Division of Environmental Remediation

Record of Decision
Photocircuits Corporation
Operable Unit No. 1
City of Glen Cove, Nassau County, New York
Site Number 130009

March 2008

New York State Department of Environmental Conservation
DAVID A. PATERSON, *Governor* ALEXANDER B. GRANNIS, *Commissioner*

DECLARATION STATEMENT - RECORD OF DECISION

Photocircuits Corporation Inactive Hazardous Waste Disposal Site
Operable Unit No. 1
City of Glen Cove, Nassau County, New York
Site No. 130009

Statement of Purpose and Basis

The Record of Decision (ROD) presents the selected remedy for Operable Unit No. 1 of the Photocircuits Corporation site, a Class 2 inactive hazardous waste disposal site. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

This decision is based on the Administrative Record of the New York State Department of Environmental Conservation (the Department) for Operable Unit No. 1 of the Photocircuits Corporation inactive hazardous waste disposal site, and the public's input to the Proposed Remedial Action Plan (PRAP) presented by the Department. A listing of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

Assessment of the Site

Actual or threatened releases of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, present a current or potential significant threat to public health and/or the environment.

Description of Selected Remedy

Based on the results of the Remedial Investigation and Feasibility Study (RI/FS) for the Photocircuits Corporation site and the criteria identified for evaluation of alternatives, the Department has selected bioremediation with additional injection points coupled with a downgradient air sparging curtain. The components of the remedy are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program, including the installation of at least one air sparging curtain well for the purpose of determining the radius of influence. Based upon the data collected from that well, the remainder of the air sparging curtain will be installed, and operated until the remedial goals are attained, or the Department determines that it is no longer effective to operate.

2. One substrate injection event, utilizing approximately 20 injection points covering the drum storage/tank farm area and the adjacent area immediately to the south will be conducted. Additional injection events will be carried out as required over a period of up to 5 years.

3. Continued groundwater monitoring at locations established during the bioremediation pilot study, at a minimum of two additional points located south of the pilot study area, and at a minimum of two downgradient points. Groundwater will be monitored for VOCs, dissolved oxygen, organic content and methane at a minimum. Additional groundwater monitoring well installations or contingent soil vapor extraction may be required based upon results.

4. Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to commercial use, which will also permit industrial use; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

5. Development of a site management plan which will include the following institutional and engineering controls: (a) continued evaluation of the potential for vapor intrusion for any buildings developed or existing buildings re-occupied on the site, including provision for mitigation of any impacts identified both on-site and off-site; (b) monitoring of groundwater; (c) identification of any use restrictions on the site; and (d) provisions for the continued proper operation and maintenance of the components of the remedy.

6. The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

7. The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

New York State Department of Health Acceptance

The New York State Department of Health (NYSDOH) concurs that the remedy selected for this site is protective of human health.

Declaration

The selected remedy is 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.

MAR 31 2008

Date

Dale A. Desnoyers, Director
Division of Environmental Remediation

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RECORD OF DECISION

Photocircuits Corporation
Operable Unit No. 1
City of Glen Cove, Nassau County, New York
Site No. 130009
March 2008

SECTION 1: SUMMARY AND PURPOSE OF THE RECORD OF DECISION

The New York State Department of Environmental Conservation (the Department), in consultation with the New York State Department of Health (NYSDOH), has selected a remedy for the Photocircuits Corporation site, Operable Unit No. 1; on-site soils and groundwater to a depth of approximately 100 feet (ft) below ground surface (bgs). The remaining operable unit for this site is Operable Unit No. 2, which addresses deep groundwater on-site and downgradient for the Photocircuits Corporation site and for the Pall site (Site No. 130053B). The presence of hazardous waste has created significant threats to human health and/or the environment that are addressed by this remedy. As more fully described in Sections 3 and 5 of this document, the manufacture of printed circuit boards and related activities have resulted in the disposal of hazardous wastes, including volatile organic compounds. These wastes have contaminated the soils and groundwater at the site, and have resulted in:

- a significant threat to human health associated with contravention of groundwater standards in a sole source aquifer.

- a significant environmental threat associated with current impacts of contaminants to a sole source aquifer.

To eliminate or mitigate these threats, the Department has selected bioremediation with additional injection points coupled with a downgradient air sparging curtain.

The selected remedy, discussed in detail in Section 8, is intended to attain the remediation goals identified for this site in Section 6. The remedy must conform with officially promulgated standards and criteria that are directly applicable, or that are relevant and appropriate. The selection of a remedy must also take into consideration guidance, as appropriate. Standards, criteria and guidance are hereafter called SCGs.

SECTION 2: SITE LOCATION AND DESCRIPTION

The Photocircuits Corporation site is located in the City of Glen Cove, in Nassau County. Figure 1 shows the site location. The site is approximately 5 acres in areal extent. The site address is 31

Sea Cliff Avenue, Glen Cove, NY. The site is bounded by Sea Cliff Avenue to the north, the Pass and Seymour site (Site No. 130053A) to the west, the Glen Head Country Club to the south, and the Glen Cove arterial highway to the east. The Pall Corporation site (Site No. 130053B) is located across Sea Cliff Avenue to the north. The site is located in an urban/industrial area of Nassau County. The Glen Cove Creek flows along the west side of the site. The main site features are several industrial buildings. Most of the site is paved. Photocircuits Corporation is one of several properties that comprise the Sea Cliff Avenue Industrial Area. Figure 2 shows the site.

The Photocircuits Corporation site is underlain by the following sequences, in descending order: the Upper Glacial Aquifer, the Port Washington confining unit, the Port Washington aquifer, the Lloyd Aquifer, and bedrock. The Upper Glacial aquifer is composed of stratified beds of fine to coarse sand and gravel with some interbedded lenses of silt and clay and extends to a depth of approximately 200 ft bgs. The Port Washington confining unit, which extends approximately 100 ft below the Upper Glacial aquifer, consists of silt and clay with some interbedded sand and gravel lenses. The Port Washington aquifer is composed of sand and gravel with variable amounts of interbedded clay and silt, and is approximately 50 ft thick. The Lloyd aquifer, which is approximately 200 ft thick, consists of discontinuous layers of gravel, sand, sandy clay, silt, and clay. It roughly parallels the crystalline bedrock, which is present at a depth of approximately 550 ft bgs. Groundwater is present at 4 to 10 ft bgs. Groundwater flow is generally to the north northwest. See Figure 3.

Operable Unit No. 1, which is the subject of this document, consists of on-site soil and groundwater to a depth of approximately 100 ft bgs. An operable unit represents a portion of the site remedy that for technical or administrative reasons can be addressed separately to eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. The remaining operable unit for this site is: Operable Unit No. 2, which addresses deep groundwater on-site and downgradient for the Photocircuits Corporation site and for the Pall site (Site No. 130053B). The remedial investigation for Operable Unit No. 2 is underway.

SECTION 3: SITE HISTORY

3.1: Operational/Disposal History

The property was formerly owned by Powers Chemco (1954-1971) & Kollmorgen Corporation (1971-1986). Photocircuits Corporation has occupied the site from 1986 to present. Kollmorgen and Photocircuits manufactured printed circuit boards. Past investigations of this area have documented high concentrations of chlorinated organics in the groundwater underlying the site. To identify the source of these contaminants, a Preliminary Site Assessment (PSA) was conducted by the Nassau County Department of Public Works (NCDPW) through a Municipal Delegation Agreement with the NYSDEC. The investigation relied largely on compilation and interpretation of existing raw data. The PSA report noted the presence of volatile organic compounds (VOCs), particularly 1,1,1-trichloroethane (1,1,1-TCA), in the soil and groundwater associated with these premises, and identified Photocircuits as a source of methylene chloride, 1,1,1-TCA and tetrachloroethene. The highest concentrations are found in a drum storage and tank farm area near the northeast corner of the property. Apparently, leaking drums and/or tanks have contaminated the

soils and the aquifer in this area. The concentration in the aquifer is also well above the applicable Part 703 Groundwater Standard, and is thereby presenting a significant threat to the environment.

3.2: Remedial History

In February of 1995, the Department listed the site as a Class 2 site in the Registry of Inactive Hazardous Waste Disposal Sites in New York. A Class 2 site is a site where hazardous waste presents a significant threat to the public health or the environment and action is required. The decision to list the site in the Registry was made, in part, on the basis of the March 1994 Preliminary Site Assessment for the Sea Cliff Industrial Area, which reported VOCs in groundwater above standards at the Photocircuits site.

Prior to the Focused Remedial Investigation (FRI), a Source Area Investigation for the Sea Cliff Avenue Industrial Area was performed in 1992 and a Preliminary Site Investigation (PSI) was conducted on-site during August of 1996. The field activities and findings of these investigations are described in the Source Area Investigation report, dated September 1992, and the Results of the Preliminary Site Investigation report, dated November 1996. These reports identified the drum storage and tank farm areas located to the east of the Photocircuits' main building as the primary areas of concern at the site (see Figure 3).

SECTION 4: ENFORCEMENT STATUS

Potentially Responsible Parties (PRPs) are those who may be legally liable for contamination at a site. This may include past or present owners and operators, waste generators, and haulers.

The Department and the Photocircuits Corporation entered into a Consent Order (Index No. W1-0713-94-12) on March 31, 1997. The Order obligates the responsible party to implement a Focused Remedial Investigation/Focused Feasibility Study (FRI/FFS) remedial program. After the remedy is selected, the Department will approach the PRPs to implement the selected remedy under an Order on Consent.

SECTION 5: SITE CONTAMINATION

A Focused Remedial Investigation/Focused Feasibility Study (FRI/FFS) has been conducted to evaluate the alternatives for addressing the significant threats to human health and the environment.

5.1: Summary of the Focused Remedial Investigation

The purpose of the FRI was to define the nature and extent of any contamination resulting from previous activities at the site. The FRI was conducted between April and September of 1998. The field activities and findings of the investigation are described in the FRI report.

The Focused Remedial Investigation was conducted from April 1998 to September 1998 and included the following tasks:

- Soil and groundwater sampling using a Geoprobe® to delineate impacts detected during the PSI in the tank farm and drum storage areas

- Sampling of monitoring wells on the site

- Slug testing of monitoring wells on the site

Additional groundwater sampling was carried out at the site in conjunction with the SVE IRM and the Bioremediation Pilot study. The information acquired is contained in the Quarterly Progress Reports for the Photocircuits site for 2000 to 2004.

5.1.1: Standards, Criteria, and Guidance (SCGs)

To determine whether the on-site soils and groundwater contain contamination at levels of concern, data from the investigation were compared to the following SCGs:

- Groundwater, drinking water, and surface water SCGs are based on the Department's "Ambient Water Quality Standards and Guidance Values" and Part 5 of the New York State Sanitary Code.

- Soil SCGs are based on the Department's Cleanup Objectives ("Technical and Administrative Guidance Memorandum [TAGM] 4046; Determination of Soil Cleanup Objectives and Cleanup Levels.") and 6 NYCRR Subpart 375.6 - Remedial Program Soil Cleanup Objectives

Based on the FRI results, in comparison to the SCGs and potential public health and environmental exposure routes, certain media and areas of the site require remediation. These are summarized in Section 5.1.2. More complete information can be found in the FRI report.

5.1.2: Nature and Extent of Contamination

This section describes the findings of the investigation for all environmental media that were investigated.

As described in the FRI report, many soil and groundwater samples were collected to characterize the nature and extent of contamination. As seen in Figure 3 and summarized in Table 1 and Table 2, the main categories of contaminants that exceed their SCGs are volatile organic compounds (VOCs).

Chemical concentrations are reported in parts per billion (ppb) for water and parts per million (ppm) for soil.

Table 1 summarizes the degree of contamination for the contaminants of concern in groundwater and compares the data with the SCGs for the site. The following are the media which were investigated and a summary of the findings of the investigation.

Subsurface Soil

The August 1996 PSI report indicated the presence of VOCs at five locations on the Photocircuits site, with the highest concentrations being found in the drum storage and tank farm areas. For the FRI, soil samples were collected at six locations on the Photocircuits site. Total VOC concentrations ranged from non-detect to 48 ppm. Tetrachloroethene (PCE) and trichloroethene (TCE) were the VOCs most frequently detected. Concentrations of individual VOC contaminants in soils did not exceed Department soil cleanup objectives (see Figure 3).

No site-related subsurface soil contamination of concern was identified during the FRI/FFS. Therefore, no remedial alternatives need to be evaluated for subsurface soil. It should be noted, however, that the soil vapor extraction (SVE) system operated as an interim remedial measure (IRM) in the drum storage/tank farm area would have reduced any soil-bound VOC contamination in this area.

