Environmental Consultants
and Contractors

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SCS ENGINEERS, PC

Permit No.	Date	Document ID No.
51-03	**February 16, 2011**	**12972**

November 30, 2010
Revised: January 26, 2011
File No. 02210301.00

RECEIVED
February 02, 2011 via an e-mail
Solid Waste Section
Raleigh Central Office

Mr. Ming Chao
North Carolina Department of Environment and Natural Resources
Division of Solid Waste
410 Oberlin Rd
Raleigh, North Carolina 27605

Subject: Solid Waste Permit Modification
Landfill Gas Collection and Control System
Johnston County MSW and C&D Landfill Facility
SW Permit #51-03
Smithfield, North Carolina

Dear Mr. Chao:

On behalf of Johnston County MSW and C&D Landfill Facility (Landfill), SCS Engineers, PC (SCS) is submitting an application for a permit modification to SW Permit #51-03. The application has been revised to reflect items contained in a comments letter from the SWS dated December 9, 2010 and a response letter from SCS dated January 14, 2011. The permit modification is for the installation of a voluntary landfill gas collection and control system (GCCS) at the Landfill. The primary purpose of the voluntary GCCS is to collect and control landfill gas (LFG). Johnston County has entered into an agreement with Blue Source to sell the greenhouse gas credits and to produce electricity from the LFG.

INTRODUCTION AND BACKGROUND

The Johnston County MSW and C&D Landfill Facility (Landfill) is located near Smithfield, North Carolina. A Request for Proposal for a Landfill Gas to Energy Project at the Johnston County Landfill was issued by the Johnston County Department of Utilities. The Development Team of Blue Source and SCS Engineers proposes to develop a landfill gas collection and control system and a beneficial use project for the LFG at the Landfill. The Development Team will finance, design, permit, build, commission, own, operate, and maintain the GCCS and plans to implement a Landfill Gas Energy system

The Landfill includes several waste disposal areas designated as Phase 1, 2, 3, 4, 4A, and 5. No GCCS construction activities are planned in Phase 1 and 2. Drilling and pipe installation will take place in Phase 3, 4A and 5. For Phase 4, no drilling is planned and pipe installation will only occur within the existing soil cover.

LANDFILL GAS COLLECTION AND CONTROL SYSTEM

The primary components of the GCCS include the following:

- Landfill gas extraction wells
- Landfill gas header and lateral piping
- Landfill gas condensate controls (sumps, air line, and force main)
- Connecting to existing passive LFG trenches and vents
- Blower flare station (blower and utility flare)
- Air compressor
- Landfill gas-fueled generator and associated landfill gas treatment and compression systems (in future)

The GCCS will be installed in portions of Phase 3, Phase 4A, Phase 4, and Phase 5. Construction Drawings for the GCCS are provided Attachment A. The remainder of this permit application describes the GCCS in more detail.

LFG Extraction Wells

LFG extraction wells will be drilled into the existing waste mass at the depths depicted on the Well Completion Schedule, Sheet 4 of 6 (Attachment A). The well depths were established following industry standards and based on our engineering judgment and experience. The bottom of the wells was set at least 15 feet above the landfill's base liner system.

To insure the wells do not penetrate the bottom liner system, as-built drawings were obtained from Johnston County and reviewed by SCS. All lined areas (Phases 4A and 5) have survey records that include the northing, easting, and elevation of the base liner system. This survey information was used to maintain a minimum distance of 15 feet above the base liner system when drilling. In areas where there is less than 30 feet of waste the minimum distance above the base liner may be shortened to 10 feet. The base of the landfill phases that do not have a synthetic base liner (Phase 3) will also be avoided by finding available survey information or assuming that the base grades are equal to the native topography outside the limit of waste. The design for a soil base liner system will again include a minimum of 15 feet from the assumed base liner.

Proposed wells have been overlaid on the surveyed baseliner system to insure that at the specific point a well will be installed the minimum buffer is present. The well locations will be surveyed by a professional surveyor prior to drilling. The survey results will be reviewed by a professional engineer and the well schedule revised if necessary.

Refer to Attachment B for SCS's CQA Guidelines for drilling LFG extraction wells. These CQA guidelines are part of a larger SCS program related to standard procedures and quality assurance.

SCS will submit the required information to the Health Hazards Control Unit (HHCU) of the Division of Public Health that addresses disturbing asbestos containing materials (ACMs). No

drilling will occur until an approval letter has been received. A copy of the notification from SCS and approval from the HHCU will be provided in the Construction Documentation Report.

All LFG extraction wells will be surveyed.

LFG Header and Lateral Piping

The GCCS will have various pipes that connect the gas wells to the flare. There will be lateral lines 4-in in diameter connected to main header pipes 8-in, 10-in, and 12-in in diameter. All piping will be HDPE SDR 17 pipe. These pipes are sized using industry standards to carry existing and projected LFG flow. A LFG projection model prepared by SCS was used to estimate expected current and future LFG collection. A pipe sizing calculation is provided in Attachment C. LFG header/lateral piping will be installed with a typical slope of 3% and a minimum slope at 1%.

Piping will be installed according to details in the attached set of construction plans. These plans illustrate the network of pipes to be installed. The details also illustrate how the piping, and other associated aspects of the GCCS will be constructed. An excavator with a two foot wide bucket will be used to dig the trenches two to three feet deep for installation of the various pipes. In areas that are closed with a synthetic liner, the trench depth will be approximately 12" to avoid damaging the synthetic liner. Also as seen in the details, the HDPE GCCS pipe will be run through corrugated metal pipe at all road crossings to protect the pipe from crushing. Refer to the drawings for additional information.

All GCCS piping will be leak tested. A copy of the leak testing protocol is provided in Attachment D.

The maximum length of trench open at one time will be limited to 1,000 feet. All trenches within the waste mass footprint will be backfilled at the end of the day.

Condensate Management

Condensate is formed within the GCCS piping network as LFG cools. Condensate is collected at the low points of the piping network in condensate sumps. Multiple condensate sumps are incorporated into the GCCS. Each condensate sump is equipped with a pneumatic pump which transfers the condensate into a force main. The locations of the sumps and force mains are illustrated on the Construction Drawings (Attachment A). Condensate is eventually transferred into the Landfill's leachate management system where it is properly disposed. Force mains not located within the waste limits will be dual-contained.

Blower/Flare Station

The blower/flare station will utilize a candlestick flare to combust the collected LFG. The Landfill has already received an Air Permit from the NC Department of Environment and Natural Resources' Division of Air Quality for the construction and operation of this system. The blowers located at the blower/flare station will be used to pull the gas from the Landfill and send it through the candlestick flare or to the planned Landfill Gas Energy Project.

The blower/flare station planned for this landfill will have a safety interlock system that will automatically shutdown the blower if no flame is present in the flare. Providing the complete system design and emergency shutdown procedures in this response would be extensive. When the blower/flare station is installed, a copy of the operation and maintenance manual, which includes emergency shut-down procedures, will be kept on-site.

The construction and operation of the flare is permitted through the NCDENR, Division of Air Quality. A copy of the Permit-to-Construct application and DAQ approvals will be included in the Construction Documentation Report.

Landfill Gas Energy Project

After the GCCS is installed and becomes operational, the Project Team plans to install a Cummins C2000 N6C Engine, or equivalent, to convert LFG into electricity. The electricity produced will them be placed on the grid. This specific engine has the capability to produce up to 2 MW of electricity. Electricity will depend on the amount of LFG that is recovered from the Landfill and collected by the GCCS.

Disposal of Excavated Waste

During drilling and pipe trenching, MSW will be generated. All MSW generated during the installation of the GCCS will be hauled to the Landfill's working face in accordance with the Landfill's operating permit.

No MSW will be left on top of the Landfill or exposed overnight. During normal operations the construction crew and the site will communicate so excavation and drilling cease for the day prior to closing the active disposal area. This will allow for proper disposal and daily cover of excavated waste.

Existing Permitted Cap

Phase 4 is the only area with a permitted cap and no drilling will take place in Phase 4. Some excavation will be required to install piping to existing LFG horizontal collectors. In areas with a synthetic cap, the LFG collection pipes will be installed above the synthetic liner within the vegetative soil layer. Excavated soils will be placed back around the installed pipe and used as backfill for the trench.

Construction Documentation Report

A construction documentation report will be prepared at the completion of the project to document the installation of the primary GCCS components. In general the report will include the following information:

- Brief descriptions of the project activities, scheduled and all involved parties.
- Descriptions of variances or deviations from the proposed plan
- Copies of approval letters and/or permit documents
- As-built drawings including survey coordinates of gas wells, valves, sumps and piping gradient.

- Well completion logs and final well completion schedule.
- Leak test results.
- QA/QC testing report for the cover restoration, if required.
- A series of color photographs to document the major project features.

The final construction documentation report will be submitted to the SWS within 30 days of system construction.

CLOSING

The installation of the GCCS will be conducted by SCS Field Services under a design-build contract between Blue Source and SCS. We anticipate the start of construction in February 2010. Following the installation of the GCCS, Johnston County will revise or update (if needed) the landfill's Operations Plan, Closure Plan, Post-Closure Plan, and financial assurance documents in accordance with the solid waste regulations.

The GCCS installation will facilitate the collection of LFG for the Green Energy Project and Carbon Credit Project. Please do not hesitate to contact either of the undersigned if you have any questions or comments at (704) 504-3107.

Sincerely,

J Morgan, PE
Senior Project Professional
SCS ENGINEERS, PC

Steven C. Lamb, PE
Vice President
SCS ENGINEERS, PC

jm/scl

cc: Rick Proctor, Johnston County Solid Waste Manager
Annika Colston, Blue Source
Matt Wells, Blue Source
Guy Lewis, SCS Field Services

Attachment A – Construction Drawings
Attachment B – SCS CQA Guidelines
Attachment C – Pipe Sizing Calculation
Attachment D – Leak Testing Guidelines

ATTACHMENT A

Construction Drawings

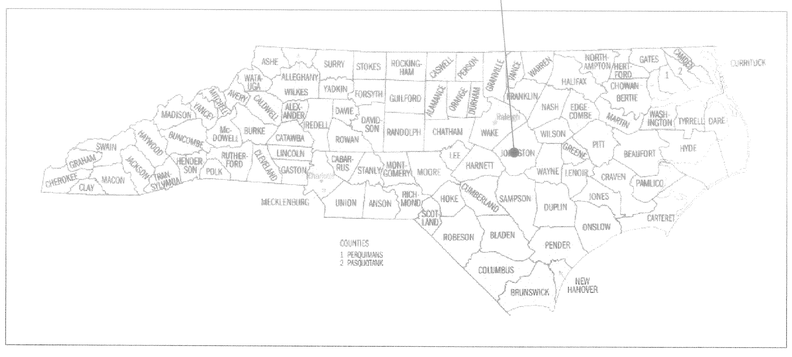
PERMIT DRAWINGS

JOHNSTON COUNTY LANDFILL
SOLID WASTE PERMIT #51-03
LANDFILL GAS PROJECT

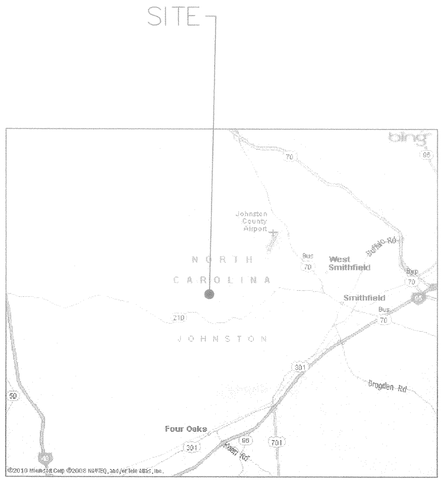
BLUE SOURCE LLC
26 W. 17TH STREET, SUITE 503
NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
(704) 504-3107

JOB NO. 02210301.00
NOVEMBER 2010



AREA MAP
SCALE: AS SHOWN



LOCATION MAP
SCALE: AS SHOWN

INDEX OF SHEETS

PERMIT DRAWINGS
DO NOT USE FOR CONSTRUCTION
DATE: 11/30/10

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 033608 JAMES LAWRENCE

NC CORP. LICENSE NO. C-1837

NO.	REVISION	DATE
1	REVISED SHEETS 3, 4, and 6	2/1/11

SHEET TITLE: TITLE SHEET
PROJECT TITLE: JOHNSTON COUNTY LANDFILL LANDFILL GAS PROJECT

CLIENT: BLUE SOURCE LLC, 26 W 17TH STREET, SUITE 503, NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO: 02210301.00
DSN. BY: JLM
DWN. BY: TAS
CHK. BY: JLM
CALC'D BY:
APP. BY: SCL

DATE: NOVEMBER 2010
SCALE: AS SHOWN
DRAWING NO. 1 of 6

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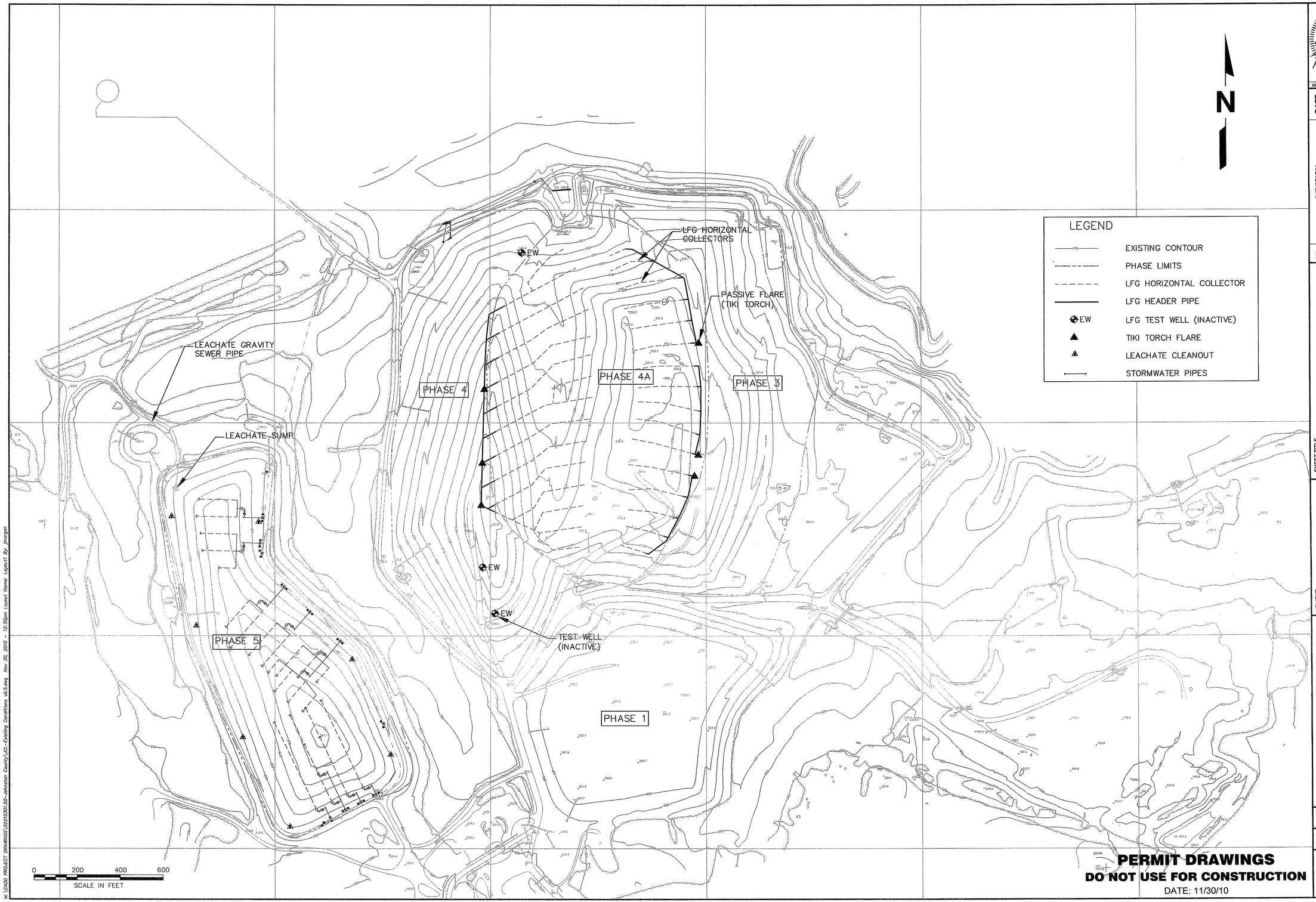

PERMIT DRAWINGS
DO NOT USE FOR CONSTRUCTION
DATE: 11/30/10

NORTH CAROLINA PROFESSIONAL SEAL 033608 ENGINEER LAWRENCE MORGAN

NORTH CAROLINA LICENSE NO. C-1837

NO.	REVISION	DATE

SHEET TITLE
EXISTING CONDITIONS

PROJECT TITLE
JOHNSTON COUNTY LANDFILL
LANDFILL GAS PROJECT

CLIENT
BLUE SOURCE LLC
26 W 17TH STREET, SUITE 504
NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02210301.00
DSN. BY: JLM
DWN. BY: TAS
CHK. BY: SCL
QA/QC BY: CL
APP. BY: CL

DATE:
NOVEMBER 2010

SCALE:
AS SHOWN

DRAWING NO.
2 of **6**

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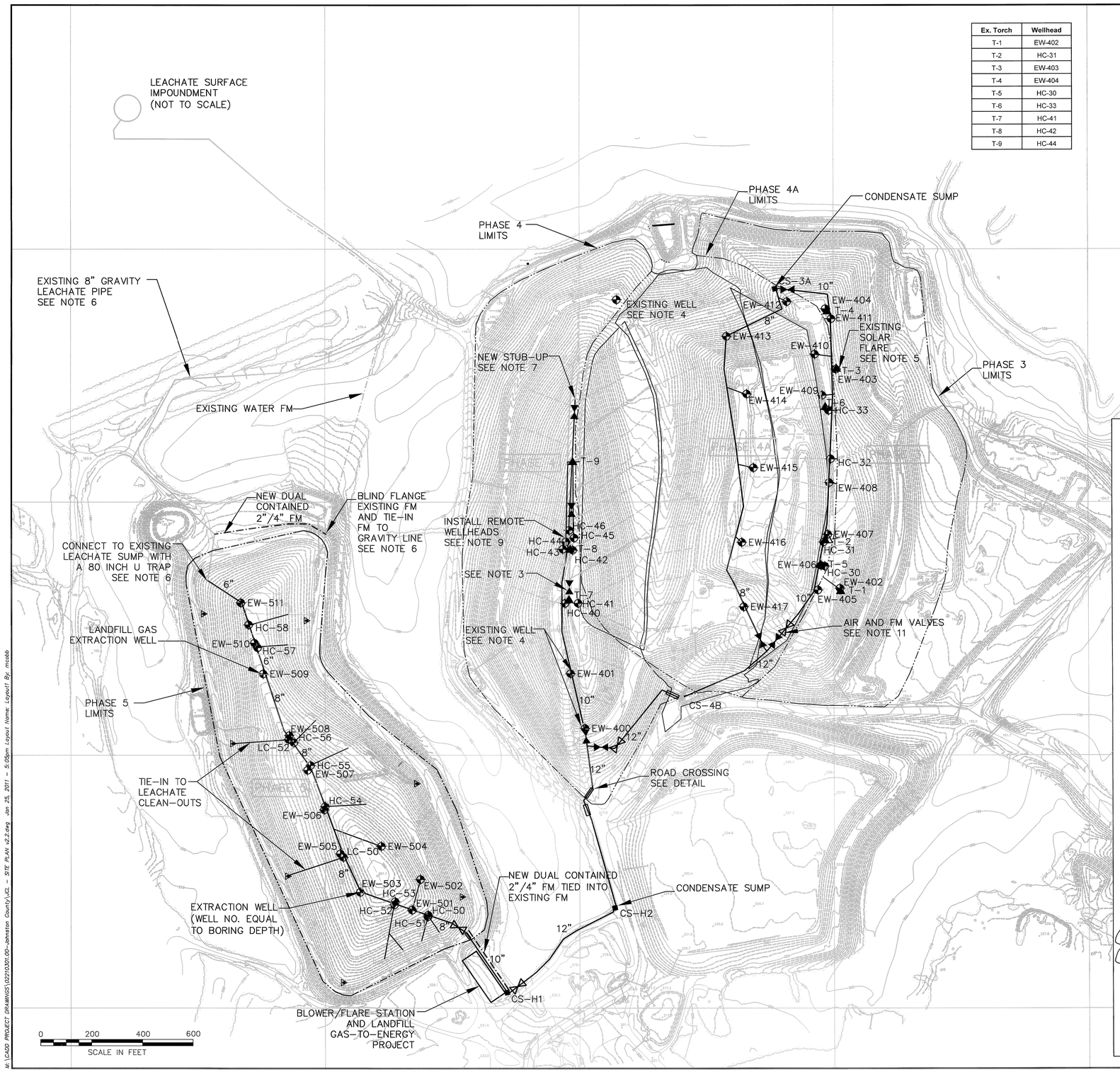
Ex. Torch	Wellhead
T-1	EW-402
T-2	HC-31
T-3	EW-403
T-4	EW-404
T-5	HC-30
T-6	HC-33
T-7	HC-41
T-8	HC-42
T-9	HC-44



