# Final Statement of Basis

Norlite Corporation
Cohoes, Albany County
EPA ID No. NYD 080469935
Site No. 401041

February 2015

Prepared by
Division of Environmental Remediation
New York State Department of Environmental Conservation

# FINAL CORRECTIVE MEASURES
# AND
# RESPONSE TO COMMENTS ON THE STATEMENT OF BASIS

Norlite Corporation
Cohoes, Albany County
Site Number 401041
EPA RCRA ID NYD080469935

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## INTRODUCTION

This document presents the final corrective measures for the Norlite Site as set forth in the Statement of Basis (SB) for the site. The final corrective measures were selected in accordance with the New York State Environmental Conservation Law and Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York (6 NYCRR) Parts 373 and 375.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for the Norlite site (see Appendix B) and the public input to the proposed corrective measures presented in the Statement of Basis (SB).

## PUBLIC PARTICIPATION AND RESPONSE TO COMMENTS

The public comment period for the SB started on June 25, 2014 and ended on October 6, 2014. A public information session and administrative hearing were held on August 5, 2014. All comments were required to be submitted no later than October 6, 2014.

Comments received from the public on the corrective measures proposed in the SB together with the Department's responses are provided in Appendix A.

## FINAL CORRECTIVE MEASURES

The elements of the selected final corrective measures (No Further Action with Site Management) are as follows:

**1- Institutional Control**:

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;
- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

**2- Site Management Plan**

A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

   Institutional Controls: The environmental easement discussed above

   Engineering Controls: The low permeable asphalt cap, as described in Section 6, over surface soil contamination at SWMU-12.

   This plan includes, but may not be limited to:

   - an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
   - a provision for further investigation to refine the nature and extent of contamination in the following areas where access was previously hindered: near the former underground fuel lines if and when the area becomes accessible
   - descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
   - a provision for evaluation of the potential for soil vapor intrusion should the use of the on-site buildings change and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
   - provisions for the management and inspection of the identified engineering controls;
   - maintaining site access controls and Department notification; and
   - the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
    - monitoring of groundwater to assess the performance and effectiveness of the remedy;
    - a schedule of monitoring and frequency of submittals to the Department; and
    - monitoring for vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

## 3- Green Remediation

Green remediation principals and techniques will be implemented to the extent feasible in the site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste.

Declaration

The final corrective measures are protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

February 6, 2015
Date

Robert W. Schick, P.E., Director
Division of Environmental Remediation

# FINAL STATEMENT OF BASIS

Norlite Facility
Cohoes, Albany County
NYD080469935/ Site No.401041

February 2015

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## SECTION 1: INTRODUCTION

The New York State Department of Environmental Conservation (Department), in consultation with the New York State Department of Health (NYSDOH), has selected the final corrective measures for the aforementioned facility. The release of hazardous wastes and/or hazardous constituents at the site were addressed in part by actions known as an interim corrective measures (ICM) which was undertaken at the site. An ICM is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the Statement of Basis. The ICMs undertaken at this site are discussed in Section 6.

The corrective measure(s) is/are intended to attain the cleanup objectives identified for this facility for the protection of public health and the environment. This final Statement of Basis (SB) identifies the final corrective measure(s), summarizes the other alternatives considered, and explains the reasons for selecting the final remedy.

Based on the results of the investigations at the site, the ICMs that have been performed and the evaluation presented here, the Department has selected No Further Action with Site Management as the remedy. This No Further Action remedy includes the implementation of Institutional and Engineering Controls (ICs/ECs) as the final remedy for the site. The Department believes that this remedy is protective of human health and the environment and satisfies the remediation objectives described in Section 6.5.

## SECTION 2: CITIZEN PARTICIPATION

The Department seeks input from the community on all remedies. A public comment period was held during which the public was encouraged to submit comments on the proposed remedy. All comments on the remedy received during the public comment period were considered by the

Department in selecting a remedy for the site. Site-related reports and documents were made available for review by the public at the following document repository:

**Cohoes Library**
**169 Mohawk Street**
**Cohoes, NY 12047**

A public information session was held on August 5, 2014. At the information session, the findings of the RCRA Facility Investigation (RFI) and the Corrective Measures Study (CMS) along with a summary of the proposed corrective measure(s) were available for public review. NYSDEC and NYS Department of Health (NYSDOH) representatives were available to respond to questions.

Comments on the remedy received during the comment period are summarized and addressed in the responsiveness summary (Appendix A) of the Final Statement of Basis.

## SECTION 3: FACILITY BACKGROUND

Site Description and History

Location: The Norlite site is located in an area of mixed land uses. The site is located on the north side of Route 7 and to the west of Route 32. Parts of the site are located in the southern portion of the City of Cohoes, and the remainder is located in the eastern portion of the Town of Colonie. Residential properties are located to the north, east and south of the site. Commercial areas are located to the east and south. Undeveloped land exists west and north of the site.

Site Features: The Norlite site consists of approximately 220 acres, which include the active shale mine, the site operations area and undeveloped buffer parcels along the site boundary. Approximately forty (40) acres of the site, other than the mine area, are developed and include offices, shale aggregate processing, two rotary kilns, fuel storage, processing areas, including tanks for the storage of hazardous waste used as a fuel, and other operations buildings.

Current Zoning and Land Use: The site, which includes the entire Norlite property, is zoned for industrial use, although one undeveloped parcel on the northwest boundary is zoned for residential use. Zoning adjacent to the site is residential.

Past Use of the Site: The site has been operated as a mine and aggregate processing plant since 1956, and is expected to remain in operation. In 1983, the facility began the hazardous waste permitting process for storage and incineration of hazardous wastes, and received its initial permit in 1992. Norlite indicates that the lifetime of the quarry is anticipated to be 30+ years from 2012.

Site Geology and Hydrogeology: Topography at the site slopes toward the Salt Kill, which flows north to south in the vicinity of the site, and an unnamed tributary to the Salt Kill which flows west to east across the site. At the confluence of these streams, the Salt Kill flows east to the Hudson River.

Overburden stratigraphy is generally sand and some silt, underlain by clay, underlain by Normanskill Shale bedrock. Depth to bedrock in the northern part of the developed facility varies from 16 to 44 feet below grade. In the southern portion of the developed area, the bedrock is found about 20 feet below grade.

Groundwater flow is in the east-southeast direction. Depth to groundwater varied from 7 to 20 feet below the surface during the 2011 RFI investigation, and appeared to be shallower in the southern portion of the site.

A site location map is attached as Figure 1 and a facility map is attached as Figure 2.

## SECTION 4: ENFORCEMENT STATUS

The facility holds a 6NYCRR Part 373 Hazardous Waste Management Permit which includes provisions for RCRA Corrective Action. The corrective action requirement requires owners and/or operators of hazardous waste treatment, storage and disposal facilities to investigate and, when appropriate, remediate releases of hazardous wastes and/or constituents to the environment. In relation to this facility, the Department last issued a Part 373 Hazardous Waste Management Permit (DEC #4-0103-00016/00016) to Norlite Corporation in July 2007. As part of the permit process, NYSDEC required Norlite to conduct a RCRA Facility Investigation (RFI) at a number of Solid Waste Management Units (SWMUs) identified in the permit. This investigation has been completed. After final corrective measures have been selected, the Department will seek to have Norlite implement the remedy as part of the hazardous waste management permit. The permit has been extended under the State Administrative Procedures Act (SAPA) and a permit renewal application is currently under review by the Department.

## SECTION 5: RCRA FACILITY INVESTIGATION (RFI)

The RCRA Corrective Action process began with investigations to evaluate potential areas of the facility that may have been impacted by hazardous wastes and/or hazardous constituents. Based on the results of investigations, the Department has determined that hazardous wastes and/or hazardous constituents have been released at the facility. The impact of releases of hazardous wastes and/or hazardous constituents at the facility were characterized and evaluated.

The analytical data collected for the facility includes data for:

| | VOCs | SVOCs | Inorganics | Pesticides | PCBs |
|---|---|---|---|---|---|
| **Soil** | X | X | X | X | X |
| **Groundwater** | X | X | X | X | X |
| **Surface Water** | X | X | X | | |
| **Surface Soil** | X | X | X | X | X |

Notes: VOCs - Volatile Organic Compounds
SVOCs - Semi-Volatile Organic Compounds
Inorganics - Metals

PCBs - Polychlorinated Biphenyls

The data have identified contaminants of concern. A "contaminant of concern" is a hazardous waste or hazardous constituent that is sufficiently present in frequency and concentration in the environment to require evaluation for remedial action. Based on the results, the Department determined that corrective measures were required to address some of the areas investigated. The RCRA Facility Investigation Report contains a full discussion of the data. The nature and extent of contamination and environmental media requiring action are summarized in **Exhibit A**.

The contaminant(s) of concern identified at this facility are:

1. Soil – the Metals arsenic, cadmium, mercury.
2. Groundwater – the VOCs 1,1, dichloroethane, 1,2-dichloroethane, cis-1,2 dichloroethene, vinyl chloride, trichloroethene, benzene, toluene, ethyl-benzene, xylene, chlorobenzene, acetone, MTBE and isopropyl benzene**.**

As illustrated in Exhibit A, the contaminants of concern exceed the cleanup objectives for:
1. Soil - NYS Part 375 Soil Cleanup Objectives for Unrestricted Use
2. Groundwater - NYSDEC Class GA Groundwater Standards and Guidance Values

## 5.1: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts may include existing and potential future exposure pathways to fish and wildlife receptors, wetlands, groundwater resources, and surface water. The RFI report presents more a detailed discussion of any existing and potential impacts from the site.

