SPRINGS, NC ON OCTOBER 26, 2008.
 3. MONITORING WELL, PIEZOMETER, AND METHANE GAS WELL LOCATIONS SURVEYED BY BATEMAN CIVIL SURVEY COMPANY, PC, ON OCTOBER 26, 2008.
 4. PROPERTY BOUNDARY OBTAINED FROM EDGEcombe COUNTY GIS DEPARTMENT.

DESIGN NOTES:

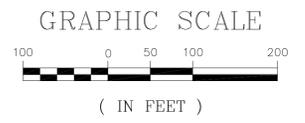
LOCATIONS AND EXTENT OF PROPOSED LANDFILL GAS COLLECTION PIPING, VERTICAL WELLS, AND CONDENSATE SUMPS ARE CONCEPTUAL AND SUBJECT TO CHANGE BASED UPON ACTUAL SOLID WASTE FILLING SEQUENCE, OPERATIONAL REQUIREMENTS OF THE LANDFILL GAS SYSTEM, AND COMPLIANCE WITH APPLICABLE AIR REGULATIONS.

CONTROL VALVES WILL BE INSTALLED AT VARIOUS POINTS IN THE GAS COLLECTION PIPING TO ISOLATE AREAS OF THE LANDFILL GAS SYSTEM DURING DEVELOPMENT AND TO MAINTAIN EFFICIENT OPERATIONS OF THE LANDFILL GAS SYSTEM.

GAS CONDENSATE SUMPS WILL BE INSTALLED AT LOW POINTS IN THE GAS COLLECTION PIPING. THE COLLECTED CONDENSATE WILL BE PUMPED AND HAULED TO A POTW.

THE GAS COLLECTION HEADER AND LATERAL PIPING WILL BE INSTALLED ON-GRADE AND SIZED PRIOR TO INSTALLATION BASED ON PROJECTED LANDFILL GAS FLOW RATES.

PORTIONS OF THE EXISTING LANDFILL GAS SYSTEM WILL BE MOVED AS WASTE FILLING CONTINUES. TEMPORARY LANDFILL GAS VERTICAL WELLS, GAS COLLECTION PIPING, CONDENSATE SUMPS, OR HORIZONTAL COLLECTORS MAY BE USED.



S&ME
 WWW.SMEINC.COM
 NC ENG. LICENSE #E-0176 PHONE: (919) 872-2660
 3201 SPRING FOREST ROAD, RALEIGH, NC 27616

NO.	DATE	DESCRIPTION	BY

PRELIMINARY PHASE I
 GAS EXTRACTION SYSTEM DESIGN
PRELIMINARY
 EDGEcombe COUNTY LANDFILL
 TARBORO, NORTH CAROLINA

DRAWN BY: BTR
 CHECKED BY:
 DESIGNED BY:
 APPROVED BY:

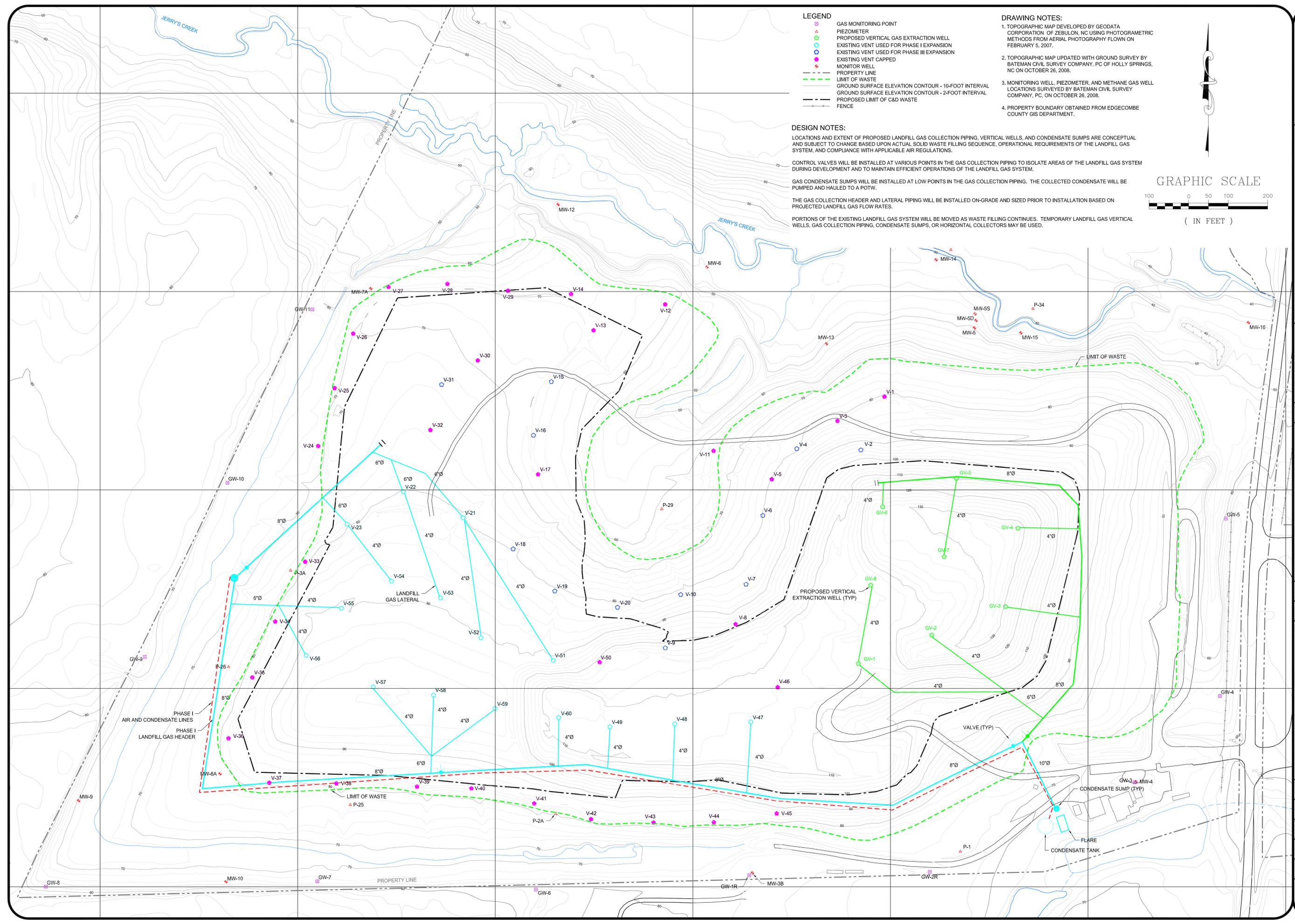
PROJECT NUMBER:
 1054-07-240F

SCALE: 1" = 100'
 DATE: MARCH 2011

DRAWING NUMBER:
 D-1210-01

DRAWINGS: 2 OF 5

S:\PROJECTS\1054-07-240F Edgecombe - On Call Services 2010\1210\1210.dwg, D:\1210_1210.dwg, 1/28/2011 3:28:21 PM, 1:1



- LEGEND**
- ▲ GAS MONITORING POINT
 - PIEZOMETER
 - PROPOSED VERTICAL GAS EXTRACTION WELL
 - EXISTING VENT USED FOR PHASE I EXPANSION
 - EXISTING VENT USED FOR PHASE III EXPANSION
 - EXISTING VENT CAPPED
 - MONITOR WELL
 - PROPERTY LINE
 - LIMIT OF WASTE
 - GROUND SURFACE ELEVATION CONTOUR - 10-FOOT INTERVAL
 - GROUND SURFACE ELEVATION CONTOUR - 2-FOOT INTERVAL
 - PROPOSED LIMIT OF C&D WASTE
 - FENCE

- DRAWING NOTES:**
1. TOPOGRAPHIC MAP DEVELOPED BY GEODATA CORPORATION OF ZEBULON, NC USING PHOTOGRAMETRIC METHODS FROM AERIAL PHOTOGRAPHY FLOWN ON FEBRUARY 5, 2007.
 2. TOPOGRAPHIC MAP UPDATED WITH GROUND SURVEY BY BATEMAN CIVIL SURVEY COMPANY, PC OF HOLLY SPRINGS, NC ON OCTOBER 26, 2008.
 3. MONITORING WELL, PIEZOMETER, AND METHANE GAS WELL LOCATIONS SURVEYED BY BATEMAN CIVIL SURVEY COMPANY, PC, ON OCTOBER 26, 2008.
 4. PROPERTY BOUNDARY OBTAINED FROM EDGEcombe COUNTY GIS DEPARTMENT.

