Methane Monitoring Plan
Chatham County Landfill
720 County Landfill Road
Chatham County, North Carolina
May 11, 2009

GTOS RECEIVED
JUN 19 2009
WASTE SECTION

Prepared for:
Chatham County Waste Management
720 County Landfill Road
Chatham County
North Carolina

Prepared by:
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5/19/09

E2S

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Attachment C: Preliminary Methane and Pressure Monitoring Data
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Submitted Separately: Methane Monitoring Site Plan

1.0 General Project Information

The Chatham County Landfill is located approximately 5 miles west of Pittsboro, NC north of Hwy. 64 North, off County Landfill Road. A Vicinity Map is provided on Figure 1 of Attachment A. The Subject Property is currently owned by the County of Chatham and contains an inactive Municipal Solid Waste Landfill. The Site is bounded east and side by Harlands Creek.

Although methane is not toxic, it is explosive at concentrations between 5 and 15 percent when sufficient oxygen is present. Landfill gas typically has a methane concentration of 40 to 55 percent volume in air. Methane is odorless and slightly lighter than air and will accumulate in confined spaces. Methane moves from place to place by diffusion and pressure gradient.

North Carolina Solid Waste Management Rules 15A NCAC 13B require quarterly monitoring of methane gas to insure that it does not exceed the lower explosive limit at the facility property boundary or 25 percent of the lower explosive limit in facility structures. If the concentration does exceed the specified limits then steps must be taken to ensure protection of public health and a remediation plan must be implemented.

This methane monitoring plan was developed specifically for the Chatham County Landfill. The methane monitoring plan developed for the Chatham County Landfill provides a plan to meet these performance standards, and provides a monitoring procedure that is technically sound.

2.0 Site Observations

On April 9, 2009 a representative of E^2S visited the site to conduct preliminary Methane and Pressure Monitoring on the existing Groundwater Monitoring Wells at the landfill. The wells were measured for Methane Gas using a US Industrial Products Portable Methane Detector 8100P (Combustible Methane Detector (% LEL)). Over a period of one half hour each monitoring well location was observed for pressures and for methane. The Specifications and Operation Manual for the Methane Detector are provided as Attachment B. The preliminary methane and pressure monitoring data is provided as Attachment C.

Based on pressure and methane monitoring conducted on the existing monitoring wells at the subject property, it appears there are no significant pressures or methane was noted at the existing monitoring wells. Surface vegetative distress can be an indicator of concentrated methane releases. During site observations of the landfill no vegetative distress was noted. Based on the monitoring data and site observations it appears that there may be no specific direction for the migration of any methane at the subject property.

2.0 General Subsurface Conditions

Soils encountered during installation of five (5) Groundwater Monitoring Wells at the subject property generally indicated a dry clayey SILT near ground surface to depth ranging from 12' BGS to 32.5' BGS. Below the clayey SILT, a change to Mafic Metavolcanic Bedrock was encountered at depths ranging from 12' BGS to 32.5' BGS. The Boring Logs for the installed Groundwater Monitoring Wells are provided as Attachment D.

3.0 Estimated Groundwater Flow Direction

Five (5) groundwater monitoring wells exist on the site at this time (NW-1, NW-2, NW-3, NW-4, and MW-5) that have been used for groundwater monitoring and sampling. Two (2) Groundwater Contour Maps were prepared from water level data collected during previous Groundwater Monitoring Events are provided as Figure 1 and Figure 2 of Attachment A. The contour maps represent typical high and low groundwater depth conditions. Tables 1, 2, 3 and 4 and Figures 2 and 3 of Attachment A show the historical water levels and elevations for the last six years. Groundwater flow is estimated to be in a Northeasterly direction across the landfill towards Harlands Creek.

4.0 Sampling Points

The limits of waste disposal area is to be surrounded by methane monitoring wells that are to be installed outside the waste boundary to depths equal to the waste ,to an impermeable barrier, and above the groundwater table. The number and location of methane monitoring wells has been based on information gathered from previous surface and subsurface investigations as well as monitoring well installations at the site, including subsurface soil stratigraphy, proximity of buildings or dwellings (receptors), and natural barriers. The existing groundwater monitoring wells are to also be used as monitoring points for methane.

The Methane Monitoring Site Plan (submitted separately) shows the approximate number and locations of methane monitoring wells. The locations are indicated on site map that indicates the groundwater monitoring well and structure locations. All immediate potential receptors are also shown on the map. The plan also provides the details, the construction specifications, and approximate depths for the Methane Monitoring Points.

Seventeen (17) proposed methane monitoring points are to be installed and located approximately 75 ft to approximately 225 ft from the limits of the waste disposal, and to depths ranging from 5 ft BGS to 30 ft. BGS below the groundsurface. The linear spacing was determined based on site conditions and proximity to structures. In areas north and east of the waste disposal area spacing is proposed at approximately 500 feet. In areas south and west of the waste disposal area where structures are present spacing is proposed every 150' to 300' depending on specific site conditions.

The methane monitoring wells are to be constructed of 2 inch PVC pipe with a screened interval to allow infiltration of methane. They are to be placed in a borehole and surrounded by a gravel pack. The borehole is then to be sealed from the gravel to the ground surface with bentonite and concrete.

All methane monitoring well installations will be observed by a Professional Engineer or Geologist, or their technical representative. Sampling will be conducted to identify and log the various subsurface materials. Relative elevations of the top of casings will be determined, with a benchmark set for reference.

5.0 Sampling Procedures

The proposed monitoring schedule or frequency is to be quarterly. Sampling is proposed four times a year during the months of February, May, August, and November. The gas monitoring data to be submitted to the Solid Waste Section the type of methane monitoring equipment used. After a period of 2 years, the frequency and number of sampling points should be assessed. Frequency and number of monitoring points may need to be adjusted based on the 2 year period of monitoring.

Instrumentation: The Instrument proposed for is a US Industrial Products Portable Methane Detector 8100P (Combustible Methane Detector (% LEL)). The instrument must be used according to the manufacturer's instructions. This includes calibrating the instrument as directed. Measurements from non-calibrated or inaccurately calibrated instruments are not reliable. The Specifications and Operation Manual for the Methane Detector are provided as Attachment B.

Monitoring Probe Construction: All methane monitoring probes should be fitted with a cap that has a stopcock type valve that can be opened or closed to control flow. The valve should have dual-barbed connections for fitting the gas meter's inlet probe and pressure meter tubes. The valve should be closed between monitoring events. Data collected in any other fashion, unless pre-approved by the Section, will not be accepted.

Monitoring Procedure: Any accumulation of methane in the probe is the result of methane migration. The possibility exists that, just as it can migrate and accumulate in monitoring probes, it can also do the same in buildings and structures. Because subsurface gas pressures are considered to be at a maximum during the afternoon measurements should be done in the afternoon. Also, preferably the monitoring should be conducted when the barometric atmospheric pressure is dropping.

The following procedure is recommended for sampling methane gas monitoring probes:

1. Calibrate the combustible gas meter according to the manufacturer's instructions.

2. Attach the gas analyzer probe tubing and pressure meter tubing to the monitoring probe stopcock on the probe cap.

3. Open the valve and record the methane concentration as LEL% and record the pressure.

4. Turn the valve to the off position and disconnect the probe tubing.

5. Proceed to the next probe and repeat steps 2 through 5.

6. Record the barometric pressure and weather conditions during the monitoring

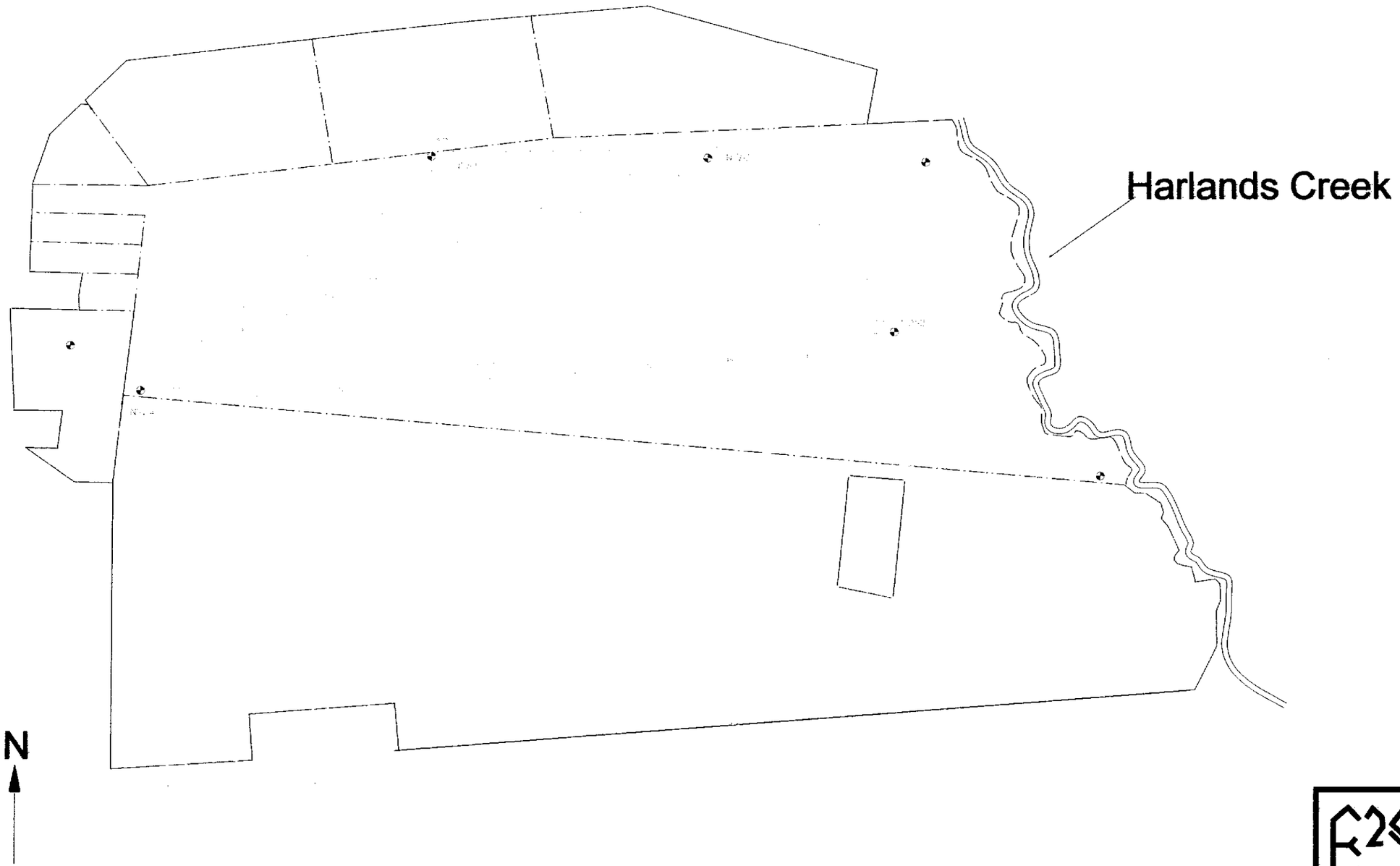
6.0 Recording Procedures

Data should be recorded and reviewed by a Professional Engineer or Geologist, or their technical representative. The results of the quarterly monitoring should be provided to NCDENR Division of Waste Management- Solid Waste Section and Chatham County Waste Management.

7.0 Closure

In the event that methane is detected at concentrations exceeding regulatory levels (100 % of the lower explosive limit) in any of the methane monitoring probes, a plan addressing corrective action should be implemented and the NCDENR Division of Waste Management should be notified.