Nature and Extent of Contamination:
The primary environmental concern is groundwater contamination in the developed area of the site, downgradient of the tank storage area. Petroleum-related compounds including xylene, ethyl-benzene and chlorobenzene in concentrations ranging from 100 to 327 ppb, acetone up to 626 ppb and low levels of chlorinated compounds at less than 50 ppb have been identified. Soil samples performed in this area indicate that there are no concentrations of contaminants that exceed cleanup objectives. However, there is a possibility that soil surrounding former underground fuel lines in this area could be a potential source of the groundwater contamination. Access is to this area is limited by the former underground fuel lines, an existing building that houses fuel-storage tanks and foundation supports for overhead fuel lines currently in use.

In addition to groundwater contamination, there were some locations where elevated metals were identified in soil. Interim corrective measures (ICMs) were performed in two locations where the levels of metals slightly exceeded industrial soil cleanup objectives: the SWMU12 Transformer Pad and SWMU-4 Surface Impoundments - South Area. The remainder of soils sampled met residential (and commercial and industrial) soil cleanup objectives, with the exception of two isolated locations where cadmium in soil (5.6 ppm) exceeded the residential soil cleanup objective

of 2.5 ppm and where mercury in soil (1.7 ppm) exceeded the residential soil cleanup objective of 0.81 ppm. Both of these locations are greater than 10 feet below grade.

## 5.2: Summary of Human Exposure Pathways

This human exposure assessment identifies ways in which people may be exposed to site-related contaminants. Chemicals can enter the body through three major pathways (breathing, touching or swallowing). This is referred to as *exposure.*

The site is an active facility that is completely fenced and guarded which restricts public access. Since some contaminated soils remain at the site below a cap or clean back-fill, people will not come in contact with contaminated soils unless they dig below the surface materials. People are not drinking the contaminated groundwater because the area is served by a public water supply that is not affected by this contamination. Volatile organic compounds in the groundwater may move into the soil vapor (air spaces within the soil), which in turn may move into overlying buildings and affect the indoor air quality. This process, which is similar to the movement of radon gas from the subsurface into the indoor air of buildings, is referred to as soil vapor intrusion. The inhalation of site contaminants in indoor air due to soil vapor intrusion does not represent a concern for the site in its current condition, but may exist for any future on-site development.

## 5.3 Summary of the Remediation Objectives

The objectives for the corrective measures have been established through the remedy selection process. The goal of the corrective measures is to protect public health and the environment and achieve unrestricted use of the site to the extent feasible.

The remedial action objectives for this site are:

Groundwater

Human Health

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent direct contact with, or inhalation of volatiles, from contaminated groundwater.
-

Environment

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.

Soil

Human Health

- Prevent the ingestion and/or direct contact with contaminated soil.

Soil Vapor

Human Health

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a facility.

## SECTION 6: INTERIM CORRECTIVE MEASURES

If at any time during an investigation, it becomes apparent that corrective actions should be taken to immediately address the spread of contamination, interim corrective measures must be taken. The design emphasis is to construct an Interim Corrective Measure (ICM) as close to a permanent system or final remedy as possible. The Department has determined that the ICMs are protective to human health and the environment, and could serve as part of the Final Corrective Measures at the facility.

The following ICMs were completed at the facility based on conditions observed during the RFI.

SWMU-12 Transformer Pad Vicinity Asphalt Cap

SWMU 12 is the transformer pad area located to the south of the rotary kilns in the central portion of the facility. Access to the transformer pad is limited due to the presence of surrounding structures and buried high-voltage utilities, therefore, only surface soil samples could be collected in the area surrounding the concrete transformer pad. The analytical results for surface samples showed that, although no PCBs were detected, some RCRA-listed metals were present at concentrations greater than industrial soil cleanup objectives (SCOs).

The corrective measure for SWMU-12 consisted of capping the area containing RCRA-listed metals at concentrations greater than the NYS Industrial SCOs. The area was covered with a low permeability asphalt cap. The cap was extended beyond the area of concern, to a total area of 3,070 square feet. The provision for maintenance of the cap will be included in the site management plan.

SWMU-4 Surface Impoundments (South Area Only)

Soil at SWMU-4 that exceeded the industrial soil cleanup objective for arsenic was excavated and removed from the site for disposal. The industrial SCO for arsenic is 16 ppm; levels of arsenic up to 39 ppm were removed during the excavation. Confirmation samples were collected and results confirm that the industrial SCOs were achieved. A total of 477 tons of soil were removed as part of this ICM.

## SECTION 7: CORRECTIVE MEASURES STUDY (CMS)

Potential final corrective action measures for the facility were identified, screened, and evaluated in the CMS report. To be selected, the final corrective measures must be protective of human health and the environment, be cost-effective, comply with other statutory requirements, and utilize permanent solutions, alternative technologies, or resource recovery technologies to the maximum extent practicable. The final corrective action measures for the facility must address potential routes of exposure to humans and the environment and attain the cleanup objectives identified for the facility, which are presented in **Exhibit B**.

A summary of the corrective measure alternatives that were considered for the facility is presented in **Exhibit C**. Cost information is presented in the form of present worth, which represents the amount of money invested in the current year that would be sufficient to cover all present and future costs associated with the alternative. This enables the costs of remedial alternatives to be compared on a common basis. As a convention, a time frame of 30 years is used to evaluate present worth maintenance. Monitoring would cease after 30 years if cleanup objectives are not achieved. A summary of the Final Corrective Measure Alternatives Costs is included as **Exhibit D**.

### 7.1: Evaluation of Corrective Measure Alternatives

A detailed discussion of the evaluation criteria and comparative analysis is included in the CMS report.

The general performance standards for corrective measures that must be satisfied in order for an alternative to be considered for selection are listed below.

1. Protection of Human Health and the Environment. This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

2. Achieve Cleanup Objectives for the Contaminated Media. – This criterion evaluates the ability of alternatives to achieve the cleanup objectives established for the facility.

3. Remediate the Sources of Releases. – This criterion evaluates the ability of the alternatives to reduce or eliminate to the maximum extent possible further releases.

4. Comply with Standards for Management of Wastes. – This criterion evaluates how alternatives assure that management of wastes during corrective measures is conducted in a protective manner.

The next five selection criteria are used to compare the positive and negative aspects of each of the remedial alternatives.

5. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. If wastes or treated residuals remain on-site after the selected remedy has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

6. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the facility.

7. Short-term Impacts and Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the cleanup objectives is also estimated and compared against the other alternatives.

8. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

9. Cost-Effectiveness. Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

## SECTION 8: ELEMENTS of the SELECTED REMEDY

The basis for the Department's selected remedy is set forth in **Exhibit E**.

The estimated present worth cost to implement the remedy is $97,000. The cost to construct the remedy is estimated to be $25,000 and the estimated average annual cost is $9,000

The elements of the selected remedy are as follows:

Based on the results of the investigations at the site, the ICMs that have been performed and the evaluation presented here, the Department is selecting No Further Action with Site Management as the remedy. This No Further Action remedy includes the implementation of Institutional and Engineering Controls (ICs/ECs) as the selected remedy for the site. The RCRA Facility Investigation focused on areas where releases were known or suspected, primarily in the eastern, developed portion of the site. The areas of the site where releases were not suspected, including the active shale mine and the undeveloped site buffer parcels, will be re-assessed for impacts to human health and the environment at the time when facility operations are scheduled to end or when the outlying undeveloped parcels are planned to be separated from the Norlite site. The Department believes that this remedy is protective of human health and the environment and satisfies the remediation objectives described in Section 6.5.

The elements of the ICMs already completed have been detailed in Section 6 of this document.

### 1- Institutional Control:

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- requires the site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
- allows the use and development of the controlled property for industrial uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws;

- restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH; and
- requires compliance with the Department approved Site Management Plan.

**2- Site Management Plan**

A Site Management Plan is required, which includes the following:

a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective:

   Institutional Controls: The environmental easement discussed above

   Engineering Controls: The low permeable asphalt cap, as described in Section 6, over surface soil contamination at SWMU-12.

   This plan includes, but may not be limited to:

   - an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
   - a provision for further investigation to refine the nature and extent of contamination in the area near the former underground fuel lines in the SWMU-1 Tank Storage Area, where access was previously limited, when the area becomes accessible;
   - descriptions of the provisions of the environmental easement including any land use, and groundwater use restrictions;
   - a provision for evaluation of the potential for soil vapor intrusion should the use of the on-site buildings change and for any buildings developed on the site, including provision for implementing actions recommended to address exposures related to soil vapor intrusion;
   - provisions for the management and inspection of the identified engineering controls;
   - maintaining site access controls and Department notification; and
   - the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls.

b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but may not be limited to:
   - monitoring of groundwater to assess the performance and effectiveness of the remedy;
   - a schedule of monitoring and frequency of submittals to the Department;
   - monitoring for vapor intrusion for any buildings developed on the site, as may be required by the Institutional and Engineering Control Plan discussed above.

## 3- Green Remediation

Green remediation principals and techniques will be implemented to the extent feasible in the site management of the remedy as per DER-31. The major green remediation components are as follows:

- Considering the environmental impacts of treatment technologies and remedy stewardship over the long term;
- Reducing direct and indirect greenhouse gas and other emissions;
- Increasing energy efficiency and minimizing use of non-renewable energy;
- Conserving and efficiently managing resources and materials;
- Reducing waste, increasing recycling and increasing reuse of materials which would otherwise be considered a waste.