Groundwater

During the August 1996 PSI, VOCs were detected in four of the eleven monitoring wells on the Photocircuits site. The groundwater sample from MW-7 in the vicinity of the tank farm and the drum storage area indicated the presence of the following compounds in excess of groundwater standards: vinyl chloride, chloroethane, 1,1-dichloroethene, methylene chloride, 1,1-dichloroethane, 1,2-dichloroethane, 2-butanone, 1,1,1-trichloroethane, TCE, toluene, and PCE. Well locations are shown in Figure 3. During the 1998 FRI, eight locations were sampled by Geoprobe®, and eleven groundwater monitoring wells were sampled. VOC contamination in excess of SCGs was detected at six of the eight Geoprobe® locations, with concentrations as high as 8,020 ppb of total VOCs. VOC contamination in excess of SCGs was detected in nine monitoring wells with total VOC concentrations as high as 3,402 ppb. Groundwater monitoring beginning in August 2000 carried out in the drum storage/tank farm as part of the SVE IRM and the bioremediation pilot study showed elevated levels of VOC contamination in groundwater with the highest level (282,800 ppb of total VOCs) being reached in September 2000 in Monitoring Well SMP-3. The dominant contaminants in the drum storage/tank farm area during this time period were 1,1,1-trichloroethane and 1,1-dichloroethane. The increase in observed contaminant levels between the 1998 and 2000 events is likely due to the installation of additional sampling points (as part of the Bioremediation pilot study) which were placed closer to the original contaminant sources than the sampling points used in 1998. Additionally, injection of the substrate during the Bioremediation pilot study may have caused increased contaminant migration in the drum storage/tank farm area. See Table 2 and Figure 3.

Groundwater contamination identified during the FRI/FFS will be addressed in the remedy selection process.

5.2: Interim Remedial Measures

An interim remedial measure (IRM) is conducted at a site when a source of contamination or exposure pathway can be effectively addressed before completion of the FRI/FFS.

In the Spring of 1999, an AS/SVE system pilot test was conducted in the vicinity of MW-7, located in the drum storage/tank farm area of the site. The system included one shallow air sparge well (screened 10 -12 ft bgs), one deep air sparge well (screened 30-32 ft bgs), and one shallow horizontal SVE well. See Figure 3 for MW-7 location. The results of the pilot test were satisfactory. Photocircuits subsequently elected to implement a soil vapor extraction system only IRM, and the system was run until May 9, 2000, achieving VOC removal rates of approximately 6 pounds per day. In May 2000, a catalytic oxidizer/scrubber was added to the system, and the system was restarted in July of 2000. Removal rates gradually declined, and the system was decommissioned in November 2002. Significant mass removal of VOC contaminants was accomplished, however, levels of VOC contamination in groundwater in the treatment area remained high (see Table 2).

In August of 2000, an Accelerated Anaerobic Bioremediation pilot test was begun on the site in the drum storage/tank farm area. See Figure 3. Substrate (emulsified soybean oil) was injected in seven locations to a depth of 50 ft bgs. In February 2002, an additional 12 points were injected. In total, approximately 9,000 gallons of emulsified soybean oil were injected. Based on monitoring before and after the pilot test (see Table 2), the PRP's consultants calculated a first order degradation half-life of 578 days for VOCs within the pilot test area. First order degradation is the removal of one chlorine atom from a chlorinated VOC. Results, however, were not evenly distributed throughout the pilot test area. In general, the results show progressive dechlorination of the contaminants and large quantities of methane were generated. In some monitoring points, elevated levels of vinyl chloride were generated, and in some monitoring points, total VOCs actually increased. See Table 2 for groundwater monitoring results of VOC contamination in the pilot study area.

In January of 2002, a hydraulic restraint system operating between the Photocircuits' main building and Sea Cliff Avenue was pilot tested. Four groundwater extraction wells were installed at depths up to 60 ft bgs. Groundwater extraction was carried out at a rate of 3 gallons per minute per well during the pilot test. The results of the pilot test were consistent with effective hydraulic restraint and the system began full time operation in January 2003. The operation of the hydraulic restraint system has not resulted in significant decrease in downgradient (north of Sea Cliff Avenue) contaminant concentrations, particularly in groundwater samples taken from 60-100 ft bgs. It is likely that the hydraulic restraint system does not have a sufficient effective depth to prevent contaminated groundwater from migrating beneath the system.

5.3: Summary of Human Exposure Pathways

This section describes the types of human exposures that may present added health risks to persons at or around the site. An exposure pathway describes the means by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: [1] a contaminant source, [2] contaminant release and transport mechanisms, [3] a point of exposure, [4] a route of exposure, and [5] a receptor population.

The source of contamination is the location where contaminants were released to the environment (any waste disposal area or point of discharge). Contaminant release and transport mechanisms carry contaminants from the source to a point where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (e.g.,

ingestion, inhalation, or direct contact). The receptor population is the people who are, or may be, exposed to contaminants at a point of exposure.

An exposure pathway is complete when all five elements of an exposure pathway exist. An exposure pathway is considered a potential pathway when one or more of the elements currently does not exist, but could in the future.

Contaminated groundwater at the site flows toward the inactive Carney Street well field. Since these public supply wells are not currently in service, this route of exposure is not a completed pathway. All public drinking water supply wells in the Glen Cove Water District are routinely sampled for volatile organic compounds [VOCs] and are required to meet Safe Drinking Water standards prior to distribution to the public. Groundwater is the sole source of drinking water in this community. Any future consideration to use the well field, or any individual well within the Carney Street Well field would require meeting drinking water standards prior to distribution for public consumption. Chlorinated VOCs can volatilize from contaminated groundwater into unsaturated soil pore spaces, creating a potential inhalation exposure from soil vapor intrusion. This is a potential exposure pathway for this site.

The portion of Glen Cove Creek that flows through the site is not known to be contaminated, however, sampling downstream has detected volatile organic compounds in the water. Direct contact with the downstream portion of Glen Cove Creek is a potential off-site exposure pathway because future workers or trespassers could come into contact with surface water.

5.4: Summary of Environmental Assessment

This section summarizes the assessment of existing and potential future environmental impacts presented by the site. Environmental impacts include existing and potential future exposure pathways to fish and wildlife receptors, as well as damage to natural resources such as aquifers and wetlands.

The following environmental exposure pathways and ecological risks have been identified:

- The Glen Cove Creek runs along the western edge of the Photocircuits property. The creek is located approximately 200 ft cross-gradient from the contaminated area on the site. Sampling results from shallow groundwater monitoring wells located adjacent to the stream (MW-4 and MW-9 - see Figure 2) indicate total VOC levels of 38 ppb or less. Therefore, it is unlikely that recharge of the stream from on-site groundwater would result in significant VOC contamination in the stream. Samples from the creek receiving drainage from the site did not contain elevated levels of contaminants, therefore, a viable exposure pathway to fish and wildlife receptors is not present.

- Site-related contamination has entered the Upper Glacial Aquifer. This aquifer is a sole source aquifer, providing virtually all the groundwater used for private, public and industrial groundwater in the area. The contaminated groundwater at the site presents a potential route of exposure to the environment. There are no known exposure pathways of concern between

the contaminated groundwater and the environment. The potential for plants or animal species being exposed to site-related contaminants is highly unlikely.

SECTION 6: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375. At a minimum, the remedy selected must eliminate or mitigate all significant threats to public health and/or the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The remediation goals for this site are to eliminate or reduce to the extent practicable:

- the release of contaminants from soil into groundwater that may exceed groundwater quality standards;
- soil vapor intrusion into residential and/or commercial facilities both onsite and offsite;
- ingestion of groundwater impacted by the site that does not attain New York State drinking water standards as outlined in 10 NYCRR Part 5, Subpart 5-1; and
- off-site migration of groundwater that does not attain Department Class GA Ambient Water Quality Standards.

Further, the remediation goals for the site include attaining to the extent practicable:

- ambient groundwater quality standards

SECTION 7: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy 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. Potential remedial alternatives for the Photocircuits site were identified, screened and evaluated in the FFS report which is available at the document repositories established for this site.

The 2006 Focused Feasibility Study was restricted in scope due to the history of IRMs undertaken at the site. On-site contaminated groundwater deeper than 100 ft bgs will be addressed under a remedial investigation for OU2.

A summary of the remedial alternatives that were considered for this site is discussed below. The present worth 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 costs for alternatives with an indefinite duration. This does not

imply that operation, maintenance, or monitoring would cease after 30 years if remediation goals are not achieved.

7.1: Description of Remedial Alternatives

The following potential remedies were considered to address the contaminated groundwater at the site.

Alternative 1: No Further Action

The No Further Action alternative recognizes remediation of the site conducted under previously completed IRMs. To evaluate the effectiveness of the remediation completed under the IRMs, only continued monitoring and continued operation of the hydraulic control system is planned. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth: *$251,000*
Capital Cost: *$0*
Annual Costs:
(Years 1-5): *$16,400*
(Years 5-30): *$16,400*

Alternative 2: Bioremediation of the Waste Recovery area by the Addition of Substrate, coupled with Hydraulic Control

Present Worth: *$326,000*
Capital Cost: *$75,000*
Annual Costs:
(Years 1-5): *$16,400*
(Years 5-30): *$16,400*

Under this alternative, substrate would be injected in the subsurface in the drum storage/tank farm area, i.e., the area covered by the Bioremediation Pilot Study (See Figure 3). The substrate injection would be conducted in the same manner as the 2002 substrate injection events. The injection would employ approximately 10-12 injection points and roughly 5000 gallons of substrate mixture. This alternative would be a continuation of both the Bioremediation Pilot Study and operation of the hydraulic restraint system described in the Interim Remedial Action section. This remedy would have a design period of approximately 6 months, an initial implementation period of approximately 6 months (assuming one injection event), and would meet remediation goals in 6 to 10 years. A long term groundwater monitoring program would be carried out until groundwater standards are met, and institutional controls limiting the future use of groundwater at the site would be implemented.

Alternative 3: In-situ Destruction of Contaminants in the Waste Recovery Area by Chemical Oxidation, Coupled with Hydraulic Control

Present Worth: *$999,000*
Capital Cost: *$748,000*
Annual Costs:
(Years 1-5): *$16,400*
(Years 5-30): *$16,400*

Groundwater, and subsurface soils would be treated under this alternative via in-situ chemical oxidation. Several chemical oxidants are commercially available for use with this technology. For the purpose of this discussion Fenton's Reagent, which consists of hydrogen peroxide with an iron catalyst, potassium (or sodium) permanganate, potassium (or sodium) persulfate, or ozone will be oxidants evaluated. When this chemical oxidant comes into contact with organic compounds such as VOCs, an oxidation reaction occurs breaking down the organic compounds to relatively benign compounds such as carbon dioxide and water.

The chemical oxidant would be applied through injection wells to at least 80 ft deep to treat contaminated groundwater and saturated soils in the drum storage/tank farm area. This is to target groundwater with VOC concentrations in excess of SCGs.

Prior to the full implementation of this technology, laboratory and on-site pilot scale studies would be conducted to more clearly define design parameters. Between the pilot and the full scale implementations, it is estimated that a minimum of 10 injection points would be installed. It is estimated that the chemical oxidant would be injected during approximately 3 separate events over several months. During implementation, groundwater VOC concentrations would be monitored.

This remedy also includes continued operation of the hydraulic restraint system described in the Interim Remedial Actions section of this PRAP. This remedy would have a design period of approximately six months, an implementation period of approximately three years, and require approximately 6 years to achieve the remedial goals. A long term groundwater monitoring program would be carried out until groundwater standards are met, and institutional controls limiting the future use of groundwater at the site would be implemented.

Alternative 4: Extraction and Treatment of Groundwater in the Drum Storage/tank Farm Area, Coupled with Hydraulic Restraint

Present Worth: *$455,000*
Capital Cost: *$205,000*
Annual Costs:
(Years 1-5): *$16,400*
(Years 5-30): *$16,400*

Under this alternative, six extraction wells would be installed in the Drum Storage/Tank Farm Area. The wells would be equipped with electric or pneumatic groundwater recovery pumps. Underground

piping would be installed to bring compressed air or electric supply to each well and to convey recovered groundwater to a centralized air stripping and vapor treatment facility. Treated water would then be discharged to the sanitary sewer. This remedy also includes continued operation of the hydraulic restraint system described in the Interim Remedial Actions section. This remedy would have a design period of approximately 6 months, an operation period of 5 years, and an estimated time to achieve remedial goals of 6 years. A long term groundwater monitoring program would be carried out until groundwater standards are met, and institutional controls limiting the future use of groundwater at the site would be implemented.