Attachment A: Figures & Tables



50
0 | 100 200 400 800 1200 FEET

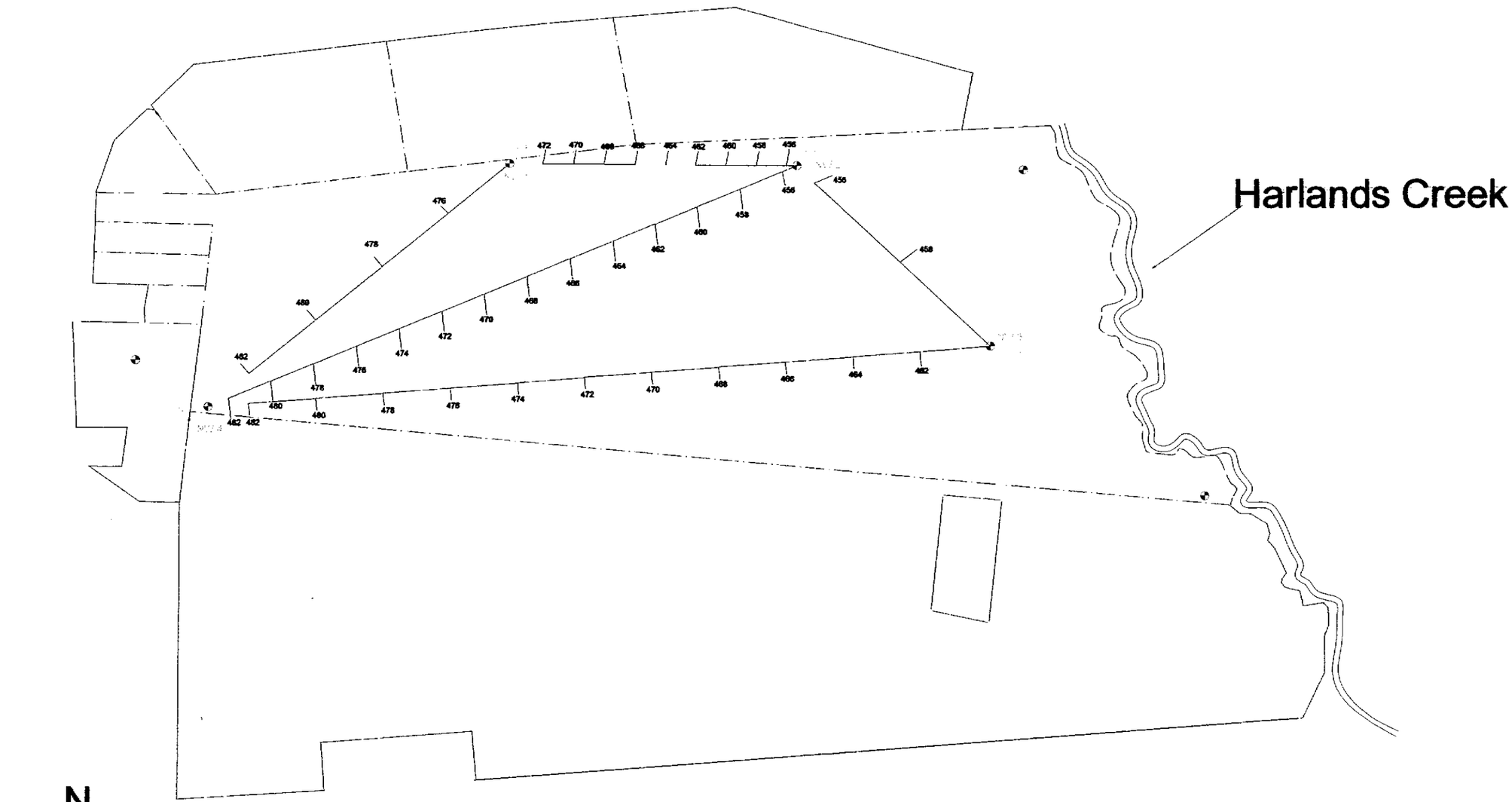
SCALE: 1"= 400'-0"

ENGINEERING & ENVIRONMENTAL SCIENCE COMPANY
3008 ANDERSON DR., SUITE 102
RALEIGH, NORTH CAROLINA 27609
(919) 781-7796

Fall 2003 Groundwater Contour Map
Chatham County Landfill
720 County Landfill Road
Chatham County, NC

DATE: 05/11/2009

FIGURE NO. 1



N

50
0 | 100 200 400 800 1200 FEET

SCALE: 1"= 400'-0"

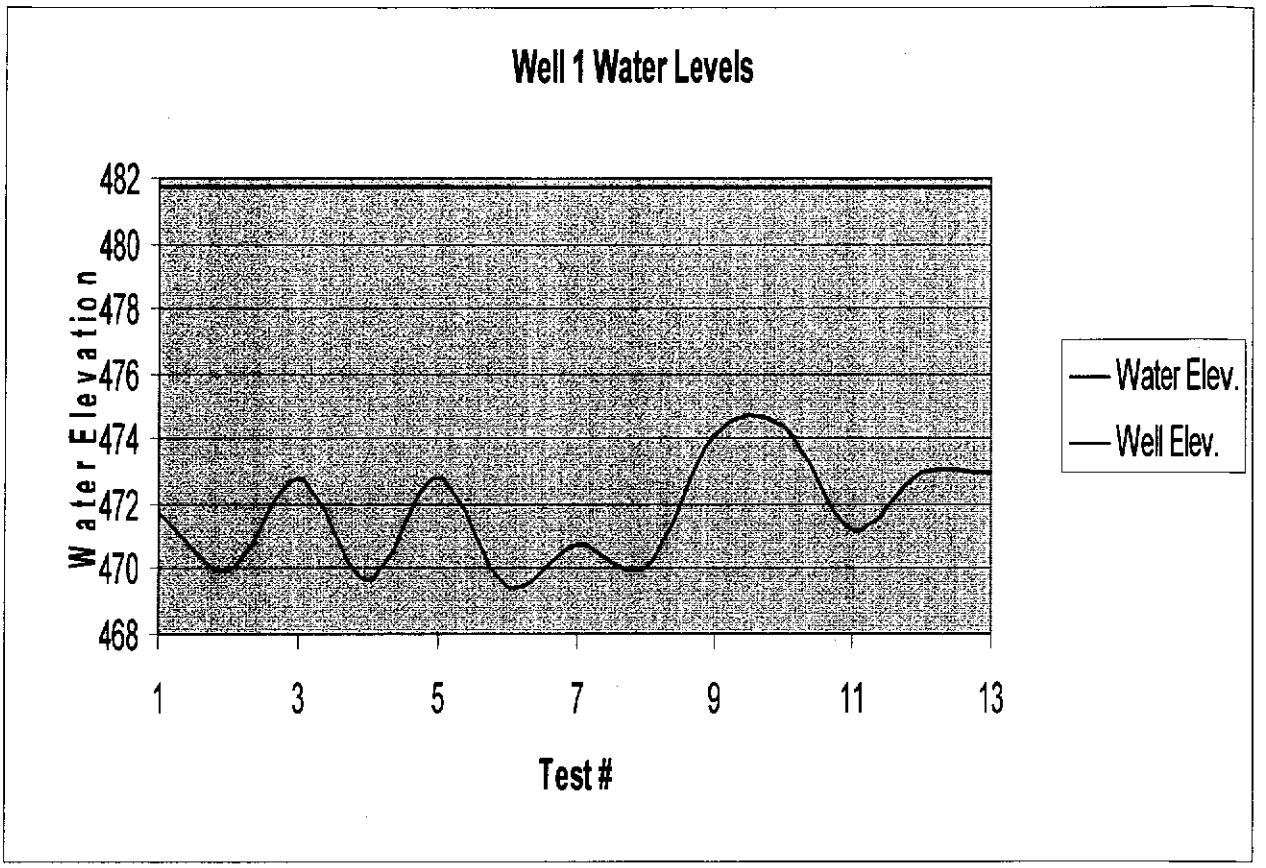
ENGINEERING & ENVIRONMENTAL SCIENCE COMPANY
3008 ANDERSON DR., SUITE 102
RALEIGH, NORTH CAROLINA 27609
(919) 781-7798

Spring 2006 Groundwater Contour Map
Chatham County Landfill
720 County Landfill Road
Chatham County, NC