# STATEMENT OF BASIS

## Exhibits A through E

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Norlite Corporation
Cohoes, Albany County
NYD080469935 / Site No. 401041

**Exhibit A**

**Nature and Extent of Contamination**

This exhibit describes the findings of the RCRA Facility Investigation for all environmental media that were evaluated. As described in Section 5, samples were collected from various environmental media to characterize the nature and extent of contamination.

For each medium, a table summarizes the findings of the investigation. The tables present the range of contamination found at the facility in the media and compares the data with the applicable SCGs for the facility. The contaminants are arranged into four categories; volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/ polychlorinated biphenyls (PCBs), and inorganics (metals and cyanide). For comparison purposes, the standards, criteria and guidance values (SCGs) are provided for each medium that allows for unrestricted use. For soil, if applicable, the Restricted Use SCGs are also presented. .

**SWMU(s)/AOC(s)**

A Solid Waste Management Unit (SWMU) includes any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of hazardous or solid wastes. Such units include any area at the facility where solid wastes have been routinely and systematically released. An Area of Concern (AOC) is an area at the facility, or an off-site area, which is not at the time known to be SWMU, where hazardous wastes and/or constituents are present or are suspected to be present as a result of a release from the facility. Solid wastes are defined in 6 NYCRR Part 371.1(c) and hazardous wastes are defined in 6 NYCRR Part 371.1(d).

There have been a total of seventeen (17) SWMUs identified. Six of these SWMUs, SWMU-2 (Kiln Supply Pump house), SWMU-3 (Incinerator/Energy Recovery Units), SWMU-6 (Filter/Tank Sludge Storage Areas), SWMU-10 (Shale Fine Leachate Pond), SWMU-13 (Salt Kill Creek), and SWMU-15 (Maintenance Garage) were designated as requiring no further action based on investigations and information provided to NYSDEC prior to the issuance of the July 2007 hazardous waste permit. Since no further investigation was necessary, these units were not included in the RCRA Facility Investigation (RFI).

In 2009, as required by the July 2007 hazardous waste permit, Norlite implemented a NYSDEC-approved RCRA Facility Investigation (RFI) workplan that addressed the remaining eleven (11) SWMUs where releases were known to have occurred or were suspected. The initial investigation work was completed in 2011, and the results provided to NYSDEC. A supplemental investigation was completed in September 2012, and additional groundwater data was collected in 2013.

A brief description of the nature and extent of contamination at each SWMU investigated during the RFI is discussed below.

SWMU-1: Tank Storage Area

The tank storage area is located on the northern portion of the site, just south of the Tanker/Truck Roll-off Staging Area (SWMU-7). SWMU 1 includes the Tank Storage Area, fuel processing buildings, aboveground tank farm and the underground storage and equalization tanks located adjacent to these buildings.

Soil borings were drilled and monitoring wells installed during the RFI in the SWMU 1 area. Soil sample concentrations did not exceed the corresponding residential SCOs at any of the locations and did not identify source areas for remediation.

Several volatile organic compounds (VOCs) exceeded the NYSDEC GA Standards in the shallow groundwater samples collected during the RFI. Additional sampling confirmed the presence of groundwater contamination, with the highest concentrations detected at wells SWMU 1 MW-7 and SWMU 1 MW-8. The groundwater contamination is believed to be related to underground fuel lines related to SWMU 17 that were cleaned and capped but left in place. Based on downgradient monitoring, the VOCs are not migrating beyond the SWMU 1 area or the Norlite property boundary. No contaminants were found in deeper (bedrock) groundwater. Groundwater in this area will be addressed by the corrective measure selection process.

SWMU-4: Surface Impoundments (South Area Only)

The surface impoundments were located south of the rotary kilns and consisted of a settling pond and the dewatering area. The settling pond and dewatering areas were drained and filled in 1992-1993. The subsurface sampling was conducted at the south area of the former surface impoundments, which is immediately south of the current wastewater treatment plant.

Soil samples were collected during the RFI to evaluate metals concentrations. At SWMU-4, arsenic exceeded the industrial SCO in three samples. The industrial SCO for arsenic (16 ppm) is the same value as the commercial SCO and residential SCO for arsenic. Additional soil samples confirmed the results from the RFI. The arsenic concentrations exceeded the industrial SCO in the top four feet of soil.

SWMU-4 Interim Corrective Measure

An Interim Corrective Measure (ICM) was conducted to remove the arsenic-containing soil in SWMU 4. The ICM consisted of excavating soil containing arsenic at concentrations greater than the industrial soil cleanup objective (SCO) of 16 ppm. Initial arsenic concentrations up to 39 ppm were noted. Excavation activities were conducted in November 2012. Soil was removed and transported off-site for disposal in accordance with applicable federal, state, and local regulations.

Confirmation samples collected at the outer limits of the excavation were all less than the industrial SCO for arsenic. The excavation varied from four to nine feet deep, nine to twenty feet wide and was 115 feet long. Approximately 477 tons of soil were removed from the excavation and disposed of off-site.

The excavation was backfilled using site-generated lightweight aggregate that was approved for use by the NYSDEC. The SWMU 4 ICM successfully achieved the industrial (and residential and commercial) SCO for arsenic. No further action is required for this SWMU.

SWMU-5: Waste Piles 1,3,4,5

The waste piles are locations where shale fines and air pollution control dust/sludges were stockpiled during historical operations at the facility. At the former pile location area 1, one sample indicated mercury in excess of the residential SCO at a depth of 12-14 feet below grade. However, the value is below the commercial (and industrial) SCO, and no further action is required for this SWMU.

SWMU-7: Tanker Truck Roll Off Staging Area

The tanker/truck roll off staging area is an approximately 250-foot by 100-foot area located adjacent to the north side of the fuel storage and processing buildings. The area is lined with an impermeable geomembrane liner which is covered with gravel. In order to protect the integrity of the liner, soil samples were collected and groundwater monitoring wells were installed outside the perimeter of the liner during the RFI.

Low concentrations of a number of VOCs, SVOCs and metals were detected at or above laboratory detection limits in soil samples collected from SWMU-7. However, no VOCs, SVOCs or metals were detected at a concentration greater than the residential SCOs.

Four groundwater sampling events were conducted during the RFI and Supplemental RFI and included at least one SWMU-7 well. Acetone was initially detected during the first round of RFI sampling in SWMU-7 MW-2 at a concentration exceeding the GA Guidance Value in 2011. No other VOCs, SVOCS, metals or pesticides were detected at levels exceeding the GA Guidance Values or Standards during any of the other sampling events. Based on these results, no further action is required for this SWMU.

SWMU-8: Employee Parking Lot Discharge Area and Floor Drain

The northeast portion of the employee parking lot was designated as SWMU-8. According to historical information and discussions with Norlite personnel, a stormwater drain from the fuel processing area once discharged to this area. A petroleum spill associated with a fire suppression pump in the fuel processing area resulted in the discharge of petroleum to the employee parking lot. The exact nature and location of the spill are not known.

Soil characterization activities completed during the RFI at SWMU-8 did not identify the presence of any compounds at concentrations greater than NYSDEC residential SCOs in soil, with the exception of cadmium. Cadmium was detected at a concentration greater than the residential SCO but less than the commercial and industrial SCOs in one sample collected at a depth between 11-13 feet below ground surface.

Acetone exceeded the respective GA Standard in one well (SWMU-8 MW-3) during the first sampling event of the RFI in 2011, but not during the second event.

In June 2013, an additional bedrock monitoring well (SWMU-8 MW-4) was installed near SWMU-8 MW-3 and additional groundwater sampling was conducted in July 2013. No targeted compounds were detected in SWMU-8 MW-3 or SWMU-8 MW-4 during this event. Based on these soil and groundwater results, no further action is required for this SWMU.

SWMU-9: Shale Fines Landfill

The Shale Fines Landfill is located in the eastern portion of the Norlite facility. The landfill has been capped and is covered with grass. As part of the RFI investigation, groundwater sampling results from the five year post-closure monitoring period were reviewed. Based on the information provided in the reports, which showed that the closed landfill was operating as designed with no indication of groundwater impacts, no further action is required for this SWMU.

SWMU-11: Interim Wastewater Treatment/Sludge Container Staging Area

SMWU 11 is designated as an approximately 200-foot by 50-foot area immediately adjacent to the north side of the current wastewater treatment facility. A portion of this area currently contains methanol storage tanks.

Based on RFI soil results that did not indicate the presence of contamination at concentrations greater than the residential SCOs, no further action is required for this SWMU.

SWMU-12: Transformer Pad Vicinity and Scrap Yard Area Soils

The transformer pad is located to south of the rotary kilns in the central portion of the facility. A PCB spill from the transformer occurred at some point in the past. The exact nature of the spill is unknown. The scrap yard area is an approximately one acre area located in the southwestern portion of the facility. The area is currently used for the storage of spare parts, supplies, and damaged/out-of-use equipment. There are past reports of a petroleum (oil or fuel) discharge from a decommissioned vehicle that was stored in the area before being sold for scrap. The exact location of the discharge is not known.

During the RFI, soil sampling was conducted at the transformer pad and in the scrap yard. Two monitoring wells were installed downgradient of the transformer pad. Elevated metal concentrations were detected in soil samples at the transformer pad, with some results exceeding the industrial SCOs. Selenium exceeded the groundwater standard at SWMU-12 MW-8 during both groundwater sampling events in 2011 and 2012. However, the concentration decreased between the two events, and selenium naturally occurs in shale.

