WORK PLAN FOR VAPOR INTRUSION EVALUATION

Greif, Inc. Facility
Town of Tonawanda
Erie County, New York
NYSDEC VCP Number V00334-9

November 2007

Prepared for:

Sonoco Products Company

Prepared by:

Environmental Resources Management
5788 Widewaters Parkway
Dewitt, New York 13214

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1.0 INTRODUCTION

The New York State Department of Environmental Conservation (NYSDEC) requested the submittal of a work plan for evaluation of vapor intrusion, to include an assessment of the potential for off-site vapor intrusion, at the Greif, Inc. (Greif) facility located at 2122 Colvin Boulevard in the Town of Tonawanda, Erie County, New York (the Site). Environmental investigation and remediation activities are being performed at the Site pursuant to Voluntary Cleanup Agreement (VCA) Index Number B9-0574-00-03 between Sonoco Products Company (Sonoco) and NYSDEC. The Site has been identified as Voluntary Cleanup Program (VCP) Site Number V00334-9.

The vapor intrusion investigation will include sampling of soil vapor, sub-slab vapor, indoor air, and outdoor ambient air to evaluate the potential for vapor intrusion of Site-related contaminants. This Work Plan for evaluation of vapor intrusion at the Site (the Work Plan) will be reviewed by all personnel working on the vapor intrusion investigation to facilitate the generation of valid and usable data. Data generated will be reviewed, interpreted, and compiled into a report that will be submitted to NYSDEC for review.

ERM understands that NYSDEC requests that the vapor intrusion investigation be implemented at the Site sometime during the upcoming heating season (i.e., between November 2007 and March 2008). This Work Plan includes an estimated project schedule outlining the anticipated timing for implementation of the major components of the vapor intrusion investigation.

1.1 SITE DESCRIPTION AND BACKGROUND INFORMATION

The Site consists of an industrial building located on approximately 25 acres in the Town of Tonawanda, Erie County, New York. The Site is located in a mixed industrial/commercial/residential area approximately one-quarter mile south of Highway I-290 (Figure 1). Adjoining properties are as follows:

- North – vacant land (including a former railroad siding and a wooded area) and residential apartments;
- South – a local park/sports fields (Walter M. Kenney Field) and land recently developed into commercial office space;
- East – Colvin Boulevard with single family/duplex homes further east; and
- West – a business park adjacent to a major railroad line formerly traversed by two railroad spurs into the Site.

Figure 2 presents a map showing general Site layout and the locations of selected Site features. The building is surrounded by paved parking areas, storage areas, and landscaped areas. The north, west and east sides of the Site are fenced to restrict access. There are two main gates on the east side of the Site where employees and visitors routinely enter and an unused, old gate on the west side of the Site at the location of an old railroad spur into the Site.

Based on information provided by Grief and ERM's review of Site plans, the building was originally constructed in 1948. From 1948 to 1985 the Site was owned and operated by Continental Fiber Drum and/or Continental Can Corporation. Historical manufacturing operations at this time consisted of the production of fiber drums but also included production of the metal lids and rims used in the fiber drums.

Sonoco Products Company (Sonoco) acquired the Fiber Drum Division in 1985. The major existing manufacturing operations reportedly continued generally unchanged until the early 1990s. In 1995, the varnishing and degreasing processes on the metal utilized to produce the lids and rims used in the fiber drums were discontinued. Greif subsequently acquired the Site in May 1998. The Site continues to be used for the manufacture of fiber drums and associated products. Secondary operations include equipment maintenance and administrative activities.

Site topography is relatively flat with an average elevation of approximately 586 feet above mean sea level. The Site is situated approximately 3.5 miles east of the Niagara River and 1.1 miles south of Ellicott Creek in the Erie-Ontario Lowlands physiographic province of western New York State. Topographic relief within one-half mile of the Site is minimal (approximately 15 feet).

Surficial geology in the vicinity of the Site was previously mapped by the New York State Geological Survey (NYSGS) as lacustrine silt and clay. These deposits consist predominantly of varved or laminated, calcareous silt and clay deposited in proglacial lakes with variable thicknesses. Bedrock in the vicinity of the Site consists predominantly of dolostones, shales, and evaporites of the Upper Silurian Salina Group based on mapping performed by NYSGS. Bedrock at the Site occurs at a depth of approximately 75 feet below ground surface.

ERM performed subsurface investigation at the Site with the overall objective to evaluate the nature and extent of soil and ground water potentially affected by Site activities. Environmental investigations initially were performed in connection with the purchase of the Site. The

scope of work associated with subsurface investigations generally included installation of soil borings, ground water monitoring wells, and collection of soil, soil vapor, and ground water samples for analysis of selected parameters at an approved environmental laboratory. Previous soil vapor samples collected at the Site were associated with a passive soil vapor survey and were reported as absolute masses, not as concentrations (ERM, 2001). Detailed information regarding previous environmental investigation at the Site is summarized the Data Gap Investigation Report (ERM, 2003). Detailed information regarding completed and ongoing Interim Remedial Measures (IRMs) at the Site are summarized in the dense, non-aqueous phase liquid (DNAPL) Recovery IRM Pilot Test Report (ERM, 2005) and Interim Report - Soil Excavation IRM (ERM, 2006).