DESIGN NOTES:

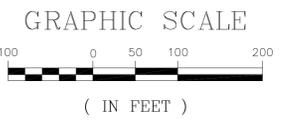
LOCATIONS AND EXTENT OF PROPOSED LANDFILL GAS COLLECTION PIPING, VERTICAL WELLS, AND CONDENSATE SUMPS ARE CONCEPTUAL AND SUBJECT TO CHANGE BASED UPON ACTUAL SOLID WASTE FILLING SEQUENCE, OPERATIONAL REQUIREMENTS OF THE LANDFILL GAS SYSTEM, AND COMPLIANCE WITH APPLICABLE AIR REGULATIONS.

CONTROL VALVES WILL BE INSTALLED AT VARIOUS POINTS IN THE GAS COLLECTION PIPING TO ISOLATE AREAS OF THE LANDFILL GAS SYSTEM DURING DEVELOPMENT AND TO MAINTAIN EFFICIENT OPERATIONS OF THE LANDFILL GAS SYSTEM.

GAS CONDENSATE SUMPS WILL BE INSTALLED AT LOW POINTS IN THE GAS COLLECTION PIPING. THE COLLECTED CONDENSATE WILL BE PUMPED AND HAULED TO A POTW.

THE GAS COLLECTION HEADER AND LATERAL PIPING WILL BE INSTALLED ON-GRADE AND SIZED PRIOR TO INSTALLATION BASED ON PROJECTED LANDFILL GAS FLOW RATES.

PORTIONS OF THE EXISTING LANDFILL GAS SYSTEM WILL BE MOVED AS WASTE FILLING CONTINUES. TEMPORARY LANDFILL GAS VERTICAL WELLS, GAS COLLECTION PIPING, CONDENSATE SUMPS, OR HORIZONTAL COLLECTORS MAY BE USED.