Alternative 5: Bioremediation with Additional Injection Points Coupled with Downgradient Air Sparging Curtain and Provision for Contingent Soil Vapor Extraction and Catalytic Oxidation

Present Worth: *$547,000*
Capital Cost: *$265,000*
Annual Costs:
(Years 1-5): *$18,400*
(Years 5-30): *$18,400*

Under this alternative, bioremediation activities would be undertaken as in Alternative 2 above. In addition, the area remediated would be extended to the south of the original bioremediation area, and additional substrate injection points would be utilized. Substrate would be injected to support the existing microbial degradation of chlorinated VOCs. The substrate injection would be conducted in the same manner as the 2002 substrate injection events. The injection would employ approximately 20 injection points at depths varying from 10 to 80 ft bgs and roughly 10,000 gallons of substrate mixture. In addition, the current hydraulic restraint system would be replaced by an air sparging curtain that would aid in the oxidation of residual contaminants in shallow groundwater migrating from the site. The air sparging curtain would have a minimum effective depth of 100 ft bgs, and employ approximately 12 sparge points, covering an area just south of Sea Cliff Avenue extending from the eastern site boundary to a point approximately 120 ft to the west. In order to be effective to a depth of 100 ft bgs, sparge points should be installed to a minimum depth of at least 110 ft bgs. The sparging curtain's main task would be oxidation of contaminants, however, provision would be made for sufficient air volume to enable stripping of contaminants migrating through the sparging curtain area if monitoring results show that this is necessary. Provision would be made for operation of a shallow, horizontally installed SVE system in the air sparging curtain area, with catalytic oxidation of effluent if contamination levels warrant. See Figure 4 for locations of the remedial systems specified in this alternative. System monitoring would include groundwater monitoring in the drum storage/tank farm area for VOCs, organics and breakdown products such as methane, groundwater monitoring downgradient of the air sparging curtain for VOCs, breakdown products and oxygen levels in groundwater, soil vapor monitoring in the air sparge curtain area, and effluent monitoring for the SVE system if the system is activated. This remedy would have a design period of approximately six months, require approximately 6 months for implementation, and require approximately 6 years to meet the remediation goals. A long term groundwater monitoring program

would be carried out until groundwater standards are met, and institutional controls limiting future use of groundwater at the site would be implemented.

7.2: Evaluation of Remedial Alternatives

The criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. A detailed discussion of the evaluation criteria and comparative analysis is included in the FS report.

The first two evaluation criteria are termed "threshold criteria" and must be satisfied in order for an alternative to be considered for selection.

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.

Institutional control measures included in all Alternatives (1, 2, 3, 4 and 5) would protect human health by preventing human contact with any contaminants that would remain in the site groundwater. While the potential for human exposure to the contaminants in the groundwater would remain, the Carney Street Well Field, located downgradient of the site, is not currently in use, and would not be used for drinking water unless either the raw water met drinking water standards or suitable treatment was applied to the water prior to delivery. Alternatives 2, 3, 4 and 5 would all offer varying degrees of protection of human health and the environment through active remediation of the groundwater contamination. Alternative 1 would offer minimal protection of human health and the environment by continued operation of the existing hydraulic restraint system.

2. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether a remedy will meet environmental laws, regulations, and other standards and criteria. In addition, this criterion includes the consideration of guidance which the Department has determined to be applicable on a case-specific basis.

Since Alternative 1 does not include an active remedial measure for groundwater, it is unlikely that NYSDEC Class GA groundwater standards would be achieved. Alternatives 2, 3, 4 and 5 all provide for active groundwater treatment and would therefore comply with NYSDEC Class GA groundwater standards within a reasonable time frame. Alternatives 3, 4 and 5 would comply with NYSDEC Class GA groundwater standards earlier than Alternative 2.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term 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 remedial objectives is also estimated and compared against the other alternatives.

Alternative 1 would not provide active groundwater remediation, and therefore would not promote the rapid attainment of remedial goals. Alternative 2 has an estimated implementation time of 6 to

10 years, while Alternatives 3, 4 and 5 would require approximately 6 years. The technology used in Alternative 3 sometimes requires extended times (longer than estimated) to achieve groundwater standards. Alternatives 4 and 5 would provide enhanced short term effectiveness relative to Alternatives 2 and 3 because the Hydraulic Groundwater Extraction specified in Alternative 4 and the Air Sparging Curtain specified in Alternative 5 would provide better inhibition of downgradient contaminant transport than the hydraulic control system specified in Alternatives 2 and 3.

Alternative 1 would have no impact on workers or the community since there would be no construction required. Alternatives 2, 3, 4 and 5 would have some impact on workers during construction. Since all the structures required for these alternatives would be built on-site, the impact on the community would be minimal.

4. 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.

Alternative 1 would rely on institutional controls and presumed natural attenuation for long term effectiveness, and would therefore provide poor long term effectiveness. Alternatives 2, 3, 4 and 5 would all provide enhanced long term effectiveness through active groundwater remediation. Based on the results of the Bioremediation pilot study, Alternative 2, which is principally a continuation of the pilot study without significant enhancement, may not deliver maximum long term effectiveness, due to potential rebound in contaminant levels, and the production of vinyl chloride. Alternative 3, due to the limited area of influence for each oxidant injection point, requires a very detailed knowledge of high concentration areas of contaminant in order to be reliably effective. The level of knowledge required is currently unavailable for this site. Alternatives 4 and 5 promise the best Long Term Effectiveness. Although short term rebound is possible for Alternatives 2, 3, 4 and 5, all provide a good degree of Permanence if provision for continued treatment, based on monitoring results, is provided.

5. 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 site.

Alternative 1 would not reduce the toxicity, mobility or volume of contaminants. Alternative 2 would reduce the toxicity of contaminants by enhancing the microbial degradation of chlorinated VOCs, eventually reduce the volume if groundwater standards are met for substantial areas within the contaminated zone, and somewhat reduce the mobility of contaminants by hydraulic restraint. Alternative 3 would reduce the toxicity by the oxidation of chlorinated VOCs, eventually reduce the volume if groundwater standards are met for substantial areas within the contaminated zone, and somewhat reduce the mobility of contaminants by hydraulic restraint. Alternative 4 would reduce the toxicity of groundwater in the contaminated area by removing VOCs, reduce volume by directly removing contaminated groundwater, and reduce mobility of contamination by hydraulic restraint augmented by the effects of the cones of depression associated with the extraction wells. Alternative 5 would reduce the toxicity of groundwater both by enhancing microbial degradation of chlorinated VOCs and by removing VOCs through air sparging and contingent soil vapor extraction, reduce

volume if groundwater standards are met for substantial areas within the contaminated zone, and reduce mobility by providing a downgradient Air Sparging Curtain barrier.

6. 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.

All of the options considered would be technically and administratively feasible. Of the alternatives providing active remediation, Alternative 2 would be readily feasible, as no additional permanent installations are required (the hydraulic restraint system is extant, and the emulsified soybean oil can be injected using temporary Geoprobe® injection points, as already demonstrated in the Bioremediation pilot study. Alternative 3 would be more technically and administratively difficult, as large numbers of permanent injection wells would be required, and current lack of detailed knowledge of subsurface geology and contaminant distribution would require additional exploration efforts. The injection wells required for Alternative 3 are more expensive and more difficult to construct than those required in Alternatives 2 and 5. Alternative 4 would be readily feasible, but may require a long term commitment to waste treatment. Alternative 5 would be readily feasible. The substrate injection process is not technically difficult, and an air sparging curtain is more readily installed and operated than extraction wells.

7. Cost-Effectivness. 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. The costs for each alternative are presented in Table 3.

This final criterion is considered a "modifying criterion" and is taken into account after evaluating those above. It is evaluated after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance. Concerns of the community regarding the RI/FS reports and the PRAP have been evaluated. The responsiveness summary (Appendix A) presents the public comments received and the manner in which the Department addressed the concerns raised. In general, public comments received were supportive of the selected remedy.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based on the Administrative Record (Appendix B) and the discussion presented below, the Department has selected Alternative 5: Bioremediation with additional injection points coupled with downgradient Air Sparging Curtain and provision for contingent Soil Vapor Extraction and Catalytic Oxidation as the remedy for this site. The elements of this remedy are described at the end of this section.

The selected remedy is based on the results of the FRI and the evaluation of alternatives presented in the FFS

Alternative 5 was selected because, as described below, it satisfies the threshold criteria and provides the best balance of the primary balancing criteria described in Section 7.2. It will achieve the remediation goals for the site by supporting microbial degradation of chlorinated VOCs in the drum storage/tank farm area and adjacent areas of the site, and providing an air sparging curtain downgradient of the primary contaminated area to ensure further oxidation of any contaminants not fully degraded in the primary treatment area. This will greatly reduce the levels of VOC contamination in the drum storage/tank farm area, and create the conditions necessary to restore groundwater quality to the extent practicable. Alternatives 2,3 and 4 will also comply with the threshold criteria but with potentially longer timeframes or lesser reliability and certainty.

Because Alternatives 2, 3, 4, and 5 satisfy the threshold criteria, the five balancing criteria are particularly important in selecting a final remedy for the site.

Alternatives 2 (bioremediation), 3 (chemical oxidation), 4 (groundwater extraction) and 5 all have short-term impacts which can easily be controlled. The time needed to achieve the remediation goals will be longest (six to ten years) for Alternative 2 and similar (approximately 6 years) for Alternatives 3, 4, and 5.

Achieving long-term effectiveness is best accomplished by Alternatives 4 and 5, which provide a wide area of remedial coverage with the best methods of restricting groundwater transport of contaminants downgradient of the site. Alternatives 2 may not cover a wide enough area to effectively treat all the contamination, and the insufficient results of the Bioremediation Pilot Study call into question the long term effectiveness of Alternative 2. Alternative 3 may leave untreated areas within the primary treatment area.

Implementation of all Alternatives is feasible. Of the Alternatives meeting the threshold criteria, Alternative 2 is the most readily implemented, followed by Alternatives 5, 4 and 3.

Alternative 5 will offer the most reduction waste volume by comprehensively treating VOC contamination in the drum storage/tank farm and offering additional treatment for residual contamination present in groundwater migrating from the site. Alternative 4 will also achieve good waste volume reduction, and Alternatives 2 and 3 will offer reasonable volume reduction.

All Alternatives will offer reduced contaminant mobility. Alternatives1, 2 and 3 will use a hydraulic restraint system to reduce mobility, whereas Alternative 4 will use hydraulic restraint coupled with the cones of depression associated with the extraction wells. Alternative 5 will rely on a downgradient Air Sparging Curtain to reduce contaminant mobility. Alternative 2 will reduce toxicity by biodegradation. Alternative 3 will reduce toxicity by oxidation of contaminants. Alternative 4 will not reduce toxicity unless secondary treatment was applied. Alternative 5 will reduce toxicity by biodegradation and oxidation.

The cost of the alternatives varies significantly. The preferred alternative (Alternative 5) is more expensive than Alternatives 2 and 4, which also meet the threshold criteria. Because Alternative 5

is estimated to be the most comprehensive and time efficient remedial alternative, the present worth cost may be less than those projected, in that systems operation and monitoring may actually be necessary for less than the 30 years provided for in the cost estimates.

The estimated present worth cost to implement the remedy is $547,000. The cost to construct the remedy is estimated to be $265,000 and the estimated average annual costs for 30 years is $18,400.

The elements of the selected remedy are as follows:

- A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program including the installation of at least one air sparging curtain well for the purpose of determining the radius of influence. Based upon the data collected from that well, the remainder of the air sparging curtain will be installed, and operated until the remedial goals are attained, or the Department determines that it is no longer effective to operate.

- One substrate injection event, utilizing approximately 20 injection points covering the drum storage/tank farm area and the adjacent area immediately to the south will be conducted. Additional injection events will be carried out as required until the remedial goals are attained, or the Department determines that it is no longer effective.

- Continued groundwater monitoring at locations established during the bioremediation pilot study, at a minimum of two additional points located south of the pilot study area, and at a minimum of two downgradient points. Groundwater will be monitored for VOCs, dissolved oxygen, organic content and methane at a minimum. Additional groundwater monitoring well installations or contingent soil vapor extraction may be required based upon results.

- Imposition of an institutional control in the form of an environmental easement that will require (a) limiting the use and development of the property to commercial use, which will also permit industrial use; (b) compliance with the approved site management plan; (c) restricting the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by NYSDOH; and (d) the property owner to complete and submit to the Department a periodic certification of institutional and engineering controls.

- Development of a site management plan which will include the following institutional and engineering controls: (a) continued evaluation of the potential for vapor intrusion for any buildings developed or existing buildings re-occupied on the site, including provision for mitigation of any impacts identified both on-site and off-site; (b) monitoring of groundwater; (c) identification of any use restrictions on the site; and (d) provisions for the continued proper operation and maintenance of the components of the remedy.

- The property owner will provide a periodic certification of institutional and engineering controls, prepared and submitted by a professional engineer or such other expert acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will: (a) contain certification that the

institutional controls and engineering controls put in place are still in place and are either unchanged from the previous certification or are compliant with Department-approved modifications; (b) allow the Department access to the site; and (c) state that nothing has occurred that will impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

- The operation of the components of the remedy will continue until the remedial objectives have been achieved, or until the Department determines that continued operation is technically impracticable or not feasible.

Since the remedy results in untreated hazardous waste remaining at the site, a long-term monitoring program will be instituted. Groundwater at and downgradient of the treatment area will be monitored. The monitoring program will allow the effectiveness of the bioremediation and air sparging curtain to be monitored and will be a component of the long-term management for the site.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken to inform and educate the public about conditions at the site and the potential remedial alternatives. The following public participation activities were conducted for the site:

- Repositories for documents pertaining to the site were established.
- A public contact list, which included nearby property owners, elected officials, local media and other interested parties, was established.
- A public meeting was held on September 20, 2007 to present and receive comment on the PRAP
- The period during which the public comments on the PRAP were received was September 14, 2007 through October 20, 2007
- A responsiveness summary (Appendix A) was prepared to address the comments received during the public comment period for the PRAP.

TABLE 1
NATURE AND EXTENT OF CONTAMINATION
APRIL 1998 TO MAY 1998

GROUNDWATER 1998	Contaminants of Concern	Concentration Range Detected (ppb)[a]	SCG[b] (ppb)[a]	Frequency of Exceeding SCG
Volatile Organic Compounds (VOCs)	1,1,1-Trichloroethane	ND to 6,000	5	4 of 18
	1,1-Dichloroethane	ND to 3,200	5	7 of 18
	Vinyl Chloride	ND to 640	2	5 of 18
	1,1-Dichloroethene	ND to 570	5	4 of 18
	cis-1,2-Dichloroethene	ND to 520	5	6 of 18
	Chloroethane	ND to 180	5	3 of 18
	Tetrachloroethene	ND to 150	5	4 of 18
	Trichloroethene	ND to 50	5	5 of 18
	Toluene	ND to 26	5	1 of 18
	Benzene	ND to 1.1	0.7	2 of 18

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water;

[b] SCG = standards, criteria, and guidance values; for groundwater samples: New York State Ambient Water Quality Standards

[c] ND = non-detect

TABLE 2
IRM TREATMENT AREA MONITORING RESULTS
VOLATILE ORGANIC COMPOUNDS

Contaminants of Concern	Concentration Range Detected (ppb)[a] by Year					SCG[b] (ppb)[a]
	2000	2001	2002	2003	2004	
1,1,1-Trichloroethane	ND-235000	ND-33700	ND-19500	ND-5970	ND-14000	5
1,1-Dichloroethane	ND-47800	ND-18800	16-20500	ND-19000	ND-26000	5
Chloroethane	ND-6970	ND-6630	ND-10100	ND-3900	ND-41000	5
Tetrachloroethene	ND-61	ND-72	ND-70	ND-180	ND-48	5
Trichloroethene	ND-860	ND-1530	ND-26600	ND-13	ND-24	5
1,1-Dichloroethene	ND-156	ND-751	ND-542	ND-820	ND-330	5
cis-1,2-Dichloroethene	ND-37500	ND-12300	ND-42500	ND-1610	ND-290	5
Vinyl Chloride	ND-5990	ND-4770	ND-3490	ND-1780	ND-1500	2
Toluene	ND-232	ND-140	ND-194	ND-160	ND-250	5
Benzene	ND-6	ND-21	ND-48	ND-214	ND-10	0.7

[a] ppb = parts per billion, which is equivalent to micrograms per liter, ug/L, in water

[b] SCG = standards, criteria, and guidance values; for groundwater samples: New York State Ambient Water Quality Standard

[c] ND = non-detect

TABLE 3
REMEDIAL ALTERNATIVE COSTS

Remedial Alternative	Capital Cost ($)	Annual Costs ($)	Total Present Worth ($)
No. 1: No Further Action	$0	$16,400	$251,000
No. 2: Bioremediation	$75,000	$16,400	$326,000
No. 3: Chemical Oxidation	$748,000	$16,400	$999,000
No. 4: Extraction	$205,000	$16,400	$455,000
No. 5: Bioremediation and Sparging	$265,000	$18,400	$547,000

Figure 1
Site Location

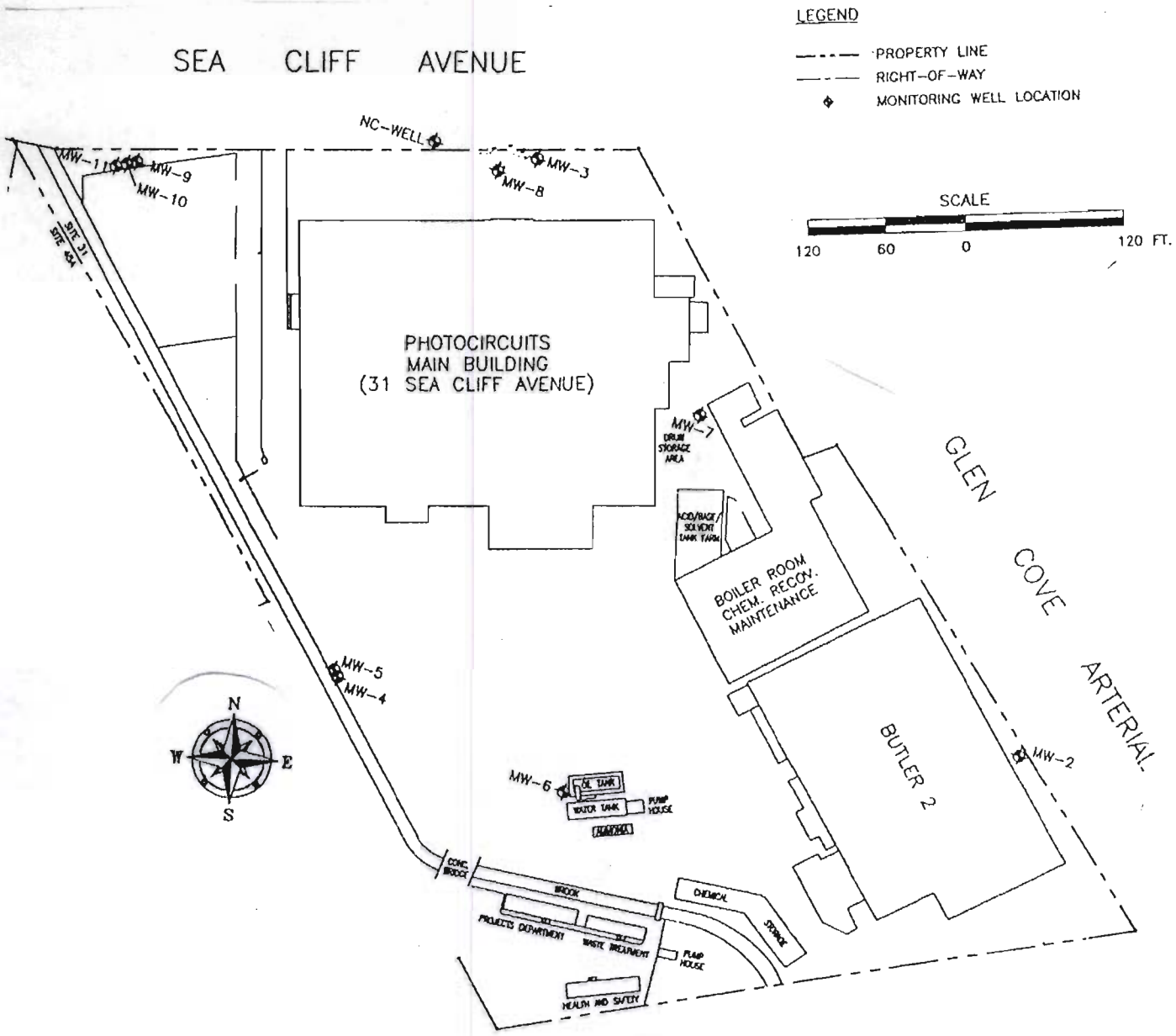
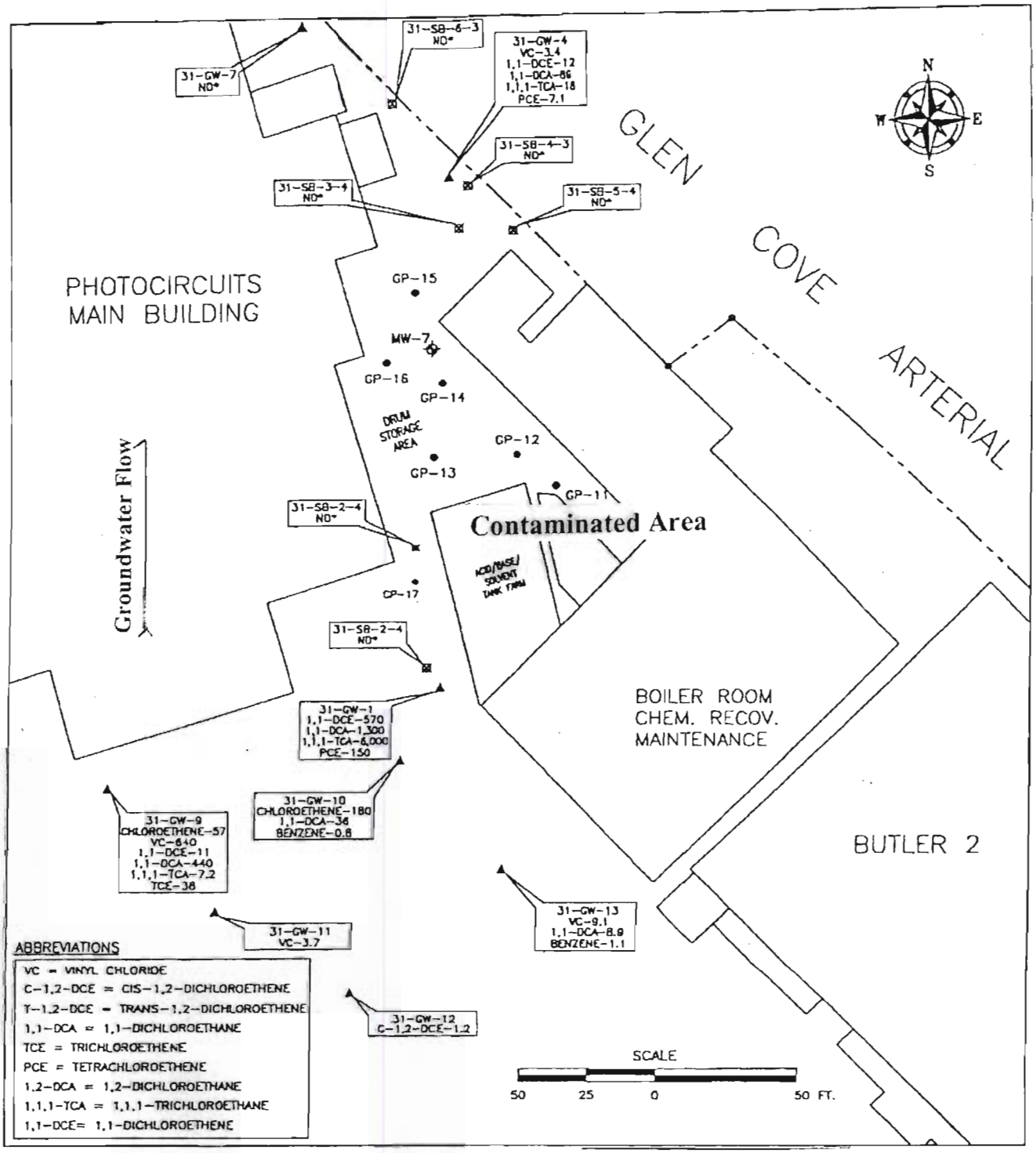


Figure 2 - Site Map



LEGEND

- PROPERTY LINE
- RIGHT-OF-WAY
- SOIL SAMPLE LOCATION (1996)
- GROUNDWATER GRAB SAMPLE
- MONITORING WELL LOCATION
- SOIL SAMPLE LOCATION (1998)

ND* NO ANALYTES DETECTED IN EXCESS OF NYSDEC CRITERIA

NOTE: ALL RESULTS REPORTED IN PARTS PER BILLION (ppb)

Figure 3 - RI Groundwater Sampling

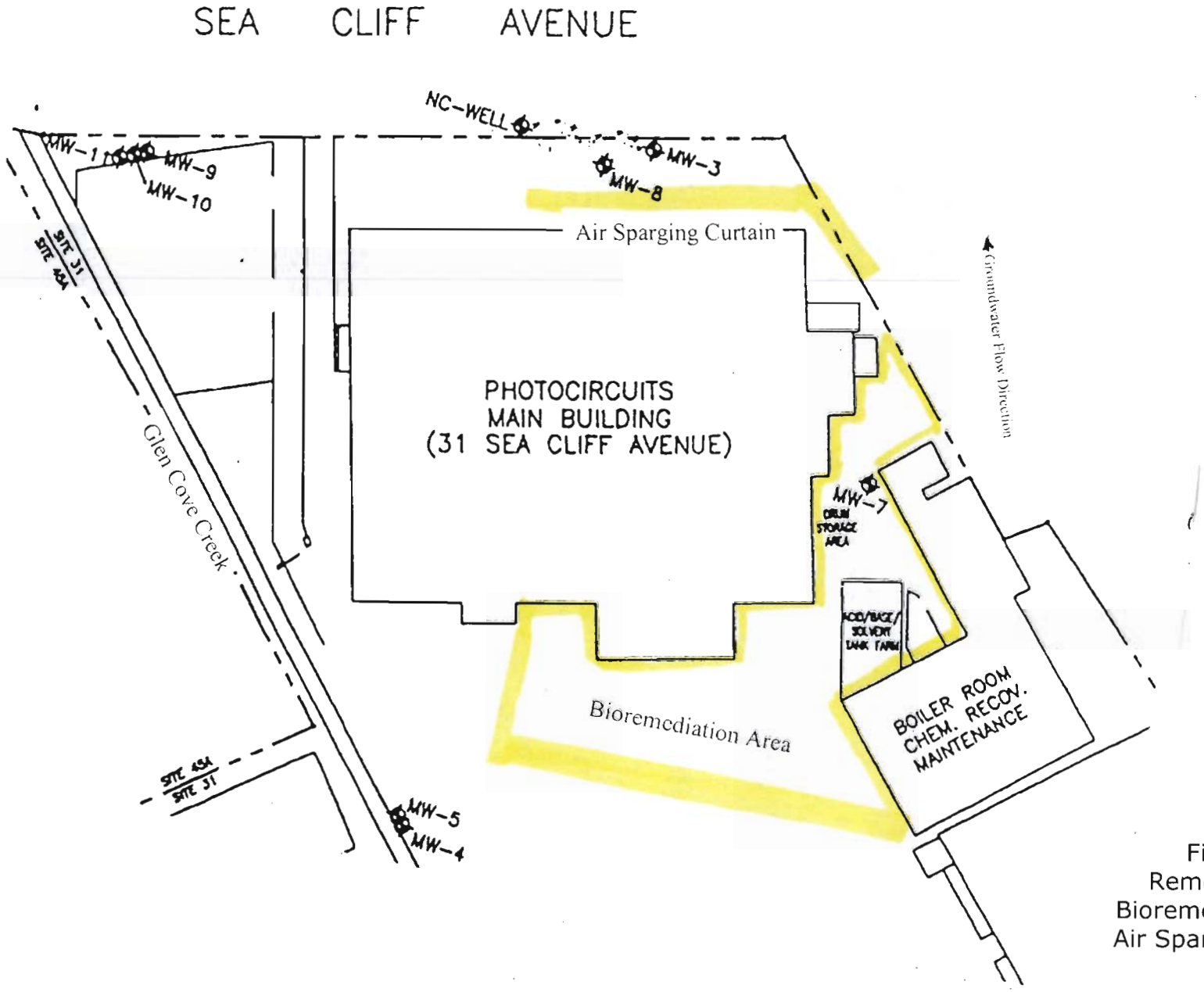


Figure 4
Remedial Area
Bioremediation with
Air Sparging Curtain

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY
PHOTOCIRCUITS CORPORATION
Operable Unit No. 1
City of Glen Cove, Nassau County, New York
Site No. 130009

The Proposed Remedial Action Plan (PRAP) for the Photocircuits Corporation 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 issued to the document repositories on September 12, 2007. The PRAP outlined the remedial measure proposed for the contaminated soils and groundwater at the Photocircuits Corporation site.

The release of the PRAP was announced by sending a notice to the public contact list, informing the public of the opportunity to comment on the proposed remedy.

A public meeting was held on September 20, 2007, which included a presentation of the Focused Remedial Investigation (FRI) and the Focused Feasibility Study (FFS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. These comments have become part of the Administrative Record for this site. The public comment period for the PRAP ended on October 20, 2007.

This responsiveness summary responds to all questions and comments raised during the public comment period. The following are the comments received, with the Department's responses:

The following comments were received at the September 20, 2007, public meeting, and are related to human health:

COMMENT 1: Is there any chance that the contamination from the site will get into our drinking water?

RESPONSE 1: The contaminated groundwater plume is within the area where the Carney Street Well Field was taken out of service due to contamination issues many years ago. Currently, there are no plans to bring these wells back into service and the contaminant plume from the Photocircuits site is not threatening any other public supply wells in the Glen Cove area. If a proposal to bring any of these wells (The Carney Street Well Field) back into service, water would have to meet all State and federal drinking water quality standards before water could be distributed to the public. It is the State's understanding that no private water supply wells exist in this area.

COMMENT 2: If a person walks on the site, are they being exposed to contamination?

RESPONSE 2: Areas of the site that could be accessible to the public do not have contaminants detected at levels that present health concerns.

COMMENT 3: What about swimming or fishing in the creek?

RESPONSE 3: The creek is not classified as a swimming stream in this area. The creek's best usage is classified for fishing at this area of the site. Areas of the site that could be accessible to the public do not have contaminants detected at levels that present health concerns.

COMMENT 4: Can houses be built on the site?

RESPONSE 4: The ROD specifies that an institutional control in the form of an environmental easement would restrict the use of the property to industrial or commercial use. This easement would preclude residential structures from the site.

COMMENT 5: Do the levels of interior air contamination at the site permit non-industrial use?

RESPONSE 5: Indoor air sampling was not done during the FRI/FRS. Regardless, the ROD specifies that an institutional control in the form of an environmental easement would restrict the use of the property to industrial or commercial use. Residential usage is not considered in the ROD.

COMMENT 6: A nearby building owner was concerned about inhalation of contaminants during the air sparging. How can my building be checked to make sure it is safe?

RESPONSE 6: The remedial action provides for air sparging at the downgradient property boundary and provides for soil vapor sampling to evaluate if vapors are being generated by this process. A safeguard in place is the contingent soil vapor extraction requirement in the ROD. If vapors are detected, the NYSDOH will evaluate if there is potential for vapors to migrate to other structures.

COMMENT 7: Did the test of the Carney Street Well Field draw the contamination north and affect the day care center?

RESPONSE 7: There is no data to show what effect the Carney Street Well Field test had on subsurface contamination from the sites in the area. A ventilation system was installed at the Day Care Center in the late 1990s. Indoor air testing at the Day Care Center did not detect site-related chemicals above typical background levels in either the indoor air or the crawl space after the ventilation system was installed. This system is effectively mitigating

vapors, regardless of source, that might be present in the soils under the day care center.

COMMENT 8: Are there other places between the Carney Street well field and the day care center that need to be tested or monitored for vapor intrusion?

RESPONSE 8: There are two small municipal buildings near the well field and the day care center. Soil vapor intrusion concerns with these buildings is unlikely.

The following comments were also received at the September 20, 2007 meeting

COMMENT 9: What is the water quality of the creek (Glen Cove Creek) that runs through the City of Glen Cove?

RESPONSE 9: No surface water samples were taken from the creek during the FRI. Groundwater samples from monitoring wells near the creek indicate it is unlikely that recharge of the stream from on-site groundwater would result in significant VOC contamination in the stream. The only surface water sampling data that we are aware is from sampling conducted by Nassau County in 2005. Samples from immediately downstream of the site did not contain contamination, but further down the stream, samples contained several volatile organic compounds at levels that exceed surface water standards. More surface water sampling is planned during the remedial investigation for OU2. The creek is not classified as a swimming stream in this area. The creek's best usage is classified for fishing at this area of the site. The NYSDOH general advisory is that you should eat no more than one half-pound meal of fish per week from any of the State's fresh waters.

COMMENT 10: How deep is the contamination on-site?

RESPONSE 10: It was confirmed under this operable unit that contamination at the site reached a minimum of 100 feet below ground surfaced (ft bgs). Further delineation of contamination below 100 ft bgs will be done under Operable Unit Number 2.

COMMENT 11: Do you consider this a successful meeting based on the turnout?

RESPONSE 11: The Department does not evaluate the successfulness of public meetings based on the turnout.

COMMENT 12: Is the Photocircuits site on Hazel Street being investigated also?

RESPONSE 12: This investigation is limited to the Sea Cliff Avenue Photocircuits Corporation site. The Hazel Street site is not a listed inactive hazardous waste disposal site on the New York State Registry.

COMMENT 13: What are Institutional Controls?

RESPONSE 13: An institutional control is any non-physical means of enforcing a restriction on the use of real property that limits human or environmental exposure, restricts the use of groundwater, provides notice to potential owners, operators, or members of the public, or prevents actions that would interfere with the effectiveness of a remedial program or with the effectiveness and/or integrity of operation, maintenance, or monitoring activities at or pertaining to a remedial site.

COMMENT 14: Where are Institutional Controls filed and how are they enforced?

RESPONSE 14: In New York State, the primary institutional control is an environmental easement. The environmental easement is filed in the County Clerk's office. The Department and the municipality may enforce the institutional controls.

COMMENT 15: What is the time frame for this work to be done and when will the site be cleaned up?

RESPONSE 15: The length of time required for the design and initial implementation of the remedy is approximately 2 years. It is estimated that a minimum of 5 additional years of remedial system operation will be needed to achieve the cleanup objectives.

COMMENT 16: Can a municipality change the zoning law to allow residential use of the site?

RESPONSE 16: Zoning laws may be changed by the municipality. The environmental easement required in the ROD, however, will limit the use of the property to industrial or commercial use. In order for the Department to consider allowing residential use, the site would have to conform to the Department's guidelines for residential usage.

COMMENT 17: Could a future purchaser clean up the site to residential standards and be allowed to use the site for houses?

RESPONSE 17: Yes, however, the Department and the NYSDOH would have to review the condition of the site and approve lifting of the environmental easement.

COMMENT 18: Is the demolition of on-site buildings allowed?

RESPONSE 18: Demolition of on-site buildings will be allowed provided that proper precautions regarding the containment and disposal of site materials are taken in observance of all applicable regulations.

COMMENT 19: Where did the 6 lbs/day of material recovered from the SVE system go?

RESPONSE 19: Contaminants recovered by the SVE system were either isolated in activated carbon or removed from the air by catalytic oxidation/scrubber system. All recovered contaminants were disposed at a permitted hazardous waste disposal facility.

COMMENT 20: Once there is a ROD for the site do they have to follow the remedy?

RESPONSE 20: Once the ROD is finalized, the Department will negotiate with the PRPs to determine who will undertake implementation of the remedy. If the PRPs undertake the remedy, they will be required to implement the elements of the selected remedy as specified in the ROD. If the PRPs are unwilling or unable to implement the remedy, the Department will implement the remedy using State Superfund money.

COMMENT 21: Will there be any more meetings for this site?

RESPONSE 21: While there is no additional public information meeting currently planned for this site, the Department's citizen participation activities provide opportunities for citizens to participate in the decision-making process for the remediation of hazardous waste sites after the ROD is issued. In addition, at the end of the remedial investigation for the deep groundwater, Operable Unit No. 2, a public meeting will be held to inform the public of the results and seek their input on any proposed remedy.

COMMENT 22: Who is the Responsible Party and how much money have they put aside for this investigation?

RESPONSE 22: At the time of the issuance of this ROD, the PRP is the Photocircuits Corporation. The Department does not have information on how much, if any, money is put aside by the PRP for the remediation of the site.

COMMENT 23: Why is this ROD limited only to contamination to 100 ft bgs?

RESPONSE 23: The information obtained by the remedial investigations undertaken to date does not provide a sufficient basis to determine effective remedies for contamination deeper than 100 ft bgs.

The following comment was summarized from an email received from Pat Tracy, of Glen Cove, dated September 21, 2007:

COMMENT 24: We would like to request that a technique of Phytoremediation be implemented in addition to your proposed remedy. There are grassy areas adjacent to the street on both sides of Sea Cliff Avenue. We are requesting that Hybrid Poplar Trees be planted there. According to the numerous

articles available on the EPA website, a planting of Hybrid Poplars can have a positive impact on TCE in the groundwater. The Trees actually incorporate the TCE into their wood and make it not toxic. If these Trees were to be planted along both sides of Sea Cliff Avenue, they would eventually screen these ugly, unused buildings from view. I have read that Phytoremediation takes ten years and that the Hybrid Poplars only last twenty years, so Hybrid Poplars have a disposal issue.

RESPONSE 24: Various factors, including the depth to groundwater and the method of planting, determine how long before the trees impact groundwater through phytoremediation. Complete restoration of the groundwater will depend on the site, the type of contaminant, the extent of contamination, and the phytoremediation technologies enhanced in the design. The plants may have to be in place for the foreseeable future as they are only cleaning the soluble contaminants that are passing the roots and not the source area that will continue to add the contaminant to the aquifer.

Depth to groundwater is often variable from season to season, or from year to year, and that influences the efficacy of trees to impact water quality. It is reasonably easy to plant trees to influence groundwater that is 15 feet below ground surface. The deepest phytoremediation-impacted aquifer is at 40 feet below ground surface.

Operable Unit No. 1, which is the subject of this document, consists of on-site soil and groundwater to a depth of approximately 100 ft bgs. Consequently, the operable unit treatment zone far exceeds the depth at which phytoremediation has seemed effective. Further, the criteria to which potential remedial alternatives are compared are defined in 6 NYCRR Part 375, which governs the remediation of inactive hazardous waste disposal sites in New York State. Remedial Alternatives need to satisfy these criteria to be considered. As the operable unit treatment zone far exceeds the depth at which phytoremediation has seemed effective, this alternative was not evaluated as it could not meet nor provide the best balance of the criteria found in 6 NYCRR Part 375.

The following comments are taken from a letter received from William B. Palmer, Senior Vice President of the Pall Corporation, dated October 19, 2007:

Pall Corporation and its engineering consultant, Apex Companies, LLC, have reviewed the September 10, 2007 Fact Sheet and September 2007 Proposed Remedial Action Plan (PRAP) for the Photocircuits Corporation (Photocircuits) site located at 31 Sea Cliff Avenue, Glen Cove, New York.

The comments provided below are intended to evaluate the PRAP from Pall's perspective as an owner of property located downgradient of the environmental concerns at the Photocircuits site. We have focused on issues that impact contaminant migration and the scope of any work that may be

necessary, or requested by the New York State Department of Environmental Conservation ("NYSDEC"), to be performed on and downgradient of the Pall property.

GENERAL COMMENTS AND COMMON THEMES

COMMENT 25: Definition of OU-1 (Area Boundary): The PRAP ignores the groundwater contamination that has migrated and continues to migrate downgradient of the Photocircuits site. Even though the NYSDEC acknowledges throughout the PRAP that groundwater contamination emanating from Photocircuits has migrated and is still migrating off-site, the NYSDEC limits without explanation the scope of the Photocircuits PRAP to the areas inside the boundaries of the Photocircuits property. NYSDEC's approach is not consistent with the PRAP and Record of Decision (March 2004) for the Pall site where a significant downgradient off-site area was included in the OU-1 remedy. The failure to address the contaminant migration from the Photocircuits site is the most significant deficiency in the PRAP because Photocircuits is not held responsible to address contamination it caused at the Pall site and farther downgradient. Instead, implicit in the PRAP is NYSDEC's expectation that off-site contamination from the Photocircuits site is now expected to be addressed as part of the Pall Inactive Hazardous Waste Disposal Site (IHWDS) program - at Pall's cost. This approach is technically inappropriate and contrary to NYSDEC's assurances to Pall that it will not be responsible for addressing contamination caused by others. It also does not satisfy the requirements of 6 NYCRR Subpart 375-1.-8(f) relating to the factors that must be considered in the selection of a remedy, including long-term and short-term effectiveness and permanence and community acceptance.

RESPONSE 25: The Department selected this operable unit to remediate source areas on the Photocircuits site to mitigate the release from site contamination. This PRAP addresses only on-site soils and groundwater to a depth of 100 ft bgs. The decision to limit the scope of the Operable Unit No. 1 PRAP to on-site soils and groundwater to a depth of 100 ft bgs was made in order to facilitate the timely remediation of known source areas on the Photocircuits site. The long term effectiveness of any remedy for downgradient contamination will be dependent on achieving sufficient source area remediation, therefore, the Department believes the remedy selection criteria are satisfied by moving forward with this operable unit. The Operable Unit No. 2 Remedial Investigation, now underway, should provide information essential to select a remedy for deep and downgradient groundwater. Additionally, the Department routinely moves forward with remediation of sites which, in addition to site related contaminants, have other contaminant contributions. Each site is responsible for cleaning up its contaminant contribution whether or not, if by doing so, it also cleans up contamination from other sources. When a site has cleaned up their contaminant contribution, the Department

does not require that the site remediation continue when only non-site related contamination is present.

COMMENT 26: Definition of OU-1 (Depth Extent): The PRAP defines the vertical depth of Operable Unit 1 to a depth of 100 feet below grade surface (bgs). The arbitrary determination of 100 feet for the depth of Photocircuits OU-1 is inconsistent with the definition of OU-1 at the downgradient Pall site (OU-1 at Pall is defined at 60 foot depth) and shows a lack of regional coordination by the NYSDEC in the Sea Cliff Avenue Industrial Area. It is recommended that the Photocircuits OU-1 depth be limited to 60 feet below grade (for on-site and downgradient off-site areas) and that Photocircuits OU-2 start at 60 feet below grade and include both on-site and off-site, downgradient contamination deeper than 60 feet.

RESPONSE 26: The depth of 100 ft bgs was chosen because sampling results indicate that areas of high contaminant concentration, potentially serving as source areas for downgradient contaminant migration, persist to approximately this depth. In order to efficiently address possible downgradient migration of contaminants, it will be necessary to remediate on-site contamination to the chosen depth.

COMMENT 27: Incomplete Investigation: The 1997 Consent Order entered into by NYSDEC and Photocircuits authorizes the performance of a Focused Remedial Investigation (FRI) and Focused Feasibility Study (FFS), together with Interim Remedial Measures. It is unclear why the PRAP acknowledges the FFS, but not the FRI, calling it instead a Remedial Investigation (see page 3 of the PRAP, Enforcement Status). In general, the data presented, or lack thereof, clearly indicates that the investigation of the Photocircuits site has not addressed many areas of the property and has not fully or adequately addressed the nature and extent of groundwater contamination to the point that remedy selection should proceed. Additional investigation is clearly warranted, and if necessary, the scope of remediation should be expanded.

RESPONSE 27: The Department acknowledges that the title "Focused Remedial Investigation," as stated in the Administrative Order on Consent, is the appropriate terminology for the investigation conducted under said Order. Regardless, the Department believes all elements of a Remedial Investigation were incorporated into the work plan for the Focused Remedial Investigation and does not believe additional investigation is necessary.

COMMENT 28: Historic Contaminant Migration Not Considered: The PRAP ignores the element of time when discussing plumes on the Photocircuits site. The PRAP does not consider the enormous impact on plume dynamics while the Carney Street well was active. During its active period, well pumping at Carney Street actively "dragged" contaminants from Photocircuits across the Pall site, further downgradient and deeper into the aquifer. This is a key element

linking the current contamination at the Photocircuits site to past, present, and future contaminant distribution downgradient at the Pall and City of Glen Cove sites. By not including this key discussion under the PRAP or in the definition of the OU-1 boundaries, Photocircuits is not being held accountable for contamination it caused at downgradient properties.

RESPONSE 28: The Operable Unit No. 2 RI, currently underway, should provide information about the possible effects of the pumping of the Carney Street Well Field on the contaminant plume leaving the Photocircuits property.

COMMENT 29: Remedial Alternatives Basis is Inappropriate: All remedies discussed appear to be significantly undersized with respect to the design basis used for cost estimates and comparison of alternatives. On-site dosing estimates appear extremely low when compared to pilot test dosing levels and results. In addition, all remedies should be modified to include downgradient areas that have been impacted by Photocircuits contaminant migration and the scope and costs adjusted accordingly.

RESPONSE 29: The Department selected this operable unit to remediate source areas on the Photocircuits site to mitigate the release from site contamination. Depending on the results of the groundwater monitoring, the level of effort of the remedy may be expanded. Other areas of contamination will be addressed under Operable Unit No. 2.

These general comments apply to multiple statements/sections throughout the PRAP, but will not be repeated in every comment.

SPECIFIC COMMENTS AND ISSUES:

The following comments pertain to specific language in the PRAP. Where appropriate, comments are referenced to a comment number showing where the language being discussed is presented in the PRAP. A copy of the PRAP, with the appropriate comment numbers indicated in the margins is presented as Attachment A to this document to facilitate NYSDEC review.

Section 1: Summary of the Proposed Plan:

COMMENT 30: Comment 1: P.1, Para. 1: The PRAP defines OU-1 as "on-site soil and groundwater to a depth of approximately 100 feet below ground surface (bgs)." The definition of OU-1 should be expanded to include downgradient properties impacted by contaminant migration from upgradient properties, including the Pall site and sites farther downgradient. In addition, the depth of 100 feet is inconsistent with the depth of 60 feet for OU-1 on the Pall site. The Photocircuits PRAP should also limit the depth of Photocircuits OU- 1 to 60 feet and the Photocircuits OU-2 should include on-site and off-site contamination deeper than 60 feet (not deeper than 100 feet).

RESPONSE 30: The term "Operable unit," as defined in 6NYCRR Part 375, means a portion of the remedial program for a site that for technical or administrative reasons can be addressed separately to investigate, eliminate or mitigate a release, threat of release or exposure pathway resulting from the site contamination. Operable units may address geographical portions of a site, media specific action, specific site problems, or an initial phase of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site. An operable unit may be proposed by the Department or a remedial party; however, only the Department can approve the use of operable units.

The Department selected this operable unit to remediate source areas on the Photocircuits site to mitigate the release from site contamination.

COMMENT 31: Comment 2: P. 1, Para. 1, Line 8: The words "and downgradient" should be inserted after "contaminated the soils and groundwater at the site."

RESPONSE 31: The words " and downgradient" are not appropriate here. The Department selected this operable unit to remediate source areas on the Photocircuits site to mitigate the release from site contamination.

Section 2: Site Location and Description:

COMMENT 32: Comment 3: P. 2, Para 1, Line 5: The words "and downgradient" should be inserted after "...is located across Sea Cliff Avenue to the north."

RESPONSE 32: See Response 31.

Section 3: Site History:

COMMENT 33: Comment 4: P. 3, Para. 1, Last Line: The site history should include a brief discussion of the injection well network historically used at Photocircuits.

RESPONSE 33: Details of the operation of the injection wells are not known to the Department. The November 1996 Preliminary Site Investigation Report reported that groundwater samples from MW-8, in the immediate vicinity of the injection wells, did not show elevated levels of VOC contamination.

Section 5.1.2: Nature and Extent of Contamination:

COMMENT 34: Comment 5: P. 4, Para 2, Line 2: A comparison of Figures 2 and 3 indicate that much of the Photocircuits property, including the entire area near Butler 2 was never investigated. This would result from the fact that only a Focused Remedial Investigation was performed. The NYSDEC should include data for other areas of the site, if any exist. If no additional data exist, additional investigation - including sampling within the building footprint underlying

former process areas - should be completed prior to finalizing any remedy for the site.

RESPONSE 34: Investigations performed prior to the FRI include the "Source Area Investigation for the Sea Cliff Industrial Area" performed in 1992, and the "Preliminary Site Investigation" performed in 1996, both cited in the PRAP. These reports identified the drum storage and tank farm areas located to the east of the Photocircuits' main building as the primary areas of concern at the site. Inclusion of the data from these investigations is beyond the scope of a PRAP, however, both documents are available in the repositories.

COMMENT 35: Comment 6: P. 4, Para 2, Line 3: The PRAP states that "the main categories of contaminants are volatile organic compounds (VOCs)." This implies that other categories of contaminants are present. Other contaminants should be discussed in the PRAP (e.g., metals, semi-volatile organic compounds, etc.), since remedial techniques that effectively degrade VOCs may have little effect on the other contaminants present at the site. In addition, it is important to discuss specific VOCs in more detail since the presence of many of the degradation products of VOCs detected on the Photocircuits property have migrated downgradient and have been detected at downgradient properties. This linkage of upgradient contaminants to downgradient plumes must be addressed in the PRAP. Information on this important topic was provided by Pall to NYSDEC in the past and to date has not been given serious consideration. Examples include but are not limited to Pall's March 26, 2004 comments on the PRAP for the Pall site, Pall's letter to NYSDEC dated April 27, 2004, Pall's presentation to NYSDEC on July 1, 2004 concerning an evaluation of the hydraulic control system at Photocircuits, Pall's presentation to NYSDEC on March 21, 2006 regarding issues impacting the remediation approach for the Pall property, and Pall's May 31, 2006 In-Situ Chemical Oxidation Phase II Pilot Test and Source Evaluation Report.

RESPONSE 35: Other categories of contamination did not exceed SCGs. Specific categories of VOCs found are discussed in more detail in the FRI and the FFS.

COMMENT 36: Comment 7: Subsurface Soil, P. 4, Para. 1 and 2: The FRI only included six (6) soil sample locations. Given the extent of groundwater contamination at this site, it is technically incomprehensible why only six (6) soil sample locations were sampled during the FRI to define the nature and extent of soil contamination at the site. In contrast, more than 100 soil samples were collected on the downgradient Pall property despite the fact that the vast majority of sample results indicated no exceedances of applicable standards, criteria and guidance (SCGs). (See Enviro-Sciences, "Phase II Remedial Investigation Report, Pall Corporation, 30 Sea Cliff Avenue, Glen Cove, New York," July 2000.) It is recommended that additional soil sampling be conducted to better define the nature and extent of contamination on the

Photocircuits property. The additional sampling should include known contaminated areas, as well as previously un-investigated areas of the site.

RESPONSE 36: As the writer of this letter has previously noted, the Remedial Investigation for the Photocircuits site is a Focused Remedial Investigation (FRI). The areas of sampling concentration were selected on the basis of the results of previous investigations, as cited in the PRAP. The Department believes all elements of a Remedial Investigation were incorporated into the work plan for the Focused Remedial Investigation and does not believe additional investigation is necessary.