Several volatile organic compounds (VOCs) of potential concern have been identified in Site soil, soil vapor, and/or ground water samples previously collected beneath or proximal to the main building at the Site. Samples collected for laboratory analysis during the implementation of this Work Plan will be analyzed for the specific VOCs listed below that were previously detected in soil, soil vapor, and/or ground water samples collected at the Site.

- Acetone
- Benzene
- 2-Butanone
- Carbon tetrachloride
- Chloroethane
- Chloroform
- 1,1-Dichloroethane (DCA)
- 1,2-DCA
- 1,1-Dichloroethene (DCE)
- cis-1,2-DCE
- trans-1,2-DCE
- Ethylbenzene
- Methylene chloride
- 4-Methyl-2-pentanone
- 1,1,2,2-Tetrachloroethane
- Tetrachloroethene (PCE)
- Toluene
- 1,1,1-Trichloroethane (TCA)
- 1,1,2-TCA
- Trichloroethene (TCE)
- 1,2,4-Trimethylbenzene
- Vinyl chloride
- Xylenes

1.2 CONCEPTUAL SITE MODEL

Previous environmental investigation has shown that VOCs of potential concern are limited in general to the southwestern portion of the building and adjacent exterior areas in three areas of concern:

1. the Varnish Pit Area;
2. the Former Drum Storage Area; and
3. the Former Varnish Underground Storage Tank (UST) Area.

The locations of these areas of concern are illustrated in Figure 2. Available data indicates that the primary VOCs of potential concern released in these areas are 1,1,1-TCA, TCE, and xylenes.

There is separate- and residual-phase DNAPL located in the saturated zone vicinity of the Varnish Pit that is currently being recovered to the extent practicable through an IRM. There is also a significantly lesser quantity of separate- and residual-phase light, non-aqueous phase liquid (LNAPL) on top of the saturate zone in the vicinity of monitoring well MW-23 that is also being recovered to the extent practicable. The DNAPL and the LNAPL are derived from the same parent non-aqueous phase liquid (NAPL) that is consistent with varnish. The varnish NAPL is a DNAPL near the Varnish Pit due to contamination with a large mass of 1,1,1-TCA and TCE. The NAPL is a LNAPL near MW-23 because contamination of the varnish NAPL with 1,1,1-TCA and TCE is much less significant away from the Varnish Pit (the location of former degreasing operations and the source area for much of the 1,1,1-TCA and TCE released at the Site).

Previous soil vapor sampling and monitoring associated with IRM activities have shown that there are VOCs in soil vapor present beneath the western portion of the main building and that there has been some migration of VOCs in the vapor phase along a 3-inch diameter sanitary sewer line that runs from the Varnish Pit to the north and then east towards Colvin Boulevard.

Two large #2 fuel oil USTs were formerly located outside the facility adjacent to the boiler room. Soil borings previously installed in this area did not reveal elevated concentrations of VOCs and there is no evidence indicating that there are VOCs in soil vapor in this portion of the building. However, this area represents the southeastern portion of the building where elevated concentrations of VOCs in soil vapor, if any, might be anticipated based on the location of the former fuel oil USTs.

2.0 INVESTIGATION FIELD WORK

The objective of vapor intrusion evaluation field work at the Site is to identify specific VOCs present and their extent in sub-slab vapor, indoor air, and outdoor air samples collected at the Site to facilitate an objective evaluation of the vapor intrusion pathway in the Site building. As requested by NYSDEC, the evaluation is also being performed to evaluate the potential for off-Site migration of VOCs in soil vapor through collection of soil vapor samples at selected locations adjacent to property boundaries.

The investigative field work described in this Work Plan has been designed in accordance with applicable guidance from the New York State Department of Health (NYSDOH, 2006). Investigative field work and associated activities will be conducted in general conformance with the most recent NYSDEC-approved Site-specific Health and Safety Plan (ERM 2004) and the NYSDEC-approved Site-specific Quality Assurance Project Plan (ERM, 2000). Field data and relevant observations will be documented in a bound, dedicated field notebook, on appropriate sampling forms, and/or with color photographs.

2.1 PRE-SAMPLING INSPECTION AND PREPARATIONS

ERM will conduct a pre-sampling inspection of the main level of the building prior to the sampling event to identify and minimize building factors or conditions that may interfere with the proposed investigation. Information on floor slab layout and condition, construction characteristics, general air flow characteristics, HVAC systems, other potentially relevant physical conditions, and potential sources of VOCs inside the main building will described and documented on a building inventory form. Chemicals or other products used in the facility for routine manufacturing and/or maintenance operations will be documented on the building inventory form. A calibrated photoionization detector (PID) with an 11.4eV or greater lamp will be used to collect readings at selected areas inside the building. To the extent practicable, reasonable effort will be made to avoid activities inside the building that may interfere with or dilute ambient indoor air within 24 hours before and during the investigation, such as opening of windows, vents, use of ventilation fans, painting, cleaning, waxing, or polishing with petroleum-or oil-based products, application of pesticides, caulking, or use of bituminous or other organic materials in building maintenance.

