

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

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy would meet applicable environmental laws, regulations, standards, and guidance.

Chemical specific and Action-Specific SCGs are identified in Tables 3-1 through 3-6 of the FS report. The main SCGs identified for this site are: NYSDEC Class GA Groundwater standards as promulgated in 6 NYCRR 703, dated June 1998; TAGM 4046: "Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives Levels"; NYSDEC Part 212 (air emission controls), and Air Guide-1 ("Guidelines for the Control of Toxic Ambient Air Contaminants).

Alternative No. 1 would not achieve compliance with the chemical-specific SCGs for soil or groundwater. Alternatives Nos. 2 and 3 are expected to eventually achieve compliance with the chemical-specific SCGs. Since Alternative No. 3 would more aggressively treat contaminants in Source Area No. 1, it would have a better chance of achieving SCGs in a reasonable amount of time. Alternative No. 4 would be expected to achieve compliance with the chemical-specific SCGs for soils but not for groundwater because it lacks the groundwater collection and containment features given in Alternatives 2 and 3.

Each alternative evaluated would comply with action-specific SCGs; approvals necessary for implementing these alternatives would be obtained before initiating the remedial action. No location-specific SCGs were identified.

2. 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.

Alternatives No. 2 and 3 would be protective of human health and the environment. The primary difference between the two alternatives lies in the approach to remediating DNAPL and highly contaminated soils in the saturated zone in Source Area 1. Alternative No. 2 uses the traditional extraction and treatment scenario at the source area, coupled with downgradient hydraulic containment via extraction wells. Alternative No. 3 uses an innovative technology (Fenton's reagent (or other chemical oxidant)) to remediate DNAPL and saturated soils, and is also coupled with downgradient hydraulic containment via extraction wells. It is expected that the Fenton's reagent (or other chemical oxidant) could remove more of the DNAPL mass than a traditional extraction well. However, in either approach it is likely that residual DNAPL would remain, thus serving as a continual source of groundwater contamination. The possible presence of localized "hot spots," if identifiable and removed for off-site thermal destruction, could reduce the lifetime and costs for the treatment systems.

Alternatives No. 1 and 4 do not provide for adequate protection of the environment regarding on-site contaminated groundwater.

Alternative 3, with its combination of aggressive source area treatment and hydraulic containment, is believed to best able to achieve the remedial action objectives given in Section 6.

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.

Alternatives No. 2, 3 and 4 involve intrusive work, which could cause releases of contamination during installation of the remedial systems. These alternatives would require excavation of trenches for piping, which may pose disruptions to Atlantic. Under Alternatives 2, 3 & 4, trench excavation for the SVE system could generate dust and vapors that could migrate around the site causing potential risks to the workers via the inhalation pathway. Suppression measures would be used to decrease the generation of dust, and air quality monitoring would be used to determine if additional personal protective equipment would be necessary. During the design of the remedy, a Community Health and Safety Plan would be developed to insure that residents living in the vicinity would not be affected by remedial activities. Alternative No. 1 would not cause releases of contamination or disruption to Atlantic operations.

Alternative 2 would take approximately 6 to 9 months to construct. Alternative 3 and 4 would take about 12 to 18 months for the construction of the remedy.

Application of Fenton's reagent (or other chemical oxidant) (Alternatives 3 and 4) would generate heat, vapors, and could possibly make contaminants more mobile if not controlled properly. By first applying the process on a small scale, monitoring frequently, installing and operating a vapor collection and treatment system, and using dilute concentrations of the reagent, it is believed that these risks can be kept to a minimum.

Alternatives No. 2 and 3 are expected to achieve the remedial action objectives within a 30-year timeframe; although, as noted previously, there could be areas on site where these objectives may not be met. However, if the use of Fenton's reagent is able to greatly reduce the DNAPL mass, then Alternative No. 3 may be able to more effectively meet the remedial action goals than Alternative No. 2. Alternatives No. 1 and 4 are not expected to achieve these objectives. Alternative No. 4, however, if augmented by groundwater remedial actions for the off-site Operable Unit, may also achieve these objectives.

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 controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives 2 and 3 employ a combination of containment and permanent treatment to achieve the remedial goals for the site. Alternative 3 would provide a greater degree of permanent treatment by using Fenton's reagent, because the use of Fenton's reagent would likely treat a larger quantity of PCE than what would be removed under Alternative 2. Given an unlimited amount of time, however, the amount of PCE removed from the aquifer by Alternative 2 could approach the amount treated in-situ by the use

of Fenton's reagent. Alternative 4 includes the same level of permanent treatment as Alternative 3 but lacks the groundwater containment features.

Alternatives 2 and 3 rely, in part, upon the long-term operation of the groundwater containment system to achieve the remedial action objectives. Although these systems are reliable, they can break down and require regular inspection and maintenance. Due to the presence of residual DNAPL, the aquifer may remain impacted for an indefinite period. Alternative 3 would be more aggressive at removing these residuals.

Alternative No. 1 would rely upon natural attenuation as the only mechanism for achieving the remedial goals. Since this would not occur in a reasonable amount of time and releases of contaminated groundwater to off-site areas would continue, it is not considered effective.

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.

Alternatives No. 3 and 4 provide for the greatest reduction of toxicity and volume (mass) of on-site contaminants, as the Fenton's reagent (or other chemical oxidant) would reduce contaminant concentrations in the highly contaminated Source Area 1.