N

LEGEND

- EXISTING CONTOUR
- PHASE LIMITS
- LFG HORIZONTAL COLLECTOR
- LFG HEADER PIPE
- EW — LFG EXTRACTION WELL
- T-1 — EXISTING PASSIVE SOLAR FLARE (TORCH)
- HC — WELL HEAD ON EXISTING HORIZONTAL COLLECTOR
- CS-H1 — CONDENSATE SUMP
- LEACHATE CLEANOUT
- LFG HEADER VALVE
- AIRLINE/FORCEMAIN VALVES

NOTES:

1. INCLUDE 2-IN AIR AND 2-IN FM IN TRENCH WITH ALL PIPING IN PHASE 5.
2. AIR COMPRESSOR SHALL BE AN INGERSOL RAND UP5 15-8. CONTRACTOR SHALL ALSO PROVIDE ENCLOSURE FOR AIR COMPRESSOR.
3. INSTALL 8-IN VALVE IN EXISTING 8-IN HEADER AND ONE ADDITIONAL STUB-UP FROM THE 8-IN HEADER IN ORDER TO ISOLATE EXISTING HORIZONTAL COLLECTORS IN PHASE 4 (SEPARATE COST).
4. THERE ARE 3 EXISTING LFG TEST WELLS IN PHASE 4. CONTRACTOR SHALL INSTALL WELLHEAD ON TWO OF THESE. (EW-400 and EW-401)
5. EXISTING TORCHES ARE MARKED AS T-X. CONTRACTOR SHALL INSTALL WELLHEAD ON ALL OF THESE. DRAWING DEPICTS SOME AS HC WELLS THAT ARE CONNECTED TO A HORIZONTAL NETWORK
6. THERE IS AN EXISTING LEACHATE SUMP IN THE NORTH CORNER OF PHASE 5. LEACHATE FLOWS BY GRAVITY FROM THE SUMP TO THE SURFACE IMPOUNDMENT
7. REMOTE WELLS ARE CONNECTED TO THE NEW STUB-UP, THE EXISTING TORCH (T-9), AND THE NORTH BANK OF NEW HORIZONTAL COLLECTORS IN PHASE 4
8. WELL NUMBERS ARE GROUPED ACCORDING TO PHASE
9. CONTRACTOR WILL RUN 4-IN LATERALS TO THE NEW STUB-UP, THE EXISTING TORCH (T-9), AND THE NORTH BANK OF NEW HORIZONTAL COLLECTORS IN PHASE 4 FOR A TOTAL OF THREE REMOTE WELLHEADS
10. INCLUDE 2-IN AIR AND FORCEMAIN IN THE 12-IN PIPING FROM THE FLARE TO PHASE 3 AND ALSO ALONG THE 10-IN PIPING TO CS-3A
11. CONTRACTOR TO INSTALL AIR AND FORCEMAIN VALVES AS SHOWN ON DRAWING AND IN DETAILS 1-4 ON SHEET 6
12. ALL PIPING WILL BE PRESSURE TESTED TO 5 PSI FOR 4 HOURS
13. ALL FORCEMAINS THAT ARE NOT ON LINED AREAS OF THE LANDFILL WILL BE DUAL-CONTAINED

PERMIT DRAWINGS
DO NOT USE FOR CONSTRUCTION
DATE: 11/30/10

NORTH CAROLINA PROFESSIONAL SEAL 033608 ENGINEER JAMES LAWRENCE MORGAN

NORTH CAROLINA LICENSE NO. C-1837

NO.	REVISION	DATE
	ADDED NOTES 12 and 13	2/1/11

SHEET TITLE: SITE PLAN

PROJECT TITLE: JOHNSTON COUNTY LANDFILL LANDFILL GAS PROJECT

CLIENT: BLUE SOURCE LLC, 26 W 17TH STREET, SUITE 504, NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02210301.00 | DWN. BY: TAS | QA/QC RVW BY: CL | APP. BY: CL | DSN. BY: JLM | CHK. BY: SCL

DATE: JANUARY 2011

SCALE: AS SHOWN

DRAWING NO. 3 of 6

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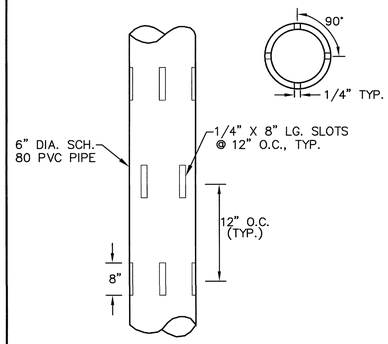
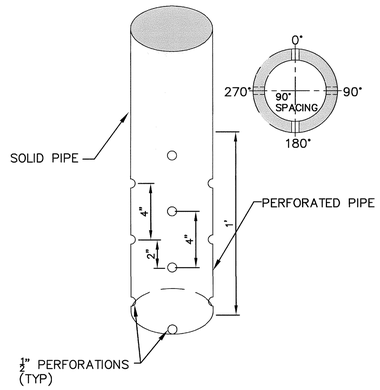
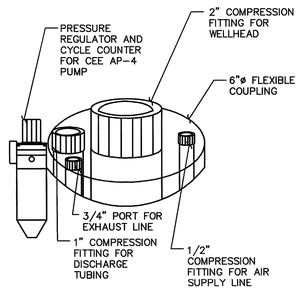


NOTE: STAGGER SLOTS BY 45° FOR ADJACENT ROWS

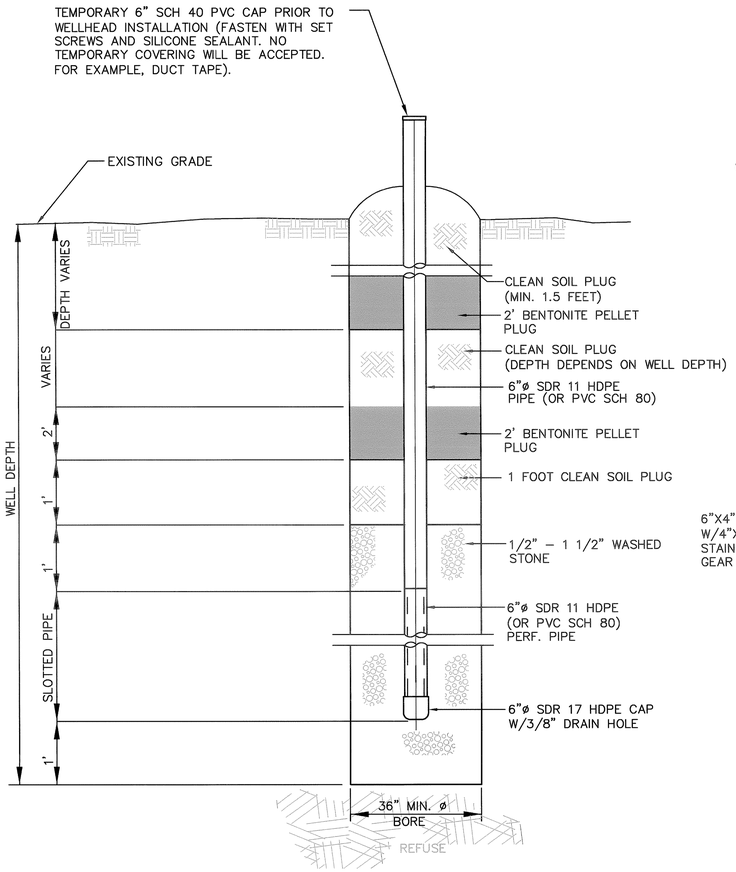
SLOTTED PIPE (PVC) FOR VERTICAL WELLS
NTS



PERFORATED PIPE (HDPE) DETAIL
NTS



WELLHEAD ADAPTER FOR AP-4 PUMP
NTS



VERTICAL EXTRACTION WELL DETAIL
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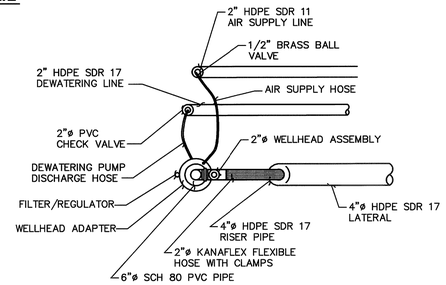
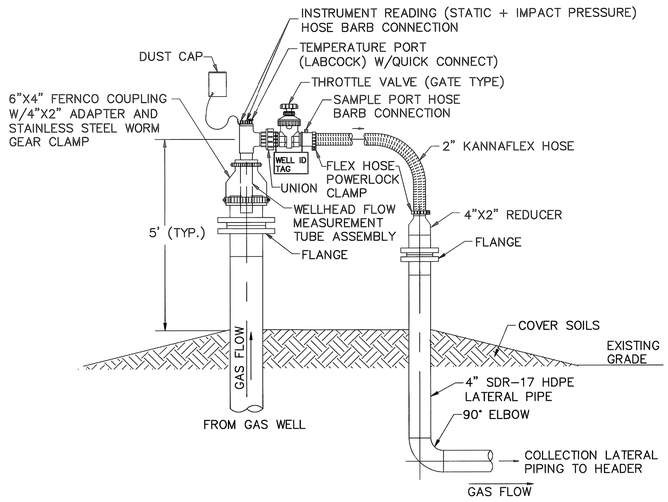


PLAN VIEW FOR DEWATERING PUMP INSTALLATION
NTS



WELLHEAD DETAIL
NTS

WELL SCHEDULE

WELL ID	NORTHING	EASTING	ANTICIPATED GROUND SURFACE ELEVATION	FINAL GROUND SURFACE ELEVATION	BASELINER ELEVATION (Note 2)	LANDFILL DEPTH	WELL DEPTH	6" SOLID PIPE LENGTH (Note 8)	6" PERFORATED PIPE LENGTH
EW-405	643,653	2,170,938	260				41	20	25
EW-406	643,750	2,170,951	256				41	20	25
EW-407	643,872	2,170,977	250				41	20	25
EW-408	644,077	2,170,983	250				41	20	25
EW-409	644,422	2,170,956	238				41	20	25
EW-410	644,585	2,170,926	238				41	20	25
EW-411	644,725	2,170,991	220				41	20	25
EW-412	644,792	2,170,817	218				41	20	25
EW-413	644,655	2,170,580	220		164	56	41	18	27
EW-414	644,428	2,170,659	260		185	75	60	24	40
EW-415	644,136	2,170,686	262		192	70	55	22	37
EW-416	643,841	2,170,640	263		193	70	55	22	37
EW-417	643,586	2,170,647	245		194	51	36	15	25
EW-501	642,388	2,169,341	272		232	40	25	14	15
EW-502	642,509	2,169,373	270		224	46	31	14	21
EW-503	642,458	2,169,138	280		224	56	41	20	25
EW-504	642,640	2,169,219	284		224	60	45	19	30
EW-505	642,610	2,169,060	276		228	48	33	15	22
EW-506	642,784	2,168,995	272		227	45	30	14	20
EW-507	642,941	2,168,929	270		224	46	31	15	20
EW-508	643,078	2,168,859	262		224	38	23	15	12
EW-509	643,324	2,168,757	250		223	27	17	14	7
EW-510	643,443	2,168,722	246		221	25	15	14	5
EW-511	643,603	2,168,670	246		221	25	15	14	5
TOTAL							881	430	547

NOTES:

1. THIS DRAFT WELL COMPLETION SCHEDULE IS NOT INTENDED FOR CONSTRUCTION UNTIL ACTUAL SURVEY DATA IS OBTAINED BY CONTRACTOR AND THE WELL COMPLETION SCHEDULE IS REVISED BY THE DESIGN ENGINEER.
2. BASE GRADE DATA BY RSG.
3. EXISTING LANDFILL SURFACE TOPOGRAPHY SHOWN ON SITE PLANS IS FROM 2009 AERIAL FLYOVER.
4. CONTRACTOR AND ENGINEER SHALL VERIFY ALL FIELD CONDITIONS INCLUDING PRE-CONSTRUCTION WELL SURVEY STAKES AND NOTIFY ENGINEER OF ANY DISCREPANCIES BETWEEN ACTUAL CONDITIONS AND CONDITIONS DEPICTED IN THESE PLANS PRIOR TO DRILLING.
5. FOLLOWING REVIEW OF SURVEY DATA, CONTRACTOR SHALL GET AUTHORIZATION FROM OWNER AND ENGINEER PRIOR TO DRILLING.
6. NO DRILLING SHALL PROCEED WITHOUT AUTHORIZATION AND ACCEPTANCE INDICATED BY SIGNATURE BELOW.
7. WELLS DEPTHS WILL VARY ACCORDING TO CONDITIONS ENCOUNTERED.
8. SOLID PIPE LENGTHS INCLUDE A 5 FEET OF SOLID PIPE ABOVE GRADE.
9. BASED ON NATURAL GRADE SURROUNDING THE LANDFILL AND ANTICIPATED GROUND SURFACE ELEVATION, A WELL DEPTH OF 41' IS SHOWN FOR WELLS IN PHASE 3. IT IS ASSUMED THIS DEPTH WILL NOT PENETRATE THE SOIL BASE OF THE LANDFILL.
10. GRAIN SIZE ANALYSIS WILL BE PERFORMED ON GRAVEL BACKFILL AT A FREQUENCY OF 1 PER 250 CUBIC YARDS, OR AS DIRECTED BY ENGINEER (ASTM D421).

CQA CONSULTANT _____ CONTRACTOR _____ OWNER _____

PERMIT DRAWINGS
DO NOT USE FOR CONSTRUCTION
DATE: 11/30/10

NORTH CAROLINA PROFESSIONAL SEAL 033608 ENGINEER JOHN L. MARTIN LAWRENCE
NC CORP. LICENSE NO. C-1837

NO.	REVISION	DATE
1	ADDED NOTES 9 and 10	2/1/11

SHEET TITLE: **WELL DETAILS**

PROJECT TITLE: **JOHNSTON COUNTY LANDFILL LANDFILL GAS PROJECT**

CLIENT: **BLUE SOURCE LLC**
26 W 17TH STREET, SUITE 504
NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02210301.00
DSN. BY: JLM
DWN. BY: TAS
CHK. BY: JLM
QA REVW BY:
APP'D BY: SCL

DATE: JANUARY 2011
SCALE: AS SHOWN
DRAWING NO. 4 of 6

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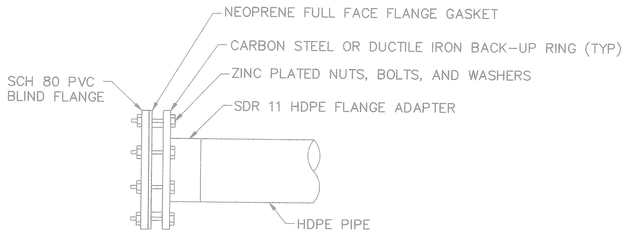
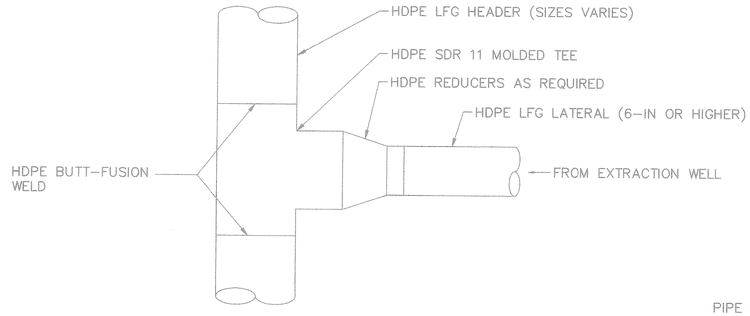
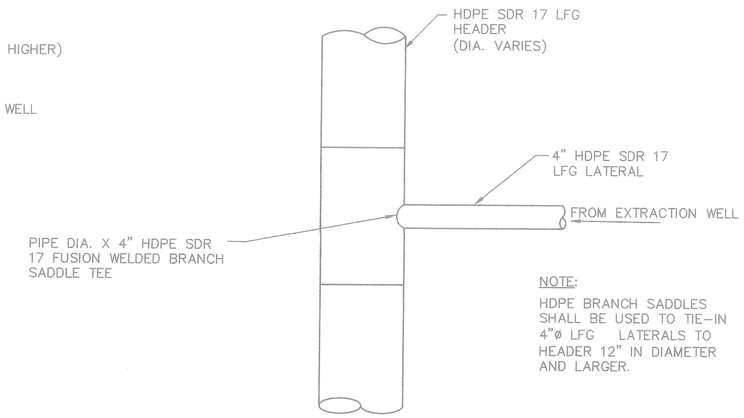


BLIND FLANGE DETAIL
NTS

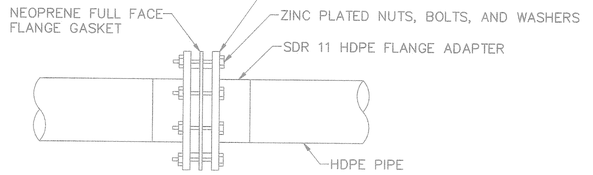


LATERAL TIE-IN W/TEE DETAIL
NTS

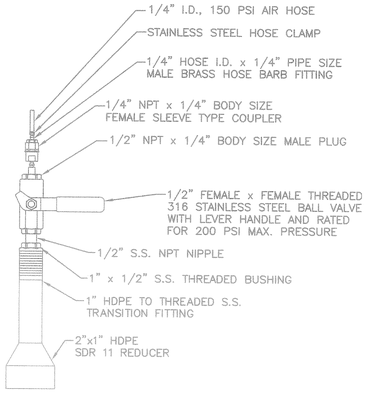


NOTE:
HDPE BRANCH SADDLES SHALL BE USED TO TIE–IN 4"ø LFG LATERALS TO HEADER 12" IN DIAMETER AND LARGER.

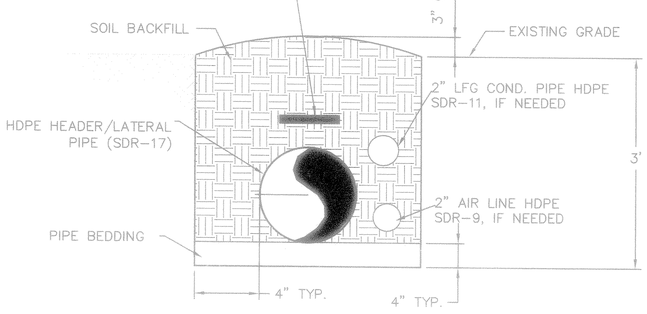
LFG LATERAL TIE-IN WITH BRANCH SADDLE DETAIL
NTS



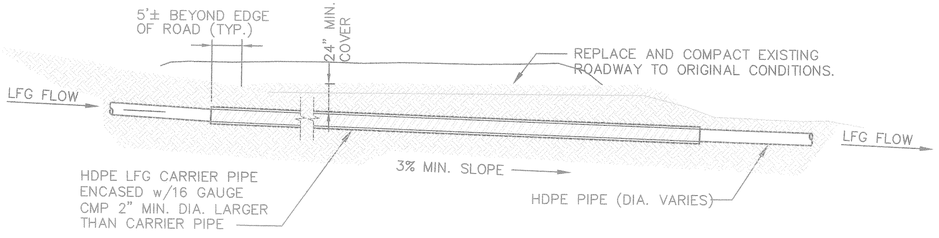
FLANGE DETAIL
NTS



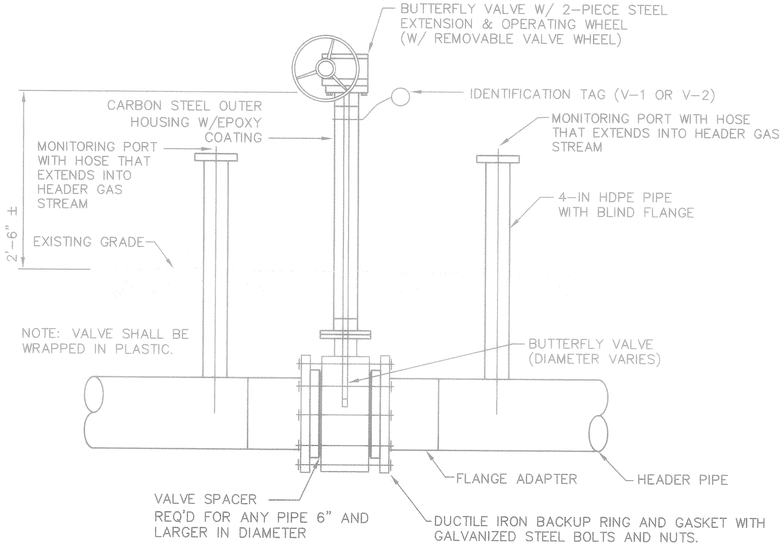
AIR SUPPLY LINE VALVE DETAIL
NTS



PIPE TRENCH DETAIL
NTS



ROAD CROSSING DETAIL
NTS



ISOLATION VALVE DETAIL
NTS

PERMIT DRAWINGS
DO NOT USE FOR CONSTRUCTION
DATE: 11/30/10

NORTH CAROLINA PROFESSIONAL SEAL 29508 ENGINEER JOHN LAWRENCE MOSS
NC CORP. LICENSE NO. C–1837

DATE / REVISION / NO.

SHEET TITLE: **PIPING DETAILS**

PROJECT TITLE: **JOHNSTON COUNTY LANDFILL LANDFILL GAS PROJECT**

CLIENT
BLUE SOURCE LLC
26 W 17TH STREET, SUITE 504
NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

DWN BY: TAS | CHK BY: JLM | DSN BY: JLM | DRAWN BY: CDH | APP BY: SCL
PROJ. NO. 02210301.00

DATE: NOVEMBER 2010
SCALE: AS SHOWN
DRAWING NO. 5 of 6

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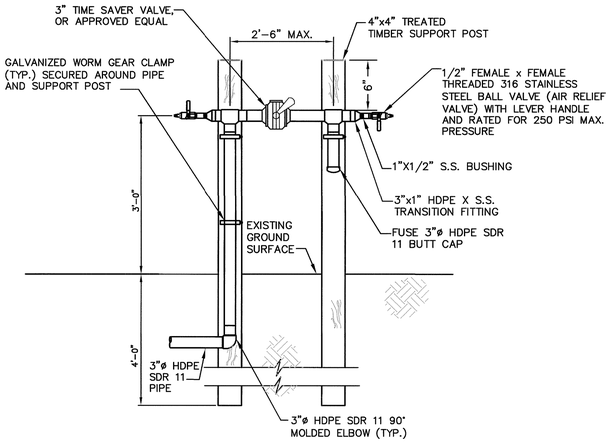
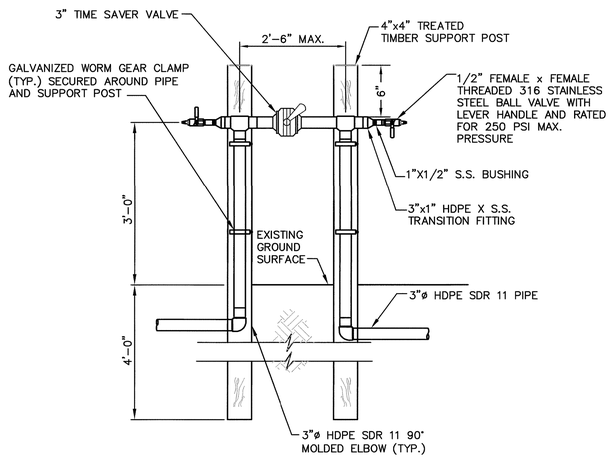
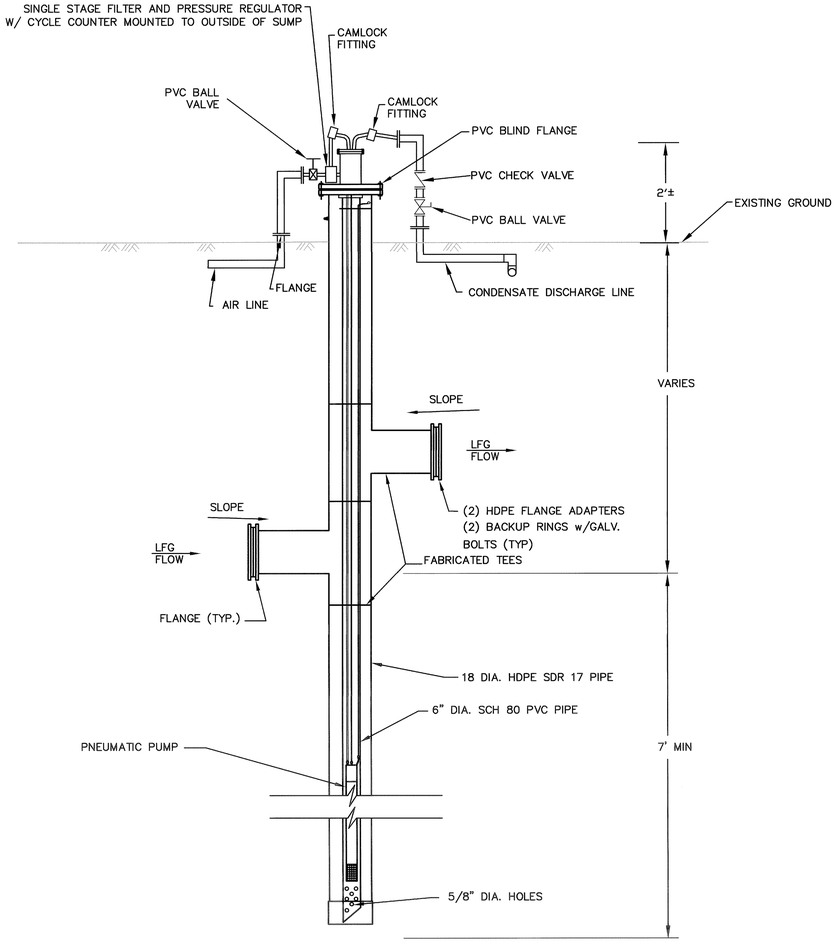


NOTE: CAN BE USED FOR FUTURE CONNECTION

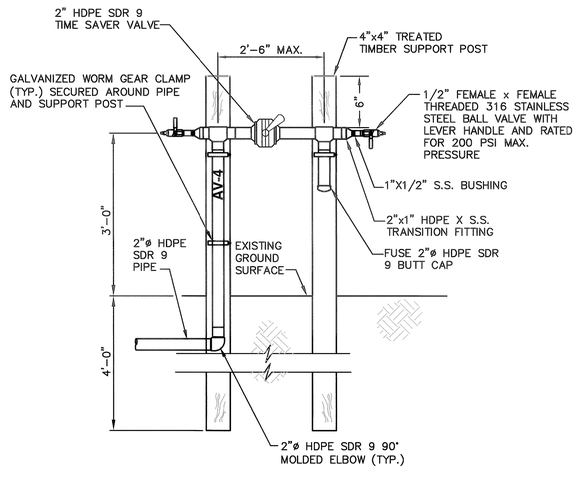
FORCEMAIN ISOLATION VALVE AND TERMINATION DETAIL
NTS



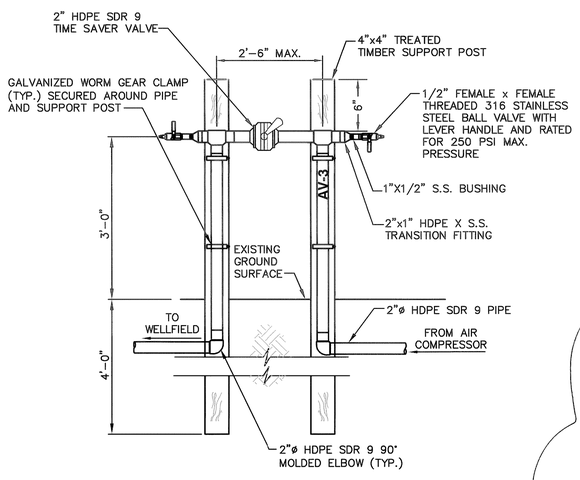
FORCEMAIN ISOLATION AND BLOWOFF VALVES DETAIL
NTS



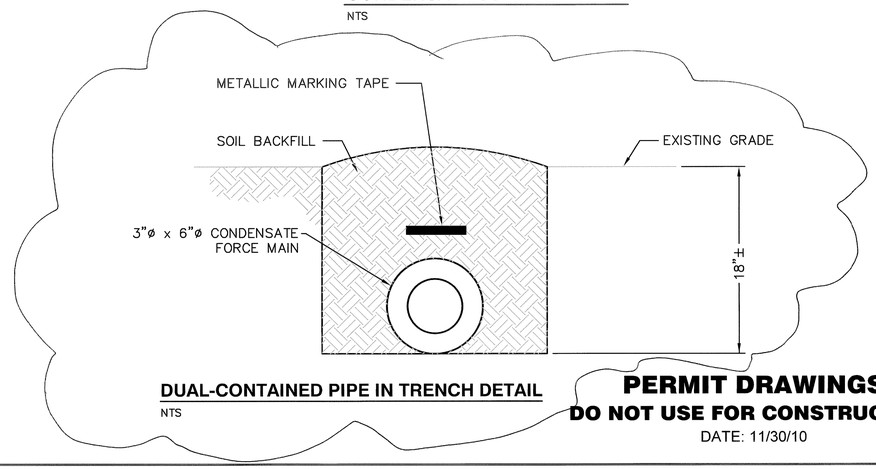
CONDENSATE SUMP DETAIL
NTS



AIR LINE ISOLATION VALVE AND TERMINATION DETAIL
NTS



AIR LINE ISOLATION AND BLOWOFF VALVES DETAIL
NTS



DUAL-CONTAINED PIPE IN TRENCH DETAIL
NTS

PERMIT DRAWINGS
DO NOT USE FOR CONSTRUCTION
DATE: 11/30/10

M:\CADD PROJECT DRAWINGS\022102301.00-Johnston County\DETAILS v1.0.dwg Feb 01, 2011 - 11:50am Layout Name: General Details By: jmorgan

NORTH CAROLINA PROFESSIONAL SEAL 033608 ENGINEER JOHN LAWRENCE MORGAN

NC CORP. LICENSE NO. C-1837

NO.	REVISION	DATE
4	ADDED DUAL-CONTAINED DETAIL	2/11

SHEET TITLE: **GENERAL DETAILS**

PROJECT TITLE: **JOHNSTON COUNTY LANDFILL LANDFILL GAS PROJECT**

CLIENT: **BLUE SOURCE LLC**
26 W 17TH STREET, SUITE 504
NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ.NO. 02210301.00
DSN. BY: JLM
DWN. BY: TYC
CHK. BY: JLM
QA REW BY:
CON:
APP. BY: SCL

DATE: JANUARY 2011

SCALE: AS SHOWN

DRAWING NO. **6** of **6**

ATTACHMENT B

SCS CQA Guidelines

Standard Procedure
Construction Quality Assurance for Installation of LFG Extraction Wells

PURPOSE

The purpose of this Standard is to describe the procedures and activities to be performed by SCS personnel in the field and office in support of drilling and installation of LFG extraction wells. This Standard supplements SCS's Quality Assurance Program, which also should be reviewed with respect to review and approval procedures for engineering drawings and documents.

This Standard addresses the following:

- Procedures used by SCS designers and engineers during the development of Construction Drawings and the Well Completion Schedule.
- Procedures used by SCS CQA personnel, both field and project engineer.

DESIGN ACTIVITIES

1. Obtain the most recent topographic map for the area where construction will occur.
2. Obtain the As-Built drawings for the bottom liner system. If As-Built drawings of the bottom liner system are not available, use the permit drawings. However, when using permit drawings, SCS should note this on the Construction Drawings or Well Completion Schedule. The Client should also be made aware that the As-Built drawings could not be located.
3. Establish the "depth of waste" for a given well, then calculate the well depth accordingly (e.g., 75% of waste depth, 15 feet off the bottom, maximum depth approx. 90 to 100 feet).
4. The Draft Well Completion Schedule provided on the Construction Drawings should be used for estimating drilling depths and pipe quantities only. Include a note under the Draft Well Completion Schedule.

   This draft well completion schedule is not intended for construction, until actual survey data is obtained and the well completion schedule is revised by the design engineer.

5. Have second person review the well completion schedule, including checking coordinates, elevations, and calculations.
6. Never plan to drill through a landfill bottom into soil below (with or without a liner).

CONSTRUCTION QUALITY ASSURANCE ACTIVITIES

1. Obtain the services of a professional land surveyor to stake the well field and to obtain the actual ground elevation at each well location. [Note: The surveyor may be hired by SCS during the design-phase or as part of our CQA services. In some cases, the Contractor or Owner may procure the services of the surveyor.]. Do not rely on GPS survey information.

2. The surveyed elevations should be written on the stakes in the field by the surveyor along with the well ID. The surveyor should provide the survey data (northing, easting, and elevation) to the Design Engineer and CQA Consultant.

3. The surveyed ground elevations should be reviewed by the Design Engineer and the Well Completion Schedule should be revised and re-issued to the Contractor. The Final Well Completion Schedule should be "signed off" by the Design Engineer.

4. The CQA Monitor should walk the site and verify the well stakes and elevations.

5. The CQA Monitor should "sign off" on the Final Well Completion Schedule" indicating that the actual ground elevations have been incorporated into the Schedule, and the drilling depths have been reviewed.

6. The CQA Monitor should verify the math on the Well Completion Schedule to make sure it makes sense!

7. The CQA Monitor must review the Final Well Completion Schedule with the Driller and General Contractor. The Driller and General Contractor should "sign off" on the Final Well Completion Schedule" indicating that the actual ground elevations have been incorporated into the Schedule, and the drilling depths have been reviewed. If there is any question or confusion regarding the information on the Well Completion Schedule, sequencing of well construction, or any other construction details, the Design Engineer should be contacted immediately for clarification. In no case should drilling proceed until all parties are in concurrence regarding the well drilling details.

8. Once the drill rig is set up on the well, the CQA Monitor must again verify the elevation on the stake is the same as on the Final Well Completion Schedule.

9. The CQA Monitor and Driller should verify the drill depth before drilling begins.

10. If drilling accidently goes through the bottom of a landfill (with or without a liner), the boring hole should be grouted back to at least to the refuse bottom The SCS Client Manager should be immediately contacted in order to coordinate with the Client and regulatory agencies if necessary regarding any further remedial measures.

ATTACHMENT C

Pipe sizing Calculations

SCS ENGINEERS

SHEET 1 of 1

CLIENT	PROJECT	JOB NO.
Blue Source	Johnston County Landfill	02210301.00

SUBJECT	BY	DATE
Pipe Sizing	J Morgan	1/31/2011
	CHECKED	DATE
	S Lamb	2/1/2011

OBJECTIVE: Calculate the appropriate pipe size for various sections of header pipe

APPROACH: Pipe sizing guideline: less than one inch of pressure drop per 100 linear feet.
The piping network is divided into four sections of pipe for pipe sizing as seen below.
The current or maximum Landfill Gas Recovery Estimate Tables (attached) were used to estimate the flow that would travel through each section and Table 1 was constructed to illustrate the results. Each section has been illustrated on the map with the letters shown below.

SOLUTION:

(Section 1) Phase 3/4A to EW-400 (A to B)

Using a distance of 900 linear feet and the flow from the recovery model for these sections, the pressure drop is calculated using the Spitzglass equation as seen in Table 1.
Only the 12 inch pipe has less than one inch of pressure drop per 100 ft.

12 in pipe

(Section 2) Phase 4 to EW-400 (C to B)

Using a distance of 800 linear feet and the flow from the recovery model from Phase 4, the pressure drop is calculated using the Spitzglass equation as seen in Table 1.
The 8, 10, and 12 inch pipe sizes all have a pressure drop of less than one inch. However to provide future capacity for flow from phase 4A and a more structurally robust pipe a 10 inch pipe was chosen.

10 in pipe

(Section 3) EW-400 to the Flare (B to D)

Using a distance of 1,250 linear feet and the combined flow for sections 1 and 2, the pressure drop is calculated using the Spitzglass equation as seen in Table 1.
Only the 12 inch pipe has less than one inch of pressure drop per 100 ft.

12 in pipe

(Section 4) Phase 5 to the Flare (E to D)

Using a distance of 900 linear feet and the flow from the recovery model for Phase 5 the pressure drop is calculated using the Spitzglass equation as seen in Table 1.
The 10 inch pipe has less than one inch of pressure drop per 100 ft.

10 in pipe

TABLE 1
LANDFILL GAS COLLECTION SYSTEM
HEADER LINE SIZING
Johnston County Landfill Pipeline

Assumptions:

Pipe sizing guideline - pressure drop/100 feet should be less than 1 inch of water column (wc)

	Flow Points		Design Flow (cfm)	Factor of Safety	Adjusted Design Flow (cfm)	Pipe Inside Diameter (in.) [2]	Nominal Pipe Size (in.) [2]	Total L (ft)	Delta P (in. wc)	Cumulative Delta P (in. wc)	Pressure Drop per 100 ft (in. wc)
	From	To									
A to B	Phase 3/4A	EW-400	1,093	1.5	1,640	7.55	8	900	35.02	35.02	3.89
	Phase 3/4A	EW-400	1,093	1.5	1,640	9.41	10	900	11.38	11.38	1.26
	Phase 3/4A	EW-400	1,093	1.5	1,640	11.16	12	900	4.83	4.83	0.54
C to B	Phase 4	EW-400	63	3	189	7.55	8	800	0.41	0.41	0.05
	Phase 4	EW-400	63	3	189	9.41	10	800	0.13	0.13	0.02
	Phase 4	EW-400	63	3	189	11.16	12	800	0.06	0.06	0.01
B to D	EW-400	Flare	1,156	1.5	1,734	7.55	8	1250	54.41	54.41	4.35
	EW-400	Flare	1,156	1.5	1,734	9.41	10	1250	17.68	17.68	1.41
	EW-400	Flare	1,156	1.5	1,734	11.16	12	1250	7.50	7.50	0.60
E to D	Phase 5	Flare	226	1.5	339	7.55	8	300	0.50	0.50	0.17
	Phase 5	Flare	226	1.5	339	9.41	10	300	0.16	0.16	0.05
	Phase 5	Flare	226	1.5	339	11.16	12	300	0.07	0.07	0.02

[2] **SDR 17**

IPS Pipe Size (In.)	ID (in.)
4	4
6	6
8	7.550
10	9.410
12	11.160
14	12
16	14
18	16
20	18
22	19
24	21

ID Measurements are Plexco Piping Standard ID's
From Plexco Piping Systems Manual

Specific Gravity LFG 0.65

Spitzglass Equation

$$Q_h = \frac{3350}{S_g^{0.5}}\left(\frac{h_1 - h_2}{L}\right)^{0.5}\left(\frac{d^5}{1+\frac{3.6}{d}+0.03d}\right)^{0.5} \quad (4\text{-}44)$$

where terms are as defined above, and

h_1 = inlet pressure, in H_2O
h_2 = outlet pressure, in H_2O

Q_h = flow, standard ft^3/hour
S_g = gas specific gravity
p_1 = inlet pressure, lb/in^2 absolute
p_2 = outlet pressure, lb/in^2 absolute
L = length, ft
d = pipe bore, in

Ex. Torch	Wellhead
T-1	EW-402
T-2	HC-31
T-3	EW-403
T-4	EW-404
T-5	HC-30
T-6	HC-33
T-7	HC-41
T-8	HC-42
T-9	HC-44

N

LEGEND

- EXISTING CONTOUR
- PHASE LIMITS
- LFG HORIZONTAL COLLECTOR
- LFG HEADER PIPE
- EW — LFG EXTRACTION WELL
- T-1 — EXISTING PASSIVE SOLAR FLARE (TORCH)
- HC — WELL HEAD ON EXISTING HORIZONTAL COLLECTOR
- CS-H1 — CONDENSATE SUMP
- LEACHATE CLEANOUT
- LFG HEADER VALVE
- AIRLINE/FORCEMAIN VALVES

LEACHATE SURFACE IMPOUNDMENT (NOT TO SCALE)

EXISTING 8" GRAVITY LEACHATE PIPE SEE NOTE 6

EXISTING WATER FM

PHASE 4 LIMITS

PHASE 4A LIMITS

CONDENSATE SUMP

PHASE 3 LIMITS

PHASE 5 LIMITS

EXISTING WELL SEE NOTE 4

NEW STUB-UP SEE NOTE 7

EXISTING SOLAR FLARE SEE NOTE 5

NEW DUAL CONTAINED 2"/4" FM

BLIND FLANGE EXISTING FM AND TIE-IN FM TO GRAVITY LINE SEE NOTE 6

INSTALL REMOTE WELLHEADS SEE NOTE 9

CONNECT TO EXISTING LEACHATE SUMP WITH A 80 INCH U TRAP SEE NOTE 6

LANDFILL GAS EXTRACTION WELL

TIE-IN TO LEACHATE CLEAN-OUTS

AIR AND FM VALVES SEE NOTE 11

ROAD CROSSING SEE DETAIL

NEW DUAL CONTAINED 2"/4" FM TIED INTO EXISTING FM

EXTRACTION WELL (WELL NO. EQUAL TO BORING DEPTH)

BLOWER/FLARE STATION AND LANDFILL GAS-TO-ENERGY PROJECT

0 200 400 600
SCALE IN FEET

NOTES:

1. INCLUDE 2-IN AIR AND 2-IN FM IN TRENCH WITH ALL PIPING IN PHASE 5.
2. AIR COMPRESSOR SHALL BE AN INGERSOL RAND UP5 15-8. CONTRACTOR SHALL ALSO PROVIDE ENCLOSURE FOR AIR COMPRESSOR.
3. INSTALL 8-IN VALVE IN EXISTING 8-IN HEADER AND ONE ADDITIONAL STUB-UP FROM THE 8-IN HEADER IN ORDER TO ISOLATE EXISTING HORIZONTAL COLLECTORS IN PHASE 4 (SEPARATE COST).
4. THERE ARE 3 EXISTING LFG TEST WELLS IN PHASE 4. CONTRACTOR SHALL INSTALL WELLHEAD ON TWO OF THESE. (EW-400 and EW-401)
5. EXISTING TORCHES ARE MARKED AS T-X. CONTRACTOR SHALL INSTALL WELLHEAD ON ALL OF THESE. DRAWING DEPICTS SOME AS HC WELLS THAT ARE CONNECTED TO A HORIZONTAL NETWORK
6. THERE IS AN EXISTING LEACHATE SUMP IN THE NORTH CORNER OF PHASE 5. LEACHATE FLOWS BY GRAVITY FROM THE SUMP TO THE SURFACE IMPOUNDMENT
7. REMOTE WELLS ARE CONNECTED TO THE NEW STUB-UP, THE EXISTING TORCH (T-9), AND THE NORTH BANK OF NEW HORIZONTAL COLLECTORS IN PHASE 4
8. WELL NUMBERS ARE GROUPED ACCORDING TO PHASE
9. CONTRACTOR WILL RUN 4-IN LATERALS TO THE NEW STUB-UP, THE EXISTING TORCH (T-9), AND THE NORTH BANK OF NEW HORIZONTAL COLLECTORS IN PHASE 4 FOR A TOTAL OF THREE REMOTE WELLHEADS
10. INCLUDE 2-IN AIR AND FORCEMAIN IN THE 12-IN PIPING FROM THE FLARE TO PHASE 3 AND ALSO ALONG THE 10-IN PIPING TO CS-3A
11. CONTRACTOR TO INSTALL AIR AND FORCEMAIN VALVES AS SHOWN ON DRAWING AND IN DETAILS 1-4 ON SHEET 6
12. ALL PIPING WILL BE PRESSURE TESTED TO 5 PSI FOR 4 HOURS
13. ALL FORCEMAINS THAT ARE NOT ON LINED AREAS OF THE LANDFILL WILL BE DUAL-CONTAINED

PERMIT DRAWINGS
DO NOT USE FOR CONSTRUCTION
DATE: 11/30/10

NORTH CAROLINA LICENSE NO. C-1837

NO.	REVISION	DATE

SHEET TITLE: SITE PLAN

PROJECT TITLE: JOHNSTON COUNTY LANDFILL LANDFILL GAS PROJECT

CLIENT: BLUE SOURCE LLC
26 W 17TH STREET, SUITE 504
NEW YORK, NY 10011

SCS ENGINEERS, PC
2520 WHITEHALL PARK DRIVE, SUITE 450
CHARLOTTE, NORTH CAROLINA 28273
PHONE: (704) 504-3107 FAX: (704) 504-3174

PROJ. NO. 02210301.00 | DSN. BY: JLM | DWN. BY: TAS | CHK. BY: SCL | QA/QC BY: CL | APP. BY: CL

DATE: JANUARY 2011

SCALE: AS SHOWN

DRAWING NO. 3 of 6

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Johnston County, NC Phase III
Preliminary Gas Recovery Estimates

	Disposal Rate	Refuse In-Place	LFG Recovery Potential			LFG System Coverage	LFG Recovery from Existing and Planned System			
Year	(tons/yr)	(tons)	(scfm)	(mmcf/day)	(mmBtu/yr)	(%)	(scfm)	(MMBtu/hr)	(MW)	(MTCO2e/yr)
1979	47,800	47,800	0	0.00	0	0%	0	0	0	0
1980	52,000	99,800	48	0.07	12,840	0%	0	0	0	0
1981	55,000	154,800	97	0.14	25,679	0%	0	0	0	0
1982	58,000	212,800	144	0.21	38,196	0%	0	0	0	0
1983	61,000	273,800	190	0.27	50,419	0%	0	0	0	0
1984	64,000	337,800	235	0.34	62,373	0%	0	0	0	0
1985	0	337,800	279	0.40	74,082	0%	0	0	0	0
1986	0	337,800	254	0.37	67,571	0%	0	0	0	0
1987	0	337,800	232	0.33	61,632	0%	0	0	0	0
1988	0	337,800	211	0.30	56,214	0%	0	0	0	0
1989	0	337,800	193	0.28	51,274	0%	0	0	0	0
1990	0	337,800	176	0.25	46,767	0%	0	0	0	0
1991	0	337,800	160	0.23	42,656	0%	0	0	0	0
1992	68,578	406,378	146	0.21	38,907	0%	0	0	0	0
1993	74,151	480,529	203	0.29	53,908	0%	0	0	0	0
1994	72,961	553,490	260	0.37	69,088	0%	0	0	0	0
1995	78,095	631,585	311	0.45	82,614	0%	0	0	0	0
1996	95,004	726,589	362	0.52	96,331	0%	0	0	0	0
1997	91,004	817,593	426	0.61	113,383	0%	0	0	0	0
1998	0	817,593	481	0.69	127,863	0%	0	0	0	0
1999	0	817,593	439	0.63	116,624	0%	0	0	0	0
2000	0	817,593	400	0.58	106,374	0%	0	0	0	0
2001	0	817,593	365	0.53	97,024	0%	0	0	0	0
2002	0	817,593	333	0.48	88,496	0%	0	0	0	0
2003	0	817,593	304	0.44	80,718	0%	0	0	0	0
2004	0	817,593	277	0.40	73,623	0%	0	0.0	0.0	0
2005	0	817,593	252	0.36	67,152	0%	0	0.0	0.0	0
2006	0	817,593	230	0.33	61,250	0%	0	0.0	0.0	0
2007	0	817,593	210	0.30	55,866	0%	0	0.0	0.0	0
2008	0	817,593	192	0.28	50,956	0%	0	0.0	0.0	0
2009	0	817,593	175	0.25	46,477	0%	0	0.0	0.0	0
2010	0	817,593	159	0.23	42,392	0%	0	0.0	0.0	0
2011	0	817,593	145	0.21	38,666	85%	124	3.8	0.4	11,316
2012	0	817,593	133	0.19	35,267	85%	113	3.4	0.3	10,321
2013	0	817,593	121	0.17	32,168	85%	103	3.1	0.3	9,414
2014	0	817,593	110	0.16	29,340	85%	94	2.8	0.3	8,587
2015	0	817,593	101	0.14	26,761	85%	86	2.6	0.3	7,832
2016	0	817,593	92	0.13	24,409	85%	78	2.4	0.2	7,144

Johnston County, NC Phase IVA
Preliminary Gas Recovery Estimates

	Disposal Rate	Refuse In-Place	LFG Recovery Potential			LFG System Coverage	LFG Recovery from Existing and Planned System			
Year	(tons/yr)	(tons)	(scfm)	mmcf/day	(mmBtu/yr)	(%)	(scfm)	MMBtu/hr	(MW)	(MTCO2e/yr)
2003	50,274	50,274	0	0.00	0	0%	0	0.0	0.0	0
2004	106,126	156,400	51	0.07	13,504	0%	0	0.0	0.0	0
2005	109,287	265,686	154	0.22	40,825	0%	0	0.0	0.0	0
2006	111,753	377,439	250	0.36	66,593	0%	0	0.0	0.0	0
2007	113,489	490,928	341	0.49	90,758	0%	0	0.0	0.0	0
2008	103,501	594,429	426	0.61	113,266	0%	0	0.0	0.0	0
2009	108,759	703,188	493	0.71	131,113	0%	0	0.0	0.0	0
2010	108,760	811,948	560	0.81	148,803	0%	0	0.0	0.0	0
2011	108,760	920,708	620	0.89	164,939	75%	465	14.1	1.4	42,592
2012	108,760	1,029,468	676	0.97	179,656	63%	424	12.9	1.3	38,849
2013	108,760	1,138,228	726	1.05	193,080	53%	387	11.7	1.2	35,434
2014	108,760	1,246,988	772	1.11	205,324	75%	579	17.6	1.7	53,021
2015	108,760	1,355,748	814	1.17	216,492	65%	528	16.0	1.6	48,361
2016	108,760	1,464,508	852	1.23	226,678	57%	482	14.6	1.4	44,110
2017	108,760	1,573,268	887	1.28	235,969	75%	665	20.2	2.0	60,935
2018	108,760	1,682,028	919	1.32	244,444	66%	607	18.4	1.8	55,579
2019	11,070	1,693,098	948	1.37	252,173	58%	554	16.8	1.6	50,693
2020	0	1,693,098	876	1.26	232,982	85%	745	22.6	2.2	68,185
2021	0	1,693,098	799	1.15	212,504	85%	679	20.6	2.0	62,192
2022	0	1,693,098	729	1.05	193,826	85%	619	18.8	1.8	56,726
2023	0	1,693,098	665	0.96	176,790	85%	565	17.2	1.7	51,740
2024	0	1,693,098	606	0.87	161,251	85%	515	15.6	1.5	47,192
2025	0	1,693,098	553	0.80	147,078	85%	470	14.3	1.4	43,044
2026	0	1,693,098	504	0.73	134,150	85%	429	13.0	1.3	39,261
2027	0	1,693,098	460	0.66	122,359	85%	391	11.9	1.2	35,810
2028	0	1,693,098	420	0.60	111,604	85%	357	10.8	1.1	32,662
2029	0	1,693,098	383	0.55	101,795	85%	325	9.9	1.0	29,792
2030	0	1,693,098	349	0.50	92,848	85%	297	9.0	0.9	27,173