ERM will file a request for the identification, location, and marking of member company subsurface utilities with Dig Safely New York prior to the initiation of intrusive activities at the Site. Greif is responsible for the identification, location, and marking of any privately-owned subsurface

utilities. ERM will coordinate with Greif personnel to obtain Greif clearance of any proposed sampling locations where subsurface intrusive activities will be required.

2.2 *SUBSURFACE SAMPLING*

Two types of subsurface samples will be collected during the implementation of this Work Plan:

- sub-slab vapor samples collected beneath the building; and
- soil vapor samples collected near the northern, eastern, southern, and western property boundaries.

2.2.1 *Sub-Slab Vapor Sample Collection*

ERM will collect four sub-slab vapor samples from beneath the concrete floor inside the building. Proposed sample locations are presented in Figure 2. Proposed sample locations have been biased towards areas where available data and information suggests that sub-slab concentrations of VOCs may be reasonably anticipated to occur at the highest concentrations as outlined in the Conceptual Site Model (Section 1.2 of this Work Plan).

Figure 3 summarizes the proposed construction of sub-slab vapor sample collection points. A 1-inch diameter hole will be drilled to a depth of approximately 6-inches into the concrete floor slab using an electric hammer drill. A ½-inch drill bit will be used to drill through the remaining thickness of the slab and approximately 3-inches into the sub-slab material. A section of ¼-inch outside-diameter (O.D.) Teflon™ tubing will be installed to a depth just below the bottom of the concrete slab. The annular space between the 1-inch hole and ¼-inch tubing will be sealed with melted beeswax. A calibrated photoionization detector (PID) with an 11.4 eV or greater lamp will be used to purge approximately 1-liter of gas from the subsurface and peak PID readings during purging will be recorded on the sampling form. A helium tracer gas will be used to determine if ambient air is being drawn into the sampling zone. The Teflon™ tubing will then be attached to a stainless steel Summa® sampling canister equipped with a 24-hour flow controller.

All samples will be collected using 6-liter Summa® canisters equipped with an appropriate flow regulator. The canisters and flow regulators will be certified clean by the laboratory prior to re-use. The sample canisters will be retrieved approximately 24-hours after initiation of sample collection.

2.2.2 *Soil Vapor Sample Collection*

ERM will collect six soil vapor samples at the locations proposed in Figure 2. The actual location of these samples is approximate and is subject to modification in the field based on subsurface utility locations and approval from Greif personnel.

Soil vapor samples will be collected through temporary soil vapor probes installed using direct-push technology. Figure 4 summarizes the proposed construction of soil vapor sample collection points. Soil vapor samples will be collected at a depth consistent with a typical building footer, approximately 4 to 6 feet below ground surface. An ERM geologist will log soil color, texture (grain size), moisture content, density, organic matter content, and other pertinent observations. A calibrated PID will be used to screen soil cores for VOCs. Stainless steel rods equipped with a detachable stainless steel drive point will be driven to the desired sampling depth. At the desired depth, a 6-inch soil vapor probe (sampling screen) attached to dedicated polyethylene tubing will be lowered through the rods to the bottom of the borehole. The drive rods will then be retracted and the borehole will be backfilled with clean coarse sand or glass beads to a minimum of six inches above the soil vapor probe. Bentonite will then be placed above the sand pack to the ground surface and immediately hydrated using potable water. A minimum time period of 24 hours will be allowed to pass before the samples are collected to allow for bentonite hydration.

Prior to collection of each soil vapor sample, the temporary soil vapor probe and tubing will be purged. A minimum of three implant volumes will be purged at a rate not exceeding 0.2 liters per minute, and a helium tracer gas will be used to determine if ambient air is being drawn into the sampling zone.

Soil vapor samples will be collected in laboratory-certified clean 6-liter Summa® canisters with 24-hour calibrated flow controllers. The Summa® canisters will be connected to the dedicated sample tubing with a Swagelok®-type fitting. The sample canisters will be retrieved approximately 24-hours after initiation of sample collection. After the soil vapor samples are collected, the sample tubing will be pulled from the boreholes. If necessary, the boreholes will be backfilled to within six inches of the ground surface with bentonite. The remainder of the borehole will be backfilled with topsoil.

2.3 INDOOR AIR SAMPLE COLLECTION

Four indoor air samples will be collected inside the building. Each indoor air sample will be placed in the same locations as the sub-slab vapor samples as shown on Figure 2.

For indoor air samples, the intake will be placed at breathing zone heights of approximately 4- to 5-feet above the floor. As practical, based on building features, the sample will typically be collected in a location away from outside windows or doors or process equipment that may affect localized air flow. At the time of sampling, any noticeable and observed changes in the condition of the sampling area, such as changes in open windows or doors, operation of the heating/ventilation system, or the condition or location of chemicals, products, or other items in proximity to the sampling canister will be noted on the sampling form.