Alternatives No. 2 and 3 provide for the greatest reduction of mobility of on-site contaminants, as the downgradient groundwater pumping would eliminate, to the extent practicable, migration of the groundwater that does not attain SCGs.

Alternative No. 4 would provide moderate benefit for the reduction of toxicity, mobility and volume of on-site contaminants, as the alternative would reduce contaminant concentrations in soil and groundwater in Source Area 1 and in soils in Source Areas 2 and 3.

Alternative No. 1 would not reduce the toxicity, mobility and volume of on-site contaminants, except as occurs through natural attenuation.

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

Alternatives No. 1, 2, 3 and 4 are technically implementable with available methods, equipment, materials, and services. Alternatives 3 and 4 would require use of Fenton's reagent (or other chemical oxidant). Currently, there are only a few vendors available who have patented rights to apply Fenton's reagent and this may limit competitive bidding. This could also be a reason for using a different chemical oxidant (e.g., potassium permanganate). Physical implementation issues associated with the use of Fenton's reagent include the prevention of the production of potentially explosive vapors, insufficient mixing or contact, pH adjustments, and determining the correct concentrations of the reagent to use. These can be resolved by the pilot-scale study.

Alternatives No. 1, 2, 3, and 4 are also administratively implementable.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 2.

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 Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A presents the public comments received and the Department's response to the concerns raised. In general the public comments received were supportive of the selected remedy. Most of the comments received focused on concerns about potential health effects from exposures that may have occurred up until 1982 when the surrounding water supply wells from the former Jamaica Water Supply System were still in use.

SECTION 8: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 7, the NYSDEC is selecting Alternative 3: Groundwater Extraction and Treatment, Soil Vapor Extraction and Treatment, and Fenton's reagent (or other chemical oxidant) application in Source area 1 as the remedy for this site.

This selection is based on the evaluation of the four alternatives developed for this site. The site is highly contaminated with VOCs (PCE in particular) and a significant release of contaminants to the groundwater is continuing. The contaminated groundwater is migrating off site. Therefore, the "No Action" alternative is not protective of the environment and is not selected.

Alternatives 2, 3, and 4 all provide for the treatment of unsaturated soils within Source Areas 1, 2, and 3 using soil vapor extraction and treatment and construction of an asphalt covering in the impacted areas. Alternative No. 4 does not include containment of impacted, on-site groundwater. Rather, it is assumed that impacted groundwater would be allowed to naturally attenuate or would be contained as part of an off-site remedy. The migration of the groundwater at significant levels of contamination would continue for many years under Alternative 4.

The excessive depth to a confining layer at the site precludes installation of barrier walls. However, Alternatives No. 2 and 3 would provide hydraulic containment through groundwater pumping. Alternatives No. 2 and 3 would be protective of human health and the environment. The primary difference between the two alternatives lies in the approach to remediating groundwater, DNAPL and soils in the saturated zone in Source Area 1. Alternative No. 2 would use a traditional extraction and treatment scenario in the source area, coupled with downgradient hydraulic containment using extraction wells. Alternative No. 3 uses an innovative technology (Fenton's reagent (or other chemical oxidant)) to remediate the saturated source area and is also coupled with downgradient hydraulic containment using extraction wells. It is expected that the Fenton's reagent (or other chemical oxidant) could remove more of the DNAPL mass than a traditional extraction well. However, in either approach it is likely that residual DNAPL will remain, thus serving as a continuing source of groundwater contamination.

Table 2
Remedial Alternative Costs ⁽¹⁾

Remedial Alternative	Capital Cost	Average Annual O&M ⁽²⁾	Total Present Worth
Alt. 1- No Action ⁽³⁾	\$0	\$6,200	\$95,000
Alt. 2 - Groundwater Extraction and Treatment and Soil Vapor Extraction	\$1,470,000	\$180,000	\$4,234,000
Alt. 3 - Groundwater Extraction and Treatment and Soil Vapor Extraction with Fenton's Reagent ⁽⁴⁾	\$2,153,000	\$158,000	\$4,576,000
Alt. 4- Fenton's Reagent ⁽⁴⁾ and Soil Vapor Extraction ⁽⁵⁾	\$1,423,000	\$50,000	\$2,184,000

NOTES:

(1) Costs are rounded to the nearest \$1,000. Cost estimate assumptions are presented in the "Draft Feasibility Study, West Side Corporation Site, Site No. 2-41-026", prepared by TAMS Consultants, Inc. and GZA GeoEnvironmental of New York, dated January 2000.

(2) Average Annual O&M Cost Estimates are based on the estimated total present worth of O&M costs, calculated as an annual cost for a 30-year timeframe and a 5% discount rate.

(3) The No Action alternative includes groundwater monitoring at the Site for 30 years.

(4) Fenton's reagent is an innovative technology that is provided as an aggressive approach to treating the highly contaminated saturated soil and groundwater within Source Area 1.

(5) This alternative does not include containment of on-site groundwater. Rather, it is assumed that impacted groundwater will be allowed to naturally attenuate or will be contained as part of an off-site remedy.

For consistency, the cost estimates are based on the assumption that operation and maintenance of the remedies will continue for a period of 30 years. The high concentration of PCE (as high as 210,000 ppb in groundwater and as high as 