DATE: 05/11/2009

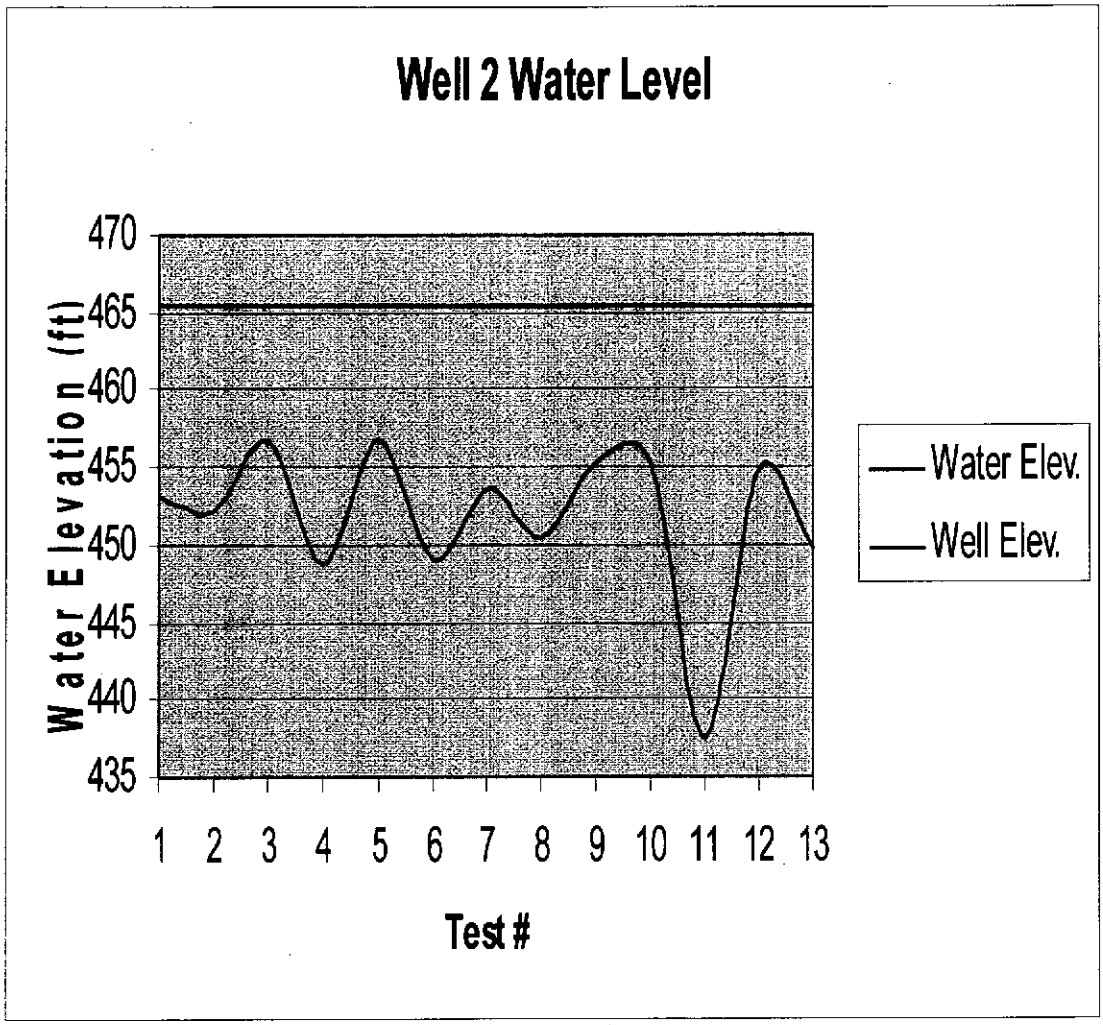
FIGURE NO. 2

Table 1



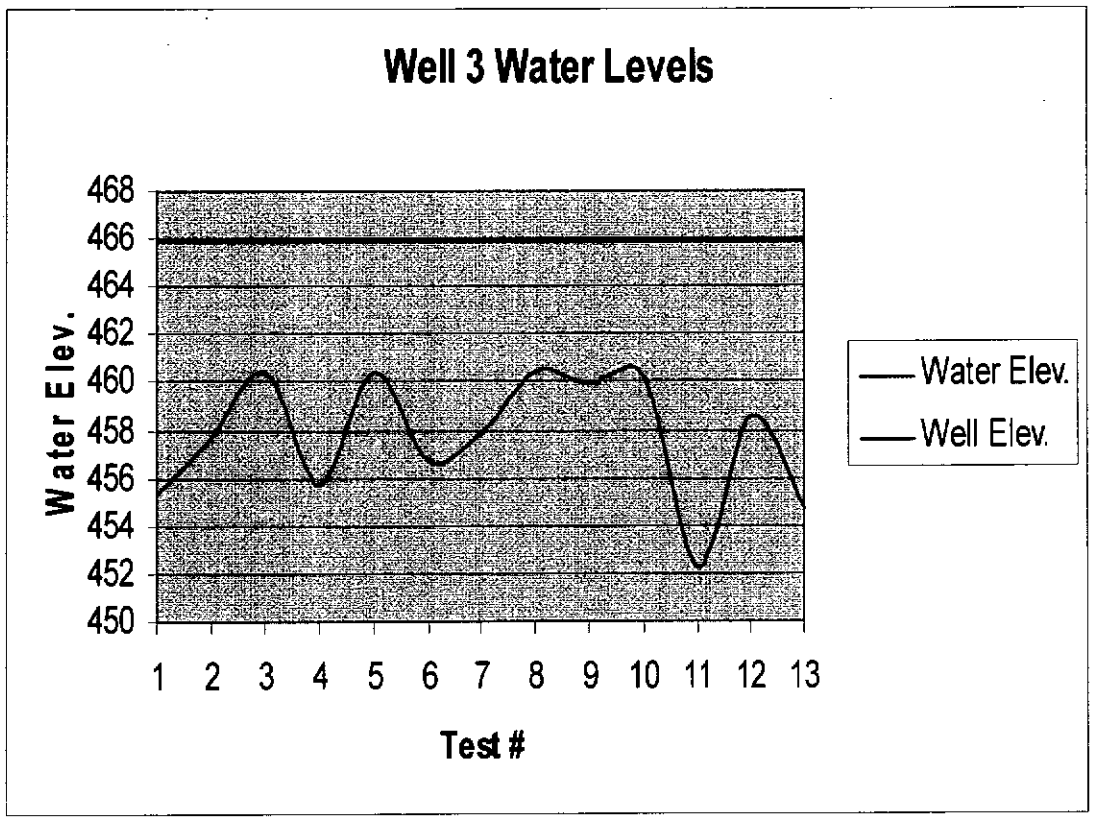
Test #	Test Date	Water Elev.
Test 1	Spr. 2002	471.73
Test 2	Fall 2002	469.99
Test 3	Spr. 2003	472.76
Test 4	Fall 2003	469.72
Test 5	Spr. 2004	472.76
Test 6	Fall 2004	469.42
Test 7	Spr. 2005	470.78
Test 8	Fall 2005	470.06
Test 9	Spr. 2006	474.14
Test 10	Fall 2006	474.39
Test 11	Spr. 2007	471.17
Test 12	Fall 2007	472.99
Test 13	Spr. 2008	472.96

Table 2



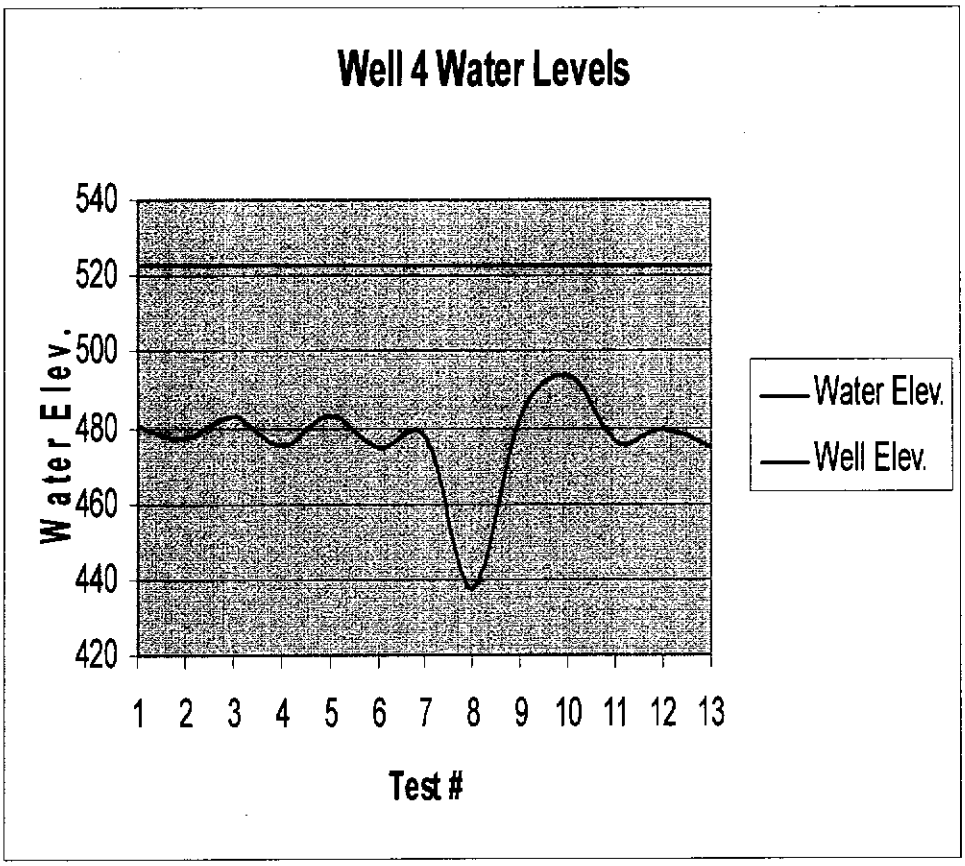
Test #	Test Date	Water Elev.
Test 1	Spr. 2002	453.11
Test 2	Fall 2002	452.08
Test 3	Spr. 2003	456.83
Test 4	Fall 2003	448.68
Test 5	Spr. 2004	456.83
Test 6	Fall 2004	448.93
Test 7	Spr. 2005	453.66
Test 8	Fall 2005	450.53
Test 9	Spr. 2006	455.32
Test 10	Fall 2006	455.37
Test 11	Spr. 2007	437.36
Test 12	Fall 2007	454.91
Test 13	Spr. 2008	449.71

Table 3



Test #	Test Date	Water Elev.
Test 1	Spr. 2002	455.32
Test 2	Fall 2002	457.64
Test 3	Spr. 2003	460.37
Test 4	Fall 2003	455.75
Test 5	Spr. 2004	460.37
Test 6	Fall 2004	456.71
Test 7	Spr. 2005	457.94
Test 8	Fall 2005	460.37
Test 9	Spr. 2006	459.89
Test 10	Fall 2006	460.14
Test 11	Spr. 2007	452.28
Test 12	Fall 2007	458.53
Test 13	Spr. 2008	454.73

Table 4



Test #	Test Date	Water Elev.
Test 1	Spr. 2002	480.13
Test 2	Fall 2002	477.07
Test 3	Spr. 2003	482.64
Test 4	Fall 2003	475.13
Test 5	Spr. 2004	482.64
Test 6	Fall 2004	474.54
Test 7	Spr. 2005	476.83
Test 8	Fall 2005	437.01
Test 9	Spr. 2006	483.25
Test 10	Fall 2006	493.85
Test 11	Spr. 2007	476.59
Test 12	Fall 2007	479.30
Test 13	Spr. 2008	474.84

Attachment B:
Methane Detector Operation Manual and Specifications

PORTABLE GAS DETECTOR

OPERATION MANUAL

(SEMICONDUCTOR SENSOR)

U.S. INDUSTRIAL PRODUCTS CO., INC.
17320 Marquardt Ave, Cerritos, CA. 90703 U.S.A
Telephone: (562) 802-9688, (800) 663-5782 Fax: (562) 802-8518

IMPORTANT

* WHEN THE UNIT IS TURNED ON, THE METER MAY "PEG OFF SCALE", AND THE ALARM IS ACTIVATED. THIS MAY CONTINUE FOR 4~5 MINUTES UNTIL THE SENSOR TEMPERATURE REACHES ITS STEADY STATE WITH THE AMBIENT AIR. THE METER WILL THEN SLOWLY RETURN TO ZERO. IF NOT, READJUST THE METER TO ZERO SLOWLY FROM THE POSITIVE SIDE.

* THIS UNIT IS ALREADY FACTORY PRECALIBRATED. NO SPAN ADJUSTMENTS IS NECESSARY.

* THE UNIT IS IDEAL FOR EARLY STAGE GAS LEAK DETECTION. IT IS NOT SUGGESTED FOR ANALYTICAL ANALYZER PURPOSE.

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LIMITED WARRANTY

U.S. Industrial Products Co. products are warranted to be free from defects in material and workmanship for the "warranty" period. All sensors and controllers are warranted under normal usage for one year from the date of original purchase. This warranty only covers failures which occur during normal use due to defects in materials or workmanship. This warranty does not cover damage which results from an accident, misuse, abuse, mishandling, faulty installation, improper maintenance, or by an unauthorized repair. This warranty is limited only to repair or replacement of any parts or components which are found to be defective after examination by the factory repair personnel. To obtain warranty service you must return the instrument to the factory with all transportation charges prepaid.

RECEIVING

In case of a shipping damage it must be reported immediately to your carrier. Do not destroy the packing material or container. The shipping damage must be claimed and collected by the cosignee. Do not return the damaged merchandise until your claim is examined and documented.

I. INTRODUCTION

In a working environment, the immediate detection of toxic fumes and vapors is vitally important. The health, and possibly the lives, of all personnel may be at stake.

USI portable gas detector unit using the state-of-the-art sensor technology, which provides high levels of sensitivity, versatility, and durability. The battery powered detector unit once charged can last at least 10 hours, which makes it easy for field detecting. Such qualities have brought USI products industry-wide recognition as the leader in both open and confined-area gas detection.

II. GENERAL DESCRIPTION

U.S. Industrial Products Co. Gas Detector consists of two separate portions: the solid-state sensor and the controller. The solid-state sensors are developed by USI for monitoring toxic or combustible gases at low ppm or % LEL concentration range.

The sensor provides incredibly fast response, even when the gases or vapors are at a low ppm range. Sturdy construction of the sensor allows it to function at temperatures ranging from -50^{0}F to +150^{0}F. Exposure to moisture and high concentration of gas also pose no threat to the system's operation.

The system controller is a compact, rugged and light-weight hand-carry portable unit. The standard model provides the following features: audio buzzer, visual LED alarms, readout meter and battery low LED indicator.

The audio/visual alarms generate a clear undeniable warning signal wherever a hazardous gas concentration surpasses the preset alarm setpoint. Potential danger is brought to your attention forcefully. Quick recovery keeps the system "on-line" for further gas detection.

Just over two pounds in weight, the detector is ideal for hand-held and belt-carried usage. Powered by standard Ni-Cad batteries, the detector lasts approximately ten (10) hours after a full charge. USI detectors meet all NEC requirements for Class I, Division I, Group B, C, and D hazardous locations and have been field proven.

III. PRINCIPLE OF GAS DETECTION

The gas detector sensor is an adsorption-desorption type. The principle of detection depends on gas adsorption on the active catalyst surface at a preset temperature. The gas adsorption causes a resistance change between two electrodes embedded in the catalyst element. The resistance change depends on the type of gas-solid interaction and the temperature employed. This change causes the gain increase of the operational amplifier. The output of the operational amplifier activates the meter display and all alarm functions. The sensing element is inside the sensor head together with porous stainless steel screens, serving as flame arrestors.

IV. PANEL INDICATORS

(1) The LED ROCKER SWITCH is used to turn ON/OFF the power of the detector. The green LED light will light up when the power is turned "ON" and the system is operating properly. If the sensor wire is disconnected from the controller, or the sensor itself is damaged, the green light will turn off and the red LED light will turn on and the audio alarm will sound.

(2) The red LED ALARM will turn on when the gas concentration exceeds the preset alarm setpoint. In this case, the audio buzzer along with the red LED light will turn on simultaneously. Both will be shut off automatically when the gas concentration drops below the alarm setting level.