Samples will be collected using 6-liter Summa® canisters equipped with flow regulators. The canisters and flow regulators will be certified clean by the laboratory prior to re-use. The sample canisters will be deployed and will be retrieved approximately 24-hours after initiation of sample collection.

2.4 OUTDOOR AIR SAMPLE COLLECTION

One outdoor ambient air sample will be collected on the up-wind side of the building on the same day that the indoor air samples are collected. The intake will be placed in the breathing zone at a height of approximately 4- to 5-feet above the ground level. At the time of sampling, any noticeable and observed changes in the condition of the sampling area, such as changes in wind direction, operation of heavy equipment or other vehicles potentially in the area, or the condition or location of chemicals, products, or other items in proximity to the sampling canister will be noted on the sampling form.

Samples will be collected using 6-liter Summa® canisters equipped with flow regulators. The canisters and flow regulators will be certified clean by the laboratory prior to re-use. The sample canisters will be deployed and will be retrieved approximately 24-hours after initiation of sample collection.

2.5 QUALITY ASSURANCE/QUALITY CONTROL

Sample collection, handling, and management will be performed in general conformance with the NYSDEC-approved Quality Assurance Project Plan for the Site as appropriate (ERM, 2000).

The following terminology will be used to identify and designate samples for the various sample types anticipated in the Work Plan.

Sub-slab vapor locations:	GREIF-SSV-xx
Soil vapor locations:	GREIF-SV-xx
Indoor air locations:	GREIF-IA-xx
Outdoor ambient air location:	GREIF-OA-xx

NOTE: "xx" refers to a two-digit sample identifier designated consecutively in chronological order of collection (i.e., 01, 02, 03, etc.).

One blind duplicate sample will be collected for each sample type with the exception of the outdoor ambient air sample. Duplicate samples will be identified and designated as follows

Sub-slab vapor locations:	GREIF-DUP-1
Soil vapor locations:	GREIF-DUP-2
Indoor air locations:	GREIF-DUP-3

3.0 ANALYTICAL METHODS

All vapor samples and blind duplicate samples collected during implementation of this Work Plan will be submitted to an environmental laboratory approved through the New York State Department of Health Environmental Laboratory Approval Program for analysis of VOCs by United States Environmental Protection Agency Method TO-15. Results will be requested on a standard laboratory turn-around time. ERM will request that the laboratory verify in writing that they are capable of detecting VOCs and can report them at the appropriate reporting limits. The laboratory will be advised that analyses for samples collected during implementation of this Work Plan shall achieve detections limits of at least 1.0 $\mu g / m^3$ for each compound, with the exception of sub-slab vapor samples, which shall achieve detection limits of 0.25 $\mu g / m^3$ for each compound.

4.0 PROJECT SCHEDULE

Figure 5 shows major tasks associated with the proposed vapor intrusion investigation along with a proposed schedule for completion of these tasks.

5.0 REFERENCES CITED

ERM, 2000. Work Plan for Remedial Investigation, 2122 Colvin Boulevard, Tonawanda, New York. NYSDEC VCP Number V00334-9, ERM Project Number D6713.00.01, June 2000.

ERM, 2001. Voluntary Remedial Investigation Report, Greif Bros. Site, 2122 Colvin Boulevard, Town of Tonawanda, Erie County, New York. NYSDEC VCP Number V00334-9, ERM Project Number D6714.00, 28 November 2001.

ERM, 2003. Data Gap Investigation Report, Greif Bros. Site, 2122 Colvin Boulevard, Town of Tonawanda, Erie County, New York. NYSDEC VCP Number V00334-9, ERM Project Number 0001242, December 2003.

