O'BRIEN & GERE

September 4, 2009

Mr. Frank Sowers, P.E.
NYSDEC, Region 8
6274 East Avon-Lima Road
Avon, NY 14414-9519

Re: RI Phase II Work Plan Addendum
Proposed Modification 2 Revised
Former ITT Rochester Form Machine Facility
Site #8-28-112
Town of Gates, Monroe County
Order on Consent: Index # B8-0614-02-05

File: 3356/35273 #2

Dear Mr. Sowers:

The following presents a revised Proposed Modification 2 to the Remedial Investigation Phase II Work Plan Addendum (Phase II Work Plan). The Phase II Work Plan was originally submitted to the New York State Department of Environmental Conservation (NYSDEC) on February 8, 2007. A revised Phase II Work Plan was submitted on August 17, 2007. NYSDEC provided approval for the revised Phase II Work Plan in a letter dated September 28, 2007. A proposed modification to the Phase II Work Plan (Modification 1) was submitted on January 7, 2008 and approved by NYSDEC in a letter dated January 14, 2008.

Subsequently, in April 2008, a natural gas pocket was encountered while drilling AMSF-MW-17MP. It was determined that a protocol, and associated standard operating procedures (SOPs), for management and mitigation of natural gas, if encountered during the balance of the investigation, should be developed. As a result, a proposed modification to the Phase II Work Plan (Modification 2), dated March 3, 2009, was prepared and submitted to the NYSDEC on March 3, 2009. At the request of NYSDEC, a meeting was held on April 4, 2009 to discuss the protocol and SOPs in an effort to help better understand and address the challenges associated with drilling in the presence of natural gas. Based on that meeting and subsequent communications (described below) with property owners adjacent to the site, specifically Maguire Family Properties ("MFP") (the current property owner of the former Alliance Metal Stamping and Fabricating [AMSF] facility), and Cinemark USA, Inc. (Cinemark), this letter revises the Phase II Work Plan (Modification 2), referred to as Modification 2 Revised. The following attachments are referenced in this letter:

- Stratigraphic Section Figure
- Natural Gas Mitigation Protocol and Associated SOPs
- Appendix C - Health and Safety Plan (HASP) (Modification 2)
- Air Emission Worksheet

- Air Dispersion Modeling Analysis

During implementation of the Phase II Work Plan on March 19, 2008, a pocket of natural gas was encountered between 154 and 159 feet (ft) below ground surface (bgs) during the bedrock coring process at AMSF-MW-17MP, resulting in natural gas venting to the atmosphere. NYSDEC was immediately notified, and after a subsequent conference call with NYSDEC on March 20, 2008, the borehole was properly abandoned with NYSDEC approval. These events were also documented to NYSDEC in Monthly Status Report #46 for March 2008, submitted on April 10, 2008. This natural gas was encountered while drilling in the Rochester Shale. As a result, the bedrock coring program has been revised to include protocols for safely managing natural gas pockets should they be encountered in the future. As a result, O'Brien & Gere Engineers, on behalf of ITT Corporation (ITT), is proposing a modified approach for the RI Phase II bedrock coring program.

The modified approach presented in this letter proposes to revise the use of packer testing, obtain data that would have been provided by the packer testing using alternate methods, refine the criteria for determining the terminal depth of each borehole, reduce the likelihood of encountering natural gas during bedrock core drilling, and provide protocols focused on health and safety management of natural gas that, while not expected, may be encountered during future bedrock core drilling. In addition, this proposed modification also includes a proposal for the well construction of the borehole AMSF-MW-18MP which will satisfy the purpose of AMSF-MW-17MP (which was abandoned in April 2008 as a result of the natural gas that was encountered at that borehole, and which will not be replaced).

Alternate Terminal Boring Depth

The approved modifications to the Phase II Work Plan (Modification 1, January 2008) specified that ground water sample collection by packer testing of the bedrock boreholes would be completed once per day spanning the lowest 10-foot zone of the borehole from the top of bedrock to the terminal depth. These packer tests would provide volatile organic compound (VOC) concentrations for the initial boring (AMSF-MW-18MP) to aid in the determination of the terminal depth of that borehole. Per the Phase II Work Plan, the total depth of borehole AMSF-MW-18MP would be selected based on ground water grab sample results from packer testing. Drilling would continue until these grab samples indicate that 1,1,1-trichloroethane (TCA) concentrations were approximately 100 micrograms per liter (μg/L) or less or up to a maximum depth of 250 ft, whichever is encountered first. "In the event that TCA concentrations remain above 100 μg/L at 250 ft or if TCA concentrations remain above 100 μg/L at the Rochester Shale-Decew Formation interface, drilling would stop" (Phase II WP Addendum Mod 1, Jan 2008). The terminal depth of borings AMSF-MW-19MP, ITT-MPBW-21, and ITT-MPBW-22 would be the same as AMSF-MW-18MP.

Based on the evaluation of bedrock core retrieved to date, the top of the Gates Member of the Rochester Shale Formation is believed to occur at a depth of approximately 120 to 130 ft bgs or 440 to 430 ft above mean sea level (amsl) (see Attachment 1, Stratigraphic Section Figure). Elevated TCA concentrations are known to exist at a depth of approximately 150 ft bgs based on data from AMSF-RW-2, AMSF-MW-17MP, and other boring data. Therefore, it appears that elevated TCA concentrations occur within the upper portion of the Rochester Shale.

In addition, while coring AMSF-MW-17MP (which is within approximately 10 ft of the partially cored AMSF-MW-18MP), the core barrel was pulled back to allow for packer testing at a depth of between 154 ft and 159 ft bgs (406 ft to 401 ft amsl). As this was being done, the natural gas pocket was encountered, which resulted in natural gas venting to the atmosphere. The presence of natural gas generates potential explosion hazards and air quality health and safety concerns for personnel occupying the exclusion zone. Conducting a packer test requires the coring rod string to be retracted, increasing the likelihood of a natural gas release at the surface in the exclusion zone. In addition, packer testing can not be performed if natural gas is venting from the borehole.

Because of the natural gas encounter in AMSF-MW-17MP a protocol, and associated SOPs, to manage and mitigate any potential future natural gas encountered during drilling were developed. As stated above, these were submitted to the NYSDEC on March 3, 2009. Upon review and discussion of the protocol and SOPs, the NYSDEC, ITT, MFP, and Cinemark collectively raised concerns about the possible risk of drilling through natural gas pockets in the deeper zones. MFP specifically advised ITT that it was opposed to allowing the proposed natural gas mitigation system equipment on its property and proposed that ITT contact the NYSDEC to request revising the Phase II Work Plan so that remaining drilling on the MFP property be terminated at depths that are above the expected potential natural gas pockets in the bedrock (i.e., above 150 ft bgs). The protocol and SOPs were developed based on empirical information gathered during the previous encounter of natural gas (which occurred at a depth of between 154 and 159 ft bgs); but the actual pressures that may be encountered at greater depths are not known. Therefore, drilling to depths greater than 150 ft bgs involves a higher risk of encountering natural gas (with pressures that could theoretically exceed the capabilities of the proposed natural gas mitigation system equipment on site), even with the protocol and SOPs in place.

The above issues were discussed during the April 7, 2009 meeting in addition to several other items that would support drilling to a total depth of 150 ft., including:

- The deep bedrock contamination present in the Rochester Shale formation is an unlikely source of drinking water due to the natural presence of petroleum compounds (although at this time it is not known for certain that there are no wells in this formation; further review will be conducted to determine this).

- The highly reducing conditions expected to be present in the deep bedrock zone should enhance natural degradation processes. While at this time significant levels of breakdown products were not observed in the deep rock cores, the concentrations in the deep rock cores as shown by the rock core data to date are limited to one location only.

- Remedial options may be limited in the deep bedrock due to the high porosity and high organic content of the rock. These conditions should also help limit the extent of contamination migration so that theoretically, the extent of the deep bedrock contamination should be smaller than the extent of the shallow bedrock contamination.

- The potential need for evacuation plans for the MFP and Cinemark buildings if high pressure gas were to be encountered at depths below 150 ft.

Subsequent to the April 7, 2009 meeting, Cinemark expressed concern to ITT over further drilling in the wells on the Cinemark property that could result in encountering natural gas. Cinemark commented that after reviewing the materials regarding the modifications to the Phase II Work Plan to account for the possibility of encountering natural gas (i.e., the RI Phase II Work Plan Addendum Proposed Modification 2, dated March 3, 2009 and related natural gas mitigation protocol and standard operating procedures), Cinemark would prefer that further drilling on the Cinemark property not take place unless it is determined that further drilling is reasonably necessary in order to fully contain the contamination and/or significantly contribute to the clean-up process.

In addition, subsequent to the April 7, 2009 meeting, MFP provided further comments regarding the Phase II Work Plan Addendum Proposed Modification 2 and related natural gas mitigation protocol and standard operating procedures in a letter dated April 15, 2009. Specifically, MFP stated that it would like the NYSDEC and ITT to reconsider whether the additional deep bedrock coring process below 150 ft is necessary given the risks from the drilling. The letter also stated that if the NYSDEC and ITT insisted on continuing this aspect of the RI, MFP would seriously consider whether to revoke ITT's access to the property for this aspect of the RI.

Therefore, for the reasons stated above, we recommend that additional drilling efforts performed for the RI Phase II do not exceed 150 ft bgs in total depth. As a result, no further bedrock coring will be performed at AMSF-MW-18MP (currently cored to 149 ft bgs or 411 ft amsl) in an effort to avoid encountering additional natural gas in the Rochester Shale. As such, the remaining boreholes (AMSF-MW-19MP, ITT-MPBW-21, and ITT-MPBW-22) will be completed to approximately 410 ft amsl, consistent with the bottom of AMSF-MW-18MP. Drilling will be performed consistent with Proposed Modification 2 Revised and the attached protocol, should natural gas be encountered above 150 ft bgs. If natural gas is encountered above 150 ft bgs, it is anticipated to be safely managed using the attached protocol and standard operating procedures. However, if natural gas is encountered, NYSDEC will be consulted to discuss the next course of action.

At each remaining boring location, packer tests will be performed in accordance with Work Plan Modification 1 to provide additional vertical profile information. In the event natural gas discharge is detected during drilling activities, packer testing will not be completed on the boring.

Natural Gas Mitigation Protocol

As noted above, natural gas was encountered while bedrock coring at the AMSF-MW-17MP location on March 19, 2008 between 154 and 159 ft bgs (406 ft to 401 ft amsl). The presence of natural gas has raised health and safety concerns for personnel occupying the exclusion zone, a potential exposure concern to the local community, as well as creating natural gas management issues for the drilling program.

The modifications presented in the attached Natural Gas Mitigation Protocol (NGMP) and associated SOPs (Attachment 2), and in the revised HASP (Attachment 3) are proposed to address these health and safety concerns and to allow continued coring work should natural gas be encountered during implementation of the field work. ITT and O'Brien & Gere are proposing that the NGMP be included in Appendix E of the Phase II Work Plan. We are also proposing that the revised sections of the HASP, provided in the attachment, be approved for implementation at the site. A natural gas mitigation flow chart, well head diverter figures, and a conceptual work zone layout figure are provided in the NGMP for visual representation of the general layout of components outlined in the protocol. Design documents, including the thermal oxidizer design document, will be provided to NYSDEC upon request.

The NGMP outlines natural gas management and destruction by use of a thermal oxidizer. Based on paragraph XIV.D. of the August 12, 2003 Order on Consent and discussions with NYSDEC, it is our understanding that a permit will not be required during operation of the proposed thermal oxidizer while conducting investigation activities consistent with this Phase II Work Plan; however, an Air Emission Worksheet and Air Dispersion Modeling Analysis and are included in Attachment 4 as per NYSDEC's request during a conference call on April 24, 2008. ITT will request written confirmation from NYSDEC that ITT is exempt from any requirement or request to obtain any permit for the on-Site and off-Site operation of the proposed thermal oxidizer and ITT will not proceed until written confirmation is received.

Based on discussions with the driller and personnel from the oil and gas section of the NYSDEC, documentation is not available on the pressure of the natural gas pockets that might be encountered. However, based on these discussions, an average natural gas pressure gradient of 0.465 psi/ft is a reasonable expectation. Based on this gradient, a natural gas pressure of up to 70 psi may be encountered at 150 ft bgs. Incorporating a 100% safety factor results in a maximum natural gas pressure of approximately 140 psi. Therefore, should natural gas be encountered, the natural gas mitigation protocols and SOPs have been developed to handle 150 psi natural gas pressure (150 psi was selected due to equipment availability). While not expected, if gas pressure of greater than 150 psi is encountered, we will attempt to close the well. If the well cannot be closed and gas contained, the immediate area will be evacuated as needed.

A practice run of the NGMP procedures will be completed before drilling to a depth of 120 feet bgs. This practice run will be documented and reviewed during daily tailgate safety meetings,

Modification of Well AMSF-MW-18MP

The approved Phase II Work Plan states that "This borehole (AMSF-MW-17MP) will extend to a depth of 170 ft bgs (390 ft amsl) and will be used to characterize the COC mass distribution in the bedrock to that depth."

The AMSF-MW-17MP borehole was properly abandoned with NYSDEC approval (March 20, 2008 e-mail correspondence) to control the emission of natural gas. Due to the presence of natural gas, AMSF-MW-18MP will be terminated at 149 ft bgs (411 ft amsl), the current depth of the borehole, as a measure to avoid encountering natural gas. Well AMSF-MW-18MP will satisfy the purposes of well AMSF-MW-17MP, which will not be replaced. Well construction for AMSF-MW-18MP will be completed similar to the proposed design of AMSF-MW-17MP.

Work Plan Revisions

The following presents the proposed modifications to the approved Phase II Work Plan, as presented above:

Modification 1: Bedrock Coring in the Presence of Natural Gas

If natural gas is encountered during the completion of the site borings, the attached NGMP and associated SOPS and the HASP will be implemented to manage the natural gas discharge. The NGMP and associated SOPs will be added to Appendix E of the approved RI Work Plan.

Modification 2: Alternate Terminal Boring Depth

In the event natural gas is encountered in a boring, packer testing will not be conducted in that boring. Because natural gas was encountered at approximately 154 ft bgs (406 ft amsl) during coring of AMSF-MW-17MP, which is approximately 10 ft from proposed boring AMSF-MW-18MP, borehole AMSF-MW-18MP will be terminated at 149 ft bgs (411 ft amsl), the current depth of the borehole. Unless field conditions such as those noted in page 3 dictate that drilling be terminated above 150 ft bgs (410 ft amsl); drilling and bedrock matrix sampling will continue to a depth of approximately 150 ft bgs (410 ft amsl).

Modification 3: Modification of AMSF-MW-18MP

Well AMSF-MW-17MP will not be replaced. Instead, well AMSF-MW-18MP will satisfy the purpose of abandoned well AMSF-MW-17MP. Well AMSF-MW-18MP will be completed with casing and well construction similar with the proposed design of AMSF-MW-17MP per the approved Phase II Work Plan.

Conclusion

These proposed modifications to the Phase II Work Plan (Modification 2 Revised) are designed to establish revised criteria for identifying the boring terminal depth; to reduce the likelihood of encountering natural gas by terminating the drilling at 150 ft.; to safely operate and mitigate the potential release of natural gas, if encountered while drilling; and to provide for the modification of borehole AMSF-MW-18MP. We respectfully request NYSDEC's written approval for the Phase II Work Plan (Modification 2 Revised) described in this letter. Please contact me at (315) 437-6100 or Teresa Olmsted at (714) 630-3175 if you have any questions or comments regarding these proposed modifications.

Very truly yours.

O'BRIEN & GERE ENGINEERS, INC.

Guy Swenson

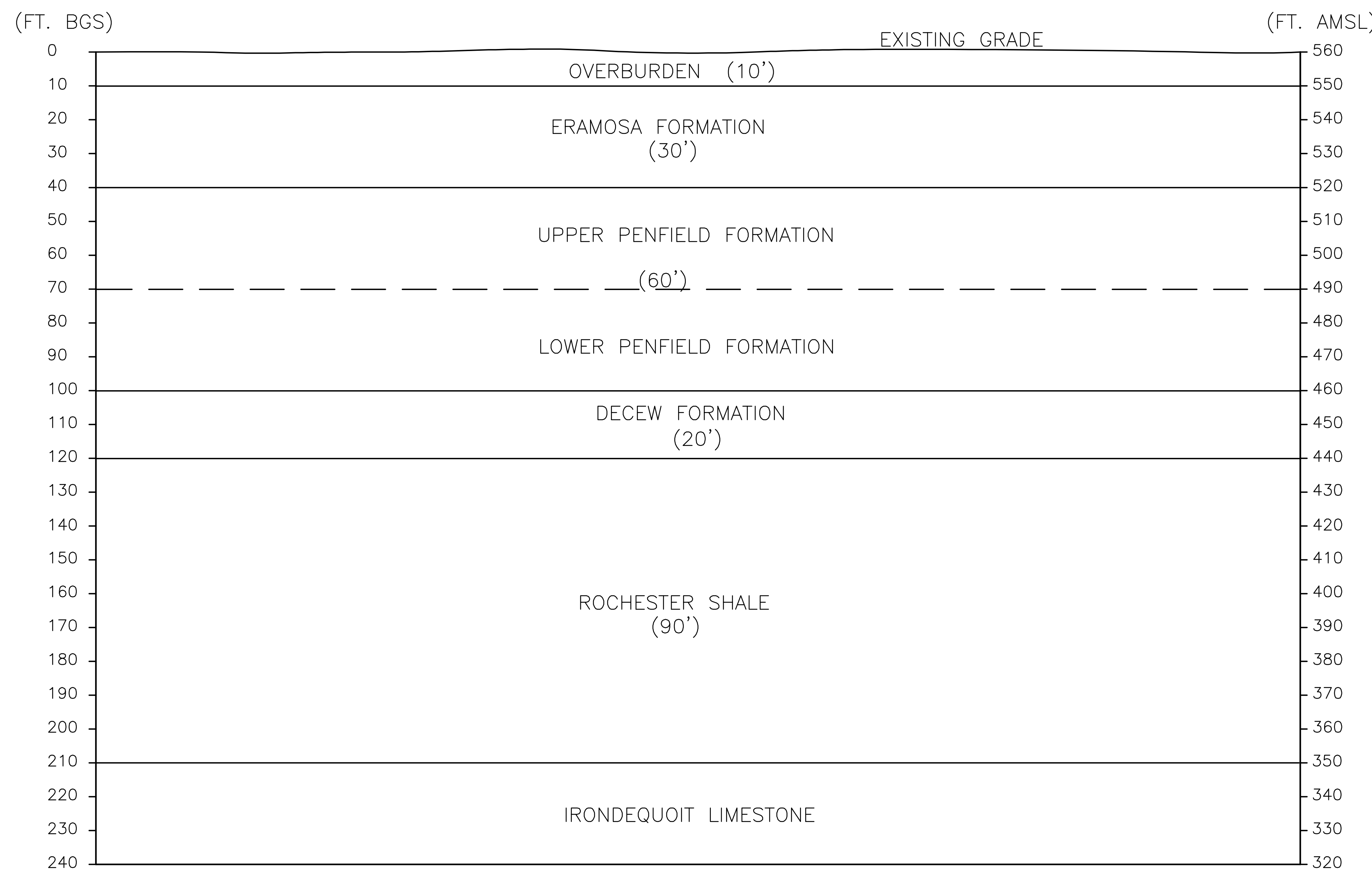
Guy Swenson, CPG
Senior Technical Director

I:\Itt.3356\35273.Itt-Auto-Fh-19\2_corres\RI P2 WP Mod 2\September_09 Submission to NYSDEC\1a-RI Ph II Letter_Sept09.doc

cc: K. Comerford– NYSDOH
J. Kosmala – MCDOH
M. Peters – SGS&P
T. Olmsted & L. Hall – ITT
S. Tucker – OBG
J. Danzinger – Day Environmental

Attachments:

1) Stratigraphic Section Figure
2) Natural Gas Mitigation Protocol and Associated SOPs
3) Health and Safety Plan (Modification 2)
4) Air Emission Worksheet and Air Dispersion Modeling Analysis



NOTE:

1. UNIT THICKNESS REPRESENTS APPROXIMATE EXPECTED THICKNESS FOR ROCHESTER AREA.
2. AMSL – ABOVE MEAN SEA LEVEL
3. BGS – BELOW GROUND SURFACE

FORMER ITT ROCHESTER
FORM MACHINE FACILITY
TOWN OF GATES, NEW YORK
SITE# 8-28-112

STRATOGRAPHIC SECTION

VERTICAL SCALE
1"=40' 40 0 40

HORIZONTAL SCALE
1"=80' 80 0 80

FILE NO. 3356.35273-016
SEPTEMBER 2009

O'BRIEN & GERE

2009 © O'Brien & Gere Engineers, Inc.

Natural Gas Mitigation Protocol
September 4, 2009

The following protocol was developed to augment the methods of bedrock coring and to manage and mitigate natural gas hazards that might be encountered while drilling. The protocol below is presented graphically in a flow chart (Figure 1). Figures 2A and 2B show a detail of the locking well head diverter and the equipment used while bedrock coring in the vicinity of natural gas hazards. Figure 3 shows the conceptual layout of the equipment used while ventilating natural gas to the thermal oxidizer.

A practice run of the NGMP procedures will be completed once before drilling to a depth of 120 feet bgs. This practice run will be documented and reviewed during daily tailgate safety meetings.

The numbered titles in the protocol correspond to numbers on the flow chart, and are supported by detailed information collected in four (4) standard operating procedures (SOPs). References to the operation methods (OM) sections of each of the SOPs are listed throughout this protocol.

Supporting SOPs:

Natural Gas Air Monitoring Standard Operating Procedure (NGAM SOP)
Locking Well Head Diverter Standard Operating Procedure (LWHD SOP)
Venturi System Standard Operating Procedure (VS SOP)
Thermal Oxidizer Standard Operating Procedure (TO SOP)
Boring Abandonment Standard Operating Procedure (BA SOP)

Below are definitions of terms used throughout the Protocol:

– ***Air quality monitoring (air monitoring)***:
  Air monitoring consists of several different types, as described below:
  - Work Zone Air Quality Monitoring – Monitoring performed during drilling activities. Monitoring will be conducted in the breathing zone of each person in the work zone, at the well head, at the top of the drilling rods, and near the settling tank and thermal oxidizer during bedrock coring and drilling rod retrieval.
  - Core Hole Ventilation Monitoring – Monitoring performed during ventilating the core hole. Monitoring will be conducted in the breathing zone of each person in the work zone, at the well head, near the settling tank and thermal oxidizer, and prior to the inlet for the thermal oxidizer during ventilation of natural gas, if encountered.
  - Core Hole Completion Ventilation Monitoring - Monitoring performed when the core hole has reached terminal depth and gas is still escaping from the well. Monitoring will be conducted in the breathing zone of each person in the work zone, at the well head, near the settling tank and thermal oxidizer, and

prior to the inlet for the thermal oxidizer during well completion activities, assuming natural gas is encountered.

- ***Intrasystem Monitoring Port***:
  Monitoring port located in the piping between the well head and the thermal oxidizer.

- ***Drillable gas conditions***:
  After encountering natural gas, use of the venturi system is able to maintain acceptable working levels of natural gas within the work zone.

- ***Undrillable gas conditions***:
  After encountering natural gas, use of the venturi system does not maintain acceptable working levels of natural gas within the work zone or the volumetric natural gas flow to the oxidizer while drilling exceeds operation constraints for the thermal oxidizer.

- ***Well Head***:
  The top of the well casing to which the locking well head diverter will be attached during bedrock coring activities.

- ***Locking Well Head Diverter***:
  A diverter that will be fitted at the top of the permanent casing and around the coring rod string. A thick rubber inverted cone in the top of the device will be locked into the top of the diverter when engaged prior to drilling. This will close the annular space and provide a seal between the coring rods and the permanent casing. The remaining inlets/outlets from the diverter will be fitted with ball valves allowing for quick shut off points. Further details on the operational use are described in the LWHD SOP attached to this protocol.

- ***Work zone***:
  The area occupied by the bedrock coring crew, including the drill rig and support equipment. The thermal oxidizer will be considered a separate work area.

- ***Breathing Zone***:
  Space within 1.5-foot radius of a person's face.

– ***Modified Level D(Natural Gas) Personal Protective Equipment*** (PPE):
Modified level D ***(Natural Gas)*** PPE will be required to occupy the work zone after a bedrock coring depth of 120 feet below ground surface (ft bgs) has been achieved. This level of PPE includes:
  - Fire Retardant Coveralls
  - Face Shield (attached to hard hat)
  - Hard Hat
  - Safety Boots
  - Gloves (leather or fire retardant)

– ***Modified Level B PPE***:
Modified level B PPE will be required to occupy the work zone when air monitoring has detected well head shut down working levels within the work zone. This level of PPE includes:
  - Self Contained Breathing Apparatus
  - Fire Retardant Coveralls
  - Hard Hat
  - Safety Boots
  - Gloves (leather or fire retardant)

– ***Natural gas is detected within work zone***:
Work zone air monitor detects the following:
  - LEL $\geq$ 1%

– ***Natural gas is detected at acceptable working levels***:
While air monitoring in accordance with the NGAM SOP, all the following conditions are observed:
  - LEL < 3%
  - Oxygen > 19.5%
  - VOC < 5 ppm over 15 minute average
  - H_2S < 10 ppm over 15 minute average

– ***Natural gas is detected at well head shutdown working levels***:
While air monitoring in accordance with the NGAM SOP, at least one the following conditions is observed:
  - LEL > 3%
  - Oxygen <19.5%
  - VOC > 5 ppm over 15 minute average
  - H_2S > 10 ppm over 15 minute average

Natural Gas Mitigation Protocol
September 4, 2009

Natural Gas Pressure:

Based on discussions with the driller and personnel from the oil and gas section of the NYSDEC, documentation is not available on the pressure of the natural gas pockets that might be encountered. However, based on these discussions, it is suggested that an average natural gas pressure gradient of 0.465 psi/ft is a reasonable expectation. Based on this gradient, a natural gas pressure of up to 70 psi may be encountered at 150 ft bgs. Incorporating a 100% safety factor results in a maximum natural gas pressure of approximately 140 psi. Therefore, should natural gas be encountered, the natural gas mitigation protocols and SOPs have been developed to handle 150 psi natural gas pressure (150 psi was selected due to equipment availability).

Protocol:

1. *Set-up and Start (**for all bedrock coring**)*
    - Temporarily modify permanent casing and well pad to fit locking well head diverter (LWHD).
    - Begin coring using air circulation techniques with wireline core rods to approximately 120 ft bgs. At approximately 120 ft bgs install the LWHD (Figure 2A & 2B), switch to water circulation bedrock coring methods, and test the venturi system and the thermal oxidizer consistent with the attached TO SOP (OM 1) and VS SOP (OM 1).
    - Upon achieving a depth of approximately 120 ft bgs, implement the following:
        - Outfit personnel within the work zone in modified level D (natural gas) PPE.
        - Place fourth member of the drill crew on standby in modified Level B PPE to secure the work zone in the event of a natural gas release.
        - Outfit identified person within the work zone with an additional multi-gas detector consistent with the 2007 Health and Safety Plan (HASP) Addendum (O’Brien & Gere, August 2007).
        - Initiate Natural Gas Air Monitoring consistent with the attached NGAM SOP and the HASP.
        - Before commencing drilling operations, perform daily testing of the thermal oxidizer unit and compressor for the venturi system to insure that equipment is fully operational (consistent with the thermal oxidizer and venturi system SOPs, respectively), should a natural gas pocket be encountered.

2. *Continue bedrock coring with water circulation methods.*

AIR QUALITY MONITORING (as described in the NGAM SOP OM 1)

a. If natural gas is not detected within the work zone or at the well head:
  - Proceed to Terminal Core Hole Depth Determination (below).

b. If natural gas is detected within the work zone or at the well head at acceptable working levels:
  - Proceed to Terminal Core Hole Depth Determination (below).

c. If natural gas is detected within the work zone or at the well head at well head shutdown levels:
  - Proceed to step 3.

TERMINAL CORE HOLE DEPTH DETERMINATION

a. If you have reached the terminal core hole depth:
  - Proceed to step 5. *Core Hole Completion.*

b. If you have not reached the terminal core hole depth:
  - Return to step 2. *Continue Drilling*.

3. *Gas is detected at well head shutdown levels.*

- Stop drilling.
- Engage LWHD, as described in the LWHD SOP (OM 1).
- Engage venturi system, as described in the VS SOP (OM 2a).
- Engage the thermal oxidizer as described in the TO SOP (OM 2).
- Vent LWHD as described in LWHD SOP (OM 2).

AIR QUALITY MONITORING (as described in the NGAM SOP OM 1)

a. If natural gas is not detected or detected at acceptable working levels within the work zone and at the well head:
  - Proceed to step 4a.

b. If natural gas is detected at well head shutdown levels within the work zone:
  - Proceed to step 4b.

c. If natural gas is detected at well head shutdown levels at the well head:
  - Proceed to step 4b.

4a. *Drillable conditions:*

- Continue drilling using water circulation methods.

AIR QUALITY MONITORING (as described in the NGAM SOP OM 1)

a. If natural gas is not detected or detected at acceptable working levels within the work zone and at the well head:
  - Proceed to Terminal Core Hole Depth Determination (below).

b. If natural gas is detected at well head shutdown levels within the work zone:
  - Proceed to step 4b.

c. If natural gas is detected at well head shutdown levels at the well head:
  - Proceed to step 4b.

TERMINAL CORE HOLE DEPTH DETERMINATION

a. If you have reached the terminal core hole depth:
  - Proceed to step 5. *Core Hole Completion.*

b. If you have not reached the terminal core hole depth:
  - Return to step 4a. *Continue Drilling*.

4b. *Undrillable gas conditions.*

Natural gas is detected above acceptable working levels using a multi-gas meter or above a volumetric flow of 15 actual cubic feet per minute (acfm):

- Engage LWHD, as described in the LWHD SOP (OM 1).
- Engage venturi system, as described in the VS SOP (OM 2b).
- Engage the thermal oxidizer as described in the TO SOP (OM 2).
- Vent LWHD as described in LWHD SOP (OM 2)

AIR QUALITY MONITORING (as described in NGAM SOP OM 2)
Intrasystem Monitoring

a. If natural gas volumetric flow has not decreased below 15 acfm:
  - Continue with step 4b.

b. If natural gas pressure has decreased below 15 acfm:
  - Proceed to Step 4a.

c. If natural gas volumetric flow is showing no signs of decreasing below 15 acfm and it is determined in consultation with NYSDEC that the boring must be abandoned:
  - Abandon boring as described in BA SOP.

5. *Core Hole Completion*

a. Remove coring rods from core hole.
b. Remove drill rig from work zone.

AIR QUALITY MONITORING (as described in NGAM SOP OM 3)
Intrasystem Monitoring

a. If natural gas is detected via the intrasystem monitoring port:
  - Continue to vent to thermal oxidizer and monitor gas via the intrasystem monitoring port.

b. If natural gas is not detected via the intrasystem monitoring port:
  - Proceed to Step 6. *Core Hole Modification*. (below)

Natural Gas Mitigation Protocol
September 4, 2009

Note:
If ventilation continues for several days with no or limited indication that natural gas is dissipating field personnel will contact the Project Manager. The Project Manager will then contact ITT Corporation to evaluate the possibility of abandoning the core hole or continuing with ventilation. NYSDEC will also be involved with the decision.

6. *Core Hole Modification* (Per 2007 RI Phase II Work Plan Addendum)
   a. Ream core hole to proper diameter for the FLUTe® liner
   b. Restore permanent casing and well pad.
   c. Install blank FLUTe® liner

References

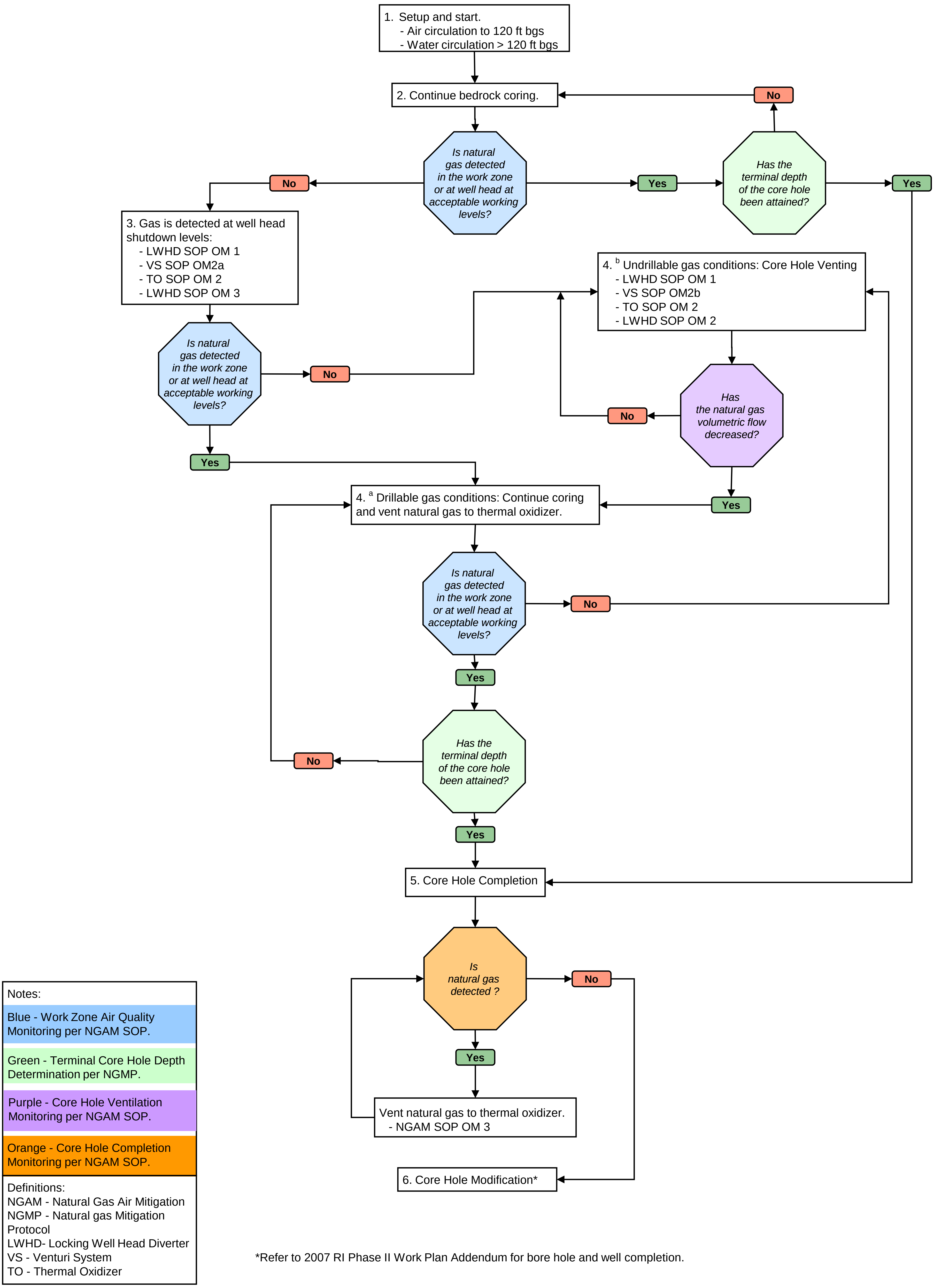
O'Brien & Gere, August 2007. Remedial Investigation Health and Safety Plan Addendum, ITT Corporation, Town of Gates, New York

Figure 1

Natural Gas Mitigation Flow Chart

Former ITT Rochester Form Machine Facility

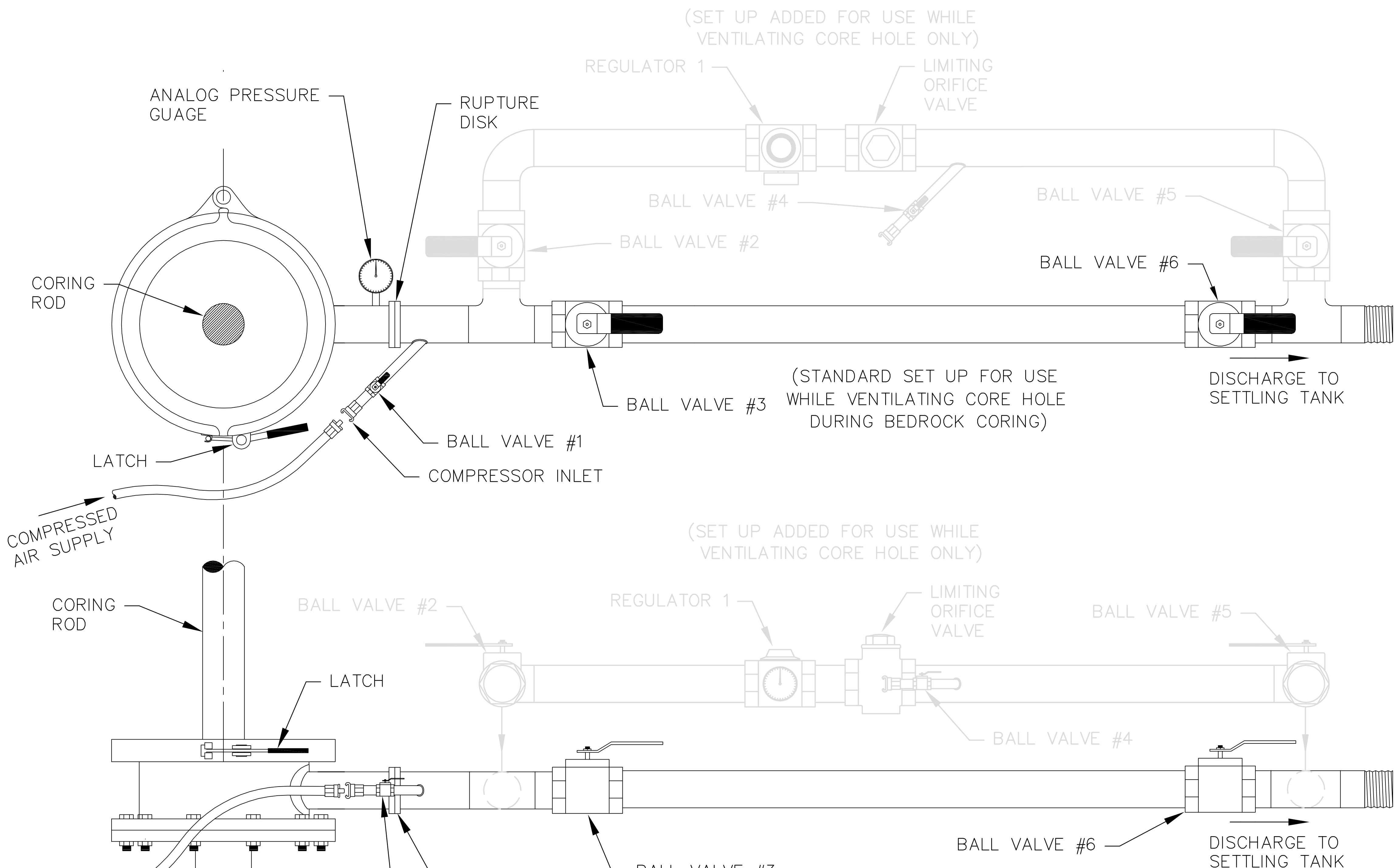
Town of Gates, New York



This document was produced in color. Reproduction in B/W may not represent the information as intended.

I:\Itt.3356\35273.Itt-Auto-Fh-19\2_corres\RI P2 WP Mod 2\September_09 Submission to NYSDEC\Gas Flow Chart_Final_Sept09.ppt

FIGURE 2A



NOTE:
1. BALL VALVE #1 AND #4, WHEN COMPRESSED AIR IS SUPPLIED, ARE THE VENTURI SYSTEM THAT CONTROLS GAS RELEASE FROM WELL HEAD.
2. COMPRESSED AIR SUPPLY ATTACHED WITH A CROW'S FOOT CONNECTION.
3. GRAY SHADED SECTION NOT IN USE FOR THIS SET-UP.

LOCKING WELL HEAD DIVERTER

CONCEPTUAL DESIGN ONLY

FORMER ITT ROCHESTER FORM MACHINE FACILITY
TOWN OF GATES, NEW YORK
SITE #8-28-112

LOCKING WELL HEAD DIVERTER STANDARD SET-UP

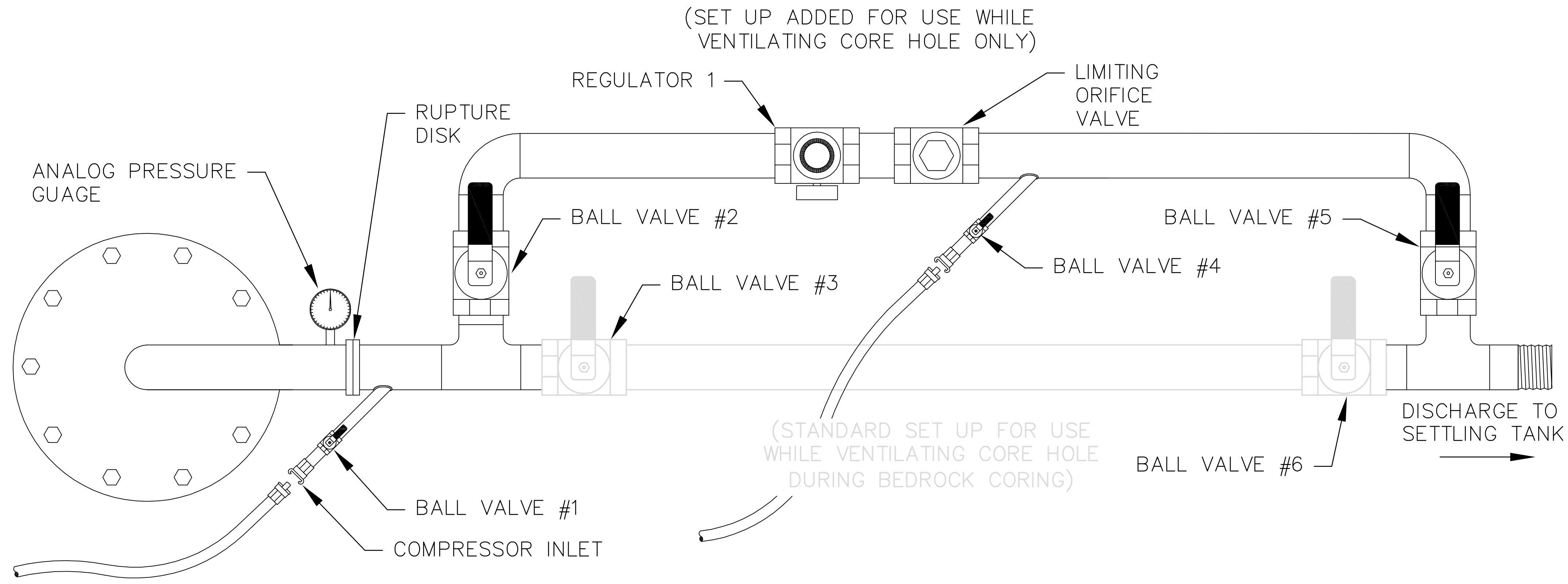
NOT TO SCALE

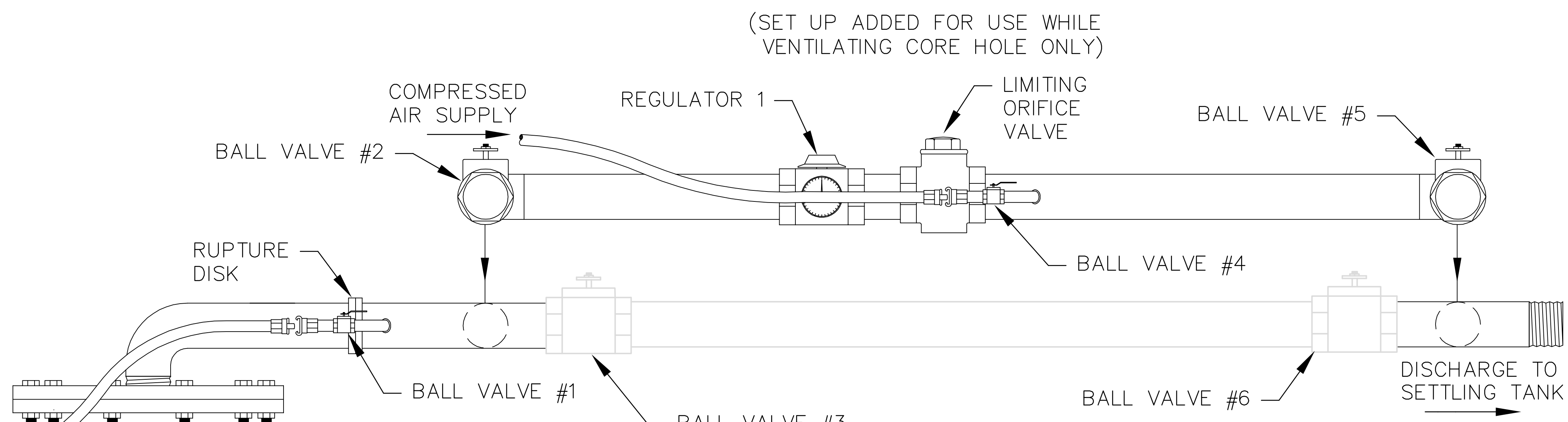
FILE NO. 3356.35273-020
SEPTEMBER 2009

O'BRIEN & GERE

2008 © O'Brien & Gere Engineers, Inc.

FIGURE 2B





NOTE:
1. BALL VALVE #1 AND #4, WHEN COMPRESSED AIR IS SUPPLIED, ARE THE VENTURI SYSTEM THAT CONTROLS GAS RELEASE FROM WELL HEAD.
2. COMPRESSED AIR SUPPLY ATTACHED WITH A CROW'S FOOT CONNECTION.
3. GRAY SHADED SECTION NOT IN USE FOR THIS SET-UP.

LOCKING WELL HEAD DIVERTER

CONCEPTUAL DESIGN ONLY

FORMER ITT ROCHESTER
FORM MACHINE FACILITY
TOWN OF GATES, NEW YORK
SITE #8-28-112

LOCKING WELL HEAD DIVERTER VENTILATING CORE HOLE ONLY

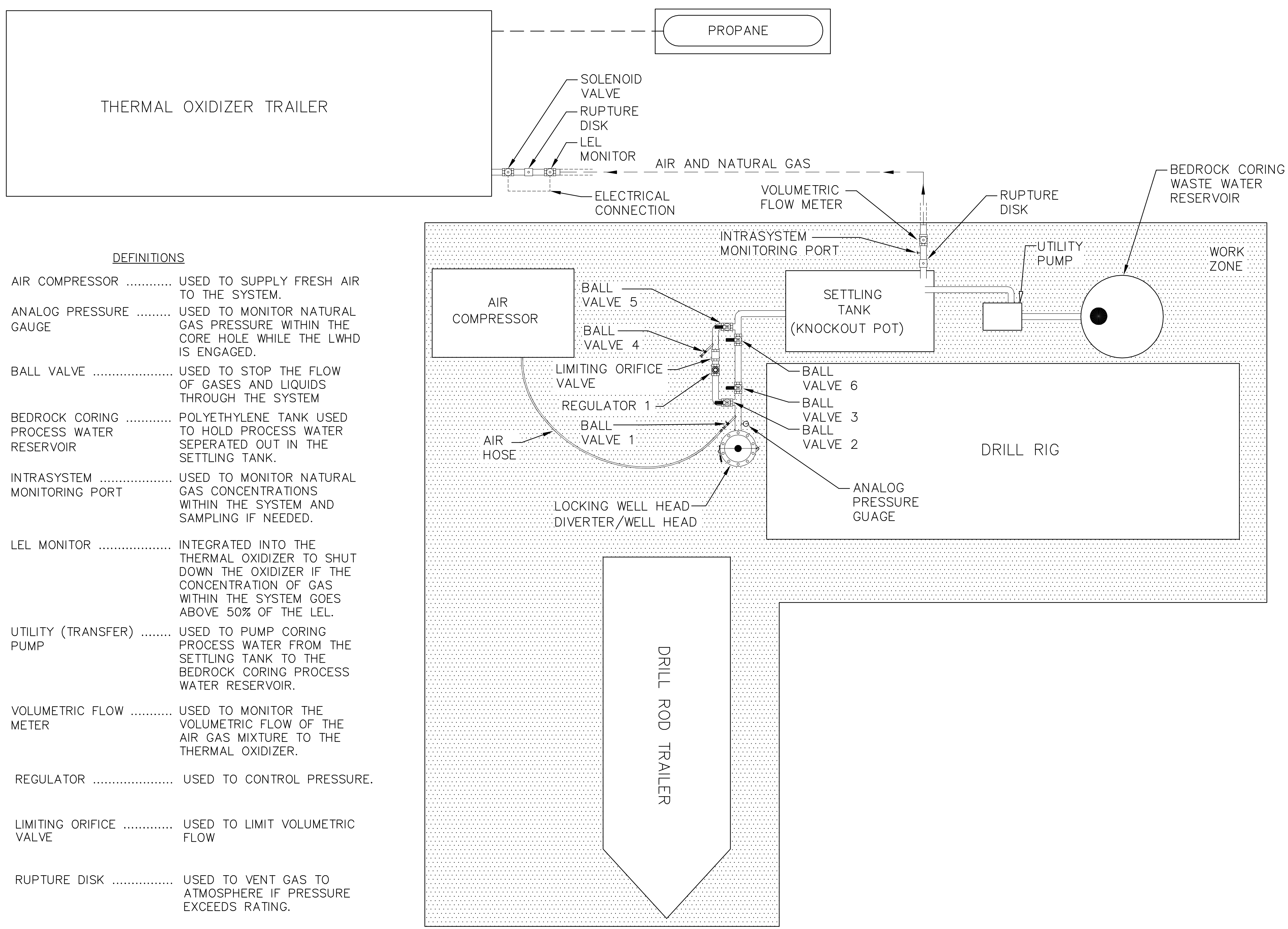
NOT TO SCALE

FILE NO. 3356.35273-021
SEPTEMBER 2009

O'BRIEN & GERE

2008 © O'Brien & Gere Engineers, Inc.

FIGURE 3



DEFINITIONS

AIR COMPRESSOR .... USED TO SUPPLY FRESH AIR TO THE SYSTEM.

ANALOG PRESSURE GAUGE .... USED TO MONITOR NATURAL GAS PRESSURE WITHIN THE CORE HOLE WHILE THE LWHD IS ENGAGED.

BALL VALVE .... USED TO STOP THE FLOW OF GASES AND LIQUIDS THROUGH THE SYSTEM

BEDROCK CORING PROCESS WATER RESERVOIR .... POLYETHYLENE TANK USED TO HOLD PROCESS WATER SEPERATED OUT IN THE SETTLING TANK.

INTRASYSTEM MONITORING PORT .... USED TO MONITOR NATURAL GAS CONCENTRATIONS WITHIN THE SYSTEM AND SAMPLING IF NEEDED.

LEL MONITOR .... INTEGRATED INTO THE THERMAL OXIDIZER TO SHUT DOWN THE OXIDIZER IF THE CONCENTRATION OF GAS WITHIN THE SYSTEM GOES ABOVE 50% OF THE LEL.

UTILITY (TRANSFER) PUMP .... USED TO PUMP CORING PROCESS WATER FROM THE SETTLING TANK TO THE BEDROCK CORING PROCESS WATER RESERVOIR.

VOLUMETRIC FLOW METER .... USED TO MONITOR THE VOLUMETRIC FLOW OF THE AIR GAS MIXTURE TO THE THERMAL OXIDIZER.

REGULATOR .... USED TO CONTROL PRESSURE.

LIMITING ORIFICE VALVE .... USED TO LIMIT VOLUMETRIC FLOW

RUPTURE DISK .... USED TO VENT GAS TO ATMOSPHERE IF PRESSURE EXCEEDS RATING.

NOTE:
SET–UP SHOWN IS FOR VENTILATING CORE HOLE ONLY.

CONCEPTUAL DESIGN ONLY

FORMER ITT ROCHESTER
FORM MACHINE FACILITY
TOWN OF GATES, NEW YORK
SITE #8–28–112

CONCEPTUAL WORK ZONE LAYOUT

NOT TO SCALE

FILE NO. 3356.35273–022
SEPTEMBER 2009

O'BRIEN & GERE

2008 © O'Brien & Gere Engineers, Inc.

Former ITT Rochester Form Machine
Town of Gates, New York
Site #8-28-112

Natural Gas Air Monitoring
Standard Operating Procedure
September 4, 2009

The following natural gas air monitoring standard operating procedure (NGAM SOP) should be instituted while bedrock coring in proximity of natural gas sources. This SOP is accompanied by four additional SOPs listed below, that support the *Natural Gas Mitigation Protocol*:

- *Locking Well Head Diverter Standard Operating Procedure* (LWHD SOP).
- *Venturi System Operations Standard Operating Procedure* (VS SOP).
- *Thermal Oxidizer Operations Standard Operating Procedure* (TO SOP).
- *Boring Abandonment Standard Operating Procedure (BA SOP).*

Below are standard terms used throughout this SOP:

- ***Air Quality Monitoring (Air Monitoring)***:
  Air monitoring consists of several different types, as described below:
  - Work Zone Air Quality Monitoring – Monitoring performed during drilling activities. Monitoring will be conducted in the breathing zone of each person in the work zone, at the well head, at the top of the drilling rods, and near the settling tank and thermal oxidizer during bedrock coring and drilling rod retrieval.
  - Core Hole Ventilation Monitoring – Monitoring performed during ventilating the core hole. Monitoring will be conducted in the breathing zone of each person in the work zone, at the well head, near the settling tank and thermal oxidizer, at the thermal oxidizer exhaust point, and prior to the inlet for the thermal oxidizer during ventilation of natural gas, if encountered.
  - Core Hole Completion Ventilation Monitoring - Monitoring performed when the core hole has reached terminal depth and gas is still escaping from the well. Monitoring will be conducted in the breathing zone of each person in the work zone, at the well head, near the settling tank and thermal oxidizer, at the thermal oxidizer exhaust point, and prior to the inlet for the thermal oxidizer during well completion activities, assuming natural gas is encountered.

- ***Breathing Zone***:
  Space within 1.5-foot radius of a person's face.

- ***Work Zone***:
  The area occupied by the bedrock coring crew, including the drill rig and support equipment. The thermal oxidizer will be considered a separate work area.

- ***Multi-Gas Meter***:
  A hand-held unit used to monitor volatile organic compounds (VOCs), oxygen, hydrogen sulfide (H_2S) concentrations, and the lower explosive limit (LEL).

- ***On-Site Health and Safety Representative (OHSR)***:
  As defined in the health and safety plan (HASP).

- ***Modified Level D(Natural Gas) Personal Protective Equipment*** (PPE) :
  Modified level D (natural gas) PPE will be required to occupy the work zone while coring is taking place after a bedrock coring depth of 120 feet has been achieved. This level of PPE includes:

- Fire Retardant Coveralls
- Face Shield (attached to hard hat)
- Hard Hat
- Safety Boots
- Gloves (leather or fire retardant)

– ***Modified Level B PPE*** :
Modified level B PPE will be required to occupy the work zone when air monitoring has detected unacceptable working levels within the work zone. This level of PPE includes:
- Self Contained Breathing Apparatus
- Fire Retardant Coveralls
- Hard Hat
- Safety Boots
- Gloves (leather or fire retardant)

– ***Natural gas is detected within work zone*** :
Work zone air monitor detects the following:
- LEL ≥1%

– ***Natural gas is detected at acceptable working levels***:
While air monitoring in accordance with the NGAM SOP, all the following conditions are observed:
- LEL < 3%
- Oxygen >19.5%
- VOC < 5 ppm over 15 minute average
- H_2S < 10 ppm over 15 minute average

– ***Natural gas is detected at well head shutdown working levels***:
While air monitoring in accordance with the NGAM SOP, at least one the following conditions is observed:
- LEL > 3%
- Oxygen <19.5%
- VOC > 5 ppm over 15 minute average
- H_2S > 10 ppm over 15 minute average

– ***Well Head***:
The top of the well casing to which the locking well head diverter will be attached during bedrock coring activities.

– ***Top of Rods***:
Top of the bedrock coring rods open to the work zone between coring runs.

– ***Bedrock Coring Run***:
Time period when the bedrock coring rods and bit are being advanced into the subsurface. During this time the bedrock coring rods are not open to act as a pathway from the subsurface to the work zone.

- ***Bedrock Core Retrieval***:
  Time period when the bedrock core barrel is pulled through the coring rods to the surface. During this time the bedrock coring rods are open to act as a pathway from the subsurface to the work zone.

- ***Intrasystem Monitoring Port***:
  Monitoring port located in the piping between the well head and the oxidizer. This port can be used for screening the air stream for gas or VOCs or for collecting samples (if required).

- ***Volumetric Flow Meter***
  Measures the volumetric flow through piping to the thermal oxidizer. Flow meter is located after the LWHD and compressor input.

Operation Methods

1) Work Zone Air Quality Monitoring during drilling

a. *Purpose*:
   - Monitor for the presence of natural gas and acceptable air quality conditions as a warning to the occupants of the work zone of potential air quality impairments that may develop within the work zone.

b. *Monitoring Equipment*:
   - RAE Systems MultiRAE Plus (multi-gas meter), or similar.

c. *Monitoring Personnel outfitted with monitoring equipment*:
   - Drill Crew Forman
   - OHSR

d. *Monitoring Locations*:
   - During each *Work Zone Air Quality Monitoring* interval the following locations within the work zone will be monitored with a multi-gas meter:
     - The breathing zone of each person within the work zone.
     - Within 3 feet of the settling tank, and thermal oxidizer.
     - Within 1 foot of the well head.

e. *Monitoring Requirements*:
   - In addition to the Community Air Monitoring Plan (O'Brien & Gere, August 2007), monitoring will be conducted by both (2) monitoring personnel once (1) during each bedrock coring run and once (1) after each bedrock core retrieval, and any other time deemed necessary.

     1. **Bedrock Coring Run Monitoring**:
        - The drill crew foreman will monitor the following areas:

- Their personal breathing zone.
- Within 1 foot of the well head.

– The OHSR will monitor the following areas:
- Their personal breathing zone and the breathing zone(s) of the drill crew assistant(s).
- Within 3 feet of the settling tank, and thermal oxidizer.

2. **Bedrock Core Retrieval Monitoring**:

– The drill crew foreman will monitor the following areas:
- Their personal breathing zone.
- Within 1 foot of the well head.
- Within 1 foot of the top of rods.

– The OHSR will monitor the following areas:
- Their personal breathing zone and the breathing zone(s) of the drill crew assistant(s).
- Within 3 feet of the settling tank, and thermal oxidizer.

f. *Monitoring Reporting*:
- Monitoring data collected as described above will be maintained on logs. A blank log for the Work Zone Air Quality Monitoring is included at the end of this SOP.

2) Core Hole Ventilation Monitoring

a. Purpose:
- Monitors for the presence of natural gas and acceptable air quality conditions as a warning to the occupants of the work zone of potential air quality impairments that may develop within the work zone.
- Monitor the volumetric flow of natural gas to verify that volumetric flow is less than 15 acfm..

b. *Monitoring Equipment*:
- RAE Systems MultiRAE Plus (multi-gas meter), or similar.
- Volumetric Flow Meter. (Figure 3)
- Thermo Electron (TECO) Model 15C (stationary on thermal oxidizer exhaust)

c. *Monitoring Personnel outfitted with monitoring equipment*:
- OHSR

d. *Monitoring Location(s)*:
- During each *Core Hole Ventilation Monitoring* interval the following location(s) will be monitored with a multi-gas meter:

– The breathing zone of each person within the work zone.
– Within 3 feet of the settling tank, and thermal oxidizer.
– Within 1 foot of the well head.

- During each *Core Hole Ventilation Monitoring* interval the following location(s) will be monitored with an in-line volumetric flow meter:
  - Piping between settling tank and thermal oxidizer (Figure 3).

- During each *Core Hole Ventilation Monitoring* interval the following location(s) will be monitored with a TECO Model 15C:
  - Thermal oxidizer exhaust.

e. *Monitoring Requirements*
- Monitoring will be conducted by the OHSR once (1) every 60 minutes while natural gas is being vented to the thermal oxidizer unit, and any other time deemed necessary.

f. *Monitoring Reporting*:
- Monitoring data collected as described above will be maintained on logs. A blank log for the Core Hole Ventilation Monitoring is included at the end of this SOP.

3) Core Hole Completion Ventilation Monitoring

a. Purpose:
- Monitors for the presence of natural gas and acceptable air quality conditions as a warning to the occupants of the work zone of potential air quality impairments that may develop within the work zone. Also monitors for the presence of natural gas to identify when it is acceptable to continue with well completion procedures.

b. *Monitoring Equipment*:
- RAE Systems MultiRAE Plus (multi-gas meter), or similar.

c. *Monitoring Personnel outfitted with monitoring equipment*:
- OHSR

d. *Monitoring Location(s)*:
- During each *Core Hole Completion Ventilation Monitoring* interval the following location(s) will be monitored with a multi-gas meter:

  - The breathing zone of each person within the work zone.
  - Within 3 feet of the settling tank, and thermal oxidizer.
  - Within 1 foot of the well head.
  - Intrasystem monitoring port. (Figure 3)

- During each *Core Hole Ventilation Monitoring* interval the following location(s) will be monitored with a TECO Model 15C:
  - Thermal oxidizer exhaust.

e. *Monitoring Requirements*:
- Monitoring will be conducted by the OHSR once (1) every 60 minutes during the core hole completion ventilation period, and any other time deemed necessary.

Natural Gas Air Monitoring
Standard Operating Procedure
September 4, 2009

f. *Monitoring Reporting*:
   - Monitoring data collected as described above will be maintained on logs. A blank log for the Core Hole Completion Ventilation Monitoring is included at the end of this SOP.

References

O'Brien & Gere, August 2007. Remedial Investigation Health and Safety Plan Addendum, ITT Corporation, Town of Gates, New York.

Former ITT Rochester Form Machine
Town of Gates, New York
Site #8-28-112

Natural Gas Air Monitoring Data Sheet

Date:________________
Employee Monitoring:______________________

Time (HHMM)	Parameter	Breathing Zone (Range)	Well Head	Thermal Oxidizer	Settling Tank	Piping	Top of Drilling Rods	LEL Monitor	HCl Monitor	Wind Direction
	O_2 (%)							----	----	
	LEL (LEL)								----	
	VOC (ppm)							----	----	
	H_2S (ppm)							----	----	
	CO (ppm)							----	----	
	HCl (ppm)	----	----	----	----	----	----	----		
	O_2 (%)							----	----	
	LEL (LEL)								----	
	VOC (ppm)							----	----	
	H_2S (ppm)							----	----	
	CO (ppm)							----	----	
	HCl (ppm)	----	----	----	----	----	----	----		
	O_2 (%)							----	----	
	LEL (LEL)								----	
	VOC (ppm)							----	----	
	H_2S (ppm)							----	----	
	CO (ppm)							----	----	
	HCl (ppm)	----	----	----	----	----	----	----		
	O_2 (%)							----	----	
	LEL (LEL)								----	
	VOC (ppm)							----	----	
	H_2S (ppm)							----	----	
	CO (ppm)							----	----	
	HCl (ppm)	----	----	----	----	----	----	----		
	O_2 (%)							----	----	
	LEL (LEL)								----	
	VOC (ppm)							----	----	
	H_2S (ppm)							----	----	
	CO (ppm)							----	----	
	HCl (ppm)	----	----	----	----	----	----	----		
	O_2 (%)							----	----	
	LEL (LEL)								----	
	VOC (ppm)							----	----	
	H_2S (ppm)							----	----	
	CO (ppm)							----	----	
	HCl (ppm)	----	----	----	----	----	----	----		

Former ITT Rochester Form Machine
Town of Gates, New York
Site #8-28-112

Locking Well Head Diverter
Standard Operating Procedure
September 4, 2009

The following locking well head diverter standard operating procedure (LWHD SOP) provides a detailed description of the function of the LWHD that will be used while bedrock coring in the proximity of natural gas sources. This SOP is accompanied by four additional SOPs, listed below, that support the *Natural Gas Mitigation Protocol*:

- *Natural Gas Air Monitoring Standard Operating Procedure* (NGAM SOP).
- *Venturi System Operations Standard Operating Procedure* (VS SOP).
- *Thermal Oxidizer Operations Standard Operating Procedure* (TO SOP).
- *Boring Abandonment Standard Operating Procedure (BA SOP).*

Below are standard terms used throughout this SOP:

- ***Breathing Zone***:
  Space within 1.5-foot radius of a person's face.

- ***Work Zone***:
  The area occupied by the bedrock coring crew, including the drill rig and support equipment. The thermal oxidizer will be considered a separate work area.

- ***Natural gas is detected within work zone*** :
  Work zone air monitor detects the following:
  - LEL $\geq$1%

- ***Well Head***:
  The top of the well casing to which the drilling fluid diverter will be attached during bedrock coring activities.

- ***Locking Well Head Diverter***:
  A diverter that will be fitted at the top of the permanent casing and around the coring rod string. A thick rubber inverted cone in the top of the device will be locked into the top of the diverter when engaged prior to drilling. This will close the annular space and provide a seal between the coring rods and the permanent casing. The remaining inlets/outlets from the diverter will be fitted with ball valves allowing for quick shut off points. Further details on the operational use are described in the LWHD SOP attached to this protocol.

- ***Venturi System Air Compressor***:
  Air compressor dedicated to supplying the venturi system with compressed fresh air.

- ***Standard Set Up***:
  Pipe and valve set up for use while ventilating core hole during drilling.

- **Ventilating Core Hole Only Set Up:**
  Pipe, valve, and regulator set up for use while ventilating core hole only.

Former ITT Rochester Form Machine
Town of Gates, New York
Site #8-28-112

Locking Well Head Diverter
Standard Operating Procedure
September 4, 2009

Purpose:

The locking well head diverter will provide a means of inhibiting the release of natural gas to the work zone while bedrock coring in the proximity of natural gas sources.

Period of Use:

Before coring to depths below 120 feet below ground surface (ft bgs) the locking well head diverter will be fitted to the permanent casing already installed into the subsurface. Ball Valves 1, 2, and 3 and Ball Valves 4, 5, and 6 (Figures 2A & 2B) provide closure points to seal the diverter. Ball Valves 3 and 6 will remain open while bedrock coring with water circulation methods. Ball Valve 1 will only be open while the LWHD is being used in conjunction with the venturi system. The locking well head diverter will remain at a bedrock coring location until the core hole has been progressed to terminal depth and the core hole has been allowed to vent any natural gas encountered while bedrock coring.

Operational Methods:

1. *Engaging the locking well head diverter*:
   (a) Close Ball Valve 3 on the output stem and Ball Valve 1 (Figure 2A).
   - This will restrict gases from escaping through output stem of the locking well head diverter.

2. *Venting the locking well head diverter*:
   Standard Set Up (Figure 2A)
   (a) Connect the compressed air supply to inlet at Ball Valve 1 and engage compressor.
   (b) Open Ball Valve 1 allowing compressed fresh air to be injected by the venturi system air compressor.
   - This will mix fresh air with any natural gas that will build up in the core hole casing and locking well head diverter.

   (c) Open Ball Valve 3 allowing the mixed air to output through the settling tank to the thermal oxidizer unit (Figure 3).
   - This allows the natural gas / air mixture to travel to the thermal oxidizer unit for combustion.

Locking Well Head Diverter
Standard Operating Procedure
September 4, 2009

Ventilating Core Hole Only Set Up (Figure 2B)

(a) Close Ball Valve 6

(b) Connect the compressed air supply to inlet at Ball Valve 4 and engage compressor.

(c) Open Ball Valve 2 allowing compressed fresh air to be injected by the venturi system air compressor.

- This will mix fresh air with any natural gas that will build up in the core hole casing and locking well head diverter.

(d) Open Ball Valve 5 allowing the mixed air to output through the settling tank to the thermal oxidizer unit (Figure 3).

- This allows the natural gas / air mixture to travel to the thermal oxidizer unit for combustion.

3. Disengaging the locking well head diverter for bedrock coring:

(a) Open Ball Valve 1 allowing compressed fresh air to be injected by the venturi system air compressor.

- This will mix compressed fresh air with natural gas that will build up in the core hole casing and locking well head diverter.

(b) Open Ball Valve 3 allowing the mixed air to output through the settling tank to the thermal oxidizer unit.

- This allows the natural gas / fresh air mixture to travel to the thermal oxidizer unit for combustion and creates a vacuum pulling air and gas away from the top rubber cone on the locking well head diverter towards the thermal oxidizer.

Former ITT Rochester Form Machine
Town of Gates, New York
Site #8-28-112

Venturi System Standard Operating Procedure
September 4, 2009

Privileged and Confidential
Attorney Client Privilege

The following venturi system standard operating procedure (VS SOP) provides a step-wise approach to using the venturi system to vent natural gas from the locking well head diverter to the thermal oxidizer system that will be used while bedrock coring in the proximity of natural gas sources. This SOP is accompanied by four additional SOPs, listed below, that support the *Natural Gas Mitigation Protocol*:

- *Natural Gas Air Monitoring Standard Operating Procedure* (NGAM SOP).
- *Thermal Oxidizer Operations Standard Operating Procedure* (TO SOP).
- *Locking Well Head Diverter Standard Operating Procedure* (LWHD SOP).
- *Boring Abandonment Standard Operating Procedure (BA SOP).*

Below are standard terms used throughout this SOP:

- ***Venturi System***:
  A supply of compressed air is injected into a pipe attached to the locking well head diverter creating a vacuum at the well head, which direct air through the piping to the thermal oxidizer.

- ***Work Zone***:
  The area occupied by the bedrock coring crew, including the drill rig and support equipment. The thermal oxidizer will be considered a separate work area.

- ***Natural gas is detected within work zone*** :
  Work zone air monitor detects the following:
  - LEL ≥1%

- ***Natural gas is detected at acceptable working levels***:
  While air monitoring in accordance with the NGAM SOP, all the following conditions are observed:
  - LEL < 3%
  - Oxygen >19.5%
  - VOC < 5 ppm over 15 minute average
  - H_2S < 10 ppm over 15 minute average

- ***Natural gas is detected at well head shutdown levels***:
  While air monitoring in accordance with the NGAM SOP, at least one the following conditions is observed:
  - LEL > 3%
  - Oxygen <19.5%
  - VOC > 5 ppm over 15 minute average
  - H_2S > 10 ppm over 15 minute average

– ***Well Head***:
  The top of the well casing to which the drilling fluid diverter will be attached during bedrock coring activities.

Operation Purpose:

The venturi system will generate a vacuum within the locking well head diverter to draw gases rising up the core hole through piping away from the work zone. This will help provide safe air quality conditions for personnel within and surrounding the work zone.

Period of Operation:

If natural gas is detected through air quality monitoring efforts consistent with the NGAM SOP, the venturi system will be used until the terminal depth of the core hole is reached and the core hole is sufficiently ventilated for well completion efforts to continue.

Operation Methods:

1) *Daily testing of the venturi system*:
   a. Start the air compressor (the source of fresh air to the system).
   b. Confirm airflow at the end of the input hose.
   c. Shutdown the air compressor.

2) *Engaging the venturi system*:

   a. *While bedrock coring (assumes drillable gas conditions)*:
      - Engage locking well head diverter as described in the LWHD SOP (OM 1).
      - Start the air compressor.
      - Connect input hose from the air compressor to the locking head diverter at Ball Valve 1 (Figure 2A).
      - Open compressor valve, allowing air to flow up to Ball Valve 1.
      - Open Ball Valve 1
      - Engage thermal oxidizer as described in the TO SOP (OM 2).
      - Vent the LWHD as described in the LWHD SOP (OM 2).

   b. *While ventilating the core hole*:
      - Engage the locking well head diverter as described in the LWHD SOP (OM 1). Close ball valves 1, 2, 3, and 6. Disengage the air compressor and close air compressor valve. With the LWHD sealed, Ball Valve 2 and Ball Valve 3 will restrict the natural gas pressure.
      - Start the air compressor.
      - Connect input hose from the compressor to the locking well head diverter at Ball Valve 4.
      - Open compressor valve, allowing air to flow up to Ball Valve 4.
      - Engage thermal oxidizer as described in the TO SOP (OM 2).
      - Open Ball Valve 2 allowing natural gas through the flow regulator (Regulator 1).
      - Open Ball Valve 4 and Ball Valve 5, allowing a mixture of fresh air from the compressor and gases from the core hole to flow through the settling tank to the thermal oxidizer.

3) *Disengaging the venturi system*:

   a. *While bedrock coring (assumes drillable gas conditions)*:
      - Stop coring.
      - Close Ball Valve 3.
        Restricts the flow of mixed fresh air and gases within the locking head diverter.
      - Close Ball Valve 1.
        Stops the flow of fresh air into the system.
      - Shut down the air compressor.

   b. *While ventilating the core hole*:
      - Close Ball Valve 2.
        Restricting the flow of gases within the locking head diverter.
      - Close Ball Valve 4.
        Stops the flow of fresh air into the system.
      - Close Ball Valve 5.
      - Shut down the air compressor.

4) *Refueling the venturi system compressor*:

   a. *While bedrock coring (assumes drillable gas conditions)*:
      - Stop coring.
      - Close Ball Valve 3.
        Restricts the flow of mixed fresh air and gases to within the locking head diverter.
      - Close Ball Valve 1.
        Stops the flow of fresh air into the system from the air compressor.
      - Shut down the air compressor.
      - Add fuel.
      - Start the air compressor (as above).
      - Open Ball Valve 1.
        Allows fresh air to flow into the system from the air compressor.
      - Open Ball Valve 3.
        Allows mixture of fresh air and gases to flow to the thermal oxidizer.

   b. *While ventilating the core hole*:
      - Close Ball Valve 2.
        Restricts the flow of gases to within the locking head diverter.
      - Close Ball Valve 4.
        Stops the flow of fresh air into the system.
      - Close Ball Valve 5.
      - Shut down the air compressor.
      - Add fuel.
      - Start the air compressor (as above).

- Open Ball Valve 5.
- Open Ball Valve 4.
- Open Ball Valve 2.

Former ITT Rochester Form Machine
Town of Gates, New York
Site #8-28-112

Thermal Oxidizer Standard Operating Procedure
September 4, 2009

The following thermal oxidizer standard operating procedure (TO SOP) provides a step-wise approach to using the thermal oxidizer to combust natural gas that is encountered while bedrock coring in the proximity of a natural gas source and in preparation of the boring for well completion. This SOP will be used in conjunction with the operation manual for the thermal oxidizer. The operation manual will be on site at all times during field activities.

This SOP is accompanied by four additional SOPs, listed below, that support the *Natural Gas Mitigation Protocol*:

- *Natural Gas Air Monitoring Standard Operating Procedure* (NGAM SOP).
- *Venturi System Operations Standard Operating Procedure* (VS SOP).
- *Locking Well Head Diverter Standard Operating Procedure* (LWHD SOP).
- *Boring Abandonment Standard Operating Procedures (BA SOP).*

Below are standard terms used throughout this SOP:

- ***Lower Explosive Limit (LEL)***:
  Concentration of a compound in air below which the mixture will not catch on fire.

- ***Work zone***:
  The area occupied by the bedrock coring crew, including the drill rig and support equipment. The thermal oxidizer will be considered a separate work area.

- ***HCl Monitor***:
  A monitor that will analyze the oxidizer exhaust for hydrochloric acid (HCl).

Operation Purpose:

The thermal oxidizer will be used to combust natural gases encountered while bedrock coring in the proximity of a natural gas source. The use of the locking well head diverter, venturi system, and thermal oxidizer in conjunction with more stringent natural gas air monitoring procedures seek to provide acceptable air quality conditions for personnel within the work zone and people in the surrounding areas.

Period of Operation:

If natural gas is detected through air quality monitoring efforts consistent with the NGAM SOP, the thermal oxidizer will be used until the terminal depth of the core hole is reached and the core hole is sufficiently ventilated (as described in the NGAM SOP) for well completion efforts to continue.

Operation Limitations:

The ThermTech VAC 100 thermal oxidizer is designed to:

- a maximum flow rate of 1,000 standard cubic feet per minute (SCFM)
- a maximum user defined operating temperature of approximately 1,600 degrees Fahrenheit:
  - If the internal temperature exceeds this limit the thermal oxidizer will automatically shutdown.

- a maximum gas fuel pressure of 40 pounds per square inch (PSI)
  - If the fuel pressure exceeds this limit the thermal oxidizer will automatically shutdown.
- a minimum gas fuel pressure of 5 PSI:
  - If the fuel pressure is less than this limit the thermal oxidizer will automatically shutdown.

An LEL monitor integrated into the thermal oxidizer is designed to:

- A maximum LEL of 50%
  - If the LEL exceeds 50% the thermal oxidizer will automatically shutdown.

An HCl monitor installed on the exhaust:

- 1 lb per hour
  - If the HCl monitor exceeds 1 lb per hour Regulator 1 will be adjusted to reduce the volumetric flow of natural gas.

Note: The natural gas flow rate of 15 actual cubic feet per minute (ACFM), that can be contributed to the process gas stream to maintain an HCl emission of less than1 lb/hr, was calculated based on a March 21, 2008 natural gas sample. The sample was collected from boring AMSF-MW-17MP prior to borehole abandonment. This calculated flow rate is based on the make-up of that specific natural gas sample. The make-up of the natural gas may vary based on boring location, depth, and time. An HCl analyzer will monitor process stream exhaust to allow the thermal oxidizer operation to regulate the HCl emission rate. Thermal oxidizer operation is also dependent on the LEL of the process gas stream entering the thermal oxidizer. . Therefore, the thermal oxidizer system operation and procedures have been set-up to monitor and regulate LEL inflow to the oxidizer and HCl emissions from the thermal oxidizer.

Operation Methods:

1) *Daily Thermal Oxidizer Testing* (from ThermTech 100 operations manual):

   a. Starting and warming up the thermal oxidizer. (Thermal Oxidizer warm-up ~20 minutes)
      - Check selector switch 3 (**SS3**) is set to the appropriate fuel type (**propane**).
      - Via the main control panel, turn on the main power.
      - Pull out the emergency stop push button and reset the power interruption circuit with the push button on the front of the control panel.
      - Reset the high temperature shutdown controller via the push buttons on the front of it's control panel.
        Push the **'Ent'** button once (**1**).
        Push the **'reset'** button once (**1**).
      - Turn the on/off selector switch to the **on** position and the bypass/run switch to the **bypass** position.
        - The combustion blower comes on at it's highest air flow starting a timed air purge of the combustion chamber that allows for at least four (4) air changes of the chamber before proceeding.
        - This cycle times out, and the combustion blower automatically goes to low air flow.
        - With the purge cycle completed, the pilot flame will light:

- If the flame safety system confirms ignition, the main gas solenoid will "kick" in. **Continue to step 6 (see manual)**.
- If the flame safety system does not confirm ignition, the thermal oxidizer will shutdown for pilot flame failure. **Return to step 5 (see manual)**.

- Manually reset (**open**) the Eclipse 'locktite' **main gas valve**, switch the bypass/run switch to the **run** position.
  - The main burner is now ignited at low fire and will continue to increase flame intensity until at high fire or until the designated point is reached.
  - Once the combustion chamber temperature is at the set point of the temperature controller the burner will continue to modulate to maintain the set point.
  - The pilot flame will shut off 5 minutes after the 'locktite' valve has been opened and the burner will continue to operate on main gas only.

b. Shut down the thermal oxidizer.

2) *Engaging the Thermal Oxidizer*:

a. Starting and warming up the thermal oxidizer (as above).
b. Transporting natural gas to the thermal oxidizer.
   - Engage the venturi system as described in the VS SOP (OM 2ab).
   - Monitor for safe operation of the thermal oxidizer TO SOP (OM 4).

3) *Disengaging the Thermal Oxidizer*:

a. Engage locking well head diverter as described in the LWHD SOP (OM 1).
b. Disengage the venturi system as described in the VS SOP (OM 3ab).
c. Shut down thermal oxidizer.

4) *Safe operation monitoring*:

a. To provide for continual safe operation of the thermal oxidizer, the following monitoring will be performed separate from, but in conjunction with, the NGAM SOP monitoring intervals while the thermal oxidizer is in operation.

   - Volumetric flow monitoring while bedrock coring:

     - If the volumetric flow of natural gas is less than 15 ACFM:
       - Continue venting gas to the thermal oxidizer.

     - If the volumetric flow of natural gas is greater than 15 ACFM:
       - Engage locking well head diverter as described in the LWHD SOP (OM 1).
       - Disengage the venturi system as described in the VS SOP (OM 3ab).
       - Install Regulator 1, Ball Valve 3, and Ball Valve 4.
       - Restrict flow via Regulator 1.
       - Engage venturi system as described in the VS SOP (OM 2ab).
       - Vent the LWHD as described in the LWHD SOP (OM 1).
       - Initiate core hole ventilation monitoring as described in the NGAM SOP.

Thermal Oxidizer Standard Operating Procedure
September 4, 2009

- LEL maximum limit monitoring:
  - If the LEL is less than 50%:
    - Continue venting gas to the thermal oxidizer.
  - If the LEL is greater than 50% (*assumes while ventilating the core hole*):
    - Thermal oxidizer will automatically shut down.
    - Close Ball Valves 2, 4, and 5.
    - Disengage venturi system as described in the VS SOP.
    - Move compressed air supply from Ball Valve 1 to Ball Valve 4.
    - Open Ball Valve 5.
    - Engage venturi system as described in the VS SOP.
    - Open Ball Valve 4, then Ball Valve 5.
    - Monitor LEL meter.
    - If LEL >50%:
      - Reduce the flow though Regulator 1.
    - If 25% ≤ LEL ≤ 50%:
      - Continue to vent gas to the thermal oxidizer.
    - If LEL < 25%:
      - Increase the flow through Regulator 1.

Thermal Oxidizer Standard Operating Procedure
September 4, 2009

Response Actions:

- If the venturi system air compressor unexpectedly shuts down during coring:
  - Close Ball Valves 1 and 3.
  - Disengage the thermal oxidizer per SOP OM 3 (above).
  - Troubleshoot and restart the compressor.
  - Engage the thermal oxidizer per SOP OM 2 (above).
  - Open Ball Valves 1 and 3.

- If the venturi system air compressor unexpectedly shuts down during core hole ventilation:
  - Close Ball Valves 2, 4, and 5.
  - Disengage the thermal oxidizer per SOP OM 3 (above).
  - Troubleshoot and restart the compressor.
  - Engage the thermal oxidizer per SOP OM 2 (above).
  - Open Ball Valves 2, 4 and 5.

- If the thermal oxidizer unexpectedly shuts down during coring:
  - Close Ball Valves 1 and 3.
  - Disengage the venturi system as described in the VS SOP (OM 3a).
  - Troubleshoot and re-engage the thermal oxidizer per SOP OM 2 (above).
  - Engage the venture system per VS SOP (OM 2a).

Open Ball Valves 1 and 3.

- If the thermal oxidizer unexpectedly shuts down during core hole ventilation:
  - Close Ball Valves 2, 4 and 5.
  - Disengage the venturi system as described in the VS SOP (OM 3b).
  - Troubleshoot and re-engage the thermal oxidizer per SOP OM 2 (above).
  - Engage the venture system per VS SOP (OM 2b).
  - Open Ball Valves 2, 4 and 5.

Former ITT Rochester Form Machine
Town of Gates, New York
Site #8-28-112

Boring Abandonment Standard Operating Procedure
September 4, 2009

The following boring abandonment standard operating procedure (BA SOP) provides a step-wise approach to abandoning a boring that has encountered conditions that prohibit the completion of a well.

This SOP is accompanied by four additional SOPs, listed below, that supports the *Natural Gas Mitigation Protocol*:

- *Natural Gas Air Monitoring Standard Operating Procedure* (NGAM SOP).
- *Locking Well Head Diverter Standard Operating Procedure (LWHD SOP).*
- *Venturi System Standard Operating Procedure (VS SOP).*
- *Thermal Oxidizer Standard Operating Procedure (TO SOP).*

Below are standard terms used throughout this SOP:

– ***Locking Well Head Diverter***:
A diverter that will be fitted at the top of the permanent casing and around the coring rod string. A rubber inverted cone in the top of the device will be locked into the top of the diverter when engaged prior to drilling. This will close the annular space and provide a seal between the coring rods and the permanent casing. The remaining inlets/outlets from the diverter will be fitted with ball valves allowing for quick shut off points. Further details on the operational use are described in the LWHD SOP attached to this protocol.

– ***Modified Level B PPE*** :
Modified level B PPE will be required to occupy the work zone when air monitoring has detected unsafe working levels within the work zone. This level of PPE includes:
  - Self Contained Breathing Apparatus
  - Fire Retardant Coveralls
  - Hard Hat
  - Safety Boots
  - Gloves (leather or fire retardant)

– ***Packer System***:
Inflatable rubber bladder that is attached to a metal frame. The unit is lowered into a bedrock boring and inflated with nitrogen gas from the surface to seal the borehole.

– ***Multi-Gas Meter***:
A hand-held unit used to monitor volatile organic compounds (VOCs), oxygen, hydrogen sulfide (H_2S) concentrations, and the lower explosive limit (LEL).

Boring Abandonment Standard Operating Procedure
September 4, 2009

Purpose:

To abandon bedrock boring when natural gas is encountered at a pressure and/or condition that prohibits ventilation to the thermal oxidizer.

Period of Use:

After it has been determined that conditions, such as the natural gas pressure is not dissipating with time or excessive water production prohibit the completion of a bedrock boring, and after consultation with NYSDEC.

These activities will be performed in Level B PPE

Operational Methods:

1. *Engage the Emergency Ball Valve*:

   (a) Remove the bedrock coring rods from the boring.
   - This will restrict gases from escaping from the open bedrock boring.

   (b) Close Emergency Ball Valve on the well casing (Figure 2A & 2B).

2. Air quality monitoring during boring abandonment:

   (a) Upon closure of the Emergency Ball Valve air quality at nearby receptors (nearest neighbor door or group of people) will be screened at regular intervals by use of a multi-gas meter and recorded to evaluate air quality prior to leaving the site. Air quality will be evaluated at times when activities require the emergency ball valve to be opened and will continue until the ball valve is closed or the well is abandoned.

3. *Ready and install packer unit:*

   (a) Open Emergency Ball Valve.

   (b) Install and inflate the packer system with capped center pipe above the depth that natural gas was encountered.
   - This will restrict gases from escaping from the natural gas producing zone of the open bedrock boring.

   (c) Verify that packer system has stopped natural gas flow.
   - Monitoring will be performed as described in NGAM SOP (OM 3).

4. *Prepare grout mix:*

   (a) Mix 3,000 psi compressive strength grout mix by mixing 6 gallons of water per 94 lb bag of type II Portland cement.

Boring Abandonment Standard Operating Procedure
September 4, 2009

5. *Abandon bedrock boring:*

(a) Inject grout mix on top of packer system in lifts.
- The volume of grout to be installed per each lift will be determined by the geologist. Volume will be based on location and size of fractures and diameter of the boring with the intent to limit loss of grout to the formation.

1. Introduction

As presented in Section 1 of the 2004 RI/FS Work Plan HASP with the following additions:

Natural gas was encountered during 2008 boring/coring activities. As a result, safety protocols while bedrock coring in the presence of natural gas were re-evaluated. As a result of the re-evaluation, updated procedures, equipment, and personal protective equipment (PPE) to mitigate the natural gas hazard are outlined in this addendum.

1.3. Scope of Work

Soil Borings and Bedrock Coring
Soil borings and bedrock coring will be completed in accordance with Section 1.3 of the 2007 RI Phase II Work Plan Addendum. In addition, bedrock boring AMSF-MW-17MP will be replaced with AMSF-MW-17MP-R to the same specifications.

Natural Gas Mitigation Protocol
Natural gas may be encountered while drilling bedrock wells at the site. As a result, natural gas mitigation protocols were developed to provide guidance for safely drilling under these conditions. Natural Gas Mitigation Protocol is provided in Appendix E of the 2007 RI Phase II Work Plan Addendum. In addition, a Natural Gas Mitigation Flow Chart was developed to aid in field decisions and is provided as Figure 1 of the Natural Gas Mitigation Protocol.

Monitoring Well Installation
Monitoring well installation will be completed in accordance with Section 1.3 of the 2007 RI Phase II Work Plan Addendum. In addition, bedrock well AMSF-MW-17MP will be replaced with AMSF-MW-17MP-R to the same specifications.

4. Personal Protective Equipment

Personal protective equipment (PPE) is consistent with Section 4 of the 2004 RI/FS Work Plan HASP with the following additions/exceptions related to bedrock coring where there is a potential for natural gas releases:

Modified Level D (Natural Gas) **PPE**

Modified level D (Natural Gas) PPE will be required to occupy the work zone while coring is taking place after a bedrock coring depth of 120 feet has been achieved.

- Fire Retardant Coveralls
- Face Shield (attached to hard hat)
- Hard Hat
- Safety Boots
- Gloves (leather or fire retardant)

Modified Level B PPE

Modified level B PPE will be required to occupy the work zone when air monitoring has detected unsafe working levels within the work zone.

- Self Contained Breathing Apparatus
- Fire Retardant Coveralls
- Hard Hat
- Safety Boots
- Gloves (leather or fire retardant)

5. Site Air Monitoring

Site air monitoring will be performed as presented in Section 5 of the 2004 RI/FS Work Plan HASP with the following additions:

5.2.2 Combustible Vapors

Combustible vapors will be monitored continuously while coring into bedrock (Rochester Shale Deposit) where natural gas has been encountered. An intrinsically safe gas meter that is calibrated in accordance with manufacturer's recommendations will be used. Combustible vapors are measured as percent of the lower explosive limit (LEL). Although the LEL action level is typically 10%, the LEL action level while coring into bedrock is 3% for this project.

5.2.3 Oxygen

Oxygen levels will be monitored continuously while coring into bedrock (Rochester Shale Deposit) where natural gas has been encountered. An intrinsically safe gas meter that is calibrated in accordance with manufacturer's recommendations will be used. Methane is the major component (approximately 74%) of natural gas. Although flammable, methane may also displace oxygen and cause an oxygen deficient atmosphere. The oxygen action level is 19.5%. Evacuation or use of Supplied Air Breathing Apparatus (SCBAs) is required for oxygen levels at or below 19.5%.

5.2.4 Hydrogen Sulfide

Hydrogen sulfide may be present in natural gas deposits and will be monitored continuously while coring into bedrock (Rochester Shale Deposit) where natural gas has been encountered. An intrinsically safe gas meter that is calibrated in accordance with manufacturer's recommendations will be used. Also, false alarms for hydrogen sulfide may be caused by the presence high levels of many VOCs that interfere with the hydrogen sulfide sensor according to information provided by one manufacturer (RAE Systems, Inc.). The Health and Safety Coordinator in consultation with the O'Brien & Gere Manager for Corporate H&S will make the determination of false alarms for Hydrogen Sulfide on a case-by-case basis. Evacuation or use of SCBAs is required for hydrogen sulfide levels that exceed 10 ppm averaged over 15 minutes.

5.3. Action Levels

Action levels are presented in Table 3.

5.4. Community Air Monitoring Plan

The community air monitoring plan is presented in Section 5.4 of the 2004 RI/FS Work Plan HASP with the following additions:

One hydrogen chloride (HCl) meter will be utilized to continuously monitor exhaust from the thermal oxidizer. Data will be logged and used to evaluate the emission rate of HCl.

In addition to VOCs, real time air monitoring will be performed in the work zone for LEL, Oxygen, and H_2S consistent with the action levels presented in Table 3. The downwind and upwind perimeter monitors will also be monitored for these parameters.

In addition to VOCs, the following parameters and action levels will be observed during monitoring of the 20-Foot Zone:

- LEL < 3%
- Oxygen > 19.5%
- H_2S < 5 ppm

6. Site Access and Site Control

Site access and site control will be maintained in accordance with Section 6 of the 2004 RI/FS Work Plan HASP with the following additions/exceptions related to bedrock coring where there is a potential for natural gas releases.

6.4 Site Access

3. **Bedrock Coring Locations -** Portable 6' high chain link fence with locked gate will be used to prevent the public or unauthorized site personnel from approaching the well head and oxidization equipment when left unattended. Signs will be posted that indicate "DANGER - Keep Out - Authorized Personnel Only" or equivalent hazard warning. The Health and Safety Coordinator will establish a chain link fence perimeter that is sufficient to protect public safety based on site conditions and air monitoring results.

Table 1. ***Potential Site Compounds and Associated Exposure Information.***

Contaminants	OSHA PEL	ACGIH TLV	Characteristics	Route of Exposure	Symptoms of Overexposure*	Target Organs
1,1-Dichloroethane	100 ppm	100 ppm	colorless, oily liquid	inhalation, ingestion, contact	1, 2, 3, 4	skin, liver, kidneys, lungs, central nervous system
Hydrogen Sulfide	10 ppm	10 ppm	Colorless gas, rotten egg odor	inhalation, contact	1, 2, 3, 4	eyes, respiratory system, central nervous system
Hexane	50 ppm	50 ppm	Colorless liquid with gasoline like odor	inhalation, ingestion, contact	1, 2, 3, 4, 6	eyes, skin, repiratory system, central nervous system, peripheral nervous system

NOTES:
PEL – Permissible exposure limits (OSHA) – 8 hour exposure
PELs were obtained from 29 CFR 1910 Subpart Z Tables Z-1 and Z-2 (last revised June 30, 1993), except for benzene which was obtained from 29 CFR 1910.1028.
TLV – Threshold limit value (ACGIH) – 8 hour exposure
TLVs were obtained from the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances and Physical Agents (2003)

Symptoms of Overexposure:
*Symptoms may include any or all listed depending upon concentration, duration and route of exposure
1) Eye, nose, throat, skin irritation or burns
2) Headache, fatigue, nausea
3) Lightheaded, some nausea, dull visual and audio response
4) CNS disorder, convulsions, sweating
5) CVS disorder
6) Potential or known carcinogens

Table 4. ***Air Monitoring***

Task	Environmental Monitoring for Personal Protection
Thermal Oxidation	Explosive gases meter
Air Sampling	Explosive gases meter and DusTrac

Note: Monitoring results will be recorded in a field log book or be electronically logged. Explosive gases meter will monitor lower explosive limit, oxygen, volatile organic compounds, and hydrogen sulfide.

Table 3. ***Action Levels***

<table>
<tr><th>Hazard</th><th>Action Level</th><th>Level of Personal Protection</th></tr>
<tr><td>Volatile Organic Compounds (VOCs)</td><td>≥ 5 ppm over 15 minute average</td><td rowspan="4">1. Personnel must evacuate the work area to an upwind location.
2. Support Person in fire resistant Level B PPE will provide assistance to any site personnel who require it while evacuating the work area.
3. Support Persons in fire resistant Level B PPE will attempt to stop the natural gas release using existing controls.
4. Support Persons in fire resistant Level B PPE may assist the Site Safety Office by performing additional air monitoring along the perimeter of the Exclusion Zone to verify that the Exclusion Zone is sufficient to protect public safety.
5. Health and Safety Coordinator will adjust the Exclusion Zone perimeter as necessary for public safety.
6. Health and Safety Coordinator to notify ITT representative and other notifications as required in the 2004 RI/FS Work Plan HASP.</td></tr>
<tr><td>Lower Explosive Limit (LEL)</td><td>≥ 3%</td></tr>
<tr><td>Oxygen</td><td>≤ 19.5%</td></tr>
<tr><td>H_2S
(hydrogen sulfide)</td><td>≥ 10 ppm over 15 minute average</td></tr>
</table>

NOTE – Full Face respirators with qualitative fit testing are limited to a protection factor (PF) of 10 per 29CFR1910.134. Full face respirators with quantitative fit testing may be assigned the full OSHA PF of 50.

Spill Cleanup/Remediation Air Emission Work Sheet
New York State Department of Environmental Conservation
Region 8, 6274 E. Avon-Lima Rd., Avon, NY 14414

Site Name: Former ITT Rochester Form Machine Facility (Site #8-28-112)

Site Address/Location: 30 Pixley Industrial Parkway
Rochester, NY 14024

Startup Date ____________________
Shutdown Date ____________________

Stack Height: 10 FT
Stack Exit Inside Dimensions: 0.792 FT (9.5 in)
Stack Exit Temperature: 1400 F
Stack Exit Flow Rate: 200 CFM

Contaminant Name	CAS #	Emission Rate Potential (lbs/hr)	Percent Control	Actual Emissions (lbs/hr)
1,1,1 Trichloroethane	71-55-6	0.33	99%	0.0033
1,1 Dichloroethane	75-34-3	0.073	99%	0.00073
1,1 Dichloroethene	75-35-4	0.0019	99%	0.000019
2-Methylbutane	78-78-4	0.049	99%	0.00049
Benzene	71-43-2	0.0021	99%	0.000021
Butane	106-97-8	0.061	99%	0.00061
Chloroethane	75-00-3	0.00052	99%	0.0000052
Cyclohexane	110-82-7	0.011	99%	0.00011
Heptane	142-82-5	0.010	99%	0.00010
Hexane	110-54-3	0.031	99%	0.00031
Hydrogen Chloride	7647-01-0	0.33	0%	0.33

Use Air Guide 1 (Draft 1991 Edition) screening equations on p. B-9 to estimate ambient impact. Compare impact estimate to AGC and SGC from tables in the back of Air Guide 1. See Air Guide 1, p. 8-9 for compounds not listed.

CAS #	Short Term Impact (ug/m3)	SGC (ug/m3)	Annual Impact (ug/m3)	AGC (ug/m3)
71-55-6	6.2	68,000	0.016	1,000
75-34-3	1.4	NA	0.0037	0.63
75-35-4	0.036	NA	9.6E-05	70
78-78-4	0.92	NA	0.0024	42,000
71-43-2	0.040	1,300	0.00011	0.13
106-97-8	1.2	NA	0.0031	57,000
75-00-3	0.0098	NA	2.6E-05	10,000
110-82-7	0.21	NA	0.00056	6,000
142-82-5	0.19	210,000	0.00051	3,900
110-54-3	0.59	NA	0.0016	700
7647-01-0	620	2,100	1.6	20

Site Name: Former ITT Rochester Form Machine Facility (Site #8-28-112) Air Emission Worksheet

Control Equipment:

____ Not Needed Based on Analysis of Design Conditions
____ Not Needed Based on Analysis of Operating Conditions
x Described Below

Control Type:

____ None
____ Activated Bed Adsorber
____ Other, Explain:
x Thermal Afterburner
____ Catalytic Unit

Manufacturers's Name: ThermTech
Model Number: 1000

Disposal of Collected Contaminants:

____ Landfill Off-Site
____ Recylced in the Process
____ Recycled On-Site
____ Other, Explain:

Frequency of stack emission monitoring/testing None
Monitoring/testing method Not Applicable

Name of DEC Spill/Remediation Project Manager Frank L. Sowers
Phone # 585-226-5357

All specifications and limits stated above and contained in any attached materials submitted with this work sheet are binding and enforcable conditions.

I certify this system will be operated in accordance with the specifications stated above and in compliance with all existing laws, rules and regulations.

Signature of Responsible Party	Title	Date

c: DEC Project Manager

A:\Remedfrm
DEW 5/30/96

Spill Cleanup/Remediation Air Emission Work Sheet
New York State Department of Environmental Conservation
Region 8, 6274 E. Avon-Lima Rd., Avon, NY 14414

Site Name: Former ITT Rochester Form Machine Facility (Site #8-28-112)

Site Address/Location: 30 Pixley Industrial Parkway
Rochester, NY 14024

Startup Date ____________
Shutdown Date ____________

Stack Height: 10 FT
Stack Exit Inside Dimensions: 0.792 FT (9.5 in)
Stack Exit Temperature: 1400 F
Stack Exit Flow Rate: 200 CFM

Contaminant Name	CAS #	Emission Rate Potential (lbs/hr)	Percent Control	Actual Emissions (lbs/hr)
Isobutane	75-28-5	0.065	99%	0.00065
Methylcyclohexane	108-87-2	0.013	99%	0.00013
Methylcyclopentane	96-37-7	0.0053	99%	0.000053
Pentane	109-66-0	0.030	99%	0.00030
Propane	74-98-6	0.0061	99%	0.000061
Toluene	108-88-3	0.0018	99%	0.000018
Trichloroethene	79-01-6	0.0052	99%	0.000052
Xylene (Mixture)	1330-20-7	0.00052	99%	0.0000052

Use Air Guide 1 (Draft 1991 Edition) screening equations on p. B-9 to estimate ambient impact. Compare impact estimate to AGC and SGC from tables in the back of Air Guide 1. See Air Guide 1, p. 8-9 for compounds not listed.

CAS #	Short Term Impact (ug/m3)	SGC (ug/m3)	Annual Impact (ug/m3)	AGC (ug/m3)
75-28-5	1.2	NA	0.0033	57,000
108-87-2	0.24	NA	0.00063	3,800
96-37-7	0.10	NA	0.00027	700
109-66-0	0.57	NA	0.0015	4,200
74-98-6	0.11	NA	0.00030	43,000
108-88-3	0.034	37,000	9.0E-05	5,000
79-01-6	0.097	14,000	0.00026	0.5
1330-20-7	0.0098	4,300	2.6E-05	100

Site Name: Former ITT Rochester Form Machine Facility (Site #8-28-112) Air Emission Worksheet

Control Equipment:

____ Not Needed Based on Analysis of Design Conditions
____ Not Needed Based on Analysis of Operating Conditions
x Described Below

Control Type:

____ None
____ Activated Bed Adsorber
____ Other, Explain:
x Thermal Afterburner
____ Catalytic Unit

Manufacturers's Name: ThermTech
Model Number: 1000

Disposal of Collected Contaminants:

____ Landfill Off-Site
____ Recylced in the Process
____ Recycled On-Site
____ Other, Explain:

Frequency of stack emission monitoring/testing None
Monitoring/testing method Not Applicable

Name of DEC Spill/Remediation Project Manager Frank L. Sowers
Phone # 585-226-5357

All specifications and limits stated above and contained in any attached materials submitted with this work sheet are binding and enforcable conditions.

I certify this system will be operated in accordance with the specifications stated above and in compliance with all existing laws, rules and regulations.

________________ ____________ ________

Signature of Responsible Party | Title | Date

c: DEC Project Manager

A:\Remedfrm
DEW 5/30/96

Table 1

Former ITT Rochester From Machine Facility
Gates, New York

Maximum Hourly Emission Rates

Compound[(a)]	CAS #	Molecular Weight	Sampling Result[(b)] (ug/m^3)	Uncontrolled Mass Emission Rate[(c)] (lb/hr)	Controlled Mass Emission Rate[(d)] (lb/hr)	Maximum Theoretical Projected HCl Emission Rate[(e)] (lb/hr)
Method TO-15 Compounds						
1,1,1- Tricholorethane	00071-55-6	133.41	5,800,000	3.26E-01	3.26E-03	0.267
1,1-Dichloroethane	00075-34-3	98.96	1,300,000	7.30E-02	7.30E-04	0.054
1,1-Dichloroethene	00075-35-4	96.95	34,000	1.91E-03	1.91E-05	0.001
Benzene	00071-43-2	78.11	38,000	2.14E-03	2.14E-05	NA
Chloroethane	00075-00-3	64.5	9,200	5.17E-04	5.17E-06	0.000
Cyclohexane	00110-82-7	84.16	200,000	1.12E-02	1.12E-04	NA
Heptane	00142-82-5	100.2	180,000	1.01E-02	1.01E-04	NA
Hexane	00110-54-3	86.17	550,000	3.09E-02	3.09E-04	NA
m&p-Xylene	01330-20-7	106.16	9,200	5.17E-04	5.17E-06	NA
Toluene	00108-88-3	92.14	32,000	1.80E-03	1.80E-05	NA
Trichlorethene	00079-01-6	131.4	91,000	5.11E-03	5.11E-05	0.004
Tentatively Identified Compounds						
Butane	00106-97-8	58.12	1,084,226	6.09E-02	6.09E-04	NA
2-Methylbutane	00078-78-4	72.15	867,346	4.87E-02	4.87E-04	NA
Methylcyclohexane	00108-87-2	98.19	223,861	1.26E-02	1.26E-04	NA
Methylcyclopentane	00096-37-7	84.16	94,196	5.29E-03	5.29E-05	NA
Isobutane	00075-28-5	58.12	1,156,508	6.50E-02	6.50E-04	NA
Pentane	00109-66-0	72.15	538,353	3.02E-02	3.02E-04	NA
Propane	00074-98-6	44.10	107,848	6.06E-03	6.06E-05	NA
					Total HCl Emissions (lb/hr):	**0.327**

Notes:

(a) Controlled and uncontrolled emission rates were estimated for those compounds that, based on the results of the March 21, 2008 sampling event, were detected at levels above laboratory detection limits.

(b) Concentrations were obtained from the March 21, 2008 sampling of the air above the groundwater at the ITT site. It is noted that the Method TO-15 results were provided in units of ug/m^3 and the Tentatively Identified Compound (TIC) results were provided in units of ppb$_v$. For the purpose of estimating the emissions of the TICs, the concentrations were converted to units of ug/m^3, as shown in the following example calculation for butane:

450,000 ppb$_v$ butane x (1 ppm$_v$/1000ppb$_v$) x (58.12 g butane/mol butane) x (101,325 Pa) x (1/294 K) x (1 K-mol/8.314 Pa-m^3) = 1,084,226 ug/m^3

(c) Uncontrolled mass emission rates were estimated assuming the air in the headspace above the groundwater will be extracted from the ground at a rate of 15 acfm and using the headspace concentrations obtained from the sample results, as shown in the following example calculation for 1,1,1-trichloroethane emissions:

(5,800,000 ug 1,1,1-trichloroethane/m^3 air) x (15 ft^3/min) x (1 m^3/(3.281 ft)^3) x (60 min/hr) x (1 lb/453.593 x 10^6 ug) = 0.326 lb/hr

(d) Controlled mass emission rates were estimated assuming the the thermal oxidizer that will be operated at the site will be capable of removing 99% of the organic compound emissions.

(e) It is expected that HCl emissions will be generated and released as a result of the thermal oxidation of the chlorinated compounds. The HCl emissions were estimated based on the following chemical equations:

1,1,1-trichloroethane: $C_2H_3Cl_3 + H_2O$ -------------> $C_2HOCl_3 + 2H_2$ --------> (over $2O_2$) -------> $3HCl + 2CO_2 + H_2O$

1,1-dichloroethane: $2C_2H_4Cl_2 + 5O_2$ -------------> $4HCl + 4CO_2 + 2H_2O$

1,1-dichloroethene: $C_2H_2Cl_2 + H_2O$ -------------> $C_2HOCl_2 + (3/2)H_2$ --------> (over $2O_2$) -------> $2HCl + 2CO_2 + H_2O$

chloroethane: $C_2H_5Cl + 3O_2$ ---------------> $HCl + 2CO_2 + 2H_2O$

trichloroethene: $C_2HCl_3 + H_2O$ ---------------> C_2HOCl_3 + 2H2 --------> (over $2O_2$) -------> $3HCl + 2CO_2 + H_2O$

The methodology used to estimate the maximum theoretical projected HCl emission rates is shown in the following example calculation for 1,1,1-trichloroethane ($C_2H_3Cl_3$):

0.326 lb $C_2H_3Cl_3$/hr x 1 mol $C_2H_3Cl_3$/133.41 lb $C_2H_3Cl_3$ x 3 mol HCl/1 mol $C_2H_3Cl_3$ x 36.45 lb HCl/mol HCl = 0.267 lb HCl/hr

O'BRIEN & GERE

Table 2

Former ITT Rochester From Machine Facility
Gates, New York

Stack Parameters

Stack Height (ft)	Inside Diameter (in)	Temperature (F)	Flow Rate (cfm)
10	9.5	1,400	200

O'BRIEN & GERE

Table 3

Former ITT Rochester From Machine Facility
Gates, New York

DAR-1 Modeling Results

Contaminant	CAS Number	Averaging Period	Emission Rate [(a)] (lb/hr)	Normalized Concentration (ug/m^3/lb/hr)	Predicted Maximum Ambient Concentration [(b)] (ug/m^3)	AGC/SGC [(c)] (ug/m^3)	Percent AGC/SGC (%)
1,1,1 Trichloroethane	71-55-6	1-Hour	0.0033	1896.5	6.2	68,000	---
		Annual	0.00022	73.3	0.016	1,000	<1
1,1 Dichloroethane	75-34-3	1-Hour	0.00073	1896.5	1.4	---	---
		Annual	5.0E-05	73.3	0.0037	0.63	<1
1,1 Dichloroethene	75-35-4	1-Hour	1.91E-05	1896.5	0.036	---	---
		Annual	1.31E-06	73.3	9.6E-05	70	<1
2-Methylbutane	78-78-4	1-Hour	4.87E-04	1896.5	0.92	---	---
		Annual	3.34E-05	73.3	2.4E-03	42,000	<1
Benzene	71-43-2	1-Hour	2.14E-05	1896.5	0.040	1,300	<1
		Annual	1.46E-06	73.3	0.00011	0.13	<1
Butane	106-97-8	1-Hour	6.09E-04	1896.5	1.2	---	---
		Annual	4.17E-05	73.3	0.0031	57,000	<1
Chloroethane	75-00-3	1-Hour	5.17E-06	1896.5	0.0098	---	---
		Annual	3.54E-07	73.3	2.6E-05	10,000	<1
Cyclohexane	110-82-7	1-Hour	1.12E-04	1896.5	0.21	---	---
		Annual	7.70E-06	73.3	0.00056	6,000	<1
Heptane	142-82-5	1-Hour	1.01E-04	1896.5	0.19	210,000	<1
		Annual	6.93E-06	73.3	0.00051	3,900	<1
Hexane	110-54-3	1-Hour	3.09E-04	1896.5	0.59	---	---
		Annual	2.12E-05	73.3	0.0016	700	<1
Hydrogen Chloride	7647-01-0	1-Hour	0.33	1896.5	620	2,100	30
		Annual	0.022	73.3	1.6	20	8
Isobutane	75-28-5	1-Hour	6.50E-04	1896.5	1.2	---	---
		Annual	4.45E-05	73.3	0.0033	57,000	<1
Methylcyclohexane	108-87-2	1-Hour	1.26E-04	1896.5	0.24	---	---
		Annual	8.61E-06	73.3	0.00063	3,800	<1
Methylcyclopentane	96-37-7	1-Hour	5.29E-05	1896.5	0.10	---	---
		Annual	3.62E-06	73.3	0.00027	700	<1
Pentane	109-66-0	1-Hour	3.02E-04	1896.5	0.57	---	---
		Annual	2.07E-05	73.3	0.0015	4,200	<1

Table 3

Former ITT Rochester From Machine Facility
Gates, New York

DAR-1 Modeling Results

Contaminant	*CAS Number*	*Averaging Period*	*Emission Rate [(a)] (lb/hr)*	*Normalized Concentration (ug/m^3/lb/hr)*	*Predicted Maximum Ambient Concentration [(b)] (ug/m^3)*	*AGC/SGC [(c)] (ug/m^3)*	*Percent AGC/SGC (%)*
Propane	74-98-6	1-Hour	6.06E-05	1896.5	0.11	---	---
		Annual	4.15E-06	73.3	0.00030	43,000	<1
Toluene	108-88-3	1-Hour	1.80E-05	1896.5	0.034	37,000	<1
		Annual	1.23E-06	73.3	9.0E-05	5,000	<1
Trichloroethene	79-01-6	1-Hour	5.11E-05	1896.5	0.097	14,000	<1
		Annual	3.50E-06	73.3	0.00026	0.5	<1
Xylene (Mixture)	1330-20-7	1-Hour	5.17E-06	1896.5	0.0098	4,300	<1
		Annual	3.54E-07	73.3	2.6E-05	100	<1

Notes:

(a) 1-hour emission rates represent maximum hourly controlled emission rates, with the exception of HCl. The 1-hour HCl emission rate represents the maximum hourly uncontrolled emission rate. Annual emission rates were estimated by multiplying the 1-hour emission rates by 600 hours and dividing the maximum annual hours of 8,760. This assumes the thermal oxidizer will be operated a maximum of 600 hours annually.

(b) Predicted Maximum Ambient Concentration (ug/m^3) = Emission Rate (lb/hr) * Normalized Concentration (ug/m^3/lb/hr)

(c) AGCs and SGCs were obtained from NYSDEC's "DAR-1 AGC/SGC Tables" Division of Air Resources, Air Toxics Section, September 10, 2007.

O'BRIEN & GERE