COMMENT 37: Comment 8: Groundwater, P. 4, Para. 1 and 2: VOCs exceeded one or more SCGs in 15 of 19 Geoprobe® locations and monitoring wells. Despite these results, the assessment of the site was declared complete. The high percentage of significantly contaminated sampling points combined with their locations, which appear to have been focused on specific areas rather than distributed across the entire site as a result of the FRI, made it unlikely that other contaminant release points would be detected.

RESPONSE 37: See Response 36.

COMMENT 38: Comment 9: Groundwater, P. 5, Para. 1, First Line: The maximum concentration listed in the PRAP ("282,000 ppb of total VOCs") is incorrect. In the Photocircuits June 2004 Status Report, the following statement is presented: "total chlorinated contaminant concentrations in wells within the pilot test area ranged from 457 to 539,000 ppb" (See Terra Systems, "June 2004 Status Report, Photocircuits Accelerated Anaerobic Bioremediation Pilot Project ", August 27, 2004.) The failure to understand the magnitude of groundwater concentrations in the area is a significant concern and supports the other concerns noted in these comments. This section of the PRAP needs to be greatly expanded to include a figure showing the locations and depths of the elevated groundwater contaminant concentrations identified during multiple sampling events - not just the minimal RI sampling events. This would be similar to what was provided with the Pall PRAP. In addition, the groundwater flow direction needs to be more prominently addressed to show that the levels of contaminants detected on the Photocircuits site are upgradient of Pall and the City of Glen Cove properties. Further, a statement should be included to indicate that the upgradient concentrations of contaminants detected on Photocircuits are several orders of magnitude higher than the highest levels of contaminants ever detected downgradient. The NYSDEC provided similar comparisons in the Pall PRAP and there is no basis for not doing so in the Photocircuits PRAP. Indeed, by not doing so, the NYSDEC would risk creating bias in the presentation of data.

RESPONSE 38: The PRAP states "Groundwater monitoring beginning in August 2000 carried out in the drum storage/tank farm as part of the SVE IRM and the

bioremediation pilot study showed elevated levels of VOC contamination in groundwater with the highest level (282,000 ppb of total VOCs) being reached in September 2000 in Monitoring Well SMP-3. The monitoring result that you reference occurred in June 1999 (in Monitoring Well SMP-3), previous to the period referenced in the PRAP. Additional information and data may be found in the ancillary documents referenced in Appendix B of the PRAP for the Photocircuits site. These are available in the document repositories. Discussions of groundwater flow are also found in these documents. The PRAP is not intended to give a comprehensive representation of all data acquired at the site. The Proposed Remedial Action Plan (PRAP) identified the preferred remedy, summarized the other alternatives considered, and discussed the reasons for the remedy preference. PRAPs are not designed to be a basis for comparisons between sites.

Section 5.2: Interim Remedial Measures

COMMENT 39: Comment 10: P. 5, Para. 2: Table 2 does not discuss before and after concentrations during the SVE pilot test as indicated in the context of the discussion. Additional discussion and a new table indicating pre- and post-remediation soil and groundwater levels should be provided.

RESPONSE 39: More detailed information on contaminant levels in the IRM Treatment areas may be found in the Quarterly Progress Reports submitted by Photocircuits as required by the Order on Consent cited in Section 4 of the PRAP. These reports are available at the document repositories.

COMMENT 40: Comment 11: P. 5, Para. 3: Table 2 does not discuss before and after concentrations during the bioremediation pilot test as indicated in the context of the discussion. Nor are specific sample locations or depths indicated in Table 2. Additional discussion and/or a new table indicating pre-and post-remediation soil and groundwater levels should be provided.

RESPONSE 40: See Response 39.

COMMENT 41: Comment 12: P. 5, Para. 3: The Accelerated Anaerobic Bioremediation pilot increased maximum concentrations of chloroethane over 300% from 2000 to 2004. While its absolute toxicity is low relative to many other VOCs at the site, its SCG is 5 micrograms per liter, the same as 1,1,1-trichloroethane or vinyl chloride. The production and control of chloroethane should be a particular focus of any bioremediation alternative. The remaining high levels of vinyl chloride are also a significant concern due to the relatively high toxicity of vinyl chloride relative to other detected VOCs and the presence of these degradation products farther downgradient on the Pall property.

RESPONSE 41: The Department recognizes the concern about the levels of chloroethane and vinyl chloride. The air sparging curtain specified in the preferred alternative

was chosen, in part, to increase the alternative's ability to reduce the concentrations of these contaminants.

COMMENT 42: Comment 13: P. 5, Last Paragraph: Despite the NYSDEC acknowledgment that the hydraulic control system has been ineffective at the public meeting and in the PRAP, the Photocircuits OU-1 PRAP does not address the contaminants that have already migrated off-site and under the Pall property and sites farther downgradient. This is a major deficiency. Page 5, Section 5.2, last sentence: "It is likely that the hydraulic restraint system does not have a sufficient effective depth to prevent contaminated groundwater from migrating beneath the system." This comment agrees with those made by the Pall team on several occasions and in several documents. The comment also raises the timing of the remediation of Photocircuits OU-1 relative to OU-2, that is, breakdown products and daughter compounds may migrate from OU-1 to OU-2 before remediation of the former is complete. Such migration can adversely impact deeper groundwater and downgradient properties.

RESPONSE 42: The PRAP addresses only Operable Unit No. 1: On-site soils and groundwater to a depth of 100 ft bgs. The remaining portions of the remedial program for the site can be addressed separately to investigate, eliminate or mitigate the release, threat of release or exposure pathway resulting from the site contamination. The Operable Unit No. 2 Remedial Investigation, now underway, should provide information essential to select a remedy for deep and downgradient groundwater.

Section 6: Summary of the Remediation Goals:

COMMENT 43: Comment 14: P. 7, 4th Bullet from the top: Although the goal discusses eliminating or reducing off-site contaminant migration, nothing in the PRAP addresses contaminants that have already migrated off-site. This is a recurring theme and significant concern with the PRAP.

RESPONSE 43: See Response 42.

Section 7.1: Description of Remedial Alternatives:

COMMENT 44: Comment 15: P. 7, Alternative 1, Para. 1: The No Further Action remedy monitoring should include both on-site and off-site monitoring, including future monitoring at sites impacted by the off-site migration of the Photocircuits groundwater contaminant plumes. The costs should be adjusted accordingly. A more detailed description of the monitoring and Operation & Maintenance (O&M) program that is the basis for this alternative should be presented to assess the reasonableness of the cost estimates provided. Based upon the limited description provided of the alternative, it is impossible to assess the validity of the presented cost estimates and scope. The need to include downgradient monitoring in cost estimates applies to all remedies

considered in the PRAP and will not be repeated in each specific comment for brevity.

RESPONSE 44: The information from the FRI and FFS are sufficient to compare remedial alternatives. Development of detailed on-site and off-site monitoring plans are beyond the scope of the PRAP or the supporting FFS.

COMMENT 45: Comment 16: P. 8, Alternative 2, Para. 1: The basis for Alternative 2 is flawed. It includes the addition of only 5,000 gallons of substrate for full-scale remediation, yet the pilot test included over 9,000 gallons of substrate over a much smaller area, and the results indicated increases in many of the contaminants of concern during the pilot test (i.e., ineffective remediation). It is certain that significantly more substrate will need to be injected over the much larger full scale remediation area with multiple injection events and to deeper depths. NYSDEC must justify the basis for substrate addition with calculations and more realistic assumptions in the PRAP. Simply stating that this will be addressed during the detailed design phase is unacceptable because the basis discussed in the PRAP is so flawed that it does not allow for a reasonable evaluation of Alternative 2 as a potentially appropriate approach for the site. Further, the remedy includes continuation of the hydraulic control system which the NYSDEC has acknowledged was ineffective in the PRAP (see also Comment 17). The costs for this entire alternative would have to be updated (i.e., significantly increased) accordingly. It can be argued that Alternative 2 as presented is not even a reasonable alternative that warranted detailed evaluation. This does not mean that the technologies proposed are unreasonable (they are not), but the basis for the alternative and associated costs need full reconsideration.

RESPONSE 45: The Department believes the remedy development and selection criteria were satisfied.

COMMENT 46: Comment 17: P. 8, Alternative 3, Para. 4: The inclusion of the hydraulic control system that NYSDEC acknowledges was ineffective is inappropriate. An upgraded hydraulic control system and associated costs need to be included in this alternative evaluation.

RESPONSE 46: See Response 45.

COMMENT 47: Comment 18: P. 9, Alternative 4, Para. 1, Line 7: The use of a five (5) year O&M period for a groundwater extraction and treatment system (i.e., "pump and treat") is unrealistic and inconsistent with NYSDEC's own recommendations on the duration to use as a design basis for the purpose of completing alternative evaluations. Given the very high levels of contaminants present, including possible separate phase product, it is very probable that the pump and treat system would have to run for a minimum of 10 years and likely at least 20 years to meet remedial objectives. The cost

estimates should be revised (i.e., increased) accordingly. The costs presented appear very low. Energy costs alone may exceed the annual O&M costs presented.

RESPONSE 47: See Response 45.

COMMENT 48: Comment 19: P. 9, Alternative 5, Para. 1, Line 6. See comment 16 regarding concerns related to the scale of the design basis for bioremediation remedy (i.e., proposed dosing appears to be very low in comparison to the dosing used for the pilot test over a much smaller area). The dosing used as a basis is almost the same as that used during the pilot test, even though the area under the PRAP is larger and deeper. As a result of this deficiency, the cost estimates generated are not accurate for the actual remedy implementation.

RESPONSE 48: The Department believes the remedy development and selection criteria were satisfied. The design will determine the number of injection points, air sparging wells, and the amount of substrate needed to effectively remediate the site.

COMMENT 49: Comment 20: P. 9, Alternative 5, Para. 1, Line 9: Although the general concept appears reasonable, the design basis used for the remedy evaluation is unrealistic and needs to be revised to more accurately evaluate alternatives and related costs. The use of only 12 sparge wells for the air sparge curtain is insufficient. Sparge barriers require very close well spacing (sometimes as close as 10 feet) and typically include multiple passes in order to allow for contact time sufficient to reduce VOCs to acceptable levels before they migrate outside of the zone of influence of the barrier system. In addition, the length of the sparge curtain indicated on Figure 4 (which is not scaled) is insufficient to prevent off-site migration from the entire bioremediation area. This concern over hydraulic control has been voiced by Pall many times and the NYSDEC's failure to act upon it has already allowed significant contamination to migrate from Photocircuits and onto downgradient properties, including Pall and the City of Glen Cove sites. The timing of the O&M for the air sparge curtain should be increased to at least 10 years and possibly 20 years as it would be likely that VOC concentrations in the Photocircuits primary source areas upgradient of the sparge curtain would exceed SCGs for at least that timeframe and protection of downgradient receptors would need to be maintained.

It should also be noted that the use of anaerobic bioremediation is proposed concurrently with aerobic air sparging in close proximity to each other. These approaches utilize competing remedial mechanisms which may decrease remedial effectiveness. The NYSDEC should indicate how this issue will be addressed in the final remedy design, and it deserves at least a cursory discussion in the PRAP.

RESPONSE 49: The radius of influence of the air sparging wells will be determined during the design through installation of one air sparging curtain well. Also, the length of time during which the remedy will be applied will largely be determined by groundwater monitoring.

COMMENT 50: Comment 21: P. 9, Alternative 5, Costs: The costs related to this remedy appear very low. Energy costs alone would exceed the O&M costs estimated for the sparge barrier system (large compressors / blowers would be required for the 100 foot deep system). Vapor treatment costs for the SVE system do not appear to be included, nor do additional substrate injection events.

General Note: NYSDEC should consider another alternative such as a slurry wall installation to prevent future migration. Using the existing hydraulic control system, which NYSDEC admits is not effective, in several of the Alternatives considered is not consistent with development of good faith alternatives for evaluation.

RESPONSE 50: The estimated costs cited in the PRAP are preliminary estimates only. The estimates are largely derived from the costs incurred in the execution of past projects using similar remedial methods and having similar scope. The Department does not believe that installation of a slurry wall of sufficient lateral coverage and depth would be practical for this site. It should be noted that the selected remedy does not rely on the existing hydraulic restraint system.

Section 7.2: Description of Remedial Alternatives:

COMMENT 51: Comment 22: P. 10, Item 2 - SCGs, Para. 2: None of the remedies as proposed will allow compliance with SCGs for the off-site plume that has already migrated downgradient of the Photocircuits site. This should be noted in the PRAP.

RESPONSE 51: See Response 42.

COMMENT 52: Comment 23: P. 10, Item 3 - Short-Term Effectiveness. Para. 3: Off-site and downgradient monitoring should be included in all remedies considered and could have an impact on the community - including neighboring properties. In addition, it is questionable whether an air sparge curtain would provide better hydraulic control and contaminant migration control than a properly designed and installed hydraulic control system. To compare the sparge curtain to the hydraulic control system of Alternatives 2 and 3, which the NYSDEC admits has been ineffective, is misleading.