948 + 145 = 1093 cfm

A + B

FOR C-13

Johnston County, NC Phase IV
Preliminary Gas Recovery Estimates

	Disposal Rate	Refuse In-Place	LFG Recovery Potential			LFG System Coverage	LFG Recovery from Existing and Planned System			
Year	(tons/yr)	(tons)	(scfm)	mmcf/day	mmBtu/yr	(%)	(scfm)	MMBtu/hr	(MW)	MTCO2e/yr
1985	33,000	33,000	0	0.00	0	0%	0	0	0	0
1986	68,000	101,000	33	0.05	8,864	0%	0	0	0	0
1987	69,000	170,000	99	0.14	26,351	0%	0	0	0	0
1988	70,000	240,000	160	0.23	42,570	0%	0	0	0	0
1989	70,940	310,940	217	0.31	57,631	0%	0	0	0	0
1990	72,050	382,990	269	0.39	71,621	0%	0	0	0	0
1991	70,050	453,040	318	0.46	84,680	0%	0	0	0	0
1992	0	453,040	361	0.52	96,054	0%	0	0	0	0
1993	0	453,040	329	0.47	87,611	0%	0	0	0	0
1994	0	453,040	300	0.43	79,911	0%	0	0	0	0
1995	0	453,040	274	0.39	72,887	0%	0	0	0	0
1996	0	453,040	250	0.36	66,480	0%	0	0	0	0
1997	0	453,040	228	0.33	60,637	0%	0	0	0	0
1998	0	453,040	208	0.30	55,307	0%	0	0	0	0
1999	0	453,040	190	0.27	50,446	0%	0	0	0	0
2000	0	453,040	173	0.25	46,012	0%	0	0	0	0
2001	0	453,040	158	0.23	41,968	0%	0	0	0	0
2002	0	453,040	144	0.21	38,279	0%	0	0	0	0
2003	0	453,040	131	0.19	34,915	0%	0	0	0	0
2004	0	453,040	120	0.17	31,846	0%	0	0	0	0
2005	0	453,040	109	0.16	29,047	0%	0	0	0	0
2006	0	453,040	100	0.14	26,494	0%	0	0	0	0
2007	0	453,040	91	0.13	24,165	0%	0	0	0	0
2008	0	453,040	83	0.12	22,041	0%	0	0	0	0
2009	0	453,040	76	0.11	20,104	0%	0	0	0	0
2010	0	453,040	69	0.10	18,337	70%	48	1.5	0.1	0
2011	0	453,040	63	0.09	16,725	70%	44	1.3	0.1	4,031
2012	0	453,040	57	0.08	15,255	70%	40	1.2	0.1	3,677
2013	0	453,040	52	0.08	13,914	70%	37	1.1	0.1	3,354
2014	0	453,040	48	0.07	12,691	70%	33	1.0	0.1	3,059
2015	0	453,040	44	0.06	11,576	70%	30	0.9	0.1	2,790
2016	0	453,040	40	0.06	10,558	70%	28	0.8	0.1	2,545
2017	0	453,040	36	0.05	9,630	70%	25	0.8	0.1	2,321
2018	0	453,040	33	0.05	8,784	70%	23	0.7	0.1	2,117
2019	0	453,040	30	0.04	8,012	70%	21	0.6	0.1	1,931
2020	0	453,040	27	0.04	7,308	70%	19	0.6	0.1	1,761
2021	0	453,040	25	0.04	6,665	70%	18	0.5	0.1	1,606
2022	0	453,040	23	0.03	6,079	70%	16	0.5	0.0	1,465
2023	0	453,040	21	0.03	5,545	70%	15	0.4	0.0	1,336
2024	0	453,040	19	0.03	5,058	70%	13	0.4	0.0	1,219
2025	0	453,040	17	0.02	4,613	70%	12	0.4	0.0	1,112
2026	0	453,040	16	0.02	4,208	70%	11	0.3	0.0	1,014
2027	0	453,040	14	0.02	3,838	70%	10	0.3	0.0	925
2028	0	453,040	13	0.02	3,501	70%	9	0.3	0.0	844
2029	0	453,040	12	0.02	3,193	70%	8	0.3	0.0	770
2030	0	453,040	11	0.02	2,912	70%	8	0.2	0.0	702

Four E & D

Johnston County, NC Phase V
Preliminary Gas Recovery Estimates

	Disposal Rate	Refuse In-Place	LFG Recovery Potential			LFG System Coverage	LFG Recovery from Existing and Planned System			
Year	(tons/yr)	(tons)	(scfm)	(mmcf/day)	(mmBtu/yr)	(%)	(scfm)	(MMBtu/hr)	(MW)	(MTCO2e/yr)
1997	45,502	45,502	0	0.00	0	0%	0	0	0	0
1998	79,428	124,930	46	0.07	12,223	0%	0	0	0	0
1999	95,761	220,691	122	0.18	32,484	0%	0	0	0	0
2000	92,141	312,832	208	0.30	55,352	0%	0	0	0	0
2001	91,475	404,307	283	0.41	75,237	0%	0	0	0	0
2002	95,430	499,737	350	0.50	93,196	0%	0	0	0	0
2003	50,274	550,010	416	0.60	110,639	0%	0	0	0	0
2004	0	550,010	430	0.62	114,418	0%	0	0	0	0
2005	0	550,010	392	0.57	104,362	0%	0	0	0	0
2006	0	550,010	358	0.52	95,189	0%	0	0	0	0
2007	0	550,010	326	0.47	86,822	0%	0	0	0	0
2008	0	550,010	298	0.43	79,191	0%	0	0	0	0
2009	0	550,010	272	0.39	72,230	0%	0	0	0	0
2010	0	550,010	248	0.36	65,882	0%	0	0	0	0
2011	0	550,010	226	0.33	60,091	85%	192	6	0.6	17,586
2012	0	550,010	206	0.30	54,809	85%	175	5	0.5	16,041
2013	0	550,010	188	0.27	49,992	85%	160	5	0.5	14,631
2014	0	550,010	171	0.25	45,598	85%	146	4	0.4	13,345
2015	0	550,010	156	0.23	41,590	85%	133	4	0.4	12,172
2016	0	550,010	143	0.21	37,935	85%	121	4	0.4	11,102
2017	0	550,010	130	0.19	34,600	85%	111	3	0.3	10,126
2018	0	550,010	119	0.17	31,559	85%	101	3	0.3	9,236
2019	0	550,010	108	0.16	28,785	85%	92	3	0.3	8,424
2020	0	550,010	99	0.14	26,255	85%	84	3	0.2	7,684
2021	0	550,010	90	0.13	23,947	85%	77	2	0.2	7,009
2022	0	550,010	82	0.12	21,843	85%	70	2.1	0.2	6,393
2023	0	550,010	75	0.11	19,923	85%	64	1.9	0.2	5,831
2024	0	550,010	68	0.10	18,172	85%	58	1.8	0.2	5,318
2025	0	550,010	62	0.09	16,574	85%	53	1.6	0.2	4,851
2026	0	550,010	57	0.08	15,118	85%	48	1.5	0.1	4,424
2027	0	550,010	52	0.07	13,789	85%	44	1.3	0.1	4,035
2028	0	550,010	47	0.07	12,577	85%	40	1.2	0.1	3,681
2029	0	550,010	43	0.06	11,471	85%	37	1.1	0.1	3,357
2030	0	550,010	39	0.06	10,463	85%	33	1.0	0.1	3,062

ATTACHMENT D

Leak Testing Guidelines

PIPE LEAK TESTING GUIDELINES

PIPE TESTING

A. All PE pipes shall be subjected to an air test as described herein to detect any leaks in the piping. Testing shall be performed below grade (inside the trench). The CONTRACTOR shall be responsible for locating, uncovering (if previously backfilled), and repairing any leaks detected during testing.

B. The pipe segment to be tested shall be allowed time to reach constant and/or ambient temperature before initiating the test.

C. Tests shall be performed during periods when the pipe segments will be out of direct sunlight when possible; i.e., early morning, late evening, or cloudy days. This will reduce the pressure changes that will occur due to temperature fluctuations.

D. The test pressure shall be 4 psig (110.8 inches, w.c.) and the CONTRACTOR shall use a digital gauge.

E. Pressure drop during the test shall not exceed one percent of the testing gauge pressure over a period of one hour. This pressure drop shall be corrected for temperature changes before determining pass or failure. (See Section 3.10 for test failures). The ENGINEER shall sign off on the test form to indicate test compliance.

F. The ENGINEER shall be notified prior to commencement of the testing procedure and shall be present during the test.

G. Equipment for this testing procedure shall be furnished by the CONTRACTOR. This shall consist of a polyethylene flange adapter with a blind flange. Tapped and threaded into the blind flange will be a temperature gauge 0 to 100 degrees C: a Schraeder tire valve to facilitate pressurization with an air compressor hose; a ball valve to release pipe pressure upon completion of the test; and a pressure measuring device. The pressure measuring device shall be a digital manometer capable of measuring positive or differential pressures of air and other non-corrosive gasses over a range of 0 to 199.9 in-w.c., Model No. 475-3 (manufactured by Dwyer Instruments, Inc., 219-879-8000), or approved equal.

TEST FAILURE

A. The following steps shall be performed when a pipe segment fails the one percent - one-hour test described in Section 3.9 F above.

1. The pipe and all fusions shall be inspected for cracks, pinholes, or perforations.

2. All blocked risers and capped ends shall be inspected for leaks.

3. Leaks shall be located and/or verified by applying a soapy water solution and observing soap bubble formation.

A. All pipe and fused joint leaks shall be repaired by cutting out the leaking area and re-fusing the pipe.

B. After all leaks are repaired, a retest shall be performed in accordance with Section 3.9.

END OF SECTION

Chao, Ming-tai

From: Morgan, J [JMorgan@scsengineers.com]
Sent: Wednesday, February 02, 2011 5:22 PM
To: Chao, Ming-tai
Subject: Johnson County Solid Waste Permit Mod. 02210301.00
Attachments: Revised SW Permit Mod.pdf

Follow Up Flag: Follow Up
Flag Status: Flagged

Mr. Chao,
Please see the attached Revised Solid Waste Permit Mod. You should receive the hardcopy via FedEx within the next day or two with the full size drawings.

Please call me if you have any questions or concerns.
Thanks,

J Morgan, PE
SCS Engineers
Sr. Project Engineer
jmorgan@scsengineers.com
704.504.3107

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