SWMU-12 Interim Corrective Measure

An Interim Corrective Measure (ICM) was conducted to minimize impacts of contaminated surface soil in the SWMU-12 transformer pad area through the installation of an asphalt cap. Initial arsenic concentrations ranged to 22 ppm, in excess of the industrial soil cleanup level of 16 ppm. Two locations exceeded the industrial SCO for mercury (5.7 ppm), with the maximum mercury level measured being 8.2 ppm. In November 2012, the area was

covered with a low permeability asphalt cap. This cap extended beyond the area of elevated metals and covered 3,070 square feet.

The SWMU-12 ICM successfully capped the area where surface soil samples exceeded the industrial SCOs. Since the cap is considered an engineering control, provisions to maintain it will be documented in the site management plan as part of the final corrective action for the site.

SWMU-14: North and East Site Perimeter Fence Area

The SWMU was identified to assess potential impacts from site air emissions and therefore focused on the shallow soil along the site perimeter. This area is undeveloped and is currently covered by shrub vegetation and grasses.

Surface and shallow sub-surface soil characterization activities completed during the RFI at SWMU-14 did not identify the presence of any compounds at concentrations greater than residential SCOs. Based on these results, no further action is required at this SWMU.

SWMU-16: Western Quarry Pond

The two quarry ponds are located in the western portion of the facility. The western quarry pond is approximately seven acres. The eastern quarry pond is approximately two-thirds of an acre. The Western Quarry Pond discharges to the Salt Kill through a regulated outfall. The Salt Kill is classified as a Class D surface water.

Water samples were collected during the RFI in the western pond. Although several compounds were detected at low levels, there are no standards for these compounds applicable to Class D water bodies. Therefore, no further action is required at this SWMU.

SWMU-17: Industrial Sewers / Hazardous Waste Feed Pipelines

In March 1993, Norlite began using a new Tank Farm facility that included the current aboveground fuel pipeline. Prior to this, fuel was supplied to the kilns via underground pipelines. Based on records reviewed during the RFI workplan development, there were three buried fuel lines and a vent line, presumed to be three inch diameter stainless steel. No surveyed drawings or plans showing the exact location and depth of the underground feed lines are available, but the approximate location of the former underground feed lines is shown on Figure 2.

Soil sampling was conducted in early 1993 in the area of the underground lines. Thirteen borings were installed and field-screened at two-foot intervals. Eleven samples were collected and analyzed for VOCs and total petroleum hydrocarbons. One sample contained total petroleum hydrocarbons (TPH) at 950 ppm; during the 2011 RFI, a monitoring well (SWMU-1 MW-8) was placed in the vicinity of this former sample location. The historic results for the chlorinated VOCs were compared to the NYSDEC Part 375 residential SCOs during development of the RFI workplan and all were less than the SCOs.

After this sampling event, correspondence from March and April 1993 indicates that two of these lines were flushed with No. 2 Fuel Oil, water, and compressed air, and that the vent line was purged

with an inert material and capped. Based on this information, and on discussions with current Norlite personnel, the disconnected buried fuel lines are still in-place at the facility.

While the source of the SWMU-1 groundwater contamination is not known, it is presumed to be associated with potential historic releases from these former underground feed lines. As stated above, the underground feed lines were flushed, capped, and left in-place. Historic laboratory results from soil samples collected in that area and 2011 soil results from the well placed as part of the RFI did not indicate any compounds were detected above residential SCOs. As such, no further action is required at this SWMU.

Nature and Extent of Contamination Summary:
Based on the RFI results, as described above, eight of the eleven SWMUs were designated as needing no further action. Two others, SWMU-4 and SWMU-12, were addressed by ICMs. These ten SWMUs require no further action with continued site management. The remaining SWMU, SWMU-1 Tank Storage Area, will be addressed in the corrective measures selection process.

## Groundwater

During the RFI, groundwater samples were collected from overburden and bedrock monitoring wells and were used to assess groundwater conditions on-site. The results indicate that there is contamination in the shallow groundwater in the area downgradient of the SWMU-1 area. The presence of these compounds may be related to the previous use of an underground fuel pipeline, which has been abandoned in-place. The compounds in question are fuel-oil related compounds and VOCs, primarily chlorinated compounds. Samples collected from bedrock wells were not contaminated.

**Table 1 - Groundwater**

| Detected Constituents | Concentration Range Detected (ppb)[a] | SCG[b] (ppb) | Frequency Exceeding SCG |
|---|---|---|---|
| **VOCs** | | | |
| 1,1 Dichloroethane | 8.7 - 49 | 5 | 11 of 62 |
| 1,2 Dichloroethane | 2.8 - 5.0 | 0.6 | 4 of 62 |
| cis-1,2 Dichloroethene | 9.9 - 30.3 | 5 | 6 of 62 |
| 1,2-Dichlorobenzene | 18 - 25.9 | 3 | 3 of 62 |
| 2-Butanone (MEK) | 60 | 50 | 1 of 62 |
| Acetone | 15 - 626 | 50 | 9 of 62 |
| Benzene | 1.7 - 17.2 | 1 | 4 of 62 |
| Chlorobenzene | 6.9 - 327 | 5 | 7 of 62 |
| Ethyl-Benzene | 5.5 - 155 | 5 | 5 of 62 |
| Isopropylbenzene | 10 | 5 | 1 of 62 |
| Methyl tert-butyl Ether | 7.1 - 230 | 10 | 7 of 38 |
| Trichloroethene | 6.1 - 8.7 | 5 | 3 of 62 |
| Vinyl chloride | 3.8 - 15 | 2 | 4 of 62 |
| Xylene | 9.1 - 98.4 | 5 | 4 of 62 |
| **SVOCs** | | | |

| Detected Constituents | Concentration Range Detected (ppb)[a] | SCG[b] (ppb) | Frequency Exceeding SCG |
|---|---|---|---|
| Naphthalene | 13.5 | 10 | 1 of 24 |
| Bis(2-Ethylhexyl)phthalate | 8.5 - 17.6 | 5 | 3 of 24 |
| **Inorganics** | | | |
| Iron | 2,040 - 2,680 | 300* | 2 of 4 |
| Magnesium | 60,700 - 64,800 | 35000 | 4 of 4 |
| Manganese | 1380 - 1660 | 300* | 4 of 4 |
| Sodium | 199,000 - 224,000 | 20,000 | 4 of 4 |
| Selenium | 8.3 - 18.5 | 10 | 5 of 28 |
| Thallium | 4.6 - 11.3 | 0.5 | 4 of 4 |
| **Pesticides/PCBs** | | | |
| 4,4'-DDD | 0.059 | 0.01 | 1 of 16 |
| Heptachlor epoxide | 0.06 | 0.03 | 1 of 16 |

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b- SCG: Standard Criteria or Guidance - Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1), 6 NYCRR Part 703, Surface water and Groundwater Quality Standards, and Part 5 of the New York State Sanitary Code (10 NYCRR Part 5).
* = the sum of these two compounds cannot exceed 300 ug/l

The primary groundwater contaminants are the thirteen VOCs listed in Table 1. These include compounds commonly associated with fuel oil (such as benzene compounds and methyl tert-butyl ether), and chlorinated compounds (such as the dichloroethane, dichloroethene and trichloroethene compounds) commonly used as solvents. The groundwater contamination is limited to one area of the shallow groundwater at the site, and is not migrating off-site.

The inorganic compounds (iron, magnesium, manganese, sodium) are commonly found in shallow groundwater in this region and are not considered site specific contaminants of concern. Selenium and thallium were detected in groundwater, but are not being addressed as part of the remedy. Both are naturally occurring trace elements in the shale mined by Norlite (at a concentration in shale of approximately 1 ppm). Selenium was initially identified in groundwater in 2011. Subsequent samples indicated that the concentrations dissolved in groundwater are within 1-2 ppb of the groundwater standards and have decreased since the 2011 sample event. The thallium values represent samples taken one month apart, concentrations decreased by half during that time, and the analytical data were qualified by the analytical lab. The thallium concentrations are believed to be naturally occurring.

Based on the findings of the RFI, past site operations have resulted in the contamination of groundwater. The site contaminants that are considered to be the primary contaminants of concern which will drive the remediation of groundwater to be addressed by the corrective measure selection process are listed in Table 1.

## Soil

The RFI completed in 2011 identified two areas on-site where soil contamination in excess of industrial soil cleanup objectives existed. It was addressed with the ICMs as described in Section 6. In one area, the soil containing arsenic was excavated and removed. At the second location, isolated areas of arsenic and mercury in excess of the industrial SCO were detected. These areas were placed under a low permeability asphalt cap.

The remaining site soil contamination is less than both the commercial and industrial soil cleanup objectives, though industrial soil cleanup objectives are shown in Table 2. The site is currently in operation as an industrial facility and is expected to remain in active use.