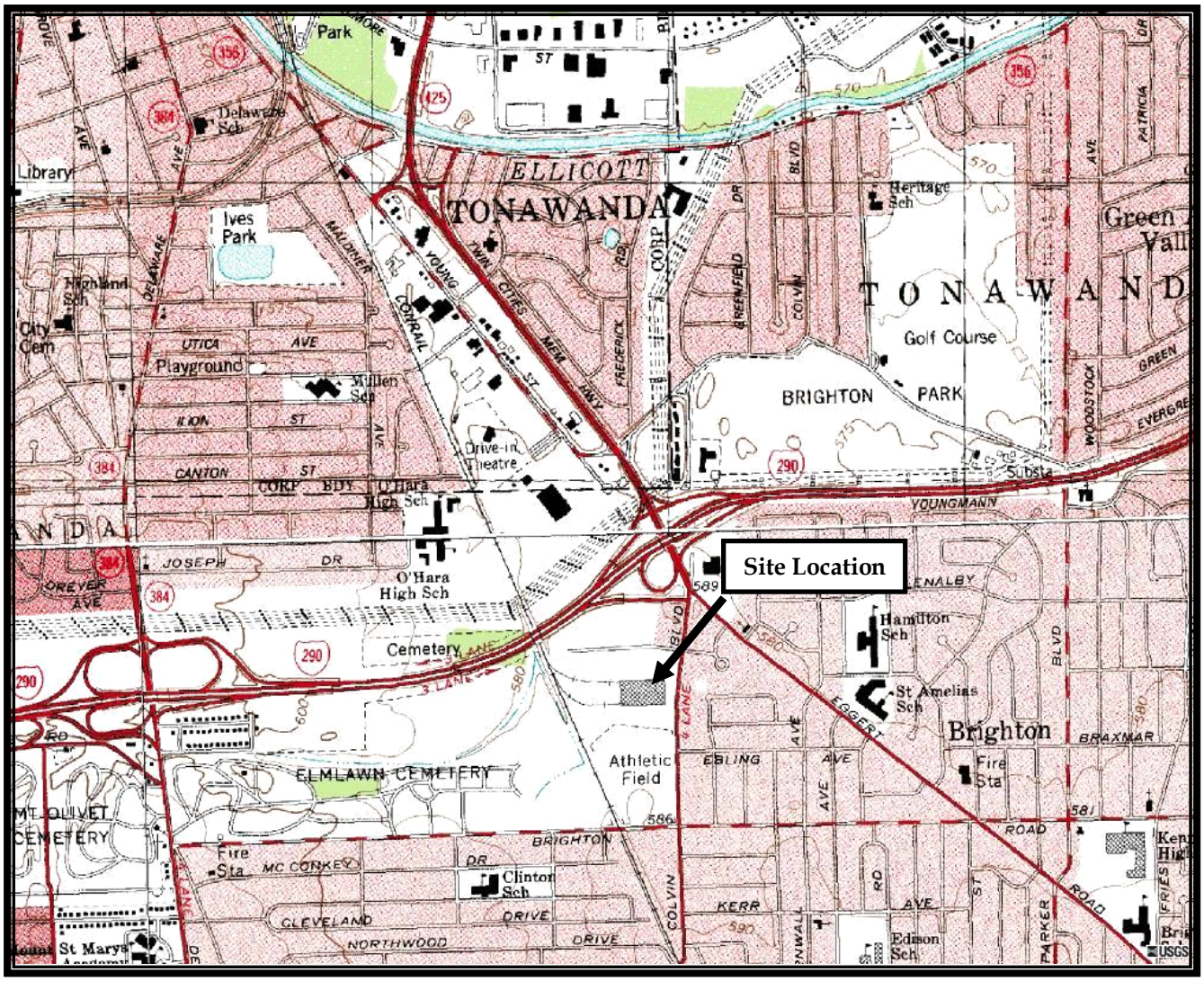
ERM, 2004. Interim Remedial Measure Work Plan, Greif Bros. Facility, 2122 Colvin Boulevard, Town of Tonawanda, Erie County, New York. NYSDEC VCP Number V00334-9, ERM Project Number 0016742, June 2004.

ERM, 2005. DNAPL Recovery IRM Pilot Test Report, 2122 Colvin Boulevard, Town of Tonawanda, Erie County, New York. NYSDEC VCP Number V00334-9, ERM Project Number 0021621, May 2005.

ERM, 2006. Interim Report – Soil Excavation Interim Remedial Measure, Greif Bros. Facility, 2122 Colvin Boulevard, Town of Tonawanda, Erie County, New York. NYSDEC VCP Number V00334-9, ERM Project Number 0017521, 28 April 2006.

NYSDOH, 2006. Guidance for evaluating soil vapor intrusion in the State of New York (Final). New York State Department of Health, Center for Environmental Health, Bureau of Environmental Exposure Investigation, Albany, October 2006, 92 pp.