S&ME
 WWW.SMEINC.COM
 NC ENG. LICENSE #E-0176 PHONE: (919) 872-2660
 3201 SPRING FOREST ROAD, RALEIGH, NC 27616

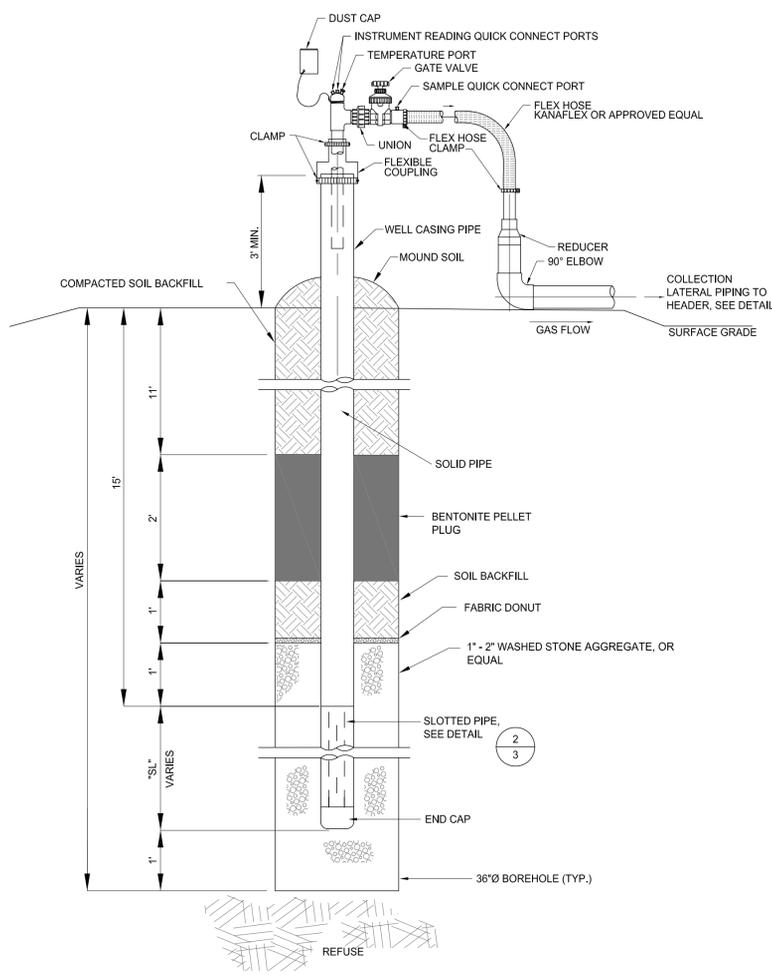
NO.	DATE	DESCRIPTION	BY

PRELIMINARY PHASE I AND II
 GAS EXTRACTION SYSTEM DESIGN
PRELIMINARY
 EDGEcombe COUNTY LANDFILL
 TARBORO, NORTH CAROLINA

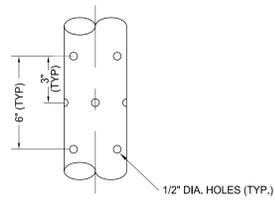
DRAWN BY: BTR CHECKED BY: _____
 DESIGNED BY: _____ APPROVED BY: _____

PROJECT NUMBER: 1054-07-240F
 SCALE: 1" = 100' DATE: MARCH 2011
 DRAWING NUMBER: D-1210-2
 DRAWINGS: 3 OF 5

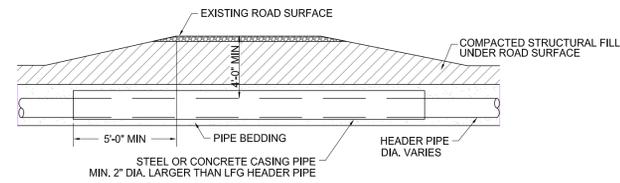
S:\PROJECT\1054-07-240F Edgecombe - On Call Services 20110311\CAD\1210.dwg, D:\1210.dwg, 2/23/2011 3:28:31 PM, 1:1



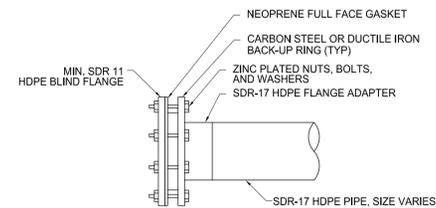
1
3 VERTICAL EXTRACTION WELL DETAIL
NOT TO SCALE



