Sterling Environmental Engineering, P.C.

B. MILLENS METAL RECYCLING FACILITY
290 EAST STRAND STREET
CITY OF KINGSTON, NEW YORK

INTERIM REMEDIAL MEASURES WORK PLAN

Prepared for:

B. Millens Metal Recycling Facility
290 East Strand Street
Kingston, New York 12401

Prepared by:

Sterling Environmental Engineering, P.C.
24 Wade Road
Latham, New York 12110

June 26, 2015
Revised November 18, 2015

"Serving our clients and the environment since 1993"

B. MILLENS METAL RECYCLING FACILITY
290 EAST STRAND STREET
CITY OF KINGSTON, NEW YORK

INTERIM REMEDIAL MEASURES WORK PLAN

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CERTIFICATION

I, Mark P. Millspaugh, P.E., certify that I am a New York State registered professional engineer and that this Interim Remedial Measures (IRM) Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10) and that all activities will be performed in accordance with the DER-approved work plan and any DER-approved modifications.

_____ 11/18/15

Mark P. Millspaugh, P.E. Date

EXECUTIVE SUMMARY

This Interim Remedial Measures (IRM) Work Plan describes the actions that will be conducted to address potential threats to the environment and public health posed by the B. Millens Scrapyard (Millens) site, located at 290 East Strand Street in the City of Kingston, Ulster County, New York (Site ID 356030) (see Figure 1). The IRM takes into consideration the planned end use of the site as a paved parking lot.

The property will be remediated to allow the owner to utilize the site for parking near the existing building. Discussions are also underway with the City of Kingston regarding possible conveyance of the property to the City after a Certificate of Completion (COC) for remediation is issued. STERLING further understands that the City is interested in using the property as a parking lot in furtherance of redevelopment of the area consistent with the Local Waterfront Redevelopment Plan. The remedial measures proposed herein are based on the intended use of the property as a parking lot and incorporate limited paved parking surface as part of the site remediation.

The IRM will consist of the following:

1) Covering the portion of site within the fenceline with a minimum 12 inch thickness of soil and/or an asphalt cap where exposed soils exceed Commercial Use Soil Cleanup Objectives (SCOs);
2) In-situ treatment of groundwater in the southeastern portion of the site by direct injection; and
3) Excavation of soils immediately offsite, impacted by prior remedial activities at the Millens site exceeding Residential SCOs, will be relocated and placed beneath the cap.

Millens served as a metal recycling facility utilized for the management of scrap metal for approximately 60 years. Reportedly, the existing brick building was constructed in the early 1900s and was used by Millens for material storage and offices.

Scrap metals were stockpiled on the property over the operating history of the facility. Reportedly, electrical transformers were provided by local utility companies and dismantled at the property in the early 1950s and 1960s. Also, car crushing activities have reportedly been conducted in the northeastern corner of the property. Periodic scraping and screening of onsite soils has been conducted to recover salable metal commodities since the 1980s. In approximately 1997, the separated soil from a scraping effort was stockpiled or containerized followed by offsite disposal of these soils, and no further metal recovery from soil operations has occurred.

Site investigations over the last decade are summarized in the following reports:

- Site Investigation for the Property Known as B. Millens, Inc. (November 16, 1998), Ecosystems Strategies, Inc.
- Remedial Investigation / Feasibility Study Report prepared by Ecosystems Strategies, Inc. dated September 30, 2004.
- Supplemental Site Investigation reported in the October 15, 2007 letter from Rodney L. Aldrich, P.E., Director of Environmental Services, STERLING to Mr. James Candiloro, NYSDEC.
- Remedial investigation by NYSDEC as reported by EA Engineering, P.C. (EA) dated August 2014.

Data generated to date indicates that soils have been sampled and tested for Volatile Organic Compounds (VOCs), Semi-Volatile Organic Compounds (SVOCs), heavy metals, and Total Polychlorinated biphenyls (PCBs).

During the most recent RI performed by EA:

- VOCs (primarily benzene, toluene, ethylbenzene, and xylene [BTEX] constituents) were detected above Unrestricted Use SCOs in 5 of 44 subsurface soil samples collected onsite between 1 and 5 feet below ground surface (bgs). VOCs were not detected in onsite soils above Commercial Use SCOs.

- SVOCs (primarily polycyclic aromatic hydrocarbons [PAHs]) were detected above Unrestricted Use SCOs in 4 of 44 subsurface soil samples collected onsite between 1 and 5 feet bgs, and detections above the Commercial Use SCOs were reported in 3 of the 4 samples. No exceedances of SVOCs were reported in samples collected between the 4 sample locations where exceedances were reported.

- Metals were detected above Unrestricted Use SCOs in 17 of 44 subsurface soil samples collected onsite between 1 and 7 feet bgs, and detections above the Commercial Use SCOs were reported in 2 of the 17 samples.

- PCBs were detected above Unrestricted Use and Commercial Use SCOs in 7 of 44 subsurface soil samples collected onsite between 1 and 6 feet bgs. PCBs were mainly detected in the location of the former roadway that crosses the center of the site east to west.

1.0 INTRODUCTION

This Interim Remedial Measures (IRM) Work Plan sets forth the design objectives, construction sequence, project schedule and supporting plan requirements for the implementation of the IRM focused upon the elimination of significant threats to public health and the environment.

The scope of the IRM Work Plan is intended to eliminate or substantially reduce significant threats to the environment and public health which may be present based upon the investigations completed to date.

The IRM provides for:

1) Covering areas of the site within the fenceline where surficial soils exceed Commercial Use Soil Cleanup Objectives (SCOs) with a 12 inch minimum layer of clean soil or by capping with asphalt pavement. The extent of pavement verses soil capping is presented on Sheet 1;

2) In-situ treatment of groundwater in the southeastern portion of the site by direct injection; and

3) Excavation of soils immediately offsite, impacted by prior remedial actions at the Millens site and which exceed Residential SCOs, will be relocated and placed beneath the cap.

1.1 Site Description, Setting & Background

Section 1.0 of the August 2014 Remedial Investigation (RI) Report presented as Appendix A contains the site description and summary of prior investigations and remedial actions.

The RI Report states that the Remedial Action (RA) performed in 2009-2010 was effective in reducing concentrations of contaminants in subsurface soil. However, based on conditions observed onsite during the RI performed for the New York State Department of Environmental Conservation (NYSDEC), the RA was not completed consistently. This is most likely the result of the RA being completed in sections while scrapyard operations continued. The RA resulted in a large quantity of material emplaced at the site that was not properly characterized for backfill. During the RI, the liner was observed to be neither consistent in material, nor placed properly to prevent recontamination of soils. Additionally, the liner is not connected between excavated cells and does not provide continuous protection.

The current condition of the site results in stormwater ponding and infiltration to the ground surface. Excess runoff is to the south to the swale along the north side of the railroad tracks.

A storm inlet north of the truck scale is clogged and not functioning. This drain will be excavated during initial remedial work to ascertain discharge location. Excavated material will be placed under the cap or will be disposed offsite as directed by Engineer.

2.0 SUMMARY OF SITE CONDITIONS

The site environmental and hydrogeologic conditions are thoroughly described in the RI Report located in Appendix A. Section 3.0 of the RI Report summarizes the site environmental conditions.

During the most recent RI performed by EA:

- VOCs (primarily benzene, toluene, ethylbenzene, and xylene [BTEX] constituents) were detected

above Unrestricted Use SCOs in 5 of 44 subsurface soil samples collected onsite between 1 and 5 feet below ground surface (bgs). VOCs were not detected in onsite soils above Commercial Use SCOs.

- SVOCs (primarily polycyclic aromatic hydrocarbons [PAHs]) were detected above Unrestricted Use SCOs in 4 of 44 subsurface soil samples collected onsite between 1 and 5 feet bgs, and detections above the Commercial Use SCOs were reported in 3 of the 4 samples. No exceedances of SVOCs were reported in samples collected between the 4 sample locations where exceedances were reported.

- Metals were detected above Unrestricted Use SCOs in 17 of 44 subsurface soil samples collected onsite between 1 and 7 feet bgs, and detections above the Commercial Use SCOs were reported in 2 of the 17 samples.

- PCBs were detected above Unrestricted Use and Commercial Use SCOs in 7 of 44 subsurface soil samples collected onsite between 1 and 6 feet bgs. PCBs were mainly detected in the location of the former roadway that crosses the center of the site east to west.

3.0 IMPLEMENTATION OF THE IRM

3.1 General

The IRM is designed to eliminate or reduce potential significant threats to the public health or environment and include the following discrete remedial actions:

1. Construction of a minimum 12 inch thick soil cover or an asphalt cover to prevent human exposure and future releases to the environment in areas where surficial soils exceed the Commercial Use SCOs (6 NYCRR 375-6.8(b)).

2. In-situ treatment of groundwater by direct injection of Oxygen Release Compound (ORC). Impacted groundwater is present in the southeast corner of the property as shown in Figures 3-12 and 3-13 of the RI Report.

3. Excavation of soils immediately offsite, impacted by prior remedial action at the Millens site and exceeding Residential SCOs, for placement beneath the cover soils.

3.2 Initial Pre-Construction Activities

Implementation of the IRM will necessitate the following steps:

1. Pre-Construction Sampling

   Additional offsite surficial soil sampling is necessary to identify the horizontal and vertical excavation limits. Surficial soil sampling of selected areas onsite may also be conducted to refine the extent of the final cover required within the fence line. Absent additional onsite soil data, the full extent of the site within the perimeter fenceline will be covered.

   Sources of imported fill material will also require testing in accordance with DER-10 acceptance criteria prior to delivery to the site.

2. Obtain Approvals and Notifications

Approvals necessary for the IRM include:

- NYSDEC and New York State Department of Health (NYSDOH) approval of the IRM Work Plan;
- Underground Injection Control (UIC) notification to the United States Environmental Protection Agency (USEPA); and
- Notification to Dig Safely New York to obtain utility clearance.

3. Site Survey

The existing site survey of the project site is underway. Much of the storm drainage at the site infiltrates into the ground. Excess runoff is to the swale along the north side of the railroad tracks. This swale has no observed outlet and appears to allow stormwater to infiltrate. The site grading plan will preserve existing drainage patterns. The pre-construction surveying includes the establishment of appropriate survey benchmarks at the property for use during construction.

4. Groundwater Monitoring and Well Abandonment

The groundwater monitoring program will be conducted on a quarterly basis following the implementation of the IRM. Certain wells may require permanent removal or decommissioning to permit implementation of the IRM. Previous sampling demonstrates groundwater flow is to the south and/or southeast in wells completed in the overburden. The presumed direction of groundwater flow in bedrock is also to the south and/or southeast.

The post-treatment groundwater monitoring program is described in Section 3.3.