RESPONSE 52: Alternatives 2 through 5 all require a long-term groundwater monitoring program. An air sparge curtain reduces downgradient contaminant migration through oxidation of residual contaminants and physical removal

of contaminants through increased volatilization, and does not rely on hydraulic restraint. The Department does not claim that air sparging and hydraulic restraint are equivalent.

COMMENT 53: Comment 24: P. 11, Item 4 - Long-Term Effectiveness. Para. 2, Line 9: The statement that additional information is needed for the high concentration areas of the site applies to all remedies, not just the oxidation remedy, further supporting our comment that additional investigation is needed at the site to select and design an appropriate remedy.

RESPONSE 53: The effectiveness of oxidation remedies is typically confined to a limited area near the injection points. While other remedies are also limited in the areal extent of their effectiveness, oxidation remedies are particularly so, and generally require more detailed knowledge of contaminant distribution than other remedies.

COMMENT 54: Comment 25: P. 11, Item 5 - Toxicity, Mobility & Volume, Para. 1: None of the proposed approaches reduce toxicity, mobility, or volume of the portions of the plume that have already migrated off-site and downgradient.

RESPONSE 54: See Response 42.

Section 8: Summary of the Proposed Remedy:

COMMENT 55: Comment 26: P. 13, Para. 2: See previous comments regarding costs. The costs presented are very low and unrealistic because the underlying design basis used to develop these costs is unrealistic.

RESPONSE 55: If the design indicates that the level of effort needed must be increased, additional injection points, air sparging wells etc. may be installed.

COMMENT 56: Comment 27: P. 13. Bullet No. 3: Time frame should not be limited to five years unless a contingent, more-aggressive remedy is defined in the PRAP.

RESPONSE 56: All time periods are for developing cost estimates to compare alternatives on an equal basis. The remedy will operate until the remedial goals are attained, or the Department determines that it is no longer effectively operating.

COMMENT 57: Comment 28: P. 13, Bullet No. 6: All provisions of the site management plan should be extended to include off-site areas impacted by Photocircuits. In addition, Pall has already paid for the installation of a soil vapor mitigation system at the City of Glen Cove property. At least some portion of the plume in that area is related to the Photocircuits site and should be addressed in the PRAP.

RESPONSE 57: See Response 42.

Tables and Figures:

COMMENT 58: Comment 29: As indicated previously in Comment 9, there appear to be errors in Table 2. These errors should be researched and corrected. Additional tables may need to be provided to better clarify the presentation of data. The figures need to be properly scaled. As indicated in Figure 3, it is clear that many areas of the site have never been investigated. Additional investigation is warranted to ensure that all source areas have been identified and will be addressed in the PRAP.

RESPONSE 58: The data presented in the PRAP was checked before inclusion in the ROD and appropriate revisions made to Table 2. Additional tables providing greater detail are beyond the scope of the PRAP, however, tables providing additional sampling results are found in the "Source Area Investigation, Sea Cliff Industrial Area, Glen Cove, New York," the "Preliminary Site Investigation" and other documents cited in the PRAP, and in the Administrative Record of the ROD. These documents are available in the document repositories.

The following comments are taken from a letter received from Barton & Loguidice, P.C. (B&L) on behalf of Photocircuits, Inc., dated September 26, 2007:

Selection of Proposed Remedy

As you are aware, Photocircuits has been conducting an extensive remedial program at this site since 2000, under NYSDEC supervision. This remedial program includes a soil vapor extraction (SVE) system in the contaminant source area (now shut down), a bioremediation program to degrade contaminants in-situ in the contaminant source area, and hydraulic control of contaminated groundwater downgradient of the contaminant source area (essentially PRAP Alternative 2). The proposed remedy (PRAP Alternative 5) would basically incorporate a new technology, air sparging, to replace hydraulic control in the current remedial program at the site. We concur with the use of bioremediation and have been requesting to be allowed to make supplemental substrate additions since April 2004. However, we have several concerns regarding the technical feasibility of air sparging and the validity of the remedy selection process.

COMMENT 59: 1. The selection of a remedy must be done in a manner consistent with the National Contingency Plan (NCP) (or in a manner not inconsistent with the NCP for a governmental agency). The NCP requires that a Feasibility Study (FS) be performed to evaluate remedial alternatives against an established set of criteria. Photocircuits prepared an FS, and submitted the FS report to NYSDEC in late 2006; the FS did not include air sparging as a possible remedial technology, nor was it included in any of the remedial alternatives. The rationale provided in the PRAP contains technical errors (described below) and, in any event, does not rise to the level of evaluation mandated by an FS under the NCP. Aside from the technical concerns identified below, implementation of the proposed remedy might be in violation of the NCP.

RESPONSE 59: 6 NYCRR Part 375-2.8 Section c, Subsection 4, article 2 states that:

"The Department shall select the remedy for the site from among the feasible alternatives:
(i) developed and evaluated by the feasibility study; or
(ii) developed by the Department in addition to those presented by the feasibility study.

The air sparging portion of the preferred remedy was developed by the Department. The selected remedial program was chosen in accordance with the New York State Environmental Conservation Law and is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300), as amended.

COMMENT 60: The PRAP incorrectly indicates that air sparging was part of the Interim Remedial Measure (IRM) at the site; only soil vapor extraction (SVE) was employed during the IRM. A pilot test was conducted at the site in June 1999 by McLaren/Hart to evaluate the viability of air sparging. The results of that testing were mixed, and it was later determined by B&L that air sparging was not a preferable technology for the shallow saturated zone at the site (generally down to 20 feet below ground surface). The proposed remedy would employ sparging at a much greater depth (reportedly down to 100 feet below ground surface). We don't believe that it is not reasonable to use a remedial technology that has been tested at the site and shown to be ineffective, and then increase the size and depth of the area to be addressed with the technology.

RESPONSE 60: The Department's records indicate that an IRM work plan proposed by Photocircuits in 1997 included pilot testing air sparging along with soil vapor extraction. That pilot test was held in 1999 and the results recommended air sparging along with soil vapor extraction to remediate contamination. Subsequently, in 2000, Photocircuits elected to submit a work plan proposing an IRM consisting only of soil vapor extraction. Based upon this information, the text describing the IRM has been modified to clarify this work. Contrary to your note, the air sparging proposed in the IRM pilot study was found to be successful and recommended to be continued. Consequently, the Department believes that the air sparging in the proposed remedy, despite being carried out in a different location than the IRM pilot study area can contribute to the remedy's overall effectiveness.

COMMENT 61: The PRAP dismisses the effectiveness of the current hydraulic control system by stating "The operation of the hydraulic restraint system has not resulted in significant decrease in downgradient (north of Sea Cliff Avenue) contaminant concentrations". The source of the data for this conclusion is not clear, and the data is not provided, discussed, or even referenced within the PRAP. We have extensive water quality data from the hydraulic control wells

which demonstrate that the system is performing its stated function. Both the Pall Corporation and NYSDEC have previously alleged possible contaminant migration from Photocircuits property onto the Pall property. Without resurrecting the dispute, we would remind you that the Pall site is a listed state superfund site with soil and groundwater contamination from its own operations with contaminants similar to those on the Photocircuits site. We therefore disagree that the existing hydraulic control system is not effective and question the basis on which the effectiveness of the existing hydraulic control system is challenged.

RESPONSE 61: While the hydraulic control system has been demonstrated to capture a portion of the contaminated groundwater migrating downgradient from the site, several factors influence its effectiveness. These include:

- The hydraulic barrier wells are only installed to a depth of 80 ft bgs. Contaminated groundwater is known to exist below this depth.
- The hydraulic barrier well boring logs indicate the presence of low-permeability soils. These may indicate that preferential pathways for groundwater flow exist which could allow contaminated groundwater to pass through the barrier.
- Since at least August 2003, the system has been operating at less than its design specification of 3 gpm/well. Operating at less than the design capacity curbs the interception of migrating groundwater.

Further, sampling results from monitoring wells located along the north side of Sea Cliff Avenue directly downgradient of the hydraulic control wells installed on the Photocircuits site does not support complete capture of the contaminated groundwater migrating downgradient from the site. Levels of VOCs in these wells during the period of operation of the hydraulic control system do not indicate that contaminated groundwater from the Photocircuits site has been prevented from migrating downgradient. Information about the sampling of these wells is contained in a number of reports, most recently, "Pall, In-Situ Chemical Oxidation Phase II Pilot Test and Source Evaluation Report," September 2007, prepared by Apex Companies LLC. This report is available in the document repositories.

COMMENT 62: In the description of the air sparging technology, there is repeated reference to "oxidation" of contaminants. It is not clear whether this refers to chemical oxidation of contaminants or biologic oxidation (aerobic degradation) of contaminants. The contaminants present at the Photocircuits site (predominantly chlorinated ethenes and ethanes) will not oxidize chemically by simply adding oxygen (by injecting air) into the subsurface; some of the daughter compounds of the ongoing bioremediation program (notably chloroethane and vinyl chloride) can be aerobically degraded, but the

remaining suite of chlorinated compounds are not degraded aerobically. Thus, the application of air sparging will not have the stated "oxidation" benefits stated in the PRAP.

In summary, we believe that the use of air sparging is not technically feasible, and that Alternative 2 (employing hydraulic control) is the appropriate remedial plan for the site.

RESPONSE 62: The sparging component of the proposed remedy will aid in the aerobic degradation of some VOC contaminants, notably chloroethane and vinyl chloride. In addition, if needed, the sparging can contribute to the removal of contamination from the groundwater by increasing volatilization. Therefore, the sparging is an important and potentially effective component of the proposed remedy.

As detailed in the response to comment 61, and in the PRAP, the Department does not believe that hydraulic control, as currently implemented, is an appropriate remedy for this site.

Proposed Land-Use Restrictions

COMMENT 63: The PRAP proposes imposition of institutional controls ("limiting the use and development of the property to commercial/industrial") for the property in the future. As presented in the PRAP, these possible restrictions are overly broad, burdensome, unreasonable, and not based on available data. The northeast corner of the site is underlain by contaminated groundwater, and we recognize that for practical purposes this area may have future-use limitations to allow the continuing remedial program. However, large portions of the property are not underlain by site-related groundwater contamination and have been used for historically "clean" activities such as product storage, offices and parking. By placing restrictions on "the property", needless restrictions are placed on these unaffected portions of the property.

We recommend that the definition of "the site" for the purposes of 6 NYCRR Part 375 be changed from its current designation (which includes all of the property located at 31 Sea Cliff Avenue) to just the northeast corner of the site, where the remedial program will be operating.

RESPONSE 63: Site reclassification or modification is subject to 6NYCRR Part 375. The site boundary description in the Registry will be revised by the Department as appropriate based upon either new information regarding the nature and extent of contamination present at the site; or a portion of the site being remediated to allow the unrestricted use of that portion of the site. Based upon the regulations, the Department does not agree that current information allows the site boundary description to be revised.

APPENDIX B

Administrative Record

Administrative Record

Photocircuits Corporation Site
Operable Unit No. 1
Site No. 130009

1. Proposed Remedial Action Plan for the Photocircuits Corporation site, Operable Unit No. 1, dated September 2007, prepared by the Department

2. Order on Consent, Index No. W1-0713-94-12, between the Department and Photocircuits Corporation, executed on March 31, 1997

3. "Source Area Investigation, Sea Cliff Industrial Area, Glen Cove, NY," September 1992, prepared by H2M Group

4. "Results of Preliminary Site Investigation, 31 and 45A Sea Cliff Avenue Properties," November 1996, prepared by McLaren Hart

5. "Remedial Investigation/Interim Remedial Measure Work Plan, Photocircuits Corporation, Glen Cove, New York," March 1997, prepared by McLaren Hart, Inc.

6. "Remedial Investigation Report, 31 and 45A Sea Cliff Avenue Sites, Photocircuits Corporation, Glen Cove, NY," September 1998, prepared by McLaren Hart, Inc.

7. "Work Plan 2000 for Remedial Investigation (RI) Completion, Interim Remedial Measure (IRM) Implementation and Feasibility Study (FS)," March 2000, prepared by Barton and Loguidice

8. Quarterly Progress Reports, Photocircuits Corporation, 2000 to 2004, prepared by Barton and Loguidice

9. "Remedial Design, Groundwater Hydraulic Control System," April 2002, prepared by Barton and Loguidice

10. "Focused Feasibility Study, Photocircuits Corporation, 31 Sea Cliff Avenue, Glen Cove, New York," October 2006, prepared by Barton and Loguidice

11. "Pall, In-Situ Chemical Oxidation Phase II Pilot Test and Source Evaluation Report," September 2007, prepared by Apex Companies LLC

12. Email received from Pat Tracy, of Glen Cove, dated September 21, 2007

13. Letter received from William B. Palmer, Senior Vice President of the Pall Corporation, dated October 19, 2007

14. Letter received from Barton & Loguidice, P.C. (B&L) on behalf of Photocircuits, Inc., dated September 26, 2007