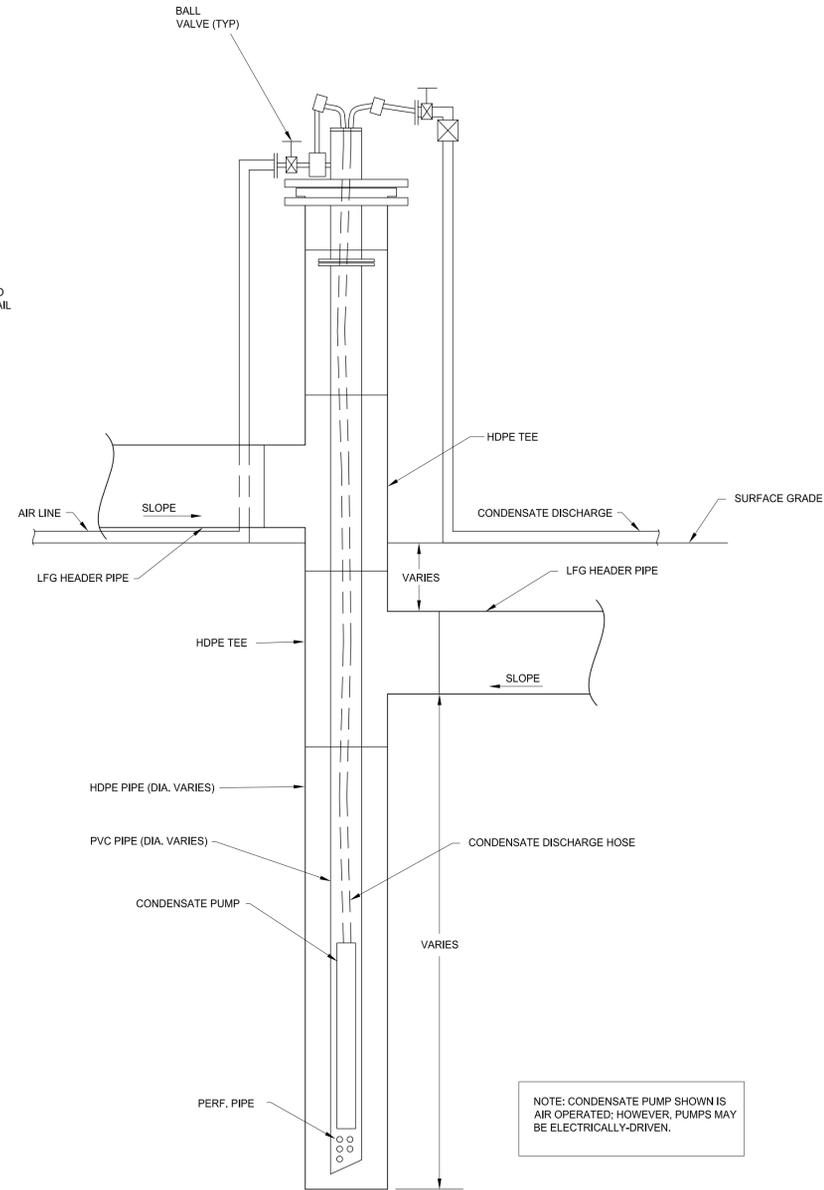
2
3 SLOTTED PIPE FOR VERTICAL WELLS DETAIL
NOT TO SCALE



4
3 ROAD CROSSING DETAIL
NOT TO SCALE

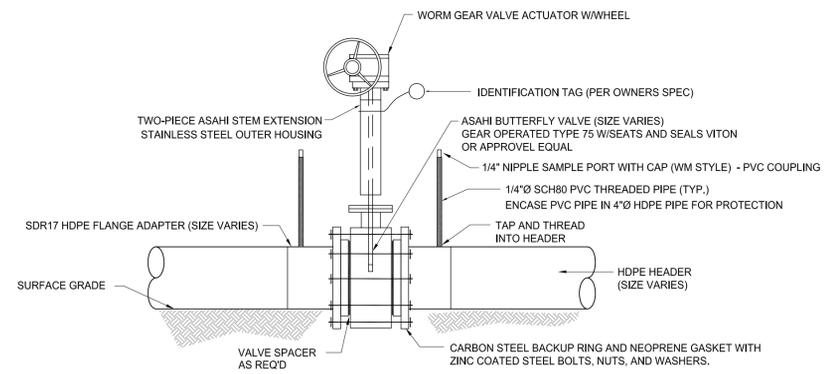


5
3 HEADER PIPE BLIND FLANGE
NOT TO SCALE

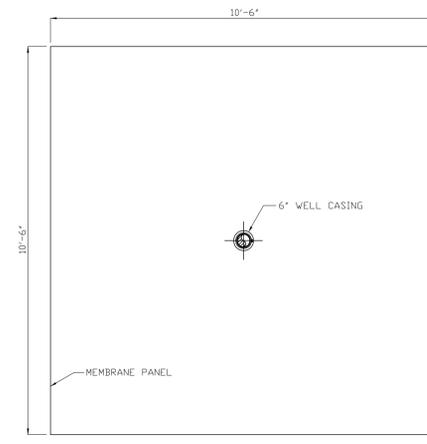


3
2 CONDENSATE SUMP DETAIL
NO SCALE

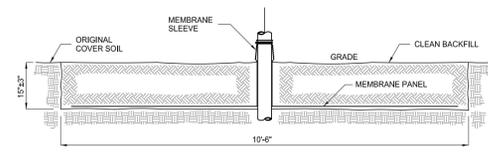
NOTE: CONDENSATE PUMP SHOWN IS AIR OPERATED; HOWEVER, PUMPS MAY BE ELECTRICALLY-DRIVEN.