The following wells will be decommissioned by jacking the casing and grouting the boreholes in accordance with Commissioner's Policy-43 Groundwater Monitoring Well Decommissioning Policy (CP-43): MW-1, MW-2, and MW-7R. MW-3 and MW-8 were not located during the December 17, 2012 site inspection performed by EA. STERLING observed steel casing near MW-13 that may be MW-3, and will conduct further investigation. There is no evidence that MW-8 was ever installed.

5. Community Air Monitoring Plan (CAMP)

Site activities involving the management of impacted soils have the potential to generate dust which could migrate from the site. A Community Air Monitoring Plan (CAMP) will be developed prior to construction and will contain the details provided in Section 5.3. The CAMP will be based on the most recent NYSDOH Generic Community Air Monitoring Plan (DER-10 Appendix 1A). The CAMP will be reviewed and approved by the NYSDEC and NYSDOH prior to commencement of construction activities. The CAMP will include real time monitoring for total particulates and VOCs with a mechanism for immediate reporting to the site where activities are causing an offsite impact.

6. Health and Safety Plan (HASP)

   Because the project involves the remediation of a regulated site, all construction/remedial activity must be carried out in accordance with a site Health and Safety Plan (HASP). Such a plan must satisfy the requirements of 40 Code of Federal Regulations (CFR) 1910 and 1926. The required elements of the HASP are presented in Section 5.2.

3.3 IRM Construction Activity and Sequence

All construction will be in accordance with the approved IRM Work Plan.

Certain preliminary site work will be required in order to implement the remedy including improving security measures, drainage improvements, etc. The building will either remain in-place or will be demolished to accommodate the needs of the future owner. Certain groundwater monitoring wells will be properly abandoned prior to cover construction. Prior to the commencement of construction, the selected contractor(s) will be required to make a series of "shop submittals" including but not limited to a Project Schedule, construction HASP, CAMP, etc.

Groundwater Treatment

Impacted groundwater will be managed by focused in-situ treatment to reduce concentrations of VOCs in the groundwater. In-situ treatment of groundwater involves the injection of oxygen release compound (ORC) in the area of well MW-12, as shown on Figure 3-13 of the RI Report, to produce a controlled release of oxygen, which will accelerate the rate of biodegradation of VOCs in groundwater over time. Proposed injection points are presented in Figure 3. The main VOCs of concern are benzene and methyl tert-butyl ether (MTBE).

Injection of ORC Advanced

The selected contractor will mix and inject the proper amount of ORC Advanced (ORC) in the treatment area. The quantity of ORC to be injected at each location was determined by Regenesis, manufacturer of ORC and other in-situ treatment products, based upon the concentration of VOCs in the groundwater and other site conditions. Injection will be accomplished by Geoprobe direct push injection. The locations of the injection points are presented in Figure 3. The precise number and location may be field-modified based on the nature of the unconsolidated material to be treated, or if obstructions are encountered.

Five (5) lbs. of ORC per vertical foot will be injected at each injection point as recommended by Regenesis. There will be 50 injection points on an approximate 10-foot grid. The injection zone will be from the water table (~5 feet below ground surface) to a depth of 15 feet. This is equivalent to approximately 50 lbs. of ORC per injection point and a total of 2,500 lbs. of ORC. Information regarding the ORC, design rates and application procedures is provided in Appendix C.

The ORC will be mixed with water to form an injectable slurry and then pumped into the injection zone (5 to 15 feet bgs). The ORC produces a controlled release of oxygen for up to 12 months, which will enhance aerobic biodegradation of the VOCs. The byproduct of the biodegradation is magnesium hydroxide ($Mg(OH)_2$), a non-toxic compound.

Long Term Groundwater Monitoring

Following treatment, groundwater monitoring events will be performed consisting of sampling designated monitoring wells for VOCs. The initial monitoring event will take place one to two (1 to 2) months following treatment, followed by quarterly monitoring for one (1) year. Additional monitoring events will be determined based on an evaluation of the data following the first year.

Designated wells will be sampled utilizing low-flow methodology.

The following wells will be sampled: MW-5, MW-6, MW-9, MW-10, MW-11, MW-12, MW-14, and upgradient well MW-13.

The following parameters will be measured in the field: Temperature, pH, Specific Conductivity, Oxidation Reduction Potential (ORP) and Dissolved Oxygen (DO) once field parameters stabilize, groundwater samples will be collected and analyzed for VOCs using USEPA Method SW8260 by a NYSDOH-certified laboratory with Category B deliverables.

All groundwater samples will be collected in accordance with the NYSDEC Department of Environmental Remediation DER-10 – Technical Guidance for Site Investigation and Remediation (May 3, 2010), as follows:

- At least ten (10) percent of all samples will be collected in duplicate for Quality Assurance/Quality Control (QA/QC).

- Monitoring wells to be sampled in duplicate will be selected randomly at the time of sampling.

A Data Usability Summary Report (DUSR) will be prepared for the groundwater monitoring data in accordance with DER-10.

Soil Vapor Intrusion (SVI) Investigation

If it is determined the onsite building will be reused, a Soil Vapor Intrusion (SVI) investigation will be completed during the heating season. Prior to conducting the investigation, a SVI investigation work plan following Final NYSDOH "Guidance for Evaluating SVI investigation in the State of New York", dated October 2006, will be submitted to the NYSDEC and NYSDOH for review and approval. The investigation will determine whether additional actions are necessary to prevent vapor intrusion into the building prior to its reuse.

Excavation of Offsite Soils

Soils immediately offsite impacted by prior remedial activities at the Millens site and which exceed Residential SCOs will be excavated, relocated and placed beneath the soil cover. Offsite soils data is summarized by Figures 3-10 and 3-11 of the RI Report provided in Appendix A. Figures indicate surficial soils exceed the Residential Use SCOs for PCBs. Certain SVOC concentrations in surface soils proximate to the former discharge area also exceed the Residential Use SCOs. The extent of the offsite excavation area is presented on Figure 2. Post excavation soil sampling will be conducted in accordance with DER-10 requirements to confirm Residential SCOs are attained. Soil samples will be collected from the excavation floor and perimeter for analysis.

Prior to excavation, the aerial extent of contaminated soil in offsite areas will be delineated. Impacted soils will then be excavated to an estimated depth of up to 12 inches. Excavated soils will be placed underneath the site cover system.

Cover Construction

All onsite soils within the existing fenceline exceeding the Commercial Use SCOs will be capped with a minimum 12 inch layer of clean soil or with an asphalt cover. Sheet 1 shows the extent of paving vs. soil cover and Sheets 2 and 3 present cross-sections. The proposed IRM measures support the intended future use of the property by providing parking near the existing building. A demarcation layer consisting of highly visible construction fencing fabric will be placed beneath the cover materials.

3.4 Pre-Demolition Asbestos Survey

In the event the building is to be demolished, an industrial building asbestos inspection of the building structures will be performed by a New York State licensed asbestos inspector. Any materials determined to contain asbestos will be removed and managed by a qualified asbestos abatement contractor in accordance with the regulations specified in 12 NYCRR Part 56 and USEPA Region 2 guidance. All non-asbestos containing materials will be handled and managed as construction debris.

3.5 Building Demolition

Prior to demolition of the building, a walk-through inspection will be conducted to identify items that will be removed prior to demolition. This inspection will be performed by the property owner and the demolition contractor. Prior to demolition, a Demolition Permit Application will be submitted to the City of Kingston.

- Filing of a Building Permit (the requirements for the Building Permit Application and payment of $100.00 application fee);
- Photographs depicting the property and structure;
- Documentation with the dates of disconnect for all utilities; and
- Asbestos removal certification.

Given that the property is located within the Rondout Creek District on the Zoning Map of the City of Kingston, the Fire Officer is required by the Zoning Code to refer Building Permit Applications for demolition to the Kingston Landmark Preservation Commission within five (5) days of receipt and shall not issue a Building Permit for at least 30 days thereafter.

Utility companies will be notified and connecting utility lines to the parking area will be shutoff prior to demolition. Demolition of the structures will commence following review and approval of the demolition permit application documents by the City. All construction debris will be removed from the site.

3.6 Post-Construction

At the completion of the offsite excavation soil sampling will be conducted to verify the soils impacted with Millens substances of concern have been removed. Such sampling will conform to the post excavation soil sampling method and procedures set forth in DER-10. Soils which exceed the established SCOs for the offsite area will be further excavated and the area resampled.

Consistent with DER-10 Chapter 6, a Site Management Plan (SMP) will be prepared to address future activities at the site following completion of the remedy. The SMP will provide for the proper monitoring and maintenance of the soil and asphalt cover, maintenance of storm drainage, future site excavations and associated soil management, future use, etc. It is anticipated the SMP will include both institutional controls (environmental easement and deed restrictions) and engineering controls (pavement, security fencing, signage, groundwater monitoring, etc.).

Institutional Controls will be detailed in an Environmental Easement.

4.0 REMEDIATION SCHEDULE

It is anticipated the project will follow the general sequence outlined below, although a number of site activities are expected to overlap:

- Pre-Remediation:

  Permits and Approvals: All necessary permits and/or approvals will be applied for and obtained to authorize the work. The following summarizes the anticipated approvals and permits.

NYSDEC	• IRM Work Plan
USEPA	• UIC approval (30 days prior to injections and groundwater treatment)
Dig Safely NY	• Notify at least three (3) days prior to injections and excavations
NYSDOH	• Community Air Monitoring Plan (CAMP) • Health and Safety Plan (HASP)
City of Kingston	• Demolition Permit (in the event of building demolition)

  Under prevailing NYSDEC policy, a separate SPDES General Permit for a Construction Activity is not anticipated for stormwater runoff.

- Remediation:

  - Injection of ORC
  - Excavation of Offsite Soils
  - Construction of Soil and Asphalt Cap

  The groundwater injection and treatment are expected to be completed in one day. The excavation of offsite soil, grading/capping of the site, and site restoration of disturbed areas is expected to require up to one-half (1/2) construction season.

5.0 IRM DESIGN

5.1 General

Following the pre-construction sampling, if any, the IRM limits for the pavement and soil cover will be finalized. Unless otherwise determined by soil sampling, all areas within the existing fenceline will be paved or otherwise covered with a minimum 12" soil cover.

- Plans:

  Prior to commencement of construction, a construction drawing will be prepared at a scale of 1":50' with one (1) foot contours. The drawing will reflect the proposed finished grades and extent of the soil cover and/or paved surfaces.

- Specifications:

  Material sources will be identified and tested in accordance with DER-10 Section 5.4(e) requirements. Prior to construction, test results will be furnished to NYSDEC using the "Request to Import/Reuse Fill or Soil" form seeking approval at each source.

5.2 Health and Safety Plan (HASP)

Selected contractor(s) will be required to provide a HASP developed in accordance with the Occupational Safety & Health Administration (OSHA) and other regulations pertaining to working in the vicinity of contaminated materials. The HASP must include all the items listed in Appendix B.