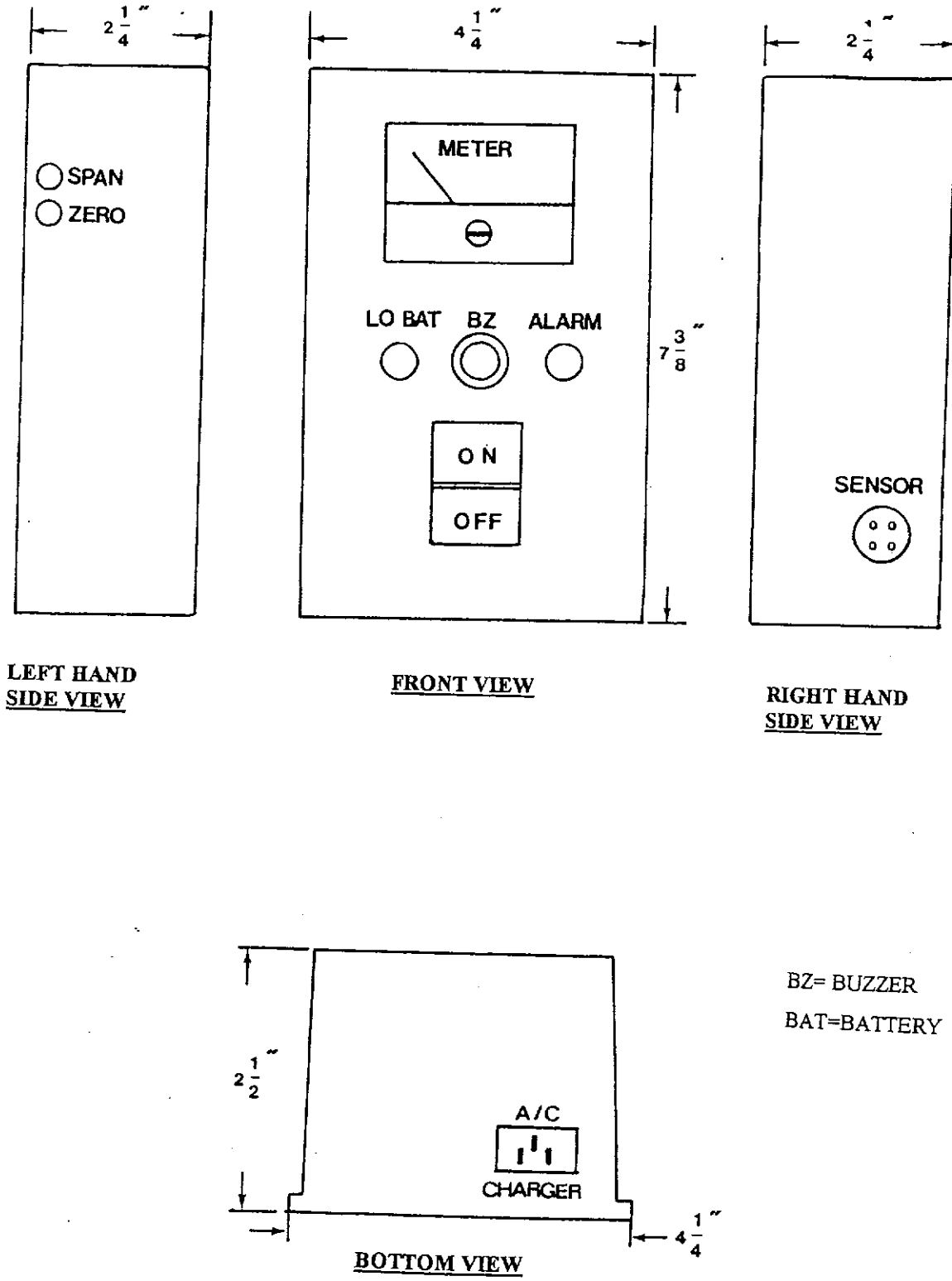
(3) The READOUT METER indicates the concentration of the detecting gas in the background, such as in the ambient air or in a high vacuum environment. The standard gas concentration range for toxic gases detection is from 0 to 1000 ppm. For explosive gases are from 0 to 50% LEL (low explosion limit).

(4) The ZERO POTENTIOMETER is used to zero the meter reading in the absence of detecting gas.

(5) The SPAN POTENTIOMETER is used for adjusting the gain of the sensor signal when the sensor is exposed to a known concentration of the calibration gas (such as 1000 ppm, or 50% LEL of the calibration gas).

(6) The Alarm setting potentiometer is built inside the controller box. To reset the alarm set point, please follow the procedures in Section X. (page 15).

(7) The Low battery LED light will turn on when the battery power decreases below 3.4 VDC. The light will continue to stay on for about 5 minutes and then be off automatically. The unit will then shut off completely to save the battery power.



BZ= BUZZER

BAT=BATTERY

FIGURE 1. DIMENSION OF THE NI-CD CHARGED PORTABLE UNIT DETECTOR

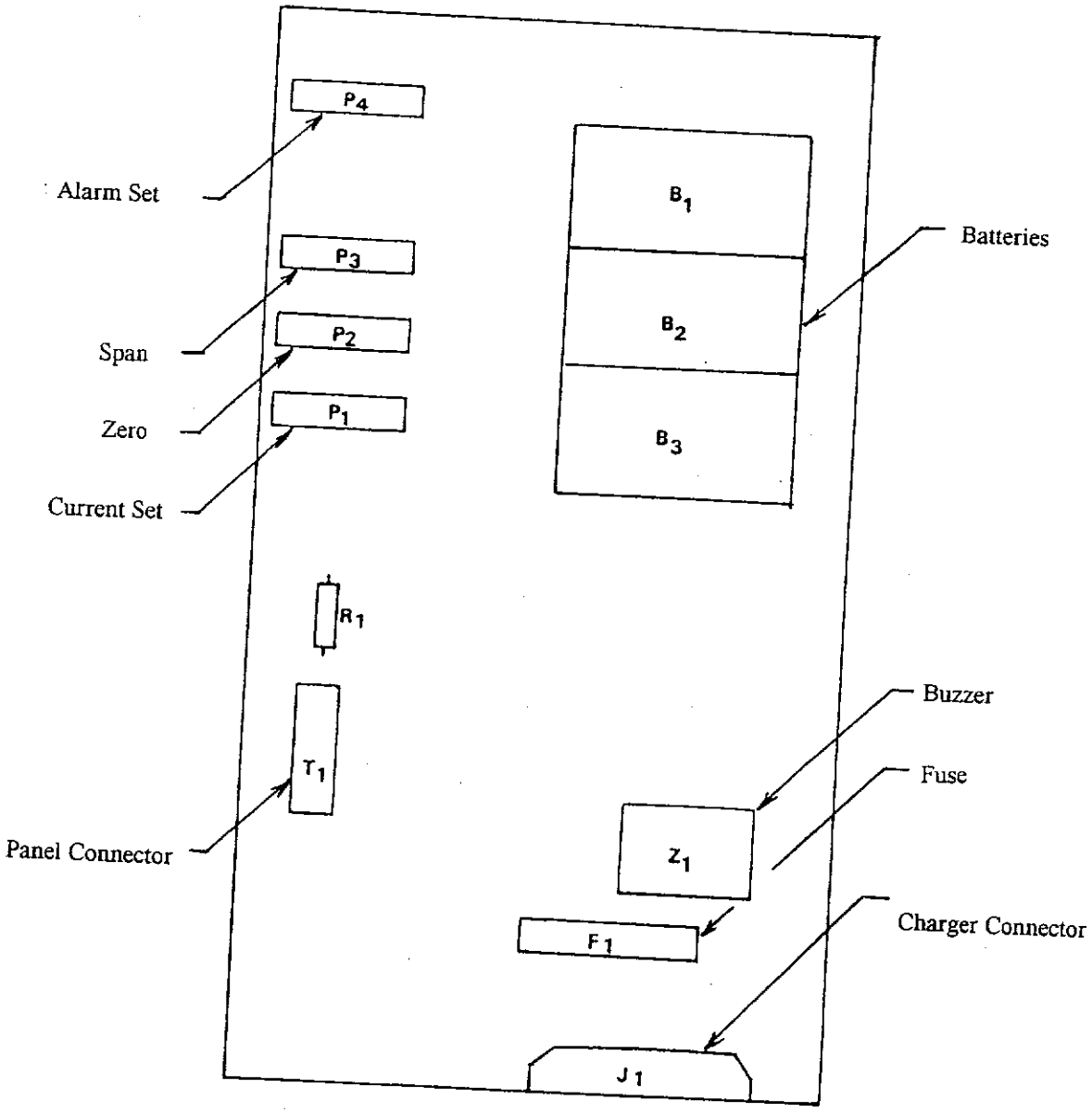
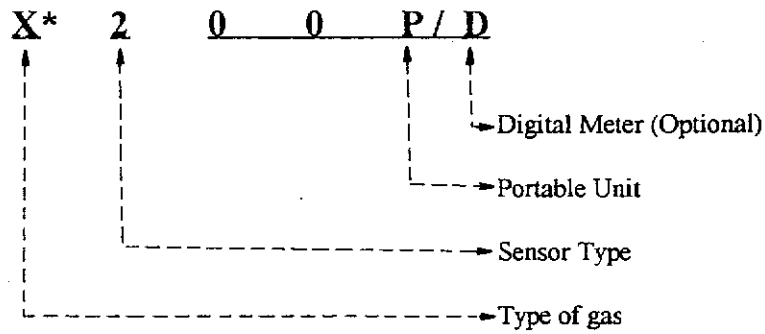


FIGURE 2. THE LAYOUT OF THE COMPONENTS ON THE CONTROL P.C. BOARD

V. SPECIFICATIONS

USI offers a series of portable gas detectors. Each gas detector uses a different sensor and circuit components. The model number indicates the type of gas detector.

The standard gas detector/monitor model are as follows:



For example: 5200P/D is a portable ammonia detector. 5 indicates the detector is used to detect ammonia, 2 is a semiconductor sensor, 00P is a portable unit, D uses Digital meter.

* X depends on the gas to be detected.

A. SENSOR

See the sensor specification Chart 1.

B. CONTROLLER

Dimensions:	4.3"W x 7.4"H x 2.8"D
Operating Temperature:	-50°F to +150°F
Weight:	2.0 lbs.
Power:	3.6 V Ni-Cad battery
Power Usage:	2.0 watts max.
Battery Signal:	Yellow LED light indicates battery is low
Operating Hours:	10 hours continuous (minimum)
Meter Range:	0-1000 ppm, or 0-100% LEL
Alarms:	Audio buzzer 75 dB Visual red LED light (Alarms level preset at the factory)
Battery Charge:	Built-in battery charger, charge when LED switch is set at CHARGE position and orange LED will turn on
Warranty:	Unit 1 year, battery 6 month

Sensors	SO_2	CO	NH_3	Hydrocarbon (no-methane)	ETO	H_2	Combustible Gases (Methane)	Freon
Model Number	3200-10	4200-10	5200-10	6200-10	ET6200-10	7200-10	8200-10	9200-10
Detection Method	Solid state diffusion	Solid state diffusion	Solid state diffusion	Solid state diffusion	Solid state diffusion	Solid state diffusion	Solid state diffusion	Solid state diffusion
Detectable Range (Standard)	0-1,000 ppm	0-1,000 ppm	0-1,000 ppm	0-1,000 ppm	0-10 ppm	0-20,000 ppm	0-50,000 ppm	0-1,000 ppm
Accuracy	±10%	±5%	±5%	±10%	±5%	±5%	±10%	±10%
Response Time (To 90% Full Scale)	<60 sec.	<30 sec.	<30 sec.	<30 sec.	<30 sec.	<30 sec.	<30 sec.	<30 sec.(R22, R502, R143A) <90 sec.(R113, R11, R123, R12)
Sensitivity (Full Scale)	±5%	±1%	±2%	±2%	±5%	±1%	±1%	±2% (R22, R502, R143A) ±5% (R113, R11, R123, R12)
Temperature Range	5 F° to 140 F°	5 F° to 140 F°	5 F° to 140 F°	5 F° to 140 F°	5 F° to 140 F°	5 F° to 140 F°	5 F° to 140 F°	5 F° to 140 F°
Humidity Range	5-95% R.H.	5-95% R.H.	5-95% R.H.	5-95% R.H.	5-95% R.H.	5-95% R.H.	5-95% R.H.	5-95% R.H.
Sensor Life	>1 yr.	>1 yr.	>2 yr.	>3 yr.	>2 yr.	>1 yr.	>1 yr.	>1 yr.
Warm Up Time	2 min.	2 min.	2 min.	2 min.	2 min.	2 min.	2 min.	2 min.
Zero Drift	<5%/mo.	<5%/mo.	<5%/mo.	<5%/mo.	<5%/mo.	<5%/mo.	<5%/mo.	<5%/mo.
Current Setting (mA)	255	250	260	255	250	250	250	230 (R22, R502, R143A) 250 (R113, R11, R123, R12)
Warranty (Normal Operation)	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.	1 yr.
Remote Sensor Cable Length	50 feet and up to 3,000 feet	50 feet and up to 3,000 feet	50 feet and up to 3,000 feet	50 feet and up to 3,000 feet	50 feet and up to 3,000 feet	50 feet and up to 3,000 feet	50 feet and up to 3,000 feet	50 feet and up to 3,000 feet
Electrical Classification (at hazardous atmosphere area)	Class I Division I Group C, D	Class I Division I Group C, D	Class I Division I Group C, D	Class I Division I Group C, D	Class I Division I Group B, C, D	Class I Division I Group B, C, D	Class I Division I Group B, C, D	Class I Division I Group B, C, D

CHART 1. SPECIFICATIONS FOR USI'S GAS SENSOR

VI. CALIBRATION PROCEDURES

USI portable gas detectors/monitors are easy to calibrate. For accurate measurement of the gas concentration, the gas detector requires regular calibration. USI recommends the user to calibrate the unit at least once every three (3) months and keep a record. If the sensor is tampered, and shows zero shift signal, it requires recalibration again.

The general calibration procedures are as follows:

(1) Turn on the LED POWER switch. The green light will turn on. Wait for 4~5 minutes until the sensor has warm up.

(2) Adjust the **ZERO** position by using a small screwdriver to adjust the **ZERO** potentiometer to bring the reading to the zero position at the gas free atmosphere.

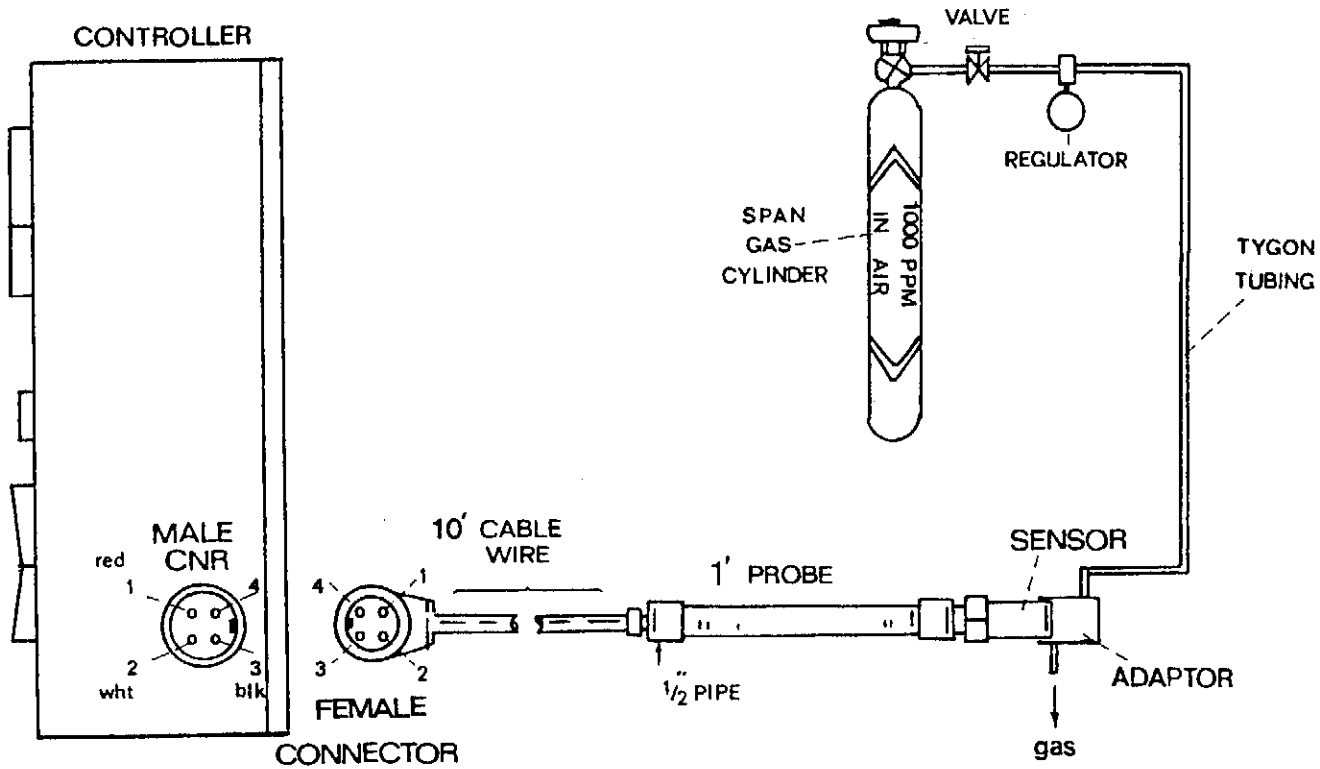
(3) Adjust the **SPAN** position by introducing standard span gas (for example, 1000 ppm) to the sensor. *An adaptor is provided for use in the flow calibration method, while a syringe and a 1-liter calibration kit is used to make a known gas concentration with the fixed chamber calibration method (see Figure 3 & 4). Adjust the **SPAN** potentiometer to match the meter reading with the concentration of the span gas. After the span adjustment, the meter will go back to zero in the gas-free background. If necessary, repeat procedures 2 and 3 again.

The unit can be used continuously for at least 10 hours before the LOW battery yellow LED light turns on. To re-charge the battery, simply connect the charge cable to the unit overnight. Power source can be either 115 V or 220 VAC, depending on the unit specification. The LED switch should be placed at CHARGE position and an orange LED light will turn on when the unit is being charged. The portable unit cannot be charged when the unit is being used.

NOTE: Steps 2 and 3 are normally pre-calibrated at the factory.

* With the chamber calibration method, injection of 1 cc. pure sample gas into a 1-liter container will dilute the sample gas in the chamber to 1000 ppm. By turning the ZERO potentiometer, and the SPAN potentiometer clockwise or counterclockwise, the signal reading can be increased or decreased.

[redacted]



CNR = Connector

FIGURE 3. DIAGRAM OF THE WIRE CONNECTION BETWEEN CONTROLLER AND THE GAS FLOW CALIBRATION METHOD

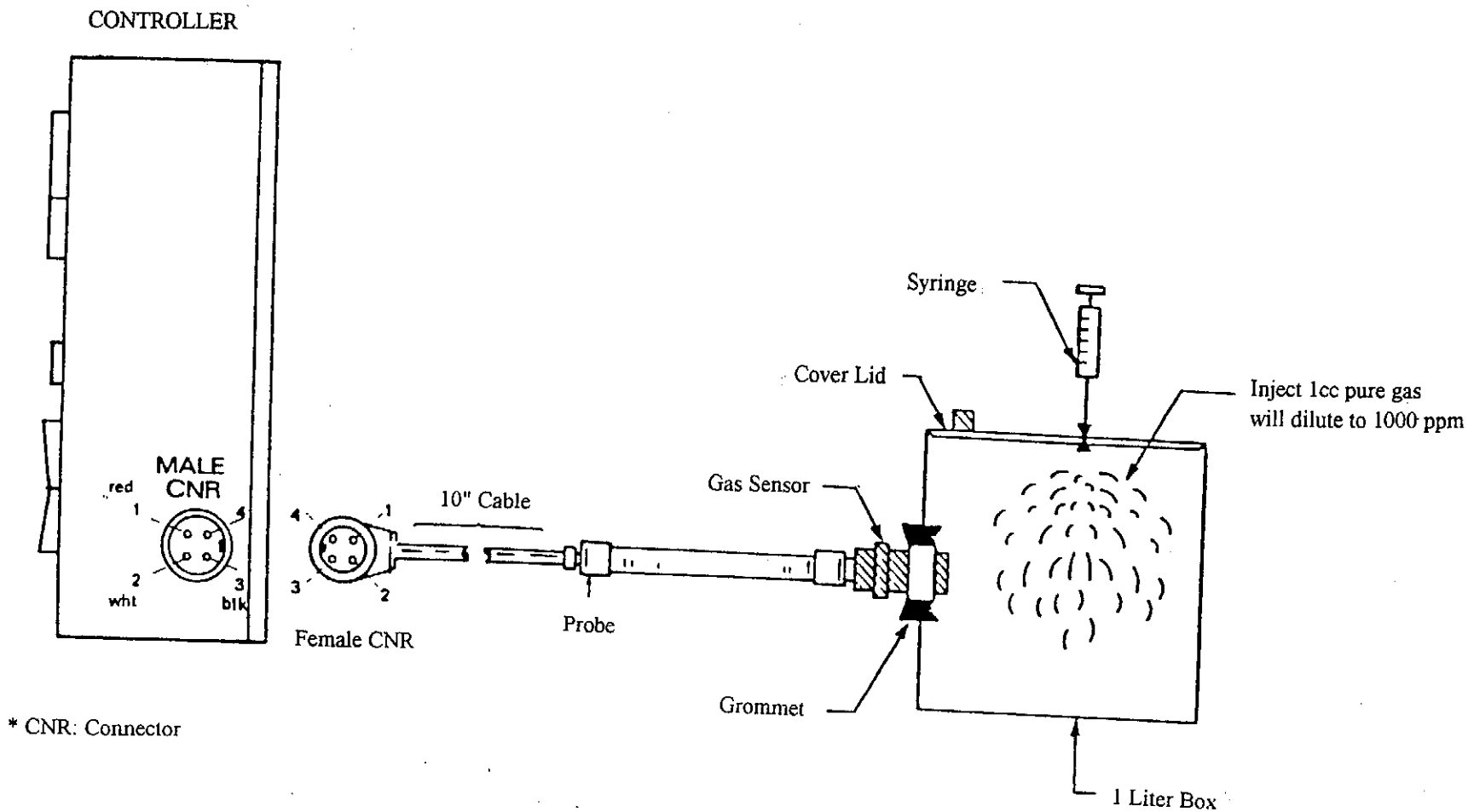


FIGURE 4. FIX VOLUME CALIBRATION METHOD FOR THE GAS SENSOR

VII. MAINTENANCE

It is necessary to maintain USI portable gas detectors regularly. Periodic calibration is necessary, which can be done according to the procedures in Section VI. If the detector is used for area monitoring, USI recommends to calibrate the sensor at least **once in every 3 months**.

The gas sensor is a solid-state type which can detect gas level at PPM range. The sensor should not be dipped in water, mud, liquid fluids, or be tampered. **Excessive mechanical shock should be avoided**. Exposure the sensor to high concentrations of acid fumes such as H_2SO_4, HCl, HNO_3, ...etc. should be avoided. This might corrode the sensing element. However, water vapor will not poison the sensor. If the sensor has been in high conc. of gas for a while, it is better to leave it in the open air when it is not in use. The sensor need to be recalibrated if you find it does not perform properly.

VIII. TROUBLESHOOTING AND REPAIR

USI controllers and sensors are under warranty for one year. If they do not operate properly, they can be returned for repair. If they are still under warranty (Page i), USI will repair or replace any parts or components free of charge if the failure is due to material defects. If the unit is damaged or tampered, the warranty will not apply. If the sensor itself fails, the green LED light will turn OFF and red LED light will turn ON. Either poor connection or disconnection between the cable and the controller unit will cause the red LED and buzzer to turn on. After you replace a new sensor, and the green LED turns ON and red LED turns OFF, does not turn on again, the old sensor must be bad and damaged. (The sensor temperature is kept constant, therefore the sensor wire will not burn out.)

The sensor will show slightly zero drift while in use. If this happens, the ZERO potentiometer at the left side of the controller unit can be used to adjust the zero baseline. High concentration of very corrosive gases, such as HCL, HF and H_2SO_4, may cause the sensor to have zero drift. Therefore, avoide to expose the sensor to these corrosive fumes.

If the alarm circuit is defective, the buzzer will not sound. If this occurs, replace the buzzer or check the ALARM set potentiometer on the PC board. Make sure its leg is not broken. If the LED lights fail, check the LED light itself and replace it if necessary. You can always send the unit back to USI for repair.

The portable unit is operating at a constant current. To check the current, just put a digital DC voltmeter across the 1 ohm resistor R1. If the reading is 0.250 VDC, this indicates the sensor has a 250 mA constant current. To increase or decrease the current, adjust the P1 potentiometer clockwise or counterclockwise, respectively.

IX. SENSOR REPLACEMENT PROCEDURE (See Figure 5)

(1) Turn off the power switch on the controller.

(2) Disconnect the wire and probe from the controller by loosing the connector lock and unplug the wire from the controller.

(3) Gently loose the connector from both top and the bottom of the probe. Then, replace a new sensor by cutting the wire off inside the probe and resolder the new sensor to the wire. Be sure, that the wire color codes for both the sensor and the wire are matched (Figure 5). Finally,connect the probe and wire back to the controller.

(4) Turn on the power switch and wait for 4-5 minutes. The green LED light should turn on. Then, callibrate the detector unit following the calibration procedures mentioned in Section VI.

NOTE: The assembly drawing of the sensor head (Figure 6).

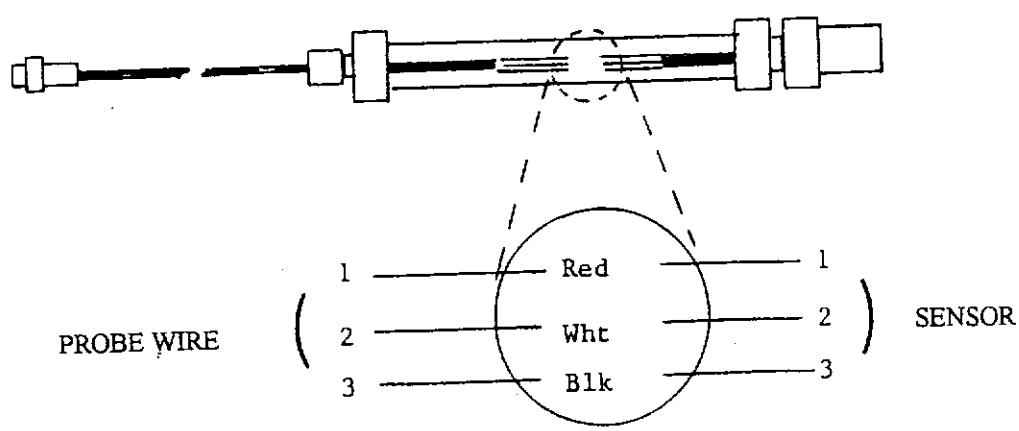


FIGURE 5. SENSOR AND PROBE WIRES CONNECTION DIAGRAM

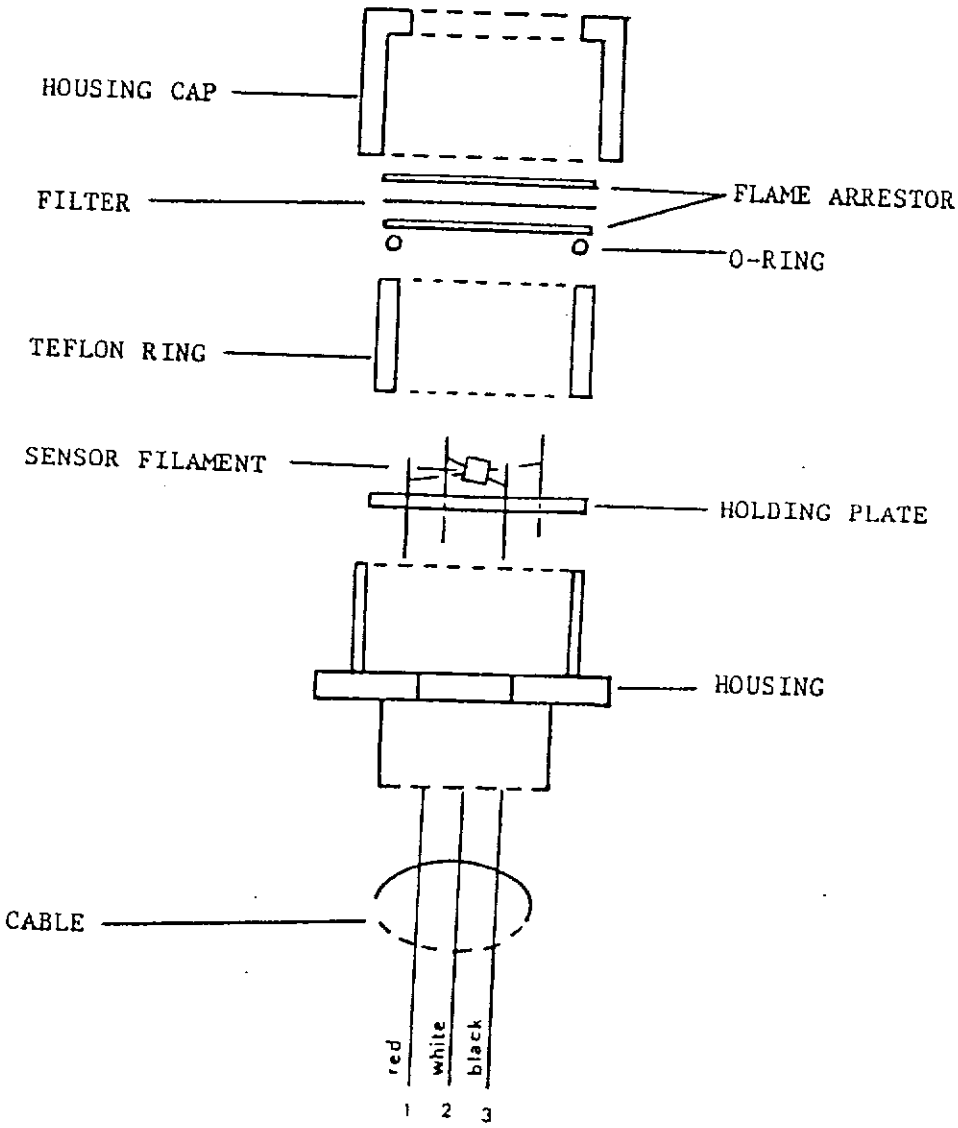


FIGURE 6. ASSEMBLY DRAWING OF THE SENSOR HEAD

X. METHOD OF ADJUSTING THE NEW ALARM SET POINT

(1) Turn the alarm SET potentiometer P4 clockwise four (4) revolutions.

(2) Turn the ZERO potentiometer P2 clockwise to the new alarm set point desired on the meter (Conduct this step while the sensor is at the vapor free environment).

(3) Turn the alarm SET potentiometer P4 counterclockwise slowly and stop when the ALARM LED light turns on.

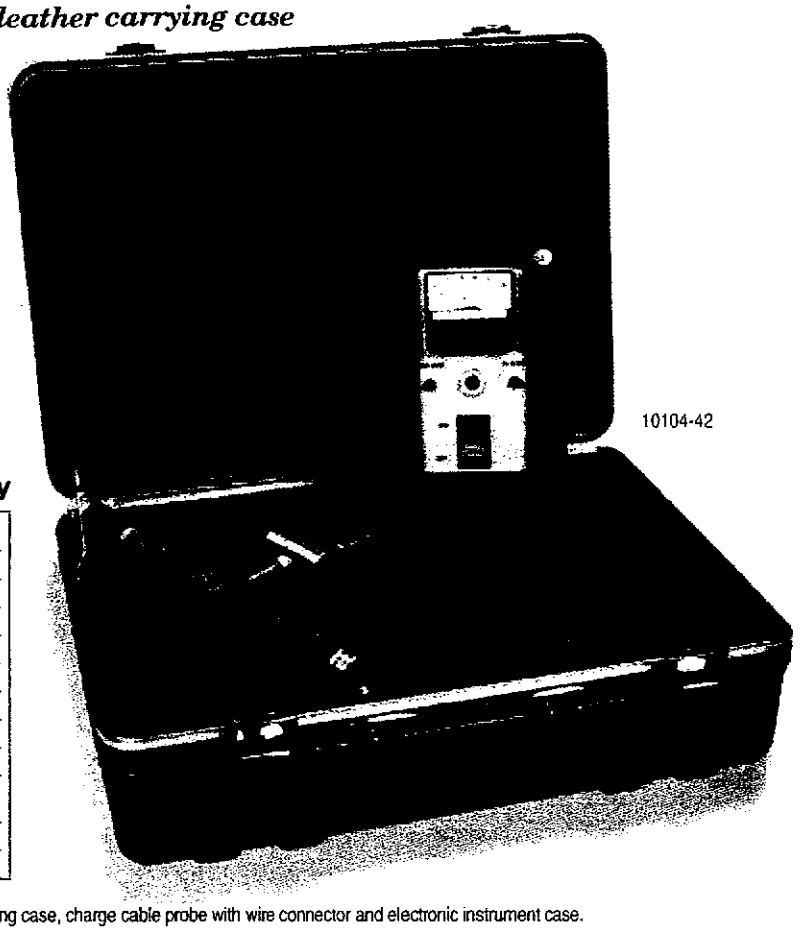
(4) Adjust the meter back to the zero position by turning the ZERO potentiometer P2 counterclockwise until the meter reads zero.

You can check the new alarm set point by slowly turning the zero potentiometer P2 clockwise and see whether the alarm LED light will turn on at the new set point. (If not, repeat steps 1 thru 4) Be sure to adjust the meter back to the zero position.

Portable Freon and Hydrogen Detectors

Rugged, compact, lightweight with leather carrying case

- Uses a UL approved solid state sensor with 1 year warranty (estimated life over 10 years)
- Accurate low ppm reading or % LEL reading
- Low battery warning light
- Analog or Digital reading
- Audio/visual alarms
- Built in battery charger
- High poison resistant to sulphur, lead, silicone, and halogenated compounds



10104-42

1 year warranty

SPECIFICATIONS	
Controller Dimensions	5" W x 8" H x 3" D
Operating Temp.	-10°F to +150°F (-20°C to +65°C)
Weight	2.0 lbs
Power	3.6V Ni-Cad battery
Power Usage	2.0 watt maximum
Battery Signal	yellow LED indicates low battery
Operating Hours	10 hours continuous (minimum)
Meter Range	ppm, % LEL, or both
Alarms	audio buzzer 75dB. Alarm lamp (red LED)
Panel Control	zero and span adjustments
Battery Charge	built in battery charger

Standard Accessories Include: Sensor, controller, batteries, carrying case, charge cable probe with wire connector and electronic instrument case.

Catalog No.	Model No.	Description	Price
ZT-10104-42	2200P	Hydrogen Sulfide detector	
ZT-10104-35	3200P	Sulfur Dioxide detector	
ZT-10104-36	4200P	Carbon Monoxide detector	
ZT-10104-37	5200P	Ammonia detector	
ZT-10104-38	6200P	Hydrocarbon (non-methane)/Gasoline & Diesel detector	
ZT-10104-43	ET6200P	Ethylene Oxide detector	
ZT-10104-39	7200P	Hydrogen detector (PPM)	
ZT-10104-40	8200P	Combustible (methane) detector (PPM)	
ZT-10104-44	9200P	Freon detector	
ZT-10104-34	0200P	Chlorine detector	
ZT-10104-41	8100P	Combustible (Methane) detector (% LEL)	
ZT-10104-33	7100P	Hydrogen detector (% LEL)	
ZT-10104-32	6100P	Hydrocarbon (non-methane) detector (% LEL)	
ZT-10104-31	5100P	Ammonia detector (% LEL)	
Standard model includes: Analog meter (PPM or % LEL), LED alarm, audio alarm, low battery and charge indicators and built-in charger.			

CAL **Calibration Services**
866-InnoCal (866-466-6225)

Attachment C:
Preliminary Methane and Pressure monitoring data

Chatham Co Landfill
Methane & Pressures Monitoring
4/9/2009

Monitoring Well	Time %LEL/ Pressure				
	11:20	11:25	11:30	11:35	11:40
NW-1	0.0/0.4	0.0/0.3	0.0/0.3	0.0/0.3	0.0/0.2
	14:20	14:25	14:30	14:35	14:40
NW-2	0.9/3.2	0.8/1.0	0.8/1.4	0.9/1.9	0.7/1.2
	13:30	13:35	13:40	13:45	13:50
NW-3	0.6/1.1	0.5/1.4	0.4/01.4	0.3/1.7	0.5/1.8
	12:10	12:15	12:20	12:25	12:30
NW-4	0.3/0.9	0.2/0.9	0.3/0.7	0.3/0.7	0.2/0.6
	12:45	12:50	12:55	13:00	13:05
NW-5	0.1/0.1	0.0/0.2	0.1/0.2	0.1/0.0	0.3/0.0

Attachment D:
Groundwater Monitoring Well Boring Logs

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611-7687
PHONE (919)733-3221

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-1N

DRILLING CONTRACTOR: ABC
DRILLER REGISTRATION NUMBER: 1747
STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Approximately 4 miles west of Pittsboro on Hwy 64
(Road, Community, or Subdivision and Lot No.)
County: Chatham

2. OWNER: Chatham Co.
ADDRESS: P.O. Box 87 (Street or Route No.)
Pittsboro (City or Town) NC (State) 27312 (Zip Code)

3. DATE DRILLED: 03/31/47 USE OF WELL: monitoring
4. TOTAL DEPTH: 22 CUTTINGS COLLECTED: ☐ Yes ☒ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: ≈10 FT. ☒ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): 0.25 METHOD OF TEST: est.
8. WATER ZONES (depth): 10-22
9. CHLORINATION: Type N/A Amount _____
10. CASING:

	Depth From	To	Ft.	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.5	7		2"	Sch. 40	PVC

11. GROUT:

	Depth From	To	Ft.	Material	Method
	0	5		Sand-Cement	
	5	6		Bentonite	

12. SCREEN:

	Depth From	To	Ft.	Diameter	Slot Size	Material
	7	22		2"	0.01 in.	PVC
				in.	in.	
				in.	in.	

13. GRAVEL PACK:

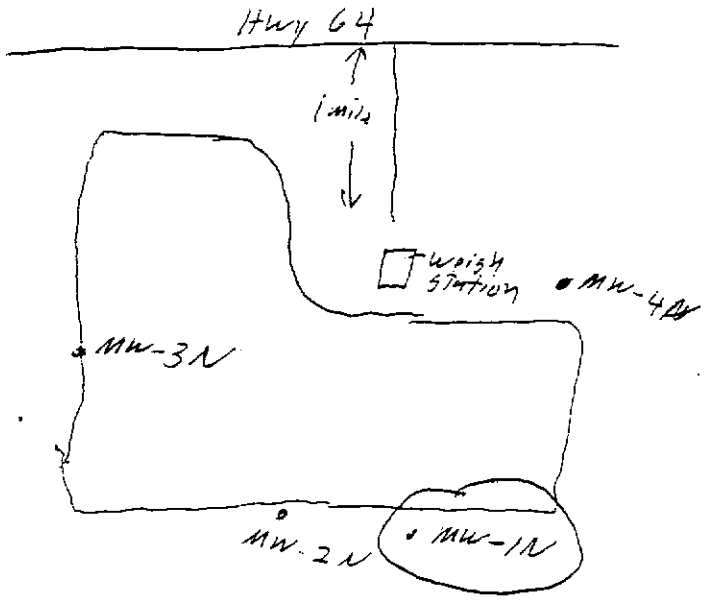
	Depth From	To	Ft.	Size	Material
	6	22		No. 2	quartz

14. REMARKS: _____

Depth From	To	DRILLING LOG Formation Description
0	9.5	Clay
9.5	14	Clay & silt
14	22	silt

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Anthony P. Dowling — 04/04/97
SIGNATURE OF CONTRACTOR OR AGENT — DATE

Submit original to Division of Environmental Management and copy to well owner.

W-1 REVISED 2/90

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611-7687
PHONE (919)733-3221

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD MW-2N

DRILLING CONTRACTOR ABC
DRILLER REGISTRATION NUMBER 1747
STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Approximately 4 miles west of Pittsboro on Hwy 64
(Road, Community, or Subdivision and Lot No.)
County: Chatham
2. OWNER Chatham Co.
ADDRESS P.O. Box 87 (Street or Route No.)
Pittsboro (City or Town) NC (State) 27312 (Zip Code)
3. DATE DRILLED 04/01/97 USE OF WELL monitoring
4. TOTAL DEPTH 27 CUTTINGS COLLECTED ☐ Yes ☒ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: ≈13 FT. ☒ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): ≈0.25 METHOD OF TEST est.
8. WATER ZONES (depth): 13-27
9. CHLORINATION: Type N/A Amount _____
10. CASING:

	Depth From	Depth To	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.5	12	2"	Sch. 40	PVC

11. GROUT:

	Depth From	Depth To	Material	Method
	0	8	Sand-cement	
	8	10	Bentonite	

12. SCREEN:

	Depth From	Depth To	Diameter	Slot Size	Material
	12	27	2"	0.01	PVC

13. GRAVEL PACK:

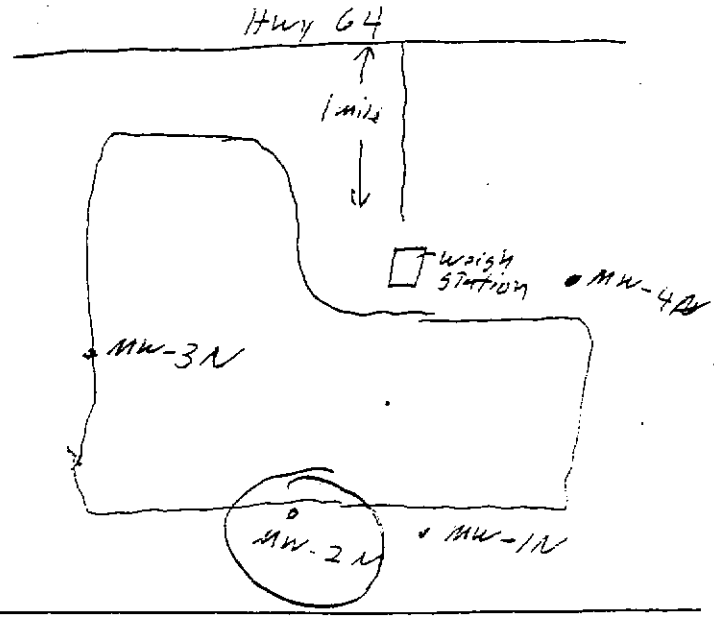
	Depth From	Depth To	Size	Material
	10	12	No. 2	quartz

14. REMARKS:

DRILLING LOG Depth From	Depth To	Formation Description
0	8.5	Clay & SILT
8.5	15	silty
15	27	bedrock

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Anthony P. Downing 04/04/97
SIGNATURE OF CONTRACTOR OR AGENT DATE

GW-1 REVISED 2/90

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611-7687
PHONE (919)733-3221

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-3N

DRILLING CONTRACTOR: ABC
DRILLER REGISTRATION NUMBER: 1747
STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Approximately 4 miles west of Pittsboro on Hwy 64
(Road, Community, or Subdivision and Lot No.)
County: Chatham

2. OWNER: Chatham Co.
ADDRESS: P.O. Box 87 (Street or Route No.)
Pittsboro (City or Town) NC (State) 27312 (Zip Code)

3. DATE DRILLED: 04/01/97 USE OF WELL: monitoring
4. TOTAL DEPTH: 20 CUTTINGS COLLECTED: ☐ Yes ☒ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: _____ FT. ☐ above ☒ below TOP OF CASING.
TOP OF CASING IS 2.5 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): <0.25 METHOD OF TEST: est.
8. WATER ZONES (depth): 8 - 20
9. CHLORINATION: Type N/A Amount _____
10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
	0	5	2"	Sch. 40	PVC

11. GROUT:

	Depth From	To	Material	Method
	0	3	Sand-Cement	
	3	4	Bentonite	

12. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
	5	20	2"	0.01 in.	PVC

13. GRAVEL PACK:

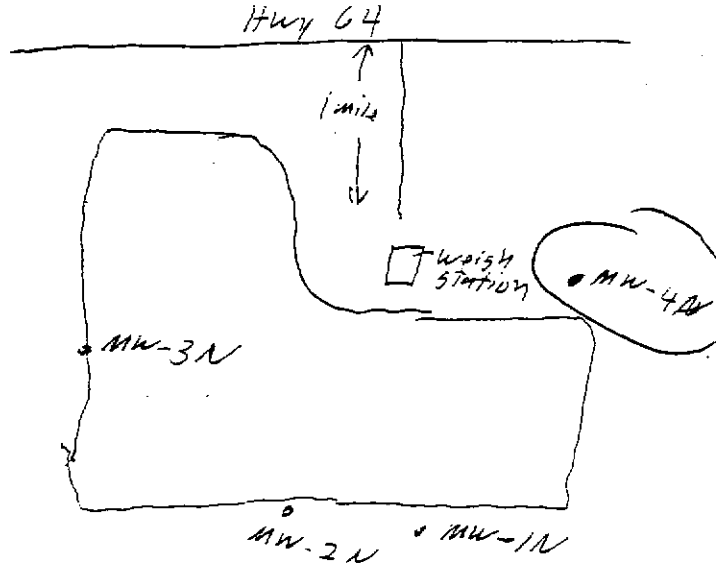
	Depth From	To	Size	Material
	4	20	No. 2	quartz

14. REMARKS:

Depth From	To	ORILLING LOG Formation Description
0	8	Clay
8	12	silt
12	20	bedrock

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT _____ DATE 04/04/97

GW-1 REVISED 2/90

Submit original to Division of Environmental Management and copy to well owner.

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT, HEALTH AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611-7687
PHONE (919)733-3221

FOR OFFICE USE ONLY
Quad. No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

MW-4N

DRILLING CONTRACTOR: ABC
DRILLER REGISTRATION NUMBER: 1747
STATE WELL CONSTRUCTION PERMIT NUMBER: N/A

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Approximately 4 miles west of Pittsboro on Hwy 64
(Road, Community, or Subdivision and Lot No.)
County: Chatham

2. OWNER: Chatham Co.
ADDRESS: P.O. Box 87 (Street or Route No.)
Pittsboro (City or Town) NC (State) 27312 (Zip Code)

3. DATE DRILLED: 06/16/97 USE OF WELL: monitoring
4. TOTAL DEPTH: 62.5 CUTTINGS COLLECTED: ☐ Yes ☒ No
5. DOES WELL REPLACE EXISTING WELL? ☐ Yes ☒ No
6. STATIC WATER LEVEL: 2.49 FT. ☒ above ☐ below TOP OF CASING.
TOP OF CASING IS 2.38 FT. ABOVE LAND SURFACE.
7. YIELD (gpm): 20.5 METHOD OF TEST: est.
8. WATER ZONES (depth): 49-62.5
9. CHLORINATION: Type N/A Amount _____
10. CASING:

	Depth From	To	Diameter	Wall Thickness or Weight/Ft.	Material
	+2.38	47.5	2"	Sch. 40	PVC

11. GROUT:

	Depth From	To	Material	Method
	0	4	Sand-Cement	
	40	45.5	Bentonite	

12. SCREEN:

	Depth From	To	Diameter	Slot Size	Material
	47.5	62.5	2"	0.01 in.	PVC
				in.	
				in.	

13. GRAVEL PACK:

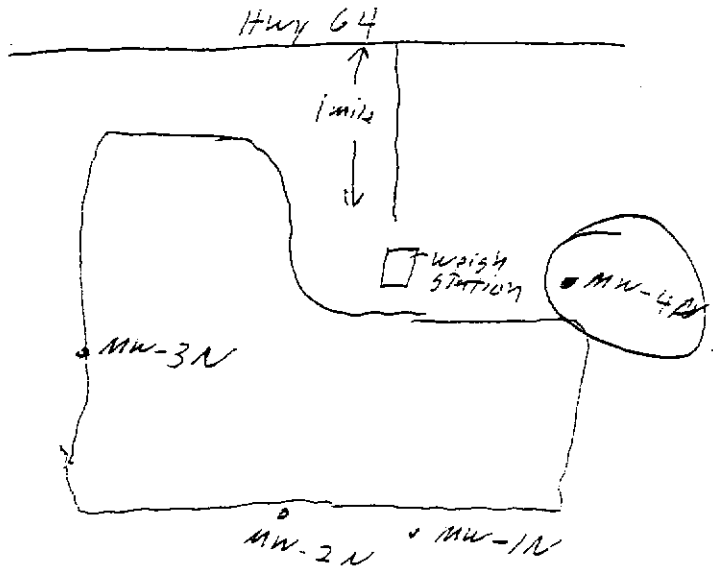
	Depth From	To	Size	Material
	45.5	62.5	No. 2	quartz

14. REMARKS: _____

Depth From	To	DRILLING LOG Formation Description
0	4	Clay
4	14	silty
14	62.5	bedrock

If additional space is needed use back of form.

LOCATION SKETCH
(Show direction and distance from at least two State Roads, or other map reference points)



I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION STANDARDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

SIGNATURE OF CONTRACTOR OR AGENT: [signature] DATE: 06/18/97

GW-1 REVISED 2/90

Submit original to Division of Environmental Management and copy to well owner.

Richardson Smith Gardner & Assoc
14 North Boylan Avenue, Raleigh NC 27603
(919) 828-0577

FIELD BOREHOLE LOG

BOREHOLE NUMBER **MW-5**

PROJECT NAME: **Chatham County Landfill**
LOACATION: **Pittsboro, NC**
DRILLING CO: **Engineering Tectonics, P.A.**
DRILLING METHOD: **AR/AH**
FIELD PARTY: **D. Barron**
GEOLOGIST: **J. Smyth**
DATE BEGUN: **1/14/09** COMPLETED: **1/14/09**

TOTAL DEPTH: **47**
TOP OF CASING ELEVATION: 515.58
GROUND SURFACE ELEVATION

STATIC WATER LEVEL (BLS)		
Depth (ft)		
Time		
Date		

DEPTH	BLOW COUNT	SAMPLING METHOD	RECOVERY	DRILL METHOD	DESCRIPTION	LITHOLOGY	DEPTH	WELL INSTALLATION
0.0				AR	CLAYEY SILT: Dry, red clayey silt to silty clay. Iron stained.		0.0	
1.0							1.0	
2.0							2.0	
3.0	7,8,11	SS	18"				3.0	
4.0							4.0	
5.0							5.0	
6.0							6.0	
7.0							7.0	
8.0	7,8,9	SS	10"		CLAYEY SILT: Dry, red clayey silt to silty clay. Iron and Mn stained.		8.0	
9.0							9.0	
10.0							10.0	
11.0							11.0	
12.0							12.0	
13.0	8,9,11	SS	18"				13.0	
14.0							14.0	
15.0							15.0	
16.0							16.0	
17.0							17.0	
18.0	14,20,20	SS	12"		CLAYEY SILT: Dry, greenish brown clayey silt. Some Mn staining.		18.0	
19.0							19.0	
20.0							20.0	
21.0							21.0	
22.0							22.0	
23.0	32,50/4	SS	10"		CLAYEY SILT: Dry, greenish brown clayey silt to silty clay.		23.0	
24.0							24.0	
25.0							25.0	
26.0							26.0	
27.0							27.0	
28.0	26,50/4	SS	6"		CLAYEY SILT: Dry, greenish brown clayey silt to silty clay. Trace of very fine sand.		28.0	
29.0							29.0	
30.0							30.0	

Richardson Smith Gardner & Assoc
14 North Boylan Avenue, Raleigh NC 27603
(919) 828-0577

FIELD BOREHOLE LOG

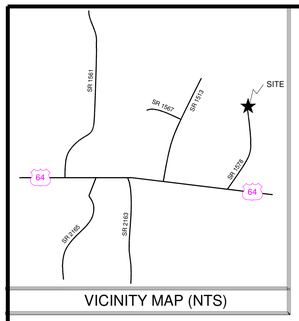
BOREHOLE NUMBER **MW-5**

PROJECT NAME: **Chatham County Landfill**
LOACATION: **Pittsboro, NC**
DRILLING CO: **Engineering Tectonics, P.A.**
DRILLING METHOD: **AR/AH**
FIELD PARTY: **D. Barron**
GEOLOGIST: **J. Smyth**
DATE BEGUN: **1/14/09** COMPLETED: **1/14/09**

TOTAL DEPTH: 47
TOP OF CASING ELEVATION: 515.58
GROUND SURFACE ELEVATION

STATIC WATER LEVEL (BLS)		
Depth (ft)		
Time		
Date		

DEPTH	BLOW COUNT	SAMPLING METHOD	RECOVERY	DRILL METHOD	DESCRIPTION	LITHOLOGY	DEPTH	WELL INSTALLATION
30.0							30.0	
31.0							31.0	
32.0							32.0	
33.0		Grab		AH	MAFIC METAVOLCANIC: Mafic metavolcanic bedrock. At 37', wet mafic metavolcanic bedrock. Water coming out up out of hole. Borehole producing water while drilling. Fracture indications (air hammer sputtering) around 40' and 43'. Boring terminated at 47' and well set.		33.0	
34.0							34.0	
35.0							35.0	
36.0							36.0	
37.0		Grab					37.0	
38.0							38.0	
39.0							39.0	
40.0							40.0	
41.0							41.0	
42.0							42.0	
43.0							43.0	
44.0							44.0	
45.0							45.0	
46.0							46.0	
47.0							47.0	



VICINITY MAP (NTS)

N.C. GRID NORTH - NAD83
PLAT SLIDE 91-192

SCALE: 1"= 200'-0"

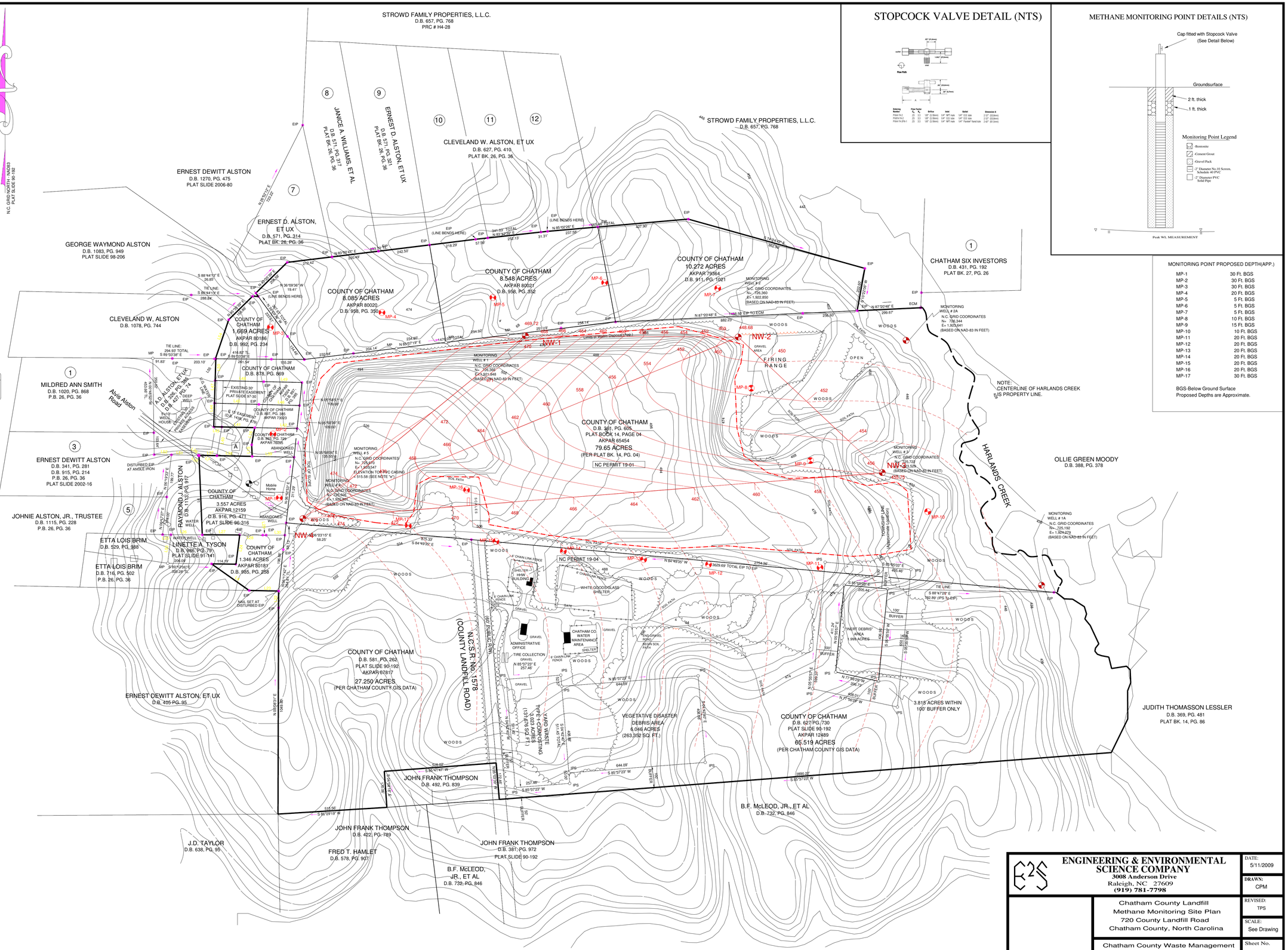
0 25 50 100 200 400 600 FEET

STOPCOCK VALVE DETAIL (NTS)

METHANE MONITORING POINT DETAILS (NTS)

MONITORING POINT	PROPOSED DEPTH(APP.)
MP-1	30 Ft. BGS
MP-2	30 Ft. BGS
MP-3	30 Ft. BGS
MP-4	20 Ft. BGS
MP-5	5 Ft. BGS
MP-6	5 Ft. BGS
MP-7	5 Ft. BGS
MP-8	10 Ft. BGS
MP-9	15 Ft. BGS
MP-10	10 Ft. BGS
MP-11	20 Ft. BGS
MP-12	20 Ft. BGS
MP-13	20 Ft. BGS
MP-14	20 Ft. BGS
MP-15	20 Ft. BGS
MP-16	20 Ft. BGS
MP-17	30 Ft. BGS

BGS-Below Ground Surface
Proposed Depths are Approximate.



LINE DATA TABLE		
LINE	DIRECTION	DISTANCE
L4	N 54°44'34" W	217.03'
L6	N 02°22'53" W	371.95'
L7	N 02°22'53" W	2.61'
L8	N 02°22'53" W	66.51'
L15	N 02°22'53" W	54.67'
L16	N 10°01'29" E	81.84'
L22	N 00°18'43" E	78.85'
L23	S 88°51'18" E	138.94'
L24	N 07°19'30" E	138.68'
L25	S 88°52'40" E	39.22'
L26	S 89°46'30" E	147.74'
L27	S 89°46'30" E	175.22'
L28	S 89°45'53" E	109.54'
L29	S 89°45'53" E	15.88'
L30	S 89°46'36" E	87.90'
L31	N 06°23'45" E	145.41'
L32	N 54°52'13" W	91.41'
L33	N 54°52'13" W	146.23'
L34	N 56°25'09" W	165.56'
L35	N 56°25'09" W	4.87'
L36	S 88°43'15" E	3.95'
L37	S 88°51'11" E	84.33'
L38	S 88°52'53" E	166.14'
L39	S 88°52'53" E	197.49'
L40	N 09°42'33" E	137.25'
L41	S 88°46'26" E	154.97'
L42	S 88°46'55" E	199.62'
L43	S 88°48'53" E	37.79'
L44	N 01°42'12" E	111.10'
L45	S 88°25'37" E	208.84'
L46	S 88°25'37" E	191.68'
L47	N 01°42'59" E	106.67'
L48	S 88°42'27" E	228.66'
L49	S 88°42'27" E	179.98'
L50	N 01°42'33" E	102.47'
L51	N 88°51'26" W	125.95'
L52	N 89°36'57" W	81.27'
L53	N 06°21'26" E	135.19'
L54	N 18°49'26" E	194.89'
L55	N 89°33'38" W	1.90'

ADJOINING LAND OWNER	
A	JOHN W. ALSTON, ET UX D.B. 574, PG. 892 PLAT SLIDE 91-188

NOTES:
(a) THE PROPERTY SHOWN HEREON IS SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD AFFECTING SAME.
(b) NO TITLE SEARCH HAS BEEN PERFORMED BY THIS FIRM DURING THE COURSE OF THIS SURVEY.
(c) THIS SURVEYOR DOES NOT CERTIFY TO THE EXISTENCE OR NON-EXISTENCE OF ANY UNDER GROUND UTILITIES THAT MAY OR MAY NOT BE PRESENT ON THIS SITE.
(d) BOUNDARY SURVEY WAS PERFORMED AUGUST 26, 1999. LOCATION SURVEY WAS PERFORMED FEBRUARY 12-17, 2009. DASHED BOUNDARY LINES WERE NOT SURVEYED BY THIS SURVEYOR. EDGE OF WOODS AS GRAPHICALLY PRESENTED HEREON WAS DRAWN BY USING CHATHAM COUNTY GIS AERIAL PHOTOGRAPHY AS THE SINGLE SOURCE OF INFORMATION.
(e) BASIS OF ELEVATION SHOWN HEREON IS FROM TABLE No. 1 GROUNDWATER MEASUREMENTS REPORT PROVIDED BY CHATHAM COUNTY (BOB HOLDEN), DATED 1997, WITH PUBLISHED WELL ELEVATION FOR MW-4N, TOP OF CASTING ELEVATION = 522.84 FEET.
(f) Property survey conducted by STALEY C. SMITH Registration Number L-3766
(g) ELEVATION CONTOURS WERE TAKEN FROM CHATHAM COUNTY GIS.

ALL DISTANCES ARE HORIZONTAL GROUND MEASUREMENTS.

AREA DETERMINED USING D.M.D. METHOD.

LEGEND

EIP - Existing Iron Pipe
IPS - Iron Pipe Set
ECM - Existing Concrete Monument
MP - Mathematical Point (Not Set)
℄ - Centerline
UG - Underground
HHW - Hazardous Household Waste

- Existing Iron Pipe
- Iron Pipe Set(Unless Otherwise Designated)
- 60D Nail Found
- 60D Nail Set
- Existing Concrete Monument
- Concrete Monument Set
- Groundwater Monitoring Well
- Methane Monitoring Point
- Limits of Waste Disposal (App.)
- Exsiting Topo Lines (2' Contours)

ENGINEERING & ENVIRONMENTAL SCIENCE COMPANY
3008 Anderson Drive
Raleigh, NC 27609
(919) 781-7798

Chatham County Landfill
Methane Monitoring Site Plan
720 County Landfill Road
Chatham County, North Carolina

Chatham County Waste Management
720 County Landfill Road
Chatham County, North Carolina

DATE: 5/11/2009
DRAWN: CPM
REVISED: TPS
SCALE: See Drawing
Sheet No. 1 of 1