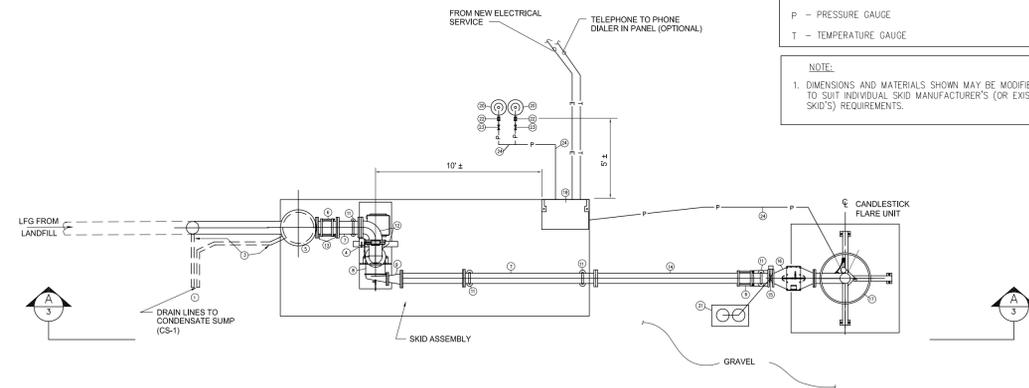
6
3 LFG COLLECTION SYSTEM BUTTERFLY VALVE DETAIL
NOT TO SCALE



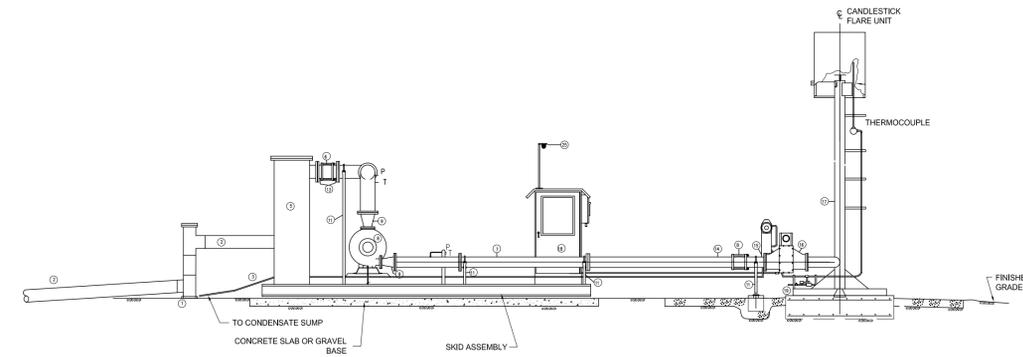
7
3 WELLBORE SEAL - TOP VIEW
NOT TO SCALE



8
3 WELLBORE SEAL - ELEVATION VIEW
NOT TO SCALE



9
3 TYPICAL BLOWER / FLARE PLAN
NOT TO SCALE



A
3 TYPICAL BLOWER / FLARE ELEVATION
NOT TO SCALE

NOTES:
1. THE BLOWER/FLARE PLAN AND ELEVATION SHOWN ARE FOR INFORMATIONAL PURPOSES ONLY. IT IS A SCHEMATIC LAYOUT AND DETAILS SHOWN HERE MAY DIFFER FROM FINAL BLOWER/FLARE SYSTEM. FINAL BLOWER/FLARE DESIGN TO BE PROVIDED BY THE MANUFACTURER OR FIELD FABRICATED BY CONTRACTOR AND APPROVED BY THE ENGINEER.
2. BLOWER/FLARE MAY BE EXISTING EQUIPMENT, DELIVERED FROM DIFFERENT SITE.
3. BLOWER/FLARE MAY BE SKID MOUNTED AS ONE ASSEMBLY, PARTIALLY SKID-MOUNTED AS DEPICTED HERE, OR MOUNTED ON A TRAILER.