**Table 2 - Soil**

| Detected Constituents | Concentration Range Detected (ppm)[a] | Unrestricted SCG[b] (ppm) | Frequency Exceeding Unrestricted SCG | Restricted Use SCG[c,d] (ppm) | Frequency Exceeding Restricted SCG |
|---|---|---|---|---|---|
| **VOCs** | | | | | |
| Acetone | ND - 2.08 | 0.05 | 12/223 | 0.05 [d] | 12/223 |
| cis-1,2 Dichloroethene | ND - 0.844 | 0.25 | 1/223 | 0.25 [d] | 1/223 |
| Chlorobenzene | ND - 1.12 | 1.1 | 1/223 | 1.1 [d] | 1/223 |
| Ethyl Benzene | ND - 5.3 | 1.0 | 1/223 | 1.0 [d] | 1/223 |
| Methylene Chloride | ND - 0.187 | 0.05 | 3 /223 | 1000 | 1/223 |
| Toluene | ND - 2.79 | 0.7 | 1/223 | 1000 | 0 /223 |
| 1,1,1 Trichloroethane | ND - 0.752 | 0.68 | 1/223 | 1000 | 0 /223 |
| Trichloroethene | ND - 0.517 | 0.47 | 1/223 | 0.47 [d] | 1 /223 |
| Xylene | ND - 8.0 | 0.26 | 2/223 | 0.26 [d] | 2 /223 |
| **SVOCs** | | | | | |
| Pentachlorophenol | ND - 1.6 | 0.8 | 1/223 | 55 | 0/223 |
| **Metals** | | | | | |
| Arsenic | ND - 15.5 | 13 | 1 /228 | 16 | 0/228 |
| Cadmium | ND - 5.6 | 2.5 | 1/228 | 60 | 0/228 |
| Lead | ND - 254 | 63 | 4/228 | 3900 | 0/228 |
| Mercury | ND - 1.7 | 0.18 | 7/228 | 5.7 | 0/228 |
| **Pesticides/PCBs** | | | | | |
| 4,4 DDD | ND - 0.0052 | 0.0033 | 2 / 117 | 0.0033 [d] | 0/117 |
| 4,4 DDE | ND - 0.0102 | 0.0033 | 1 / 117 | 120 | 0/117 |

ND = non-detectable
a - ppm: parts per million, which is equivalent to milligrams per kilogram, mg/kg, in soil;
b - SCG: Part 375-6.8(a), Unrestricted Soil Cleanup Objectives.
c - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Industrial Use, unless otherwise noted.
d - SCG: Part 375-6.8(b), Restricted Use Soil Cleanup Objectives for the Protection of Groundwater.

Based on the findings of the RCRA Facility Investigation, past site operations have resulted in isolated areas of soil contamination. Since soils exceeding the industrial SCO were addressed through ICMs, no further remedies are presented in the corrective measures selection process for soils.

## Surface Water

Surface water contained in the West Quarry Pond was sampled during the RFI. The samples were collected to determine whether quarry operations were impacting the surface water. The West Quarry Pond discharges to the Salt Kill through an outfall that is regulated by NYSDEC's Division of Water.

**Table 3 - Surface Water**

| Detected Constituents | Concentration Range Detected (ppb)[a] | SCG[b] (ppb) | Frequency Exceeding SCG |
|---|---|---|---|
| **VOCs** | | | |
| None | Not Detected | | 0 of 5 |
| **SVOCs** | | | |
| Di-n-butyl Phthalate | 0.51 - 0.62 | 50 | 0 of 5 |
| Bis (2-ethylhexyl) Phthalate | Not Detected- 1.2 | 0.6 fish propagation | 0 of 5 |
| **Metals** | | | |
| Barium | 32.5-40.3 | 1000 | 0 of 5 |
| Selenium | 1.6 - 2.3 (total) | 4.6 (dissolved) | 0 of 5 |

a - ppb: parts per billion, which is equivalent to micrograms per liter, ug/L, in water.
b-SCG: Ambient Water Quality Standards and Guidance Values (TOGs 1.1.1) and 6 NYCRR Part 703: Surface Water and Groundwater Quality Standards.

The West Quarry Pond and the Salt Kill are classified as Class D surface waters. There are no standards for these compounds applicable to Class D water bodies. The SCGs shown are for Class C surface waters, and would be expected to be more stringent than standards for Class D. The results indicated no contaminants were noted.

No site-related surface water contamination of concern was identified during the RFI. Therefore, no corrective measures alternatives need to be evaluated for surface water.

## Soil Vapor

No soil vapor, sub-slab vapor or indoor air sampling was conducted at the site. Inhalation of site contaminants in indoor air due to soil vapor intrusion does not represent a concern for the site in its current condition. The office areas of the Norlite site are located in temporary structures (office trailers) that are not constructed on-grade. Additional buildings house machines and equipment and are not occupied on a routine basis. Groundwater sampling results at the site's perimeter indicate that soil vapor intrusion is not a concern for off-site buildings.

Therefore, no corrective measures need to be evaluated for soil vapor. However, the site management plan will include a provision for the evaluation of the potential for soil vapor intrusion for any buildings developed on the site, or any existing buildings that change use.

**Exhibit B**

## SUMMARY OF THE CLEANUP OBJECTIVES

The goal for the corrective measure program is to restore the facility to pre-disposal conditions to the extent feasible. At a minimum, the corrective measure(s) shall eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the facility through the proper application of scientific and engineering principles.

The established cleanup objectives for this facility are:

Soil: Part 375-6.8(b) Restricted Use Soil Cleanup Objectives for the Protection of Public Health for Industrial Use

Groundwater: NYS Groundwater Standards (6 NYCRR Part 700) Division of Water TOGS

## Exhibit C

## Description of Remedial Alternatives

The following alternatives were considered based on the cleanup objectives (see Exhibit B) to address the contaminated media identified at the facility as described in Exhibit A:

The detailed analysis of the alternatives is provided in the approved final Corrective Measures Study Report.

### Alternative 1: No Further Action

The No Further Action Alternative recognizes the remediation of the site completed by the ICMs described in Section 6. This alternative leaves the site in its present condition and does not provide any additional protection of the environment. This alternative would include no remedial measures or monitoring, and there are no costs associated with it. The No Further Action alternative is evaluated as a procedural requirement and as a basis for comparison, and was not considered further.

### Alternative 2: No Further Action with Site Management

The No Further Action with Site Management Alternative recognizes the remediation of the site completed by the ICM(s) described in Section 6, and Site Management, Institutional Controls and Engineering Controls are necessary to confirm the effectiveness of the ICMs. This alternative maintains engineering controls which were part of the ICMs and includes institutional controls, in the form of an environmental easement and site management plan, necessary to protect public health and the environment from contamination remaining at the site after the ICMs. Site management includes long-term, periodic groundwater sampling of the monitoring well network at Norlite.

The RAOs for the site can potentially be met by monitoring alone in a reasonable time period, based on observed concentrations of VOCs and the following conditions:

- Groundwater contamination is not migrating off the site;
- Groundwater at the site is not used for any purpose;
- Soil vapor intrusion does not represent a concern for the site in its current condition;
- There are no exposure pathways (inhalation, ingestion, direct contact) with the affected media.

No Further Action with Site Management will be considered further as a primary remedial alternative for the site.

*Present Worth:*.....*$97,000*
*Capital Cost:*.....*$25,000*
*Annual Costs:*.....*$9,000*

**Alternative 3: Source Removal**

While the source of the groundwater contamination at Norlite is unknown, it is presumed to be associated with the former underground fuel line (Figure 2).

Source removal involves the physical removal of targeted media (i.e., contaminated soil related to the feed line). Typical equipment used includes backhoes, draglines, clamshells, vacuum trucks, and front-end loaders. Soil sampling would confirm the removal of contaminants before backfilling. Excavation and removal of soil containing VOCs eliminates the potential for VOCs to leach from soil to groundwater.
Excavated material is typically characterized and disposed off-site at an approved waste management facility. Off-site transportation of wastes must comply with applicable federal and state shipping and manifesting regulations. Disposal cost depends on the amount of soil removed and the soil characteristics (hazardous or non-hazardous).

*Present Worth:.....$409,000*
*Capital Cost:.....$337,000*
*Annual Costs:.....$9,000*

**Alternative 4: In Situ Chemical Oxidation**

In-situ chemical oxidation (ISCO) has been used since the early 1990s to treat environmental contaminants in groundwater, soil, and sediment. Many of these projects have focused on the treatment of chlorinated solvents (e.g., trichloroethene and tetrachloroethene), although several projects have also used the process to treat petroleum compounds [(i.e., BTEX and methyl tertiary-butyl ether (MTBE)] and semi-volatile organic compounds such as polycyclic aromatic hydrocarbons (PAHs) and pesticides.

ISCO is defined as the delivery and distribution of oxidants and other amendments into the subsurface to transform contaminants of concern into innocuous end products such as carbon dioxide (CO2), water, and inorganic compounds. Injection locations can be either permanently installed wells or temporary injection points installed using direct-push methods. When oxidants come in contact with contaminants they are broken down into non-toxic components. However, contact between the oxidant and contaminant required to facilitate the reaction is the most important technical limitation of this technology, as it can be difficult to accomplish.

The most common oxidants utilized for ISCO are hydrogen peroxide (Fenton's reagent), potassium and sodium permanganate, and sodium persulfate. Based on a variety of factors described in the focused CMS, sodium persulfate is being considered as a potential oxidant for this site.

Sodium persulfate is a strong oxidant that is capable of oxidizing a wide range of contaminants, including chlorinated ethenes, phenols, MTBE, and low molecular weight PAHs. Sodium persulfate is supplied in an aqueous solution at concentrations up to 50 percent by weight. Because of its ability to oxidize a wide range of contaminants, including aromatics, it will be considered further as a potential ISCO remedial alternative.

*Present Worth:* ..... *$344,000*
*Capital Cost:* ..... *$272,000*
*Annual Costs:* ..... *$9,000*

**Exhibit D**

## Corrective Measure Alternative Costs

| Corrective Measure Alternative | Capital Cost ($) | Annual Costs ($) | Total Present Worth ($) |
|---|---|---|---|
| Alternative 1: No Action | 0 | 0 | 0 |
| Alternative 2: No Further Action with Site Management | 25,000 | 9,000 | 97,000 |
| Alternative3: Excavation of Contaminated Soil | 337,000 | 9,000 | 409,000 |
| Alternative 4: In-Situ Chemical Oxidation | 272,000 | 9,000 | 344,000 |

**Exhibit E**

## SUMMARY OF THE SELECTED FINAL CORRECTIVE MEASURE(S)

The Department is selecting Alternative 2, No Further Action with Site Management as the final corrective measure(s) for this facility. The elements of this alternative are described in Section 7. The selected final corrective measures are depicted in Figure 4.

### Basis for Selection

The selected final corrective measures are based on the results of the RFI, CMS, ICMs and the evaluation of alternatives. A summary of the corrective measures as they compare to the evaluation criteria provided below:

1. **Protection of Human Health and the Environment:** This criterion is an overall evaluation of each alternative's ability to protect public health and the environment.

The Norlite site is currently an active site and will continue to perform current operations. The groundwater contamination is limited to on-site areas. Although all of the soil remaining on-site does not meet unrestricted use criteria, the remaining soil contamination meets the commercial and industrial soil cleanup objective, and only two isolated locations, which are more than 10 feet below ground exceed residential soil cleanup standards.

The levels of groundwater contamination are very low and a monitoring well network is in place. This includes shallow and deep wells downgradient of the existing contaminated wells. Four sets of samples during the investigation process produced consistent results and the groundwater contamination was found to be stable. Three sets of shallow and deep wells along the property boundary can be used to monitor and confirm that migration of contaminated groundwater is not occurring.

Alternative 1 provides no monitoring of groundwater conditions or documentation of remaining site soil contamination and therefore is not protective. Alternative 1 has been eliminated from further consideration. Alternative 2 monitors the groundwater conditions which are not impacting public health or the environment, and ensures that future site use does not create a potential exposure pathway. Alternative 3 is protective as it requires excavation of the suspected contaminant source area. Alternative 4 treats the remaining groundwater contamination in-place and therefore is protective.

2. **Achieve Cleanup Objectives for the Contaminated Media:** This criterion evaluates the ability of alternatives to achieve the cleanup objectives established for the facility.

Alternative 2 will document the progress of VOC reduction through natural attenuation to concentrations less than standards, criteria and guidance values (SCGs). Since there are no groundwater receptors, this alternative is protective of the environment. Alternatives 3 and 4 are

in compliance with SCGs because there would be a reduction of VOC concentrations within the excavation or treatment area and through active in-situ treatment.

3. **Remediate the Sources of Releases:** This criterion evaluates the ability of the alternatives to reduce or eliminate to the maximum extent possible further releases.

During the investigation, no distinct source of releases was identified. The likely source of the releases appears to be related to former underground fuel lines that remain in place near the tank farm, though no drawings of pipeline locations were located. Alternative 2 does not address this potential source of the releases. Alternative 3 requires excavation of the general area near the fuel lines. This could potentially remove source material, (if found) but might also result in no further identification of contaminated soil. Alternative 4 treats existing groundwater contamination and does not reduce further releases.

4. **Comply with Standards for Management of Wastes:** This criterion evaluates how alternatives assure that management of wastes during corrective measures is conducted in a protective manner.

Alternatives 2 and 4 generate waste consisting of contaminated groundwater and personal protective equipment during future monitoring events. Alternative 4 also generates soil waste during drilling of injection points for chemical treatment. Alternative 3 generates a higher quantity of excavated materials, though it is unknown whether those materials would be classified as hazardous or whether they could be re-used to backfill the excavation after removal of underground fuel lines. In all alternatives, Norlite has the personnel knowledge and the storage capacity to manage the wastes produced in accordance with applicable regulations.

The next five selection criteria are used to compare the positive and negative aspects of each of the remedial alternatives.

5. **Long-term effectiveness and permanence**: This criterion evaluates the long-term effectiveness of the alternatives after implementation. If wastes or treated residuals remain on-site after the selected alternative has been implemented, the following items are evaluated: 1) the magnitude of the remaining risks, 2) the adequacy of the engineering and/or institutional controls intended to limit the risk, and 3) the reliability of these controls.

Alternative 2 is effective in the long-term, since there is no continuing release of materials from current site operations and the concentrations of contamination in groundwater will continue to decrease through natural processes. The extended time needed for Alternative 2 is acceptable, since Norlite plans to operate the site indefinitely, based on the supply of shale in the quarry area. Alternatives 3 and 4 are expected to be more effective in the long-term, although these alternatives may not fully remove all groundwater contamination.

In addition, Alternative 2 is acceptable because the groundwater at the site presents low risk; it is not migrating off-site and is not used on-site. The site management plan, including monitoring

groundwater, restricting future site use to industrial purposes and maintaining the asphalt cap over the surface soil contaminants are effective methods to minimize the risks presented by the remaining site contamination. Furthermore, an institutional control can require evaluation of future additional source removal if future site demolition makes that area available.

6. **Reduction of toxicity, mobility and volume:** Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the facility.

As described above, Alternatives 3 and 4 would be expected to be best at reducing the volume of wastes remaining at the site. However, groundwater contamination may not be fully addressed by removal of contaminated soil (Alternative 3) and the low levels of groundwater contamination would be difficult to reliably treat with in-situ chemical oxidation (Alternative 4). Alternative 2 allows the mobility of the low level groundwater contamination to be monitored.

7. **Short-term impacts and effectiveness:** The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the cleanup objectives is also estimated and compared against the other alternatives.

Alternative 2 is not effective in the short-term in reducing many of the groundwater concentrations to less than CAOs. In Alternative 3, groundwater concentrations are expected to be reduced more quickly than Alternative 2, if source material is encountered and removed. However, based on the RFI sampling, no source areas were located that could be easily targeted in Alternative 3. Alternative 4 would be effective in the short-term since ISCO treatment oxidizes VOCs almost immediately upon contact. However, ISCO is not effective at treating groundwater upgradient and downgradient of the ISCO injection locations. Groundwater contamination at this site is below 100 ppb for 10 of the 14 compounds for which ISCO is suggested. Generally, ISCO is used to treat VOC contamination at higher initial concentrations that those found at this site. Implementation and initial operation of this alternative do involve storing and mixing of chemicals on-site, but are not expected to pose significant risk to the community.

8. **Implementability**: The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction of the remedy and the ability to monitor its effectiveness. For administrative feasibility, the availability of the necessary personnel and materials is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, institutional controls, and so forth.

Since the monitoring well network is in place, the process to implement long-term monitoring (Alternative 2) is straightforward. Alternative 3 is precluded by site structures that prevent removal of most if not all suspected source material and Alternative 4 requires installation of additional injection points in the area of groundwater contamination and access to install these points is limited. Otherwise, Alternative 4 is a using readily available technology and is considered easy to implement. However, the success of the treatment would be dependent on the degree to which the

oxidant solution is able to come into contact with the contaminants and the number of injections required.

9. **Cost Effectiveness:** Capital costs and annual operation, maintenance, and monitoring costs are estimated for each alternative and compared on a present worth basis. Although cost-effectiveness is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the other criteria, it can be used as the basis for the final decision.

Alternative 2 is the least expensive alternative. There is an upfront cost associated with development of the site management and monitoring plan, and the monitoring costs are spread over a number of years. Alternatives 3 and 4 have greater capital costs than Alternative 2, but are expected to require less long term monitoring, although short term monitoring is necessary for Alternative 4.

# APPENDIX A

## Responsiveness Summary

# RESPONSIVENESS SUMMARY

Norlite Corporation
Cohoes, Albany County
NYD080469935 / Site No.401041

The Statement of Basis (SB) for the Norlite site was prepared by the New York State Department of Environmental Conservation (the Department) in consultation with the New York State Department of Health (NYSDOH) and was placed in the document repositories on June 25, 2014.

This responsiveness summary responds to all questions and comments related to the Statement of Basis that were raised during the public comment period, which ran from June 25, 2014 to October 6, 2014. A public availability session was held on August 5, 2014. There were no questions specifically related to the Statement of Basis. The following are the written comments received, with the Department's responses:

Note: The comments listed here were contained in documents that provided comments on both the Operating Permit and the Statement of Basis. At the time of permit issuance, a full responsiveness summary including all of the comments (approximately 158) will be released. For ease of use, only the comments related to the Statement of Basis are addressed here. The corresponding permit comment number (pc #) is listed for information only.

***Citizen's Environmental Coalition, Clean and Healthy New York, Communities Concerned about NL Industries, Empire State Consumer Project, New York Public Interest Research Group, People of Albany United for Safe Energy, and United Neighbors Concerned about GE Dewey Loeffel Landfill submitted a letter dated October 6, 2014, which included the following comments related to the Statement of Basis:***

Comment 1 (pc 145): The Remediation Objectives in this investigation were seriously flawed in not including inhalation of dust and particulate as an important human health threat for this site.

Not only has fugitive dust control been an obvious and major issue at this site, but ATSDR has noted its significance to human health in its 2005 health assessment "Analyses of shale and clinker (raw materials and product) indicate that fugitive particulates from the processing of these materials may expose nearby residents to particulate concentrations that could cause health effects. However, existing data are insufficient to give a clear answer; therefore, ATSDR recommends air sampling at the fence-line or in residential areas under conditions likely to produce maximum fugitive emissions. Dust control is extremely important at Norlite because their processing equipment creates dust." p. 1, (ATSDR Human Health Assessment 2005).

Missing a major health objective alone is so egregious as to require a thorough review including additional investigation. No one with any health background would choose soil vapor and eliminate dust as a major pathway of exposure at Norlite.

Response 1: The Remedial Action Objectives address the protection of public health and the environment from contaminated environmental media (groundwater, soil, surface water, sediment and soil vapor). The Department, in consultation with NYS Department of Health, evaluated all exposure pathways and no complete exposure pathways were found. Naturally occurring components of site soils, such as shale, are not addressed by the RAOs or the corrective action process.