5.3 Community Air Monitoring Plan (CAMP)

The Community Air Monitoring Plan (CAMP) must be prepared and implemented in conformance with the NYSDOH Generic Community Air Monitoring Plan as contained in Appendix 1A of the "DER-10 Technical Guidance for Site Investigation and Remediation", May 3, 2010. Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells. The particulate monitoring at the perimeter of the Exclusion Zone will be with a MIE PDM-3 MiniRam or equal.

Prior to construction, the site specific CAMP will be submitted to the appropriate agencies for approval, including the NYSDEC and NYSDOH.

In particular, the following sections of the NYSDOH Generic Community Air Monitoring Plan must be followed:

VOC Monitoring, Response Levels and Actions

VOCs must be monitored at the downwind perimeter of the immediate work area (i.e., the Exclusion Zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed

using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of five (5) ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below five (5) ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (NYSDEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the Exclusion Zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area. Dust control materials and equipment will be available for immediate deployment if necessary.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust

migration.

All readings must be recorded and be available for NYSDEC and NYSDOH personnel to review.

6.0 SCHEDULE

Millens is committed to fully implementing the groundwater treatment and final cover installation set forth in this IRM Work Plan in the 2015 construction season. The vapor intrusion investigation and/or building demolition will be deferred pending discussions with the City of Kingston regarding the future use of the property and building. Such will be clearly expressed in the SMP.

Anticipated Timeframe:

NYSDEC Approval of IRM Work Plan	November 2015
Millens Submittal of Final Grading Plan	December 1, 2015
NYSDEC Authorization to Proceed	December 1, 2015
Construction Activities: • Soil Testing and Cover Soil Approval • Groundwater Treatment • Delivery and Placement of Soil Cover and/or Pavement	 December 10, 2015 December 1, 2015 – December 10, 2015 December 30, 2015
Submit Final Engineering Report Construction Certification; SMP and As-Built Survey	February 15, 2016
Prepare and Submit Environmental Easement	April 15, 2016
NYSDEC Issues Certificate of Completion	2016

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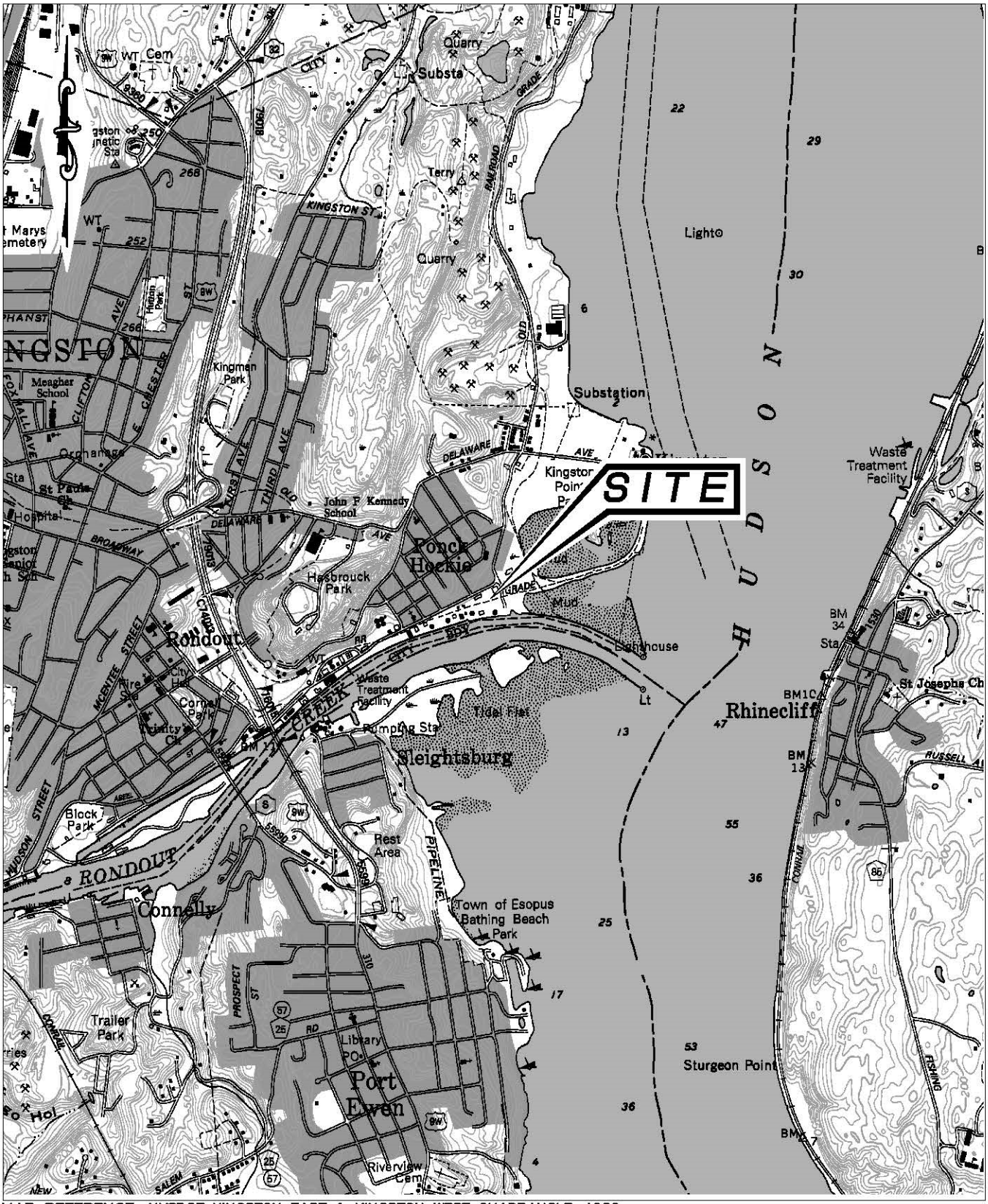
FIGURES



MAP REFERENCE: NYSDOT KINGSTON EAST & KINGSTON WEST QUADRANGLE, 1989.

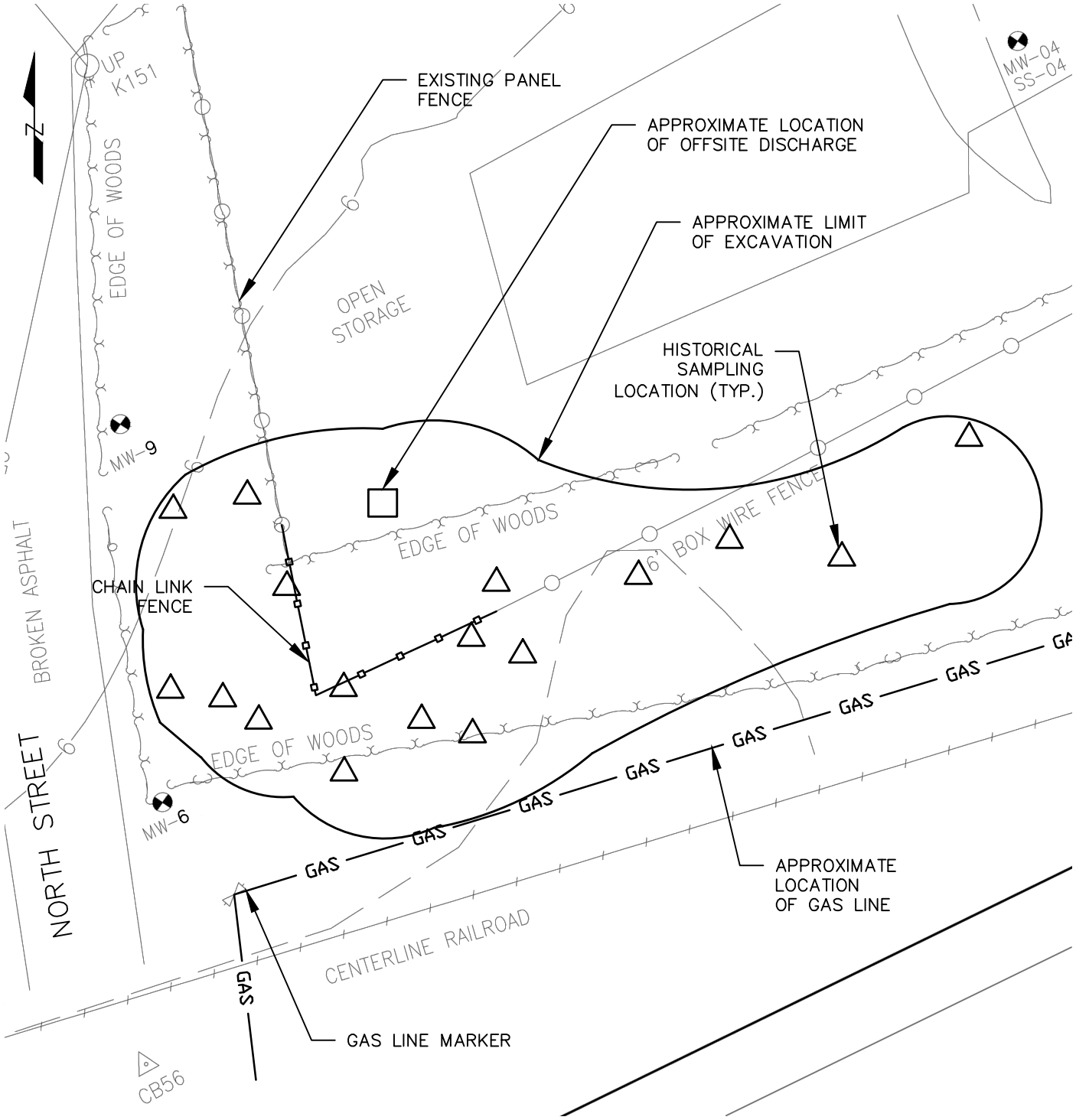
FIGURE 1

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road ♦ Latham, New York 12110

SITE LOCATION MAP
B. MILLENS SONS, INC.
290 EAST STRAND STREET
CITY OF KINGSTON ULSTER CO., NY

PROJ. No.:	27023	DATE:	11/18/15	SCALE:	1" = 2000'	DWG. NO.	27023006	FIGURE	1

\\SERVER02\Shared\Drawings\27023 - Millens Scrap Metal Recycling\DRW\27023006 - Figure 1 - SiteLoc SWEETT 11/18/2015 3:26 PM



MAP REFERENCE: SITE PLAN; MILLENS STAGING AREA BY MJ ENGINEERING AND LAND SURVEYING DATED MAY 18, 2010.

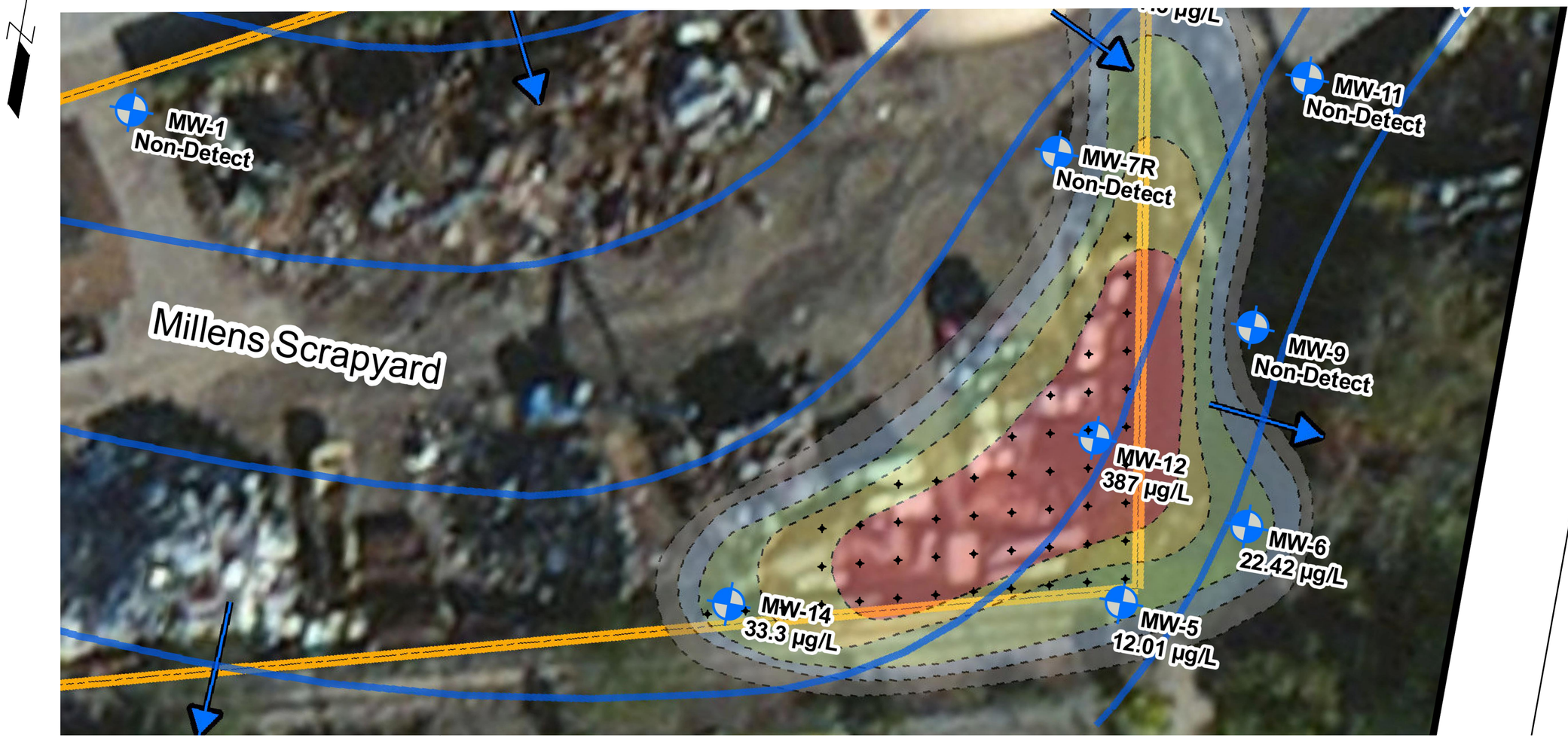
FIGURE 2

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road ♦ Latham, New York 12110

OFF-SITE EXCAVATION AREA
B. MILLENS SONS, INC.
290 EAST STRAND STREET
CITY OF KINGSTON ULSTER CO., NY

PROJ. No.:	27023	DATE:	11/18/15	SCALE:	1" = 20'	DWG. NO.	27023014	FIGURE	2

\\SERVER02\Shared\Drawings\27023 - Millens Scrap Metal Recycling\RM\27023012 - Figure 2 - Off Site Sampling SWEETT 11/18/2015 3:29 PM



✦ INJECTION POINT (TYP.)

Total VOC Concentration (µg/L)

<1	50-100
1-10	100-500
10-50	500-1,000

MAP REFERENCE: NEW YORK STATEWIDE DIGITAL ORTHOIMAGERY PROGRAM, AERIAL PHOTOGRAPHY CIRCA 2009. GROUNDWATER BTEX CONCENTRATION PLUME MAPS, REMEDIAL INVESTIGATION REPORT, EA ENGINEERING, SCIENCE, AND TECHNOLOGY INC. DATED AUGUST, 2014

FIGURE 3

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road ♦ Latham, New York 12110

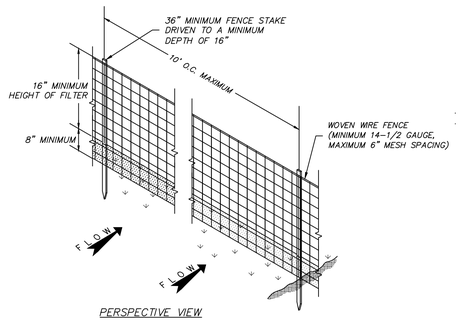
IN-SITU GROUNDWATER TREATMENT INJECTION PLAN
B. MILLENS SONS, INC.
290 EAST STRAND STREET
CITY OF KINGSTON ULSTER CO., NY

PROJ. No.:	DATE:	SCALE:	DWG. NO.	FIGURE
27023	11/18/15	1" = 30'	27023015	3

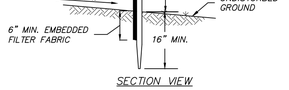
DRAWINGS

NOTES:

1. SCALE TO BE DEMOLISHED IN PLACE.
   1.1. TOP TO BE CRUSHED AND USED AS FILL FOR SCALE PIT.
   1.2. SCALE CONNECTION TO BUILDING TO BE FILLED WITH FLOWABLE FILL OR NON SHRINK GROUT AS APPROVED BY ENGINEER.
2. NON–SHRINK GROUT PLUG TO BE PLACED IN RAMP SUMP PRIOR TO FILL PLACEMENT.
3. BUILDING DOOR AT BASE OF RAMP TO BE REMOVED AND CMU OR REINFORCED CONCRETE WALL TO BE CONSTRUCTED WITHIN THE FRAME AREA TO AN ELEVATION 4–INCHES ABOVE PROPOSED FINISHED PAVEMENT GRADES.
4. NEW DOOR TO BE FABRICATED AND INSTALLED TO SECURE BUILDING.
5. RAMP AREA TO BE FILLED IN WITH SELECT STRUCTURAL FILL.
6. ROOF DRAINS TO BE EXCAVATED TO ONE FOOT BELOW GRADE AND CAPPED PRIOR TO ASPHALT PLACEMENT.
7. AREAS OF EXISTING ASPHALT AND CONCRETE SHALL BE MILLED TO A DEPTH SUCH THAT A SUITABLE SUBGRADE EXISTS FOR PLACEMENT OF THE BINDER AND/OR TOP COURSE.
8. AREAS OF THE SITE NOT RECEIVING ASPHALT SHALL RECEIVE A MINIMUM OF 1–FOOT OF COVER SOIL PLACED TO GRADES INDICATED IN THE PROFILES.
9. AREAS WHERE PROPOSED GRADES ARE LESS THAN 1–FOOT ABOVE EXISTING GRADES SHALL BE EXCAVATED SUCH THAT 1–FOOT OF COVER MAY BE PLACED.
10. COVER SOIL IS TO BE SEEDED AND MULCHED TO ESTABLISH A VEGETATIVE COVER. SEED MIX IS TO BE APPROVED BY THE CITY PRIOR TO PLACEMENT.
11. PROFILE LOCATIONS ARE APPROXIMATE.
12. OR OTHER APPROVED COVER MATERIALS AS DIRECTED BY ENGINEER.
13. MINIMUM 20–FOOT BUFFER ALONG EAST AND SOUTH PERIMETERS TO BE VEGETATED.



PERSPECTIVE VIEW



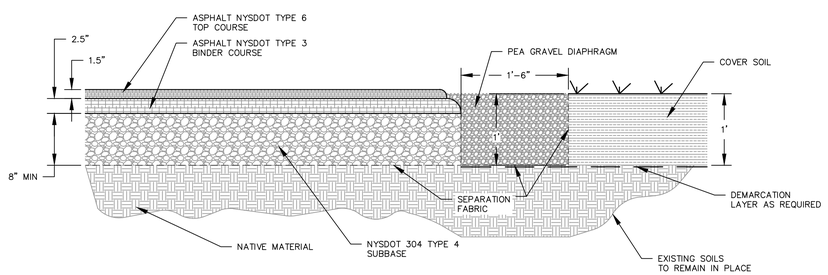
SECTION VIEW

SILT FENCE NOTES:

1. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
2. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE STAKES WITH WIRE TIES OR STAPLES.
3. FILTER FABRIC SHALL BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
4. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY 6" AND FOLDED.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

2 SILT FENCE DETAIL

SCALE: 1" = 1'



1 PAVEMENT AND GRAVEL DIAPHRAGM DETAIL

SCALE: 1" = 1'

AREA APPARENTLY LOCATED OUTSIDE OF PROPERTY BOUNDARY; EXCAVATE TWO (2) FEET AND CONDUCT POST-EXCAVATION SAMPLING; MUST ACHIEVE 6 NYCRR PART 375 UNRESTRICTED STANDARDS. FILL AND GRADE TO BLEND IN WITH SURROUNDING TOPOGRAPHY. EXCAVATED MATERIALS TO BE USED AS FILL ON SITE.

PLATE 1

NO.	DATE	RECORD OF WORK	DRN	CKD	APPR

PROJECT	
PROJ. ENGR.:	MPM
PROJ. NO.:	27023
PREPARED BY:	TAS
DRAFTED BY:	TAS
CHECKED BY:	
APPROVED BY:	
DATUM:	SITE SPECIFIC
CONTOUR INTERVAL =	NA FEET

0 5 10 20 40

1" = 20'

SITE PLAN AND PROFILES MAP

B. MILLENS & SONS, INC.

290 EAST STRAND STREET

CITY OF KINGSTON ULSTER CO., N.Y.

STERLING

Sterling Environmental Engineering, P.C.

24 Wade Road • Latham, New York 12110

DATE: 11/18/15 | SCALE: 1" = 20' | DWG. NO. 27023011 | SHEET 1 OF 3

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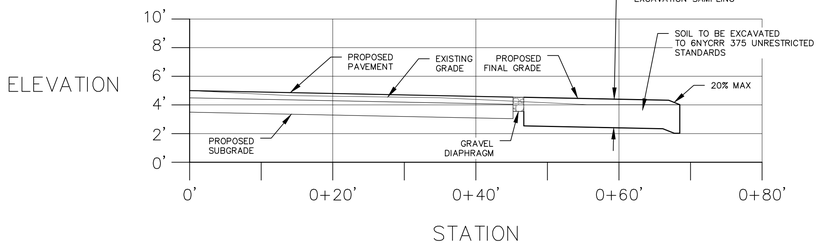
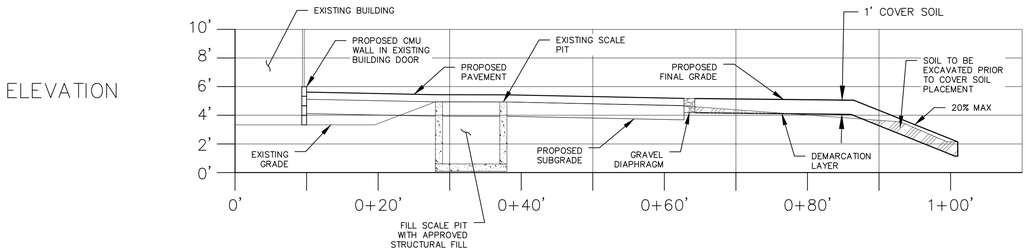
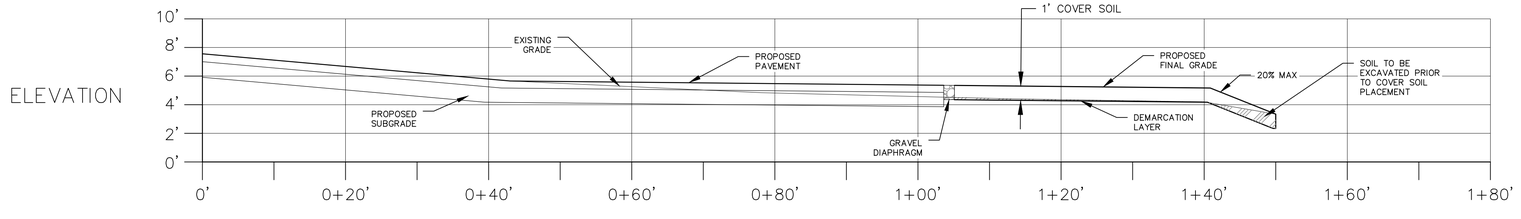
A–A' PROFILE



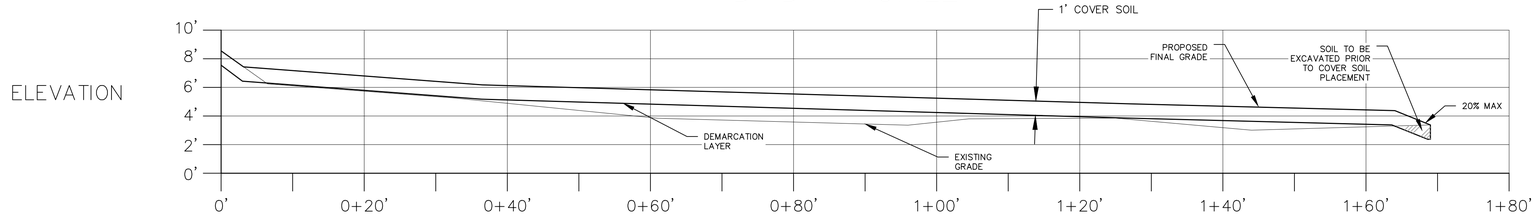
B–B' PROFILE



C–C'PROFILE



D–D' PROFILE



NOTES:

1. ELEVATION BASED ON RELATIVE SITE DATUM.
2. ELEVATION DATA FROM SURVEY PERFORMED BY STERLING ENVIRONMENTAL, 10/21/15.
3. EXCAVATED SOILS TO BE USED ON SITE AS FILL IN RAMP AREA AND SCALE PIT, OR IN LOCATIONS THAT REQUIRE MORE THAN 1–FOOT OF COVER SOIL.

VERTICAL SCALE: 1" = 5'
HORIZONTAL SCALE: 1" = 10'

PLATE 2

NO.	DATE	RECORD OF WORK	DRN	CKD	APPR

PROJECT	
PROJ. ENGR.:	MPM
PROJ. NO.:	27023
PREPARED BY:	TAS
DRAFTED BY:	TAS
CHECKED BY:	
APPROVED BY:	
DATUM:	SITE SPECIFIC
CONTOUR INTERVAL =	NA FEET

0 2.5 5 10 20
1" = 10'

PROPOSED SITE PROFILES

B. MILLENS & SONS, INC.
290 EAST STRAND STREET
CITY OF KINGSTON ULSTER CO., N.Y.

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road • Latham, New York 12110

DATE:	SCALE:	DWG. NO.	SHEET
11/18/15	1" = 10'	27023012	2 OF 3

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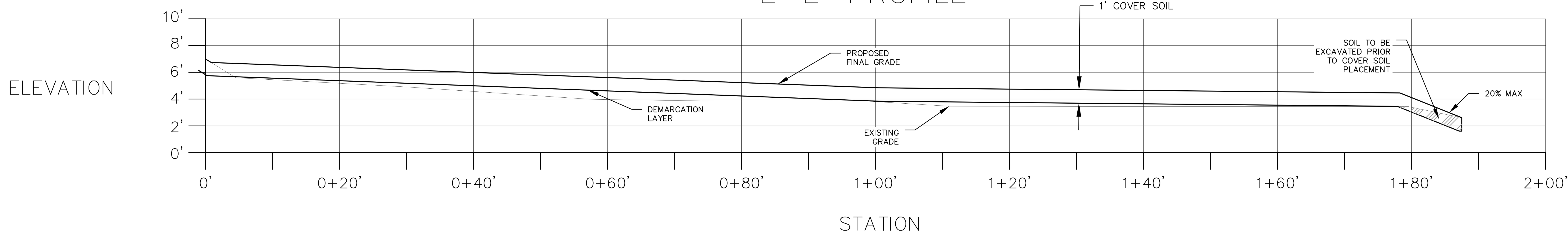
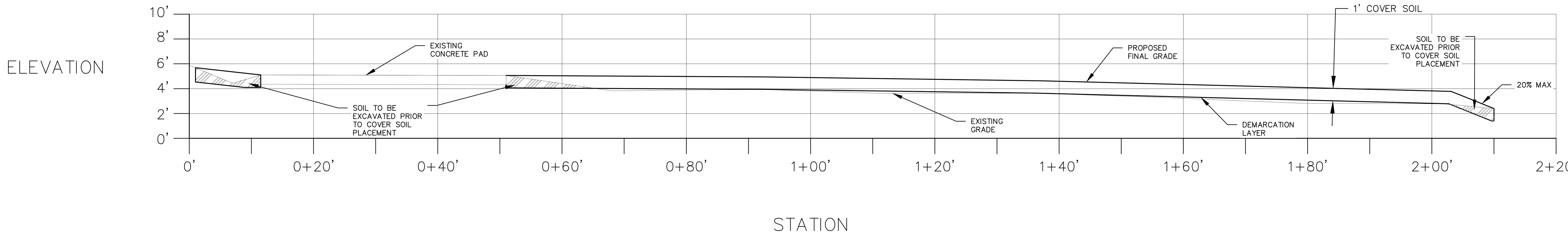
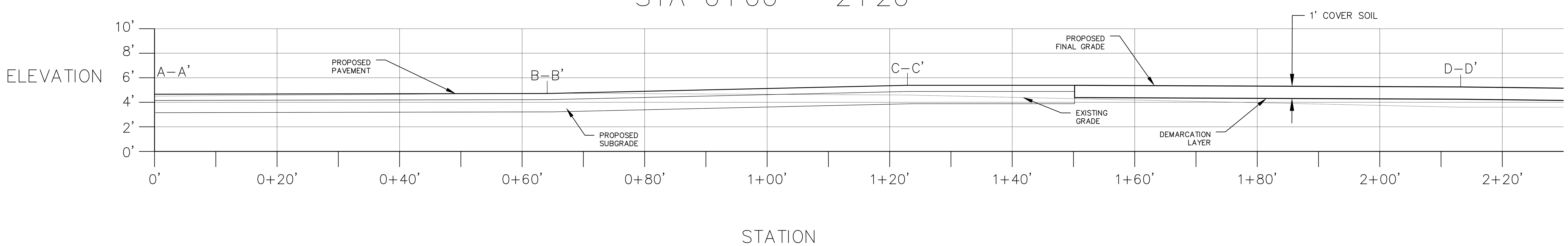
E–E' PROFILE



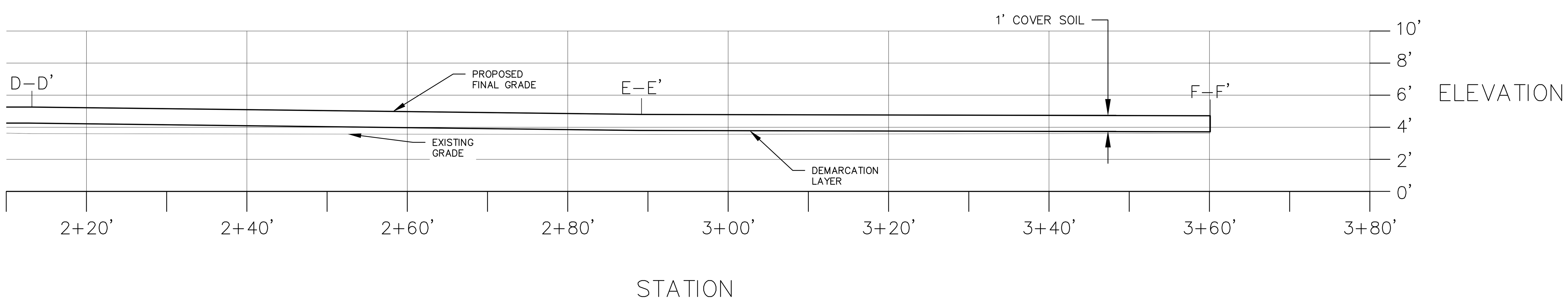
F–F' PROFILE



G–G' PROFILE
STA 0+00 – 2+20



G–G' PROFILE
STA 2+20 – 3+60



VERTICAL SCALE: 1" = 5'
HORIZONTAL SCALE: 1" = 10'

NOTES:

1. ELEVATION BASED ON RELATIVE SITE DATUM.
2. ELEVATION DATA FROM SURVEY PERFORMED BY STERLING ENVIRONMENTAL, 10/21/15.
3. EXCAVATED SOILS TO BE USED ON SITE AS FILL IN RAMP AREA AND SCALE PIT, OR IN LOCATIONS THAT REQUIRE MORE THAN 1–FOOT OF COVER SOIL.

PLATE 3

NO.	DATE	RECORD OF WORK	DRN	CKD	APPR

PROJECT	
PROJ. ENGR.:	MPM
PROJ. NO.:	27023
PREPARED BY:	TAS
DRAFTED BY:	TAS
CHECKED BY:	
APPROVED BY:	
DATUM:	SITE SPECIFIC
CONTOUR INTERVAL =	NA FEET

0 2.5 5 10 20
1" = 10'

PROPOSED SITE PROFILES

B. MILLENS & SONS, INC.
290 EAST STRAND STREET
CITY OF KINGSTON ULSTER CO., N.Y.

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road • Latham, New York 12110

DATE: 11/18/15	SCALE: 1" = 10'	DWG. NO. 27023013	SHEET 3 OF 3

APPENDIX A

RI REPORT DATED AUGUST 2014 (PROVIDED ON CD)

APPENDIX B

REQUIRED HEALTH AND SAFETY PLAN (HASP) CONTENT

HEALTH AND SAFETY PLAN (HASP)
OUTLINE

1.0 GENERAL INFORMATION

2.0 DESIGNATION OF RESPONSIBILITIES

3.0 SITE PROPERTY SPECIFIC HEALTH AND SAFETY CONCERNS

- Airborne Exposure Limits
- Explosive Gas
- Personal Protective Equipment (PPE)
- Suspected Safety Hazards
- Excavator and Drill Rig Operations
- Adverse Weather
- Fire and Explosion
- Requirement to Conduct Utility Mark Out
- Confined Space Entry
- Excavation and Sampling Work Zones
- Natural Hazards
- Heat and Cold Stress Hazards
- Signs and Symptoms of Cold Stress
- Preventing Cold Related Illness/Injury
- Treatment of Cold Related Injuries
- Signs and Symptoms of Heat Stress
- Preventing Heat Related Illness/Injury
- Noise Hazards
- Slip, Trip and Fall Hazards
- Modifications to this Plan

4.0 MEDICAL SURVEILLANCE PROGRAM

- General
- Frequency of Medical Exams

5.0 EMERGENCY ACTION PLAN

- Notification
- Emergency Services
- Personal Injury
- Fire/Explosion
- Equipment Failure
- Record Keeping

6.0 DECONTAMINATION METHODS

- Contamination Prevention Methods
- Decontamination Methods

APPENDIX C

GROUNDWATER TREATMENT DESIGN INFORMATION

Proposal for Site Remedy

To: Vedran Cirkovic (Sterling Environmental Engineering) **Date:** November 13, 2015

From: Andy Lowy - Design Specialist
alowy@regenesis.com (610) 655-5259

Subject: ***Design and Cost Estimate Proposal***

Site: *Millens Scrap Yard*

Treatment Unit: Dissolved Plume

Applicable Product	**Link to View/Download Product Information**
ORC Advanced®	ORC Advanced

Technical and Cost Summary

The following is a remedial design for the above-referenced site. Based on the site data provided, the design and cost estimate includes the use of Oxygen Release Compound Advanced® (ORC Advanced) to treat residual petroleum hydrocarbons. Design assumptions and technical specifications regarding the proposed design are contained on the attached tables. The following table provides a summary of pertinent information pertaining to the treatment areas, basic design elements and product cost.

Treatment Unit	Treatment Surface Area (sq ft)	Treatment Thickness (ft)	Cubic Yards (cy)	Technology	Injection Points	Product Quantity (lbs)	Injection Volume (gals)	Product Cost*
Dissolved Plume	5,000	10	1,852	**ORC Advanced**	50	2,520	818	$22,050
				Project Totals	**50**	**2,520**	**818**	**$22,050**

***Does not include tax or freight. Please contact Customer Service Department at 949-366-8000 for a shipping quote.**

Product Description and Use Rationale

Petroleum hydrocarbon plumes are typically depleted in oxygen, which limits the ability of naturally occurring microorganisms to degrade petroleum hydrocarbons. ORC Advanced supplies a controlled release of oxygen for 9-12 months in the target treatment zone to create and support the geochemical environment necessary for aerobic biodegradation of contaminants. This preliminary technical design and cost estimate contains information related to the design, application, and performance monitoring of ORC Advanced. Use the above hyperlink to access more information about ORC Advanced.

Conceptual Model and Treatment Area Technical Considerations

In generating this design proposal Regenesis relied upon professional judgment and site specific information provided by Sterling Environmental Engineering. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site. The attached design summary tables specify the assumptions used in preparation of this technical design. We request that these modeling input assumptions be verified by Sterling Environmental Engineering prior to application.

REGENESIS

Application Guidance

ORC Advanced is shipped as a dry, off-white powder and is mixed with water to form a slurry. Most designs specify a slurry percentage of 20% to 30%. This material is typically applied using a direct push technology (DPT) injection method as proposed here. It is important that the materials be applied per the design, including material loading rates and injection point spacing specified, to the extent site conditions allow. A brief description of the application method is provided below along with links to application instructions for these products. Regenesis can assist with further site-specific application design information, as needed, upon notification that our proposed remedy is chosen for implementation.

Application Method	Description	Instructions
Direct Push Injection	Direct push drilling rods are advanced to target depth. Reagent is injected through rods, under pressure, as they are withdrawn.	ORC-Advanced App Inst

Given the complexities associated with applications, it is recommended that a contractor with proven experience mixing and injecting the remediation products proposed for this project. As part of the selection process, it is suggested to question the application contractor on the following:

- Specific experience injecting the reagent proposed
- of the appropriate injection pump (type, pressure rating, flow rate, etc.)
- Use of in-line flow meters and pressure gauges
- In-line safety values for bleeding high pressure from injection lines
- Injection tooling for bottom up or top down application
- Other project specific tooling (i.e. air compressor)
- Distribution monitoring during injection

The contractor should provide a detailed log of field activities for the application process. This information is critical to the post-injection assessment of remediation performance across the site. For more information on appropriate injection methods and/or qualification of injection contractors contact Scott Mullin at 630-319-0836.

Performance Monitoring

We recommend groundwater samples be collected from select performance monitoring wells to evaluate enhanced natural attenuation processes. Ideally, wells from within and outside of the treatment area (i.e., upgradient and downgradient of the plume) should be sampled. A round of sampling should be conducted prior to treatment with ORC Advanced to evaluate the baseline aquifer conditions and to assess the total demand for oxygen in the treatment area. After ORC Advanced has been installed into the subsurface, groundwater samples should be collected on a quarterly, or more frequent, basis. We recommend samples be collected using low-flow methods and be analyzed for field redox parameters (pH, Temp, DO, ORP, turbidity). Additionally, submit samples to a qualified laboratory for analysis of: chemicals of concern, total dissolved Fe and Mn, COD, BOD (5 day) and methane. If practical, analyze some soil samples from the proposed treatment areas just below the water table for the contaminants of concern. This is useful in estimating the amount of hydrocarbon contamination that can continue to partition from the soil to the dissolved phase.

Closing

Please feel free to contact me if you need additional information or have any questions regarding our evaluation and/or this correspondence (contact info provided above). I will be following up with you in the near future regarding this proposal. We appreciate the opportunity and thank you for considering Regenesis as your remedial solution provider for this project.

REGENESIS

Project Info		
Millens Scrap Yard		
Kingston, NY		
Dissolved Plume		
Prepared For:		
Vedran Cirkovic (Sterling Environmental Engineering)		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Treatment Area	ft^2	5,000
Top Treat Depth	ft	5.0
Bot Treat Depth	ft	15.0
Vertical Treatment Interval	ft	10.0
Treatment Zone Volume	ft^3	50,000
Treatment Zone Volume	cy	1,852
Soil Type	---	silty sand
Porosity	cm^3/cm^3	0.40
Effective Porosity	cm^3/cm^3	0.20
Treatment Zone Pore Volume	gals	149,610
Treatment Zone Effective Pore Volume	gals	74,805
Fraction Organic Carbon (foc)	g/g	0.003
Soil Density	g/cm^3	1.6
Soil Density	lb/ft^3	100
Soil Weight	lbs	5.0E+06
Hydraulic Conductivity	ft/day	10.0
Hydraulic Conductivity	cm/sec	3.53E-03
Hydraulic Gradient	ft/ft	0.005
GW Velocity	ft/day	0.25
GW Velocity	ft/yr	91
Sources of Oxygen Demand	**Unit**	**Value**
Dissolved Phase Contaminant Mass	lbs	1
Sorbed Phase Contaminant Mass	lbs	5
Reduced Metals (Fe2+ and Mn2+) Mass	lbs	37
BOD mass equivalent	lbs	6
COD mass equivalent	lbs	25
Total Mass Contributing to O_2 Demand	**lbs**	**75**
Stoichiometric Demand	**Unit**	**Value**
Stoichiometric O_2 Demand	lbs	53
Stoichiometric ORC Advanced Demand	**lbs**	**312**
Application Dosing	**Unit**	**Value**
ORC Advanced to be Applied	**lbs**	**2,520**

ORC Advanced® Application Design Summary

Dissolved Plume		Field App Instructions
Application Method	**Direct Push**	
Spacing Within Rows (ft)	**10.0**	
Spacing Between Rows (ft)	**10.0**	
Application Points	**50**	
Areal Extent (square ft)	5,000	
Top Application Depth (ft bgs)	5	
Bottom Application Depth (ft bgs)	15	
ORC Advanced to be Applied (lbs)	**2,520**	**Field Mixing Ratios**
ORC Advanced per point (lbs)	50	Water per Pt (gals)
Percent Slurry	**30%**	14
Volume Water (gals)	**705**	ORC Advanced per Pt (lbs)
Volume ORC Advanced (gals)	113	50
Total Application Volume (gals)	**818**	Total Volume per Pt (gals)
Injection Volume per Point (gals)	16	16

Technical Notes/Discussion

Prepared By: Andy Lowy - Design Specialist

Date: 11/13/2015

Assumptions/Qualifications

In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by Sterling Environmental Engineering. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS

Purchasing Information

Millens Scrap Yard	--	Dissolved Plume
ORC Advanced Required	**lbs**	**2,520**
ORC Advanced Cost*	**$**	**$22,050**
Estimated Tax and Freight %	%	15%
Estimated Tax and Freight Cost	$	$3,308
Estimated Total Product Cost**	**$**	**$25,358**

***Note that the combined tax and freight costs are preliminary estimates only. Please contact your local sales manager or Customer Service at 949-366-8000 to obtain a shipping quote. You will be asked to provide a ship-to address and estimated time of delivery.**

Currently Available Packaging Options

Package Type***	# of packages	lbs required
40 lb poly lined bags	63	2,520

****Total Project cost is only an estimate; actual project cost may change as the final scope and/or RRS proposal are developed.**

*****Available Package Types are subject to change.**

OXYGEN RELEASE COMPOUND

ORC Advanced® Pellets Technical Specification

ORC Advanced Pellets are a dust-minimizing, dry application, pelletized form of the widely-used ORC Advanced controlled-release oxygen compound.

They are designed specifically for the treatment of dissolved-phase petroleum hydrocarbons through direct application into excavations, petroleum storage tank pits, trenches and backfill.

Oxygen is released from ORC Advanced for a period of 9 to 12 months *in situ*.

Example of ORC Advanced Pellets

$$CaO(OH)_2 + H_2O \rightarrow \tfrac{1}{2}O_2 + Ca(OH)_2 + H_2O$$

ORC Advanced is a formulation of calcium oxyhydroxide which, upon hydration, releases oxygen and forms simple calcium hydroxide and water.

For a list of treatable contaminants with the use of ORC Advanced, view the Range of Treatable Contaminants Guide.

Chemical Composition

- Calcium Oxyhydroxide
- Calcium Hydroxide
- Monopotassium Phosphate
- Ammonium Phosphate Dibasic

Properties

- Pellet size: 3-10 mm
- Contains micro-nutrients such as nitrogen, phosphorous, and potassium (N,P,K) which can be beneficial to aerobic biodegradation processes

OXYGEN RELEASE COMPOUND

ORC Advanced® Pellets Technical Specification

Storage and Handling Guidelines

Storage

Store in a cool, dry place out of direct sunlight

Store in original tightly closed container

Store in a well-ventilated place

Do not store near combustible materials

Store away from incompatible materials

Provide appropriate exhaust ventilation in places where dust is formed

Handling

Minimize dust generation and accumulation

Keep away from heat

Routine housekeeping should be instituted to ensure that dust does not accumulate on surfaces

Observe good industrial hygiene practices

Take precaution to avoid mixing with combustibles

Keep away from clothing and other combustible materials

Avoid contact with water and moisture

Avoid contact with eyes, skin, and clothing

Avoid prolonged exposure

Wear appropriate personal protective equipment

Applications

- *In situ* or *ex situ* out of the bag
- Direct application into open excavations, petroleum storage tank pits and trenches
- Direct application to contaminated backfill or contaminated soils
- *Ex situ* biopile applications (requires a source of hydration)

Health and Safety

Wash thoroughly after handling. Wear protective gloves, eye protection, and face protection.
Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: ORC Advanced SDS.

REGENESIS

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

REGENESIS
Oxygen Release Compound (ORC®) Installation Instructions
(Direct-Injection Slurry Application)

SAFETY:

Pure ORC is shipped to you as a fine powder rated at -325 mesh (passes through a 44 micron screen). It is considered to be a mild oxidizer and as such should be handled with care while in the field. Field personnel should take precautions while applying the pure ORC. Typically, the operator should work upwind of the product as well as use appropriate safety equipment. These would include eye and respiratory protection, and gloves as deemed appropriate by exposure duration and field conditions.

Personnel operating the field equipment utilized during the installation process should have appropriate training, supervision and experience.

GENERAL GUIDELINES:

ORC may be installed in the contaminated saturated zone in the ground utilizing hand augered holes, Geoprobe® type hydraulic punch equipment, or hollow stem augers. This set of instructions is specific for Geoprobe equipment. Alternate instructions may be obtained from the Regenesis Technical Support Department.

For optimum results the ORC slurry installation should span the entire vertical contaminated saturated thickness, including the capillary fringe and "smear zone".

Two general installation approaches are available. The first is to backfill only the probe hole with slurry. This is a simple approach, in that it is easy, straightforward, and the location of the ORC slurry is precisely known after installation. However, this method requires significantly more probe holes than the alternative, and may take more time for the completion of the remediation process. A separate set of instructions for this method utilizing Geoprobe equipment is available from Regenesis.

The second method is to inject the slurry through the probe holes into the contaminated saturated zone. This method requires fewer probe holes, is less disruptive to the site, and aids the spread of oxygen by spreading the ORC source material. However, it may be difficult to know the exact, final disposition of the ORC installed with this method. This is the method described in these instructions.

Note: It is important that the installation method and specific ORC slurry point location be established prior to field installation. It is also important that the ORC slurry volume and solids content for each drive point be predetermined. The Regenesis Technical Service Department is available to discuss these issues, and Helpful Hints at the end of these instructions offers relevant information. Regenesis also has available Technical Bulletins covering source treatments with ORC.

SPECIFIC INSTALLATION PROCEDURES

1. Identify the location of all underground structures, including utilities, tanks, distribution piping, sewers, drains, and landscape irrigation systems.
2. Identify surface and aerial impediments.
3. Adjust planned installation locations for all impediments and obstacles.
4. Pre-mark the installation grid point locations, noting any that have special depth requirements.
5. Set up the Geoprobe unit over each specific point, following manufacturer recommended procedures. Care should be taken to assure approximate vertical probe holes.
6. Penetrate surface pavement, if necessary, following standard Geoprobe procedures.
7. Drive the 1 1/2" (one-and-one-half inch) pre-probe (part #AT-148B) with the expendable tip (part #AT142B) to the desired maximum depth. Standard 1" (one inch) drive rods (part AT104B) should be used, after the pre-probe. (Hint: Pre-counted drive rods should be positioned prior to the installation driving procedure to assure the desired depth is reached.)
8. Disconnect the drive rods from the expendable tip, following standard Geoprobe procedures.
9. Mix the appropriate quantity of ORC slurry for the current drive point. (See separate "Directions for ORC® Slurry Mixing" and Helpful Hints). **Note: Do not mix more slurry than will be used within a 30 minute period.**
10. Set up and operate an appropriate slurry pump according to manufacturer's directions. Based on our experience, a Geoprobe model GS-1000 pump is recommended. Connect the pump to the probe grout pull cap (GS-1054) via a 1 inch diameter delivery hose. The hose is then attached to the 1" drive rod with its quick connector fitting. Upon confirmation of all connections add the ORC slurry to the pump hopper/tank.
11. Withdraw the pre-probe and drive stem 4' (four feet). (Also note Helpful Hints - Operations at end of instructions.)
12. Optional pretreatment step. (See Helpful Hints - Operations at end of instructions). Pump one to two gallons of tap water into the aquifer to enhance dispersion pathways from the probe hole.
13. Pump the predetermined quantity of ORC slurry for the depth interval being injected. Observe pump pressure levels for indications of slurry dispersion or refusal into the aquifer. (Increasing pressure indicates reduced acceptance of material by the aquifer).
14. Remove one 4' section of the 1" drive rod. The drive rod will contain slurry. This slurry should be returned to the ORC bucket for reuse.
15. Repeat steps 11, 13, and 14 until treatment of the entire affected thickness has been achieved. It is generally recommended that the procedure extend to the top of the capillary fringe/smear zone.
16. Install an appropriate seal, such as bentonite, above the ORC slurry through the entire vadose zone. This helps assure that the slurry stays in place and prevents contaminant migration from the surface. Depending on soil conditions and local regulations, a bentonite seal can be pumped through the slurry pump or added via chips or pellets after probe removal.
17. Remove and decontaminate the drive rods and pre-probe.

18. Finish the probe hole at surface as appropriate (concrete or asphalt cap, if necessary).
19. Move to the next probe point, repeating steps 5 through 18.

HELPFUL HINTS:

A. Physical characteristics

A1. Slurry

The ORC slurry is made using the dry ORC powder (rated at -325 mesh). It makes a smooth slurry, with a consistency that depends on the amount of water used.

A thick, but pumpable, slurry that approaches a paste can be made by using 65-67% solids. This material would normally be used for back-filling a bore or probe hole. It is especially useful where maximum density is desired such as where ground water is present in the hole or there are heaving sands.

Thinner slurries can be made by using more water. Typical solids for the thinner slurries content will range from 35% to 62%. Such slurries are useful for injecting through a probe or bore hole into the saturated aquifer.

As a rule, it is best to mix the first batch of slurry at the maximum solids content one would expect to use. It can then be thinned by adding additional water in small increments. By monitoring this process, the appropriate quantities of water for subsequent batches can be determined.

The slurry should be mixed at about the time it is expected to be used. It is best to not hold it for more than 30 minutes. Thinner slurries, especially, can experience a separation upon standing. All ORC slurries have a tendency to form cements when left standing. If a slurry begins to thicken too much, it should be mixed again and additional water added if necessary.

Care should be taken with slurry that may be left standing in a grout pump or hose. Problems can generally be avoided by periodically re-circulating the slurry through the pump and hose back into the pump's mixing or holding tank.

A2. Equipment

Most geotechnical grout pumping equipment has a holding tank with a capacity sufficient for injection.

When applying measured volumes of ORC slurry to probe holes, it is sometimes useful to know the volumes and content of the delivery system lines. The following information may be useful in this regard.

Geoprobe pump: At the end of a pump stroke virtually no deliverable slurry remains in the pump.

5/8" O.D. connecting hose (10 feet long):	0.2 gallons (26 fluid ounces).
Four foot (4') length of 1" drive rod:	.04 gallons (5 fluid ounces).
Three foot (3') length of 1 1/2" pre-probe:	.03 gallons (4 fluid ounces).

Cleaning and maintenance:

Pumping equipment and drive rods can be lightly cleaned by circulating clear water through them. Further cleaning and decontamination (if necessary due to subsurface conditions) should be performed according to the equipment supplier's standard procedures and local regulatory requirements.

B. Operating characteristics

B1. Operations - General

Judgment will be needed in the field when injecting ORC slurries. In general, it is relatively easy to inject ORC slurries into sandy soils, and this can usually be accomplished at very moderate pressures. Silts and clays require more pressure, and may accept less slurry.

Careful observation of pressure during slurry pumping is the best indication of the effectiveness of the slurry injection. To test the soil's ability to accept the slurry and to "precondition" the injection point for the slurry, it is sometimes useful to inject a small volume of plain water prior to the slurry. Normally, one-half (0.5) gallons to two (2) gallons would be appropriate.

During injection, increasing pressure and decreasing flow rate are signs of refusal by the soil matrix to accept the slurry. The site geologist should determine whether to increase pressure, and possibly fracture ("frac") the soil matrix to achieve ORC slurry installation in a tight site that has refused the slurry at lower pressures.

B2. Fill Volumes

Probe hole back-filling

Probe hole capacities:

Per 10' (Ten Foot) Length			
Theoretical		**Operating Volume**	
(Gallons/Fluid Ounces/Cubic Inches)		**(Gallons/Fluid Ounces)**	
Sand, Silts & Clay		**Sand**	**Silts & Clay**
1" Diameter	.41 gal/52 fl. oz./94.2 cu. in.	.61 gal/78 fl. oz.	.51 gal/65 fl. oz.
1 1/2" Diameter	.92 gal/117 fl. oz./212.0 cu. in.	1.38 gal/176 fl. oz.	1.15 gal/146 fl. oz.
2" Diameter	1.63 gal/209 fl. oz./376.8 cu. in.	2.44 gal/313 fl. oz.	2.04 gal/261 fl. oz.
2 1/4" Diameter	2.06 gal/264 fl. oz./476.9 cu. in	3.09 gal/396 fl. oz.	2.57 gal/330 fl. oz.

Note that the operating volumes include a 50% excess above the theoretical volume in sands and 25% in clays and silts. This is important to successful treatment. The additional material allows for a small degree of infiltration of the slurry into the surrounding soil and fractures, as well as hole diameter variability. It is important to assure that the entire contaminated saturated zone is treated (including the capillary fringe), since this is often the area of highest pollution concentration. Failure to treat this area due to improper installation can undermine an otherwise successful remediation effort.

For direct assistance or answers to any questions you may have regarding these instructions, contact Regenesis Technical Services at 949-366-8000.

REGENESIS
Oxygen Release Compound (ORC®) Installation Instructions
(Slurry Mixing)

1. OPEN 5 GALLON BUCKET, AND REMOVE PRE-MEASURED BAG OF ORC.
2. MEASURE AND POUR WATER INTO THE 5-GALLON BUCKET ACCORDING TO THE FOLLOWING DESIRED CONSISTENCY:

65% Solids Slurry	Mix .63 gallons of water per 10 pounds of ORC powder.	
	Example:	Mix 20 pounds of ORC with 1.26 gallons of water.
		Mix 30 pounds of ORC with 1.89 gallons of water.
60% Solids Slurry	Mix .79 gallons of water per 10 pounds of ORC powder.	
	Example:	Mix 20 pounds of ORC with 1.58 gallons of water.
		Mix 30 pounds of ORC with 2.37 gallons of water.
50% Solids Slurry	Mix 1.19 gallons of water per 10 pounds of ORC powder.	
	Example:	Mix 20 pounds of ORC with 2.38 gallons of water.
		Mix 30 pounds of ORC with 3.57 gallons of water.
25% Solids Slurry	Mix 3.57 gallons of water per 10 pounds of ORC powder.	
	Example:	Mix 10 pounds of ORC with 3.57gallons of water.

3. ADD THE APPROPRIATE ORC QUANTITY TO THE WATER. Check weight of each bucket (see label). The 5 gallon shipping bucket weighs 2 pounds. An additional 4 pounds of ORC would require one additional quart of water, at the 65% solids level.
4. USE AN APPROPRIATE MIXING DEVICE TO THOROUGHLY MIX ORC AND WATER. A hand held drill with a "jiffy mixer" or a stucco mixer on it may be used in conjunction with a small paddle to scrape the bottom and sides of the container. Standard environmental slurry mixers may also be used, following the equipment instructions for operation. For small quantities a usable slurry can be mixed by hand, if care is taken to blend all lumps into the mixture thoroughly.

CAUTION: ORC MAY SETTLE OUT OF SLURRY IF LEFT STANDING. ALSO, ORC EVENTUALLY HARDENS INTO A CEMENT-LIKE COMPOUND, AND CANNOT BE RE-MIXED AFTER THAT HAS HAPPENED. THEREFORE:

Mix immediately before using. Do not let stand more than 30 minutes, and re-mix immediately before use, to be sure the mixture has not settled out. If a mechanical slurry mixer attached to a pump is being used, the material may be cycled back through the mixer to maintain slurry suspension and consistency.

5. CHECK SLURRY CONSISTENCY FOR POURABILITY. ADD WATER IF NECESSARY (IN 1 CUP INCREMENTS) TO ACHIEVE THE CORRECT CONSISTENCY.

For direct assistance or answers to any questions you may have regarding these instructions, contact Regenesis Technical Services at 949-366-8000.

REGENESIS, 2002
www.regenesis.com

REGENESIS

Technology-Based Solutions for the Environment

SAFETY DATA SHEET

1. Identification

Product identifier **Oxygen Release Compound Advanced (ORC Advanced®)**

Other means of identification None.

Recommended use Soil and Groundwater Remediation.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name Regenesis

Address 1011 Calle Sombra
San Clemente, CA 92673

Telephone 949-366-8000

E-mail CustomerService@regenesis.com

Emergency phone number CHEMTREC® at 1-800-424-9300 (International)

2. Hazard(s) identification

Physical hazards	Oxidizing solids	Category 2
Health hazards	Skin corrosion/irritation	Category 1
	Serious eye damage/eye irritation	Category 1

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement May intensify fire; oxidizer. Causes skin irritation. Causes serious eye damage.

Precautionary statement

Prevention Keep away from heat. Keep/Store away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Wash thoroughly after handling. Wear protective gloves/eye protection/face protection.

Response If on skin: Wash with plenty of water. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. In case of fire: Use appropriate media to extinguish.

Storage Store away from incompatible materials.

Disposal Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC) None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Calcium hydroxide oxide	682334-66-3	≥85
Calcium hydroxide	1305-62-0	≤15
Dipotassium Phosphate	7758-11-4	<5
Monopotassium Phosphate	7778-77-0	<5

Composition comments All concentrations are in percent by weight unless otherwise indicated.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	IF ON CLOTHING: rinse immediately contaminated clothing and skin with plenty of water before removing clothes. Rinse skin with water/shower. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
Eye contact	Do not rub eyes. Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Ingestion	Never give anything by mouth to a victim who is unconscious or is having convulsions. Rinse mouth. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Dusts may irritate the respiratory tract, skin and eyes. Skin irritation. May cause redness and pain.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Take off all contaminated clothing immediately. Contact with combustible material may cause fire. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water spray, fog (flooding amounts). Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	Greatly increases the burning rate of combustible materials. Containers may explode when heated. During fire, gases hazardous to health may be formed. Combustion products may include: metal oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk. Use water spray to cool unopened containers.
Specific methods	Cool containers exposed to flames with water until well after the fire is out.
General fire hazards	May intensify fire; oxidizer. Contact with combustible material may cause fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Keep away from clothing and other combustible materials. Wear appropriate protective equipment and clothing during clean-up. Use a NIOSH/MSHA approved respirator if there is a risk of exposure to dust/fume at levels exceeding the exposure limits. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Collect dust using a vacuum cleaner equipped with HEPA filter. Keep combustibles (wood, paper, oil, etc.) away from spilled material. Ventilate the contaminated area. Stop the flow of material, if this is without risk. Absorb in vermiculite, dry sand or earth and place into containers. Large Spills: Sweep up or vacuum up spillage and collect in suitable container for disposal. Shovel the material into waste container. Minimize dust generation and accumulation. Avoid the generation of dusts during clean-up. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. Place all material into loosely covered plastic containers for later disposal. For waste disposal, see section 13 of the SDS. Wear appropriate protective equipment and clothing during clean-up.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Minimize dust generation and accumulation. Routine housekeeping should be instituted to ensure that dusts do not accumulate on surfaces. Keep away from heat. Provide appropriate exhaust ventilation at places where dust is formed. Keep away from clothing and other combustible materials. Take any precaution to avoid mixing with combustibles. Avoid contact with water and moisture. Do not get this material in contact with eyes. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Keep away from heat. Store in a cool, dry place out of direct sunlight. Store in original tightly closed container. Store in a well-ventilated place. Do not store near combustible materials. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Calcium hydroxide (CAS 1305-62-0)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

US. ACGIH Threshold Limit Values

Components	Type	Value
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Calcium hydroxide (CAS 1305-62-0)	TWA	5 mg/m3

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. If engineering measures are not sufficient to maintain concentrations of dust particulates below the Occupational Exposure Limit (OEL), suitable respiratory protection must be worn. If material is ground, cut, or used in any operation which may generate dusts, use appropriate local exhaust ventilation to keep exposures below the recommended exposure limits. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection

Use dust-tight, unvented chemical safety goggles when there is potential for eye contact.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves. Frequent change is advisable. Recommended gloves include rubber, neoprene, nitrile or viton.

Other

Wear appropriate chemical resistant clothing.

Respiratory protection

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Recommended use: Wear respirator with dust filter.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state

Solid.

Form

Powder.

Color

White to pale yellow.

Odor	Odorless.
Odor threshold	Not available.
pH	12.5 (3% suspension/water)
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Oxidizer.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Slightly soluble
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	527 °F (275 °C)
Viscosity	Not available.
Other information	
Bulk density	0.5 - 0.9 g/ml
Explosive limit	Non-explosive.

10. Stability and reactivity

Reactivity	Greatly increases the burning rate of combustible materials.
Chemical stability	Decomposes on heating. Product may be unstable at temperatures above: 275°C/527°F.
Possibility of hazardous reactions	Reacts slowly with water.
Conditions to avoid	Heat. Moisture. Avoid temperatures exceeding the decomposition temperature. Contact with incompatible materials.
Incompatible materials	Acids. Bases. Salts of heavy metals. Reducing agents. Combustible material.
Hazardous decomposition products	Oxygen. Hydrogen peroxide (H2O2). Steam. Heat.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Dust may irritate respiratory system. Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye damage.
Ingestion	Ingestion may cause irritation and malaise.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Dusts may irritate the respiratory tract, skin and eyes. Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity

Components	Species	Test Results
Calcium hydroxide (CAS 1305-62-0)		
Acute		
Oral		
LD50	Rat	7340 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Due to the physical form of the product it is not expected to be an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Calcium hydroxide (CAS 1305-62-0)			
Aquatic			
Fish	LC50	Zambezi barbel (Clarias gariepinus)	33.8844 mg/l, 96 hours

Persistence and degradability Decomposes in the presence of water. The product contains inorganic compounds which are not biodegradable.

Bioaccumulative potential The product does not contain any substances expected to be bioaccumulating.

Mobility in soil This substance has very low solubility in water and low mobility in the environment.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

UN number UN1479

UN proper shipping name Oxidizing solid, n.o.s. (Calcium hydroxide oxide)

Transport hazard class(es)	
Class	5.1
Subsidiary risk	-
Label(s)	5.1
Packing group	II
Environmental hazards	
Marine pollutant	No
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.
Special provisions	62, IB8, IP2, IP4, T3, TP33
Packaging exceptions	152
Packaging non bulk	212
Packaging bulk	240

IATA

UN number	UN1479
UN proper shipping name	Oxidizing solid, n.o.s. (Calcium hydroxide oxide)
Transport hazard class(es)	
Class	5.1
Subsidiary risk	-
Packing group	II
Environmental hazards	No
ERG Code	5L
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN1479
UN proper shipping name	OXIDIZING SOLID, N.O.S. (Calcium hydroxide oxide)
Transport hazard class(es)	
Class	5.1
Subsidiary risk	-
Packing group	II
Environmental hazards	
Marine pollutant	No
EmS	F-A, S-Q
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not applicable.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - Yes

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Calcium hydroxide (CAS 1305-62-0)

US. New Jersey Worker and Community Right-to-Know Act

Calcium hydroxide (CAS 1305-62-0)
Calcium hydroxide oxide (CAS 682334-66-3)

US. Pennsylvania Worker and Community Right-to-Know Law

Calcium hydroxide (CAS 1305-62-0)

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 02-April-2015

Revision date -

Version # 01

Further information HMIS® is a registered trade and service mark of the American Coatings Association (ACA).

HMIS® ratings Health: 3
Flammability: 0
Physical hazard: 2

NFPA ratings

Disclaimer

Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.