- TYPICAL BLOWER LEGEND
- 1 CONDENSATE SUMP
 - 2 HDPE HEADER PIPE
 - 3 CONDENSATE DRAIN LINE
 - 4 BUTTERFLY VALVE
 - 5 FLANGED MOISTURE SEPARATOR w/ DE-MISTER PAD
 - 6 FLANGED EXPANSION JOINT
 - 7 CONNECTOR PIPE
 - 8 BLOWER/MOTOR ASSEMBLY
 - 9 FLANGED EXPANSION JOINT REDUCER
 - 10 NUMBER NOT USED
 - 11 PIPE SUPPORT
 - 12 90° FLANGED BEND
 - 13 FLANGE ADAPTER
 - 14 FLANGED PIPE
 - 15 AUTOMATIC SHUT-OFF VALVE
 - 16 FLANGED FLAME ARRESTOR
 - 17 VERTICAL CANDLESTICK FLARE UNIT w/ WINDSHIELD
 - 18 CONTROL PANEL w/SUN SHIELD
 - 19 PILOT ASSEMBLY VALVE TRAIN
 - 20 PROPANE TANKS WITH GAUGES
 - 21 NITROGEN TANKS AND BASE
 - 22 PRESSURE REGULATOR
 - 23 VALVE
 - 24 PIPE AND FITTINGS
 - 25 WEATHERPROOF LIGHT FIXTURE PROVIDED ON SKID ASSEMBLY
- P - PRESSURE GAUGE
T - TEMPERATURE GAUGE
- NOTE:
1. DIMENSIONS AND MATERIALS SHOWN MAY BE MODIFIED TO SUIT INDIVIDUAL SKID MANUFACTURER'S (OR EXISTING SKID'S) REQUIREMENTS.



NO.	DATE	DESCRIPTION	BY

LFG SYSTEM DETAILS	
PRELIMINARY	
EDGEcombe COUNTY LANDFILL TARBORO, NORTH CAROLINA	
DRAWN BY:	CHECKED BY:
DESIGNED BY:	APPROVED BY:
PROJECT NUMBER:	1054-07-240F
SCALE:	DATE:
NTS	MARCH 2011
DRAWING NUMBER:	D-1211
DRAWING:	OF:
5	5

**NOT FOR CONSTRUCTION
FOR DISCUSSION PURPOSES ONLY**

Chao, Ming-tai

From: Samuel Watts [SWatts@smeinc.com]
Sent: Thursday, March 24, 2011 10:58 AM
To: Chao, Ming-tai
Cc: Whit Rawls; Mussler, Ed
Subject: Edgecombe County Landfill - Request for Approval to Construct a Gas Collection System
Attachments: Request for Permit to Construct_1054-07-240F_03162011.pdf

Hi Ming

I hope you're doing well.

On behalf of Edgecombe County, S&ME is submitting the attached request for approval to construct an active Landfill Gas Collection and Control System (LFGCCS) at the Edgecombe County Landfill located in Tarboro, North Carolina. (DWM Permit No. 33-01). The request includes a description of the proposed LFGCCS and a preliminary design of the active LFGCCS. A hard copy of the request is also being mailed to your attention.

The attached request supplements preliminary information about the active LFGCCS presented by S&ME in the facility's application for Permit to Operate, approved by DMW on March 31, 2010.

If you have any questions about the enclosed request, or need additional information, please don't hesitate to call me.

Thanks
Sam

Samuel P. Watts, PG

Senior Project Manager



ENGINEERING INTEGRITY.

S&ME, Inc.
3201 Spring Forest Road
Raleigh NC 27616
Ph: 919-872-2660
Fax: 919-876-3958
Mobile: 919-801-4920

swatts@smeinc.com

www.smeinc.com

This electronic message and its attachments are forwarded to you for convenience and "for information only." The message may represent a summary with limitations, conditions and further explanations omitted in the interest of brevity and time constraints. The contents of this electronic message and any attachments may be preliminary and incomplete, subject to review and revision. If this electronic transmittal contains Findings, Conclusions or Recommendations, S&ME, Inc. will submit a follow-up hard copy via mail or overnight delivery for your records, and this hard copy will serve as the final record. In the event of conflict between electronic and hard copy documents, the hard copy will govern. This electronic message and any attachments transmitted with it are the property of S&ME, Inc. and may contain information that is confidential or otherwise protected from disclosure. The information this electronic message contains is intended solely for the use of the one to whom it is addressed, and any other recipient should delete this electronic message and destroy all copies. VER 4, Rev 1 -- 031207