During the RFI, samples were taken at SWMU 14 along the northeast property boundary to assess potential impacts from site air emissions. Soil samples were analyzed in each of ten locations at two intervals: shallow 0-6", and from 6" to 36". The soil samples were analyzed for volatile organic compounds, semi-volatile organic compounds, and metals. No results were above the applicable NYCRR Part 375-6.8 Soil Cleanup Objectives for residential use. Based on these results, no further action was determined necessary in this area.

Comment 2 (pc 146): Particularly toxic and bioaccumulative chemicals were not included in the testing for this investigation. No testing was apparently done for dioxins, furans and PAHs in soil or baghouse dust. These are the likely outcomes of failure to operate the incinerators in continuous compliance with permit conditions that Norlite has been repeatedly cited for. This means that it is likely that these chemicals would be found in soil and baghouse dust and the investigation should have tested for them. In addition shale contains radioactive elements and these should also be tested - uranium, radium, radon, polonium.

Response 2: Baghouse dust is used by Norlite as a raw material in its Block Mix and is sampled and analyzed periodically for the compounds noted. PAHs (poly-nuclear aromatic hydrocarbons) are semi-volatile organic compounds (SVOCs) and were tested in soil samples using USEPA method 8270.

Naturally-occurring radioactivity in shale was not evaluated since it is not regulated by or subject to the RCRA Corrective Action process.

Comment 3 (pc 147): There were 17 identified Solid Waste Management Units (SWMUs). Six of these were dismissed by DEC based on information provided prior to the 2007 hazardous waste permit issuance. SWMU-2 (Kiln Supply Pump House), SWMU-3 (Incinerator Energy Recovery Units), SWMU-6

(Filter/Tank Sludge Storage areas), SWMU-10 (Shale Fine Leachate Pond), SWMU-13 (Salt Kill Creek) and SWMU-15 (Maintenance Garage).

1. There is no further information about these 6 SWMUs: the quality and quantity of information, testing and sampling and who provided the information. The nature and description of these units certainly provides no assurance that there is no contamination with hazardous substances. In addition, Norlite was cited for unauthorized pumping of wastewater into the Salt Kill Creek in the 2010 consent order. If this was actually a common practice, sediment testing is needed.

2. Was there a previous opportunity for the public to review the plans for an RFI that deleted these 6 units from any investigation? If there was no previous opportunity for the public to review this decision, all the information about these 6 units should have been provided in the Statement of Basis.

Response 3: These six units were evaluated during the facility assessment and preliminary review process, beginning in the late 1980's and continuing through the development of the RFI workplan in 2009. Based on those evaluations, there was no evidence of releases from any of these units. As a result, no further investigation was required.

These units were also listed in the previous hazardous waste permit, and designated No Further Action. The public was afforded the opportunity to comment on this designation prior to issuance of the last hazardous waste permit in 2007 and no comments or concerns were raised.

Comment 4 (pc 148): Of the remaining 11 SWMUs, two received Interim Control Measures, ICMs and DEC is telling us that eight need no further action. One SWMU will be addressed with groundwater monitoring—SWMU-1 (Tank Storage Area), which includes fuel processing buildings, an above ground tank farm and underground storage and equalization tanks.

1. SWMU-1 (Tank Storage area). There is an assumption here that old underground feed lines resulted in the contamination found in this area. This could be a dangerous assumption if current tanks or equipment are leaking. There is no presentation of the age and integrity of the containment for all the tanks in this area, the piping and ancillary equipment. Preventing leaks should be the first priority, not just monitoring the groundwater for worsening contamination.

Response 4: NYSDEC agrees that preventing leaks should come before monitoring

groundwater for contamination. Existing equipment is not believed to be responsible for the groundwater contamination based on several factors, including the relatively low levels of groundwater contamination, and the current regulatory requirements for existing tanks, to include monitoring, inspecting, and secondary containment. None of the Department inspection reports have indicated that any of the active tank systems are leaking. Module IV of the hazardous waste permit addresses storage of waste in tanks, including inspection and testing requirements. Petroleum tanks that store petroleum products and non-hazardous waste are also subject to inspection and testing requirements.

Comment 5 (pc 149): The location of the landfill used for piles of baghouse dust should be identified and investigated. "All baghouse dust piles present at the time of the plant's acquisition by American Nukem in 1991 were placed in an onsite solid waste landfill. "p. 22 Fugitive Dust Plan, Sci-Tech, 1995 Rev1.

Response 5: The on-site solid waste landfill was granted a permit in 1991 by the Department. Prior to its construction, the material intended to be placed in the landfill was tested and found to be non-hazardous. The landfill was closed in accordance with a Department-approved plan in 1995 and post-closure monitoring of the landfill was conducted for five years (through the year 2000). Since the activities associated with the landfill were performed under Department oversight and review, there was no need to re-evaluate the landfill.

Groundwater flow direction is to the east-southeast. Four wells on the east side of the landfill were sampled for VOCs as part of the supplemental RFI work and did not contain VOCs above groundwater standards, supporting that the landfill is serving to contain the wastes therein.

Comment 6 (pc 150): One of the ICMs was the removal of tons of soil from SWMU-4- Surface Impoundment.
What was this surface impoundment used for in the past? Is there another impoundment operating today? If Norlite is no longer using an impoundment, what is Norlite now using as a replacement for this facility? Is there a plan to deal with these high arsenic levels at the new facility?

Response 6: The purpose of the site investigation is to determine the nature and extent of existing contamination at the site. Based on these findings, cleanup alternatives can be evaluated and where appropriate, ICM(s) can be implemented.

The area known as SWMU 4 was formerly used by Norlite as a surface impoundment and dewatering area for wastewater from the air pollution

control equipment. Use of this surface impoundment was discontinued in 1990, when a dry air pollution control system was installed. All shale fines and air pollution residue was excavated and removed from the surface impoundment and sampling occurred after the area ceased to be used. During the RFI in 2010, samples were collected in the former footprint of this surface impoundment to determine if prior excavations had removed all remaining contamination.

The current unrestricted soil cleanup objective (SCO) for arsenic is 13 parts per million (ppm). The current industrial SCO for arsenic in soil is 16 ppm. The 2010 sampling showed that arsenic levels in the footprint of the former surface impoundment were above the 16 ppm SCO (the highest value was 39.2 ppm) so, as an ICM, these soils were required to be removed. As part of the excavation process, Norlite sampled to confirm that remaining soils met the 16 ppm limit. The excavation and removal process continued until the side and bottom samples in the excavation were below 16 ppm. A total of 477 tons of soil (17 truckloads) were removed from the excavation area and disposed off-site.

The waste from the current air pollution control equipment is managed in accordance with NYS requirements. There is no replacement surface impoundment.

Comment 7 (pc 151): Planned Corrective Measures: DEC is proposing Alternative #2- No further action with Site Management including engineering and institutional controls.

Finally, we recommend several public meetings, with sufficient advance notice so that the public can meaningfully participate, asking questions in order to make recommendations.

Decisions about Corrective measures should not occur until the public is allowed to engage in the process.

Response 7: The draft Statement of Basis outlining the proposed corrective measures was made available for review and comment beginning on June 25, 2014. A minimum of 45 days for public comment is required by the regulations. At the request of Citizen's Environmental Coalition, the comment period was extended to October 6, 2014 allowing a total of 103 days for public comment. Further, a presentation on a lap-top computer explaining the Statement of Basis was available during the public availability session on August 5, 2014 at which time staff were also on hand to answer questions regarding the Remedial Facility Investigation and proposed

Corrective Measures. Comments related to the draft Statement of Basis were received in a letter on October 6, 2014 signed by the Citizens' Environmental Coalition (CEC).

Based on technical evaluation of data collected in accordance with the applicable statute and regulations, the Department has selected the final corrective measures for the site. NYSDOH has also reviewed and concurred with the proposal. The Department's final decision regarding corrective measures considers public input and all comments provided. Comments related to ongoing site operations are not within the scope of the corrective action process and have not been included in this response to comments. These comments will be addressed, as appropriate, by the permit response to comments. The final corrective measure for the site addresses the groundwater contamination and imposes restrictions on future use of the property.

# APPENDIX B

# ADMINISTRATIVE RECORD

# Administrative Record

## Norlite Corporation
## Cohoes, Albany County
## NYD080469935 / Site No.401041

## February 2015

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**Documents**


EBI Consulting. 2011. RCRA Facility Investigation Report, Norlite Corporation, Cohoes, New York. October 28, 2011.

Malcolm Pirnie, Inc. 2009. Final RCRA Facility Investigation Work Plan, Norlite Corporation, Cohoes, New York. July 2009.

ARCADIS-US, 2013. Supplemental RCRA Facility Investigation Report, Norlite Corporation, Cohoes, New York, January 2013.

ARCADIS-US, 2013. Supplemental RCRA Facility Investigation Letter Report, Additional Activities and Groundwater Sampling Report, Norlite Corporation, Cohoes, New York, August 2013.

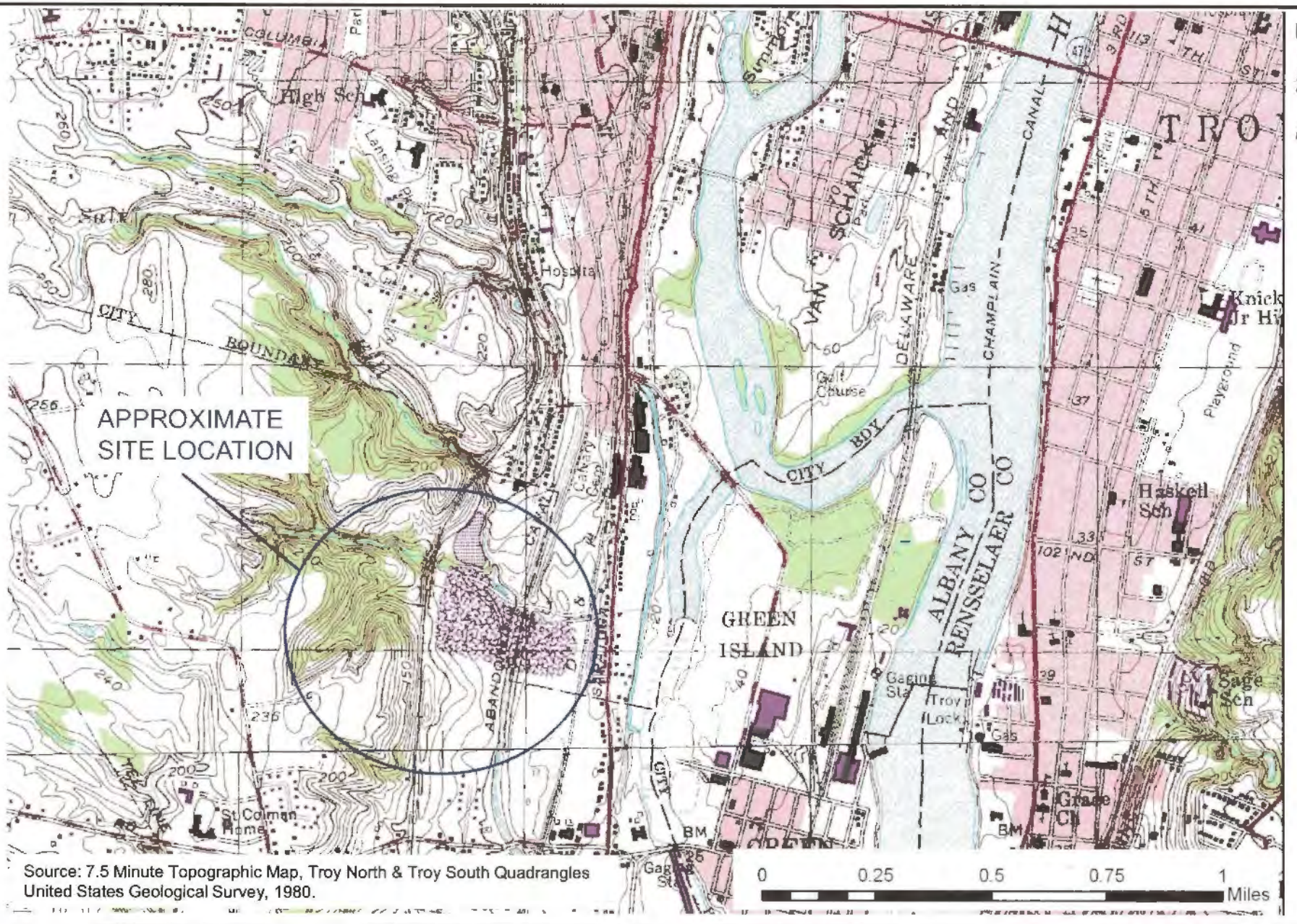
ARCADIS-US, 2013. Interim Corrective Measures completion Report, SWMU 4 Soil Area Norlite Corporation, Cohoes, New York, March 2013.

ARCADIS-US, 2013. Interim Corrective Measures completion Report, SWMU 12 Soil Area, Norlite Corporation, Cohoes, New York, April 2013.

ARCADIS-US, 2013. Focused Corrective Measure Study Report, Norlite Corporation, Cohoes, New York, November 2013.

Letter dated August 14, 2014 submitted by Barbara Warren, Citizens' Environmental Coalition,

Letter dated October 6, 2014 submitted by Citizens' Environmental Coalition, Clean and Healthy New York, Communities Concerned about NL Industries, Empire State Consumer Project, New York Public Interest Research Group, People of Albany United for Safe Energy, and United Neighbors Concerned about GE Dewey Loeffel Landfill and signed by Barbara Warren, Citizens' Environmental Coalition




Source: 7.5 Minute Topographic Map, Troy North & Troy South Quadrangles
United States Geological Survey, 1980.

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| | | | |
|---|---|---|---|
| ARCADIS | NORLITE CORPORATION<br>CORRECTIVE MEASURES STUDY | **SITE LOCATION** | AUGUST 2013<br>FIGURE 1 |

Notes:
Basemap image: New York State GIS Clearinghouse Orthoimagery, 2011.

0 120 240 480 720 960 Feet

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ARCADIS

NORLITE CORPORATION
COHOES, NEW YORK

CORRECTIVE MEASURES STUDY

**SOLID WASTE MANAGEMENT UNITS (SMWUs)**

ARCADIS-US, INC

AUGUST 2013
FIGURE 2

Legend

Wells highlighted with yellow contained concentrations of VOCs that exceeded NYSDEC GA Standards.

Monitoring Well: Bedrock, Damaged, Destroyed, Overburden

0 30 60 120 180 240 Feet

Source: Basemap image - New York State GIS Clearinghouse Orthoimagery, 2011.

ARCADIS

NORLITE CORPORATION
COHOES, NEW YORK

CORRECTIVE MEASURES STUDY

AREAS OF CONCERN
SWMUs 1,7, and 8

ARCADIS-US, INC

AUGUST 2013
FIGURE 3

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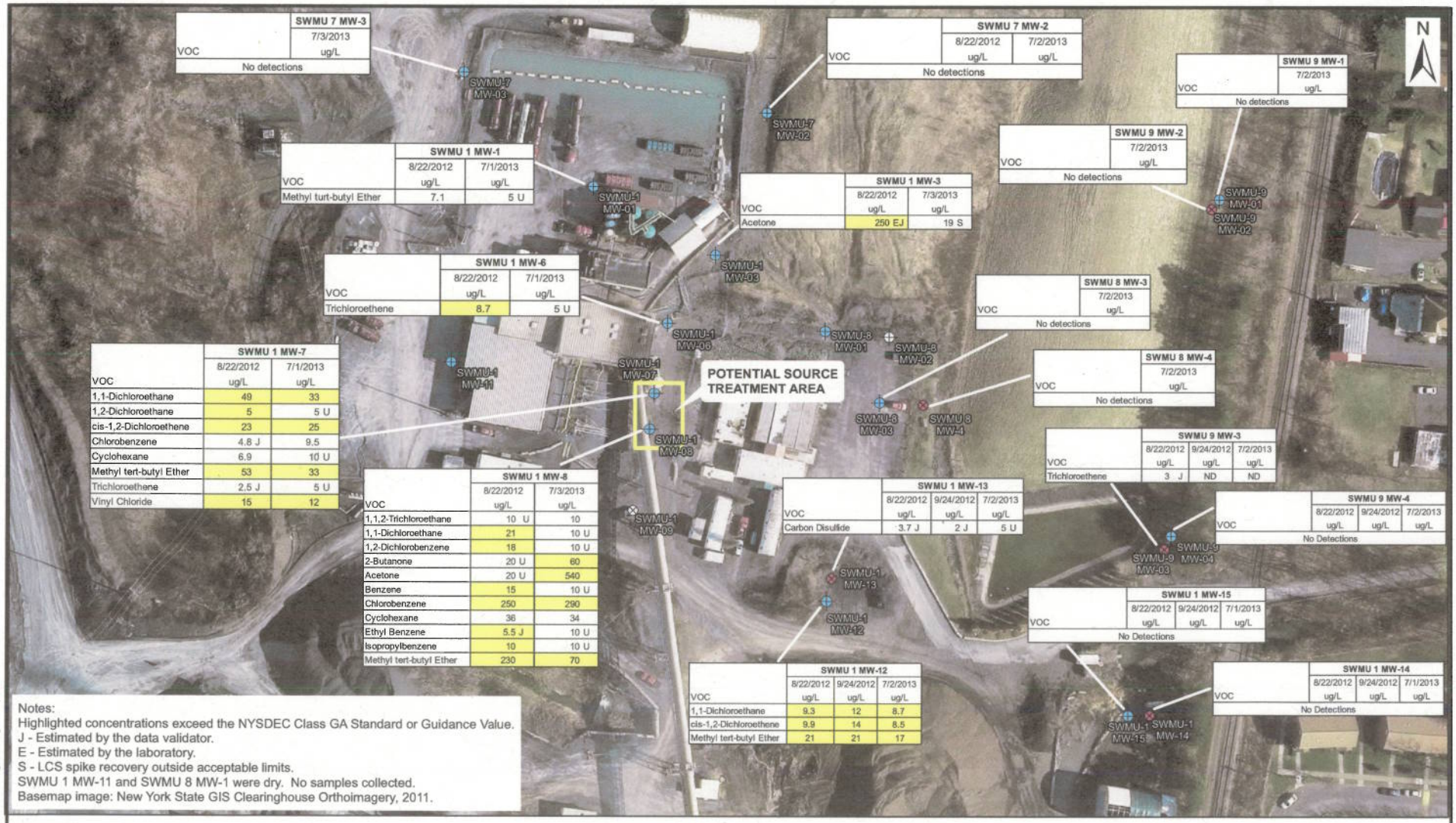


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ARCADIS

NORLITE CORPORATION
COHOES, NEW YORK

CORRECTIVE MEASURES STUDY

**SUMMARY OF GROUNDWATER VOC DETECTIONS AND POTENTIAL SOURCE TREATMENT AREA SWMUs 1, 7, 8, 9**

Figure 4