Figures



Buffalo NE Quadrangle
New York
7.5 Minute Series

SCALE 1 : 24,000

1 .5 0 1 MILE

CONTOUR INTERVAL 20 FEET

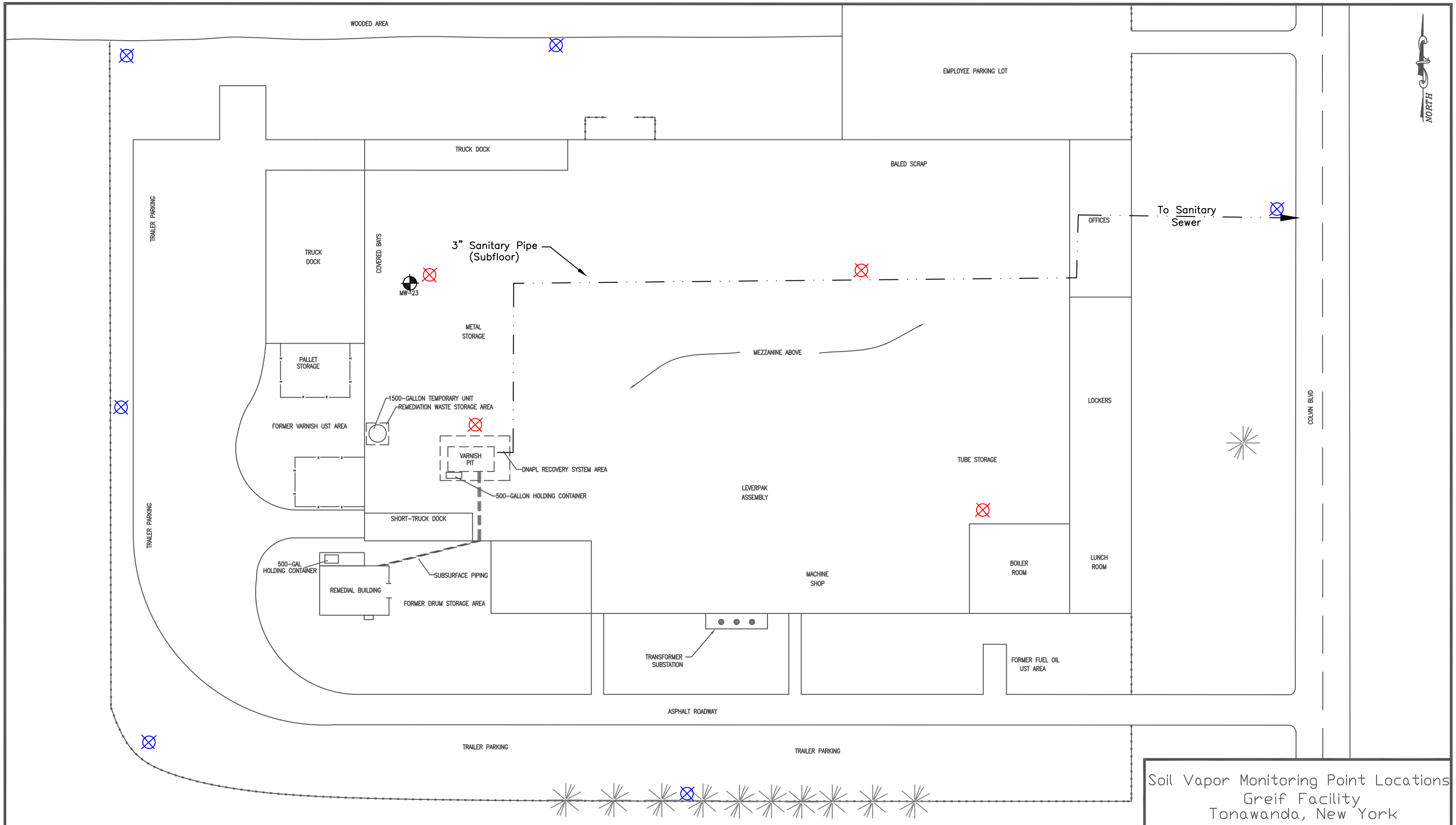
Site Location Map
Grief Facility
Tonawanda, New York
NYSDEC VCP# V00334-9

PREPARED FOR
Sonoco Products Company

ERM
5788 WIDEWATERS PARKWAY
DEWITT, NEW YORK 13214

SCALE	FIGURE
NTS	1
DATE	
5/07	

PROJECT#0070448



LEGEND

Proposed Soil Vapor Sample Locations

Proposed Sub-slab Soil Vapor and Indoor Ambient Air Sample Locations

Soil Vapor Monitoring Point Locations
Greif Facility
Tonawanda, New York
NYSDEC VCP# V00334-9

PREPARED FOR
Sonoco Products Company

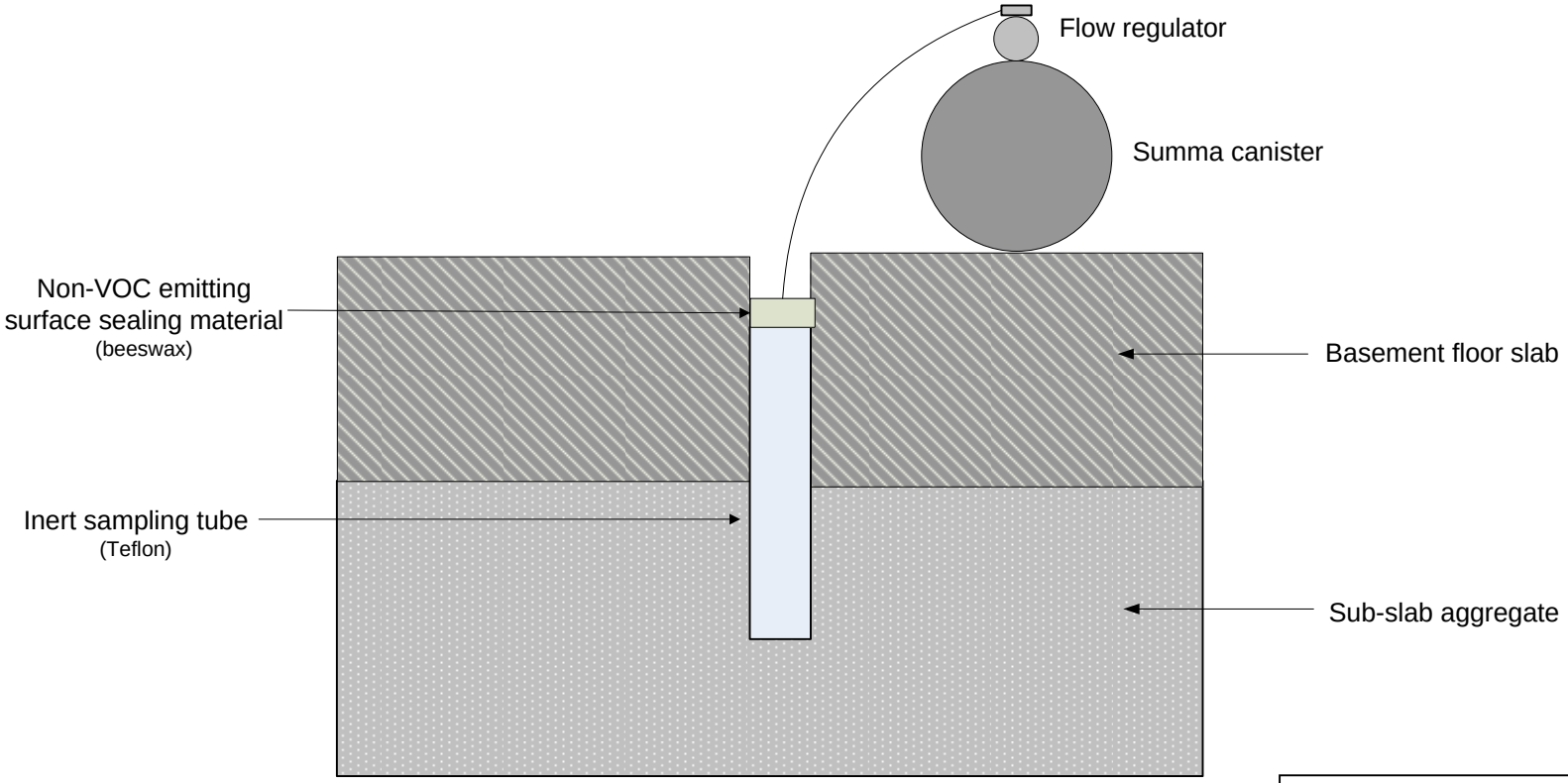
ERM
5788 WIDEWATERS PARKWAY
DEWITT, NEW YORK 13214

SCALE 1"=60'

DATE 5/07

FIGURE 2

PROJECT#0070448



Sub-Slab Vapor Sample Collection

Greif Facility – Tonawanda, NY
NYSDEC VCP # V00334-9

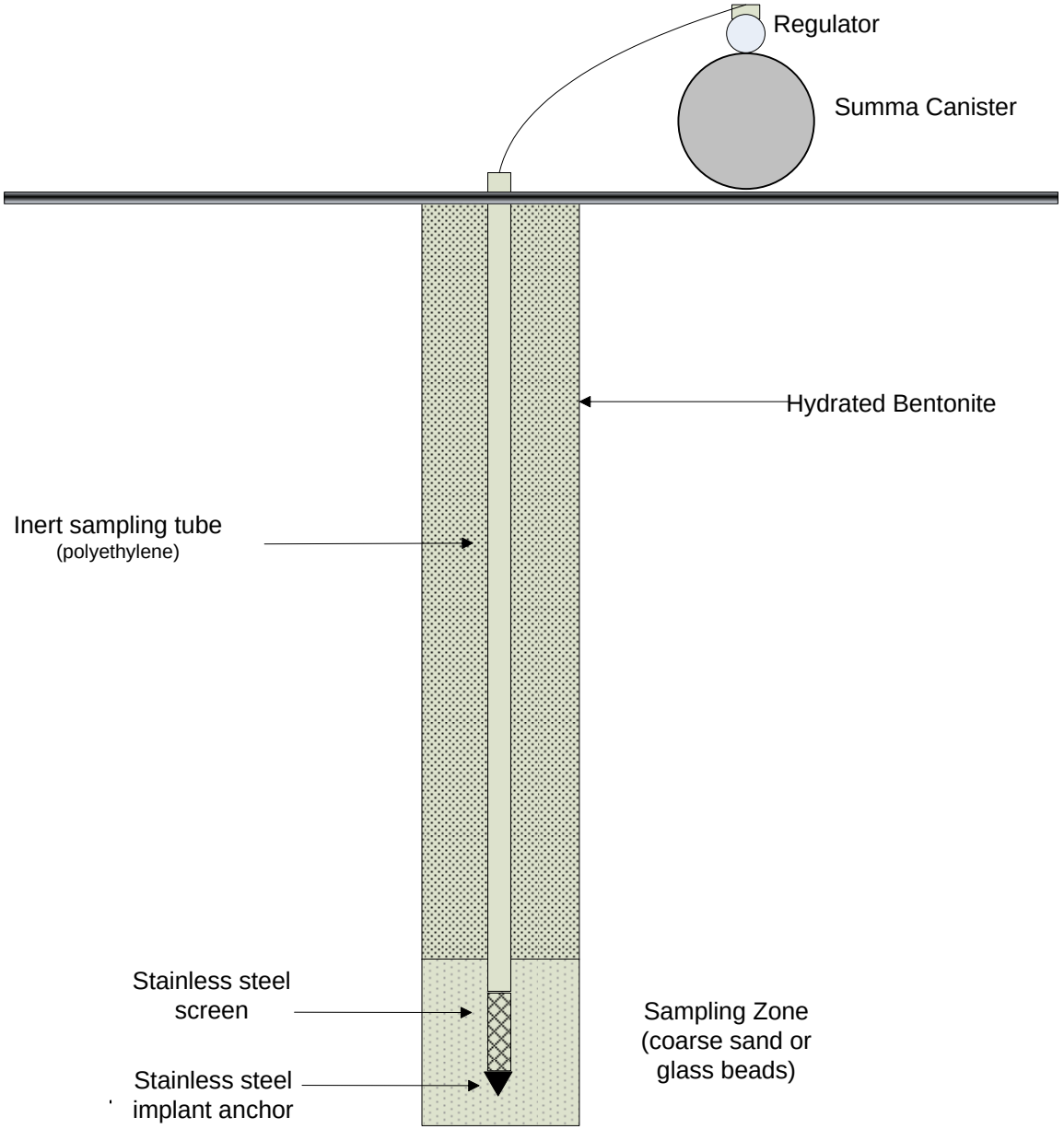
Client: Sonoco Products Company

ERM Environmental Resources Management

Date: Oct 2007

Figure: 3

Job#: 0022684



Vapor Sample Collection via
Temporary Soil Vapor Probe
Greif Facility – Tonawanda,NY
NYSDEC VCP #V00334-9

Client: Sonoco Products Company

ERM Environmental Resources Management

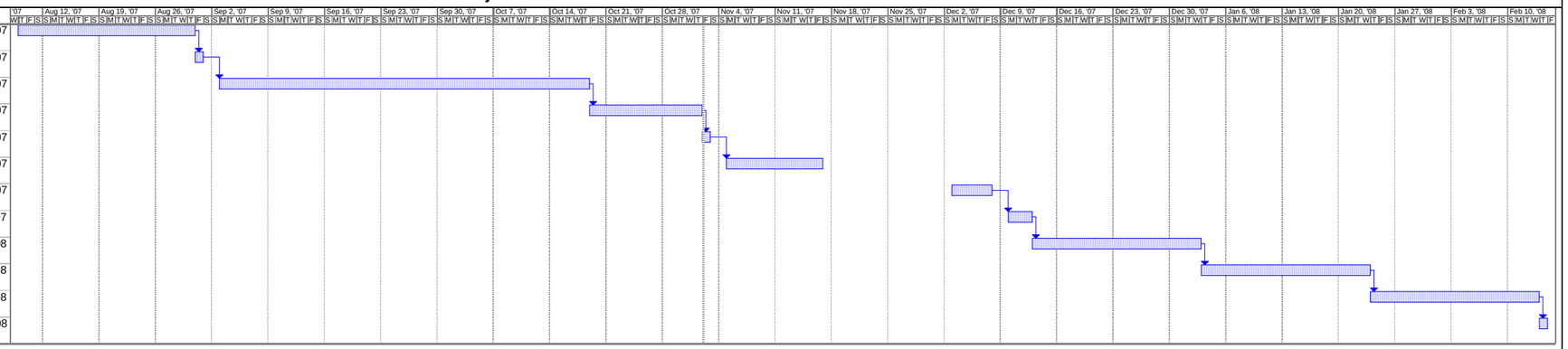
Date: Oct 2007

Figure: 4

Job#: 0022684

Figure 5
Soil Vapor Intrusion Evaluation Proposed Project Schedule
Greif Facility - Tonawanda, New York
NYSDEC VCP Number V00334-9
ERM Project Number 0070448

ID	Task Name	Duration	Start	Finish
1	VI Work Plan Preparation	16 days	Thu 8/9/07	Thu 8/30/07
2	Submittal to NYSDEC and NYSDOH	1 day	Fri 8/31/07	Fri 8/31/07
3	NYSDEC and NYSDOH Review	34 days	Mon 9/3/07	Thu 10/18/07
4	Revise VI Work Plan if necessary	10 days	Fri 10/19/07	Thu 11/1/07
5	Re-Submitttal to NYSDEC and NYSDOH	1 day	Fri 11/2/07	Fri 11/2/07
6	Final Regulatory Approval of VI Work Plan	10 days	Mon 11/5/07	Fri 11/16/07
7	Preparations for Field Work	5 days	Mon 12/3/07	Fri 12/7/07
8	Field Work	3 days	Mon 12/10/07	Wed 12/12/07
9	Laboratory Analyses	15 days	Thu 12/13/07	Wed 1/2/08
10	Evaluate Data	15 days	Thu 1/3/08	Wed 1/23/08
11	Report Preparation	15 days	Thu 1/24/08	Wed 2/13/08
12	Submittal of VI Report to NYSDEC	1 day	Thu 2/14/08	Thu 2/14/08



Project: Tonawanda VI Inv Pro
Date: Fri 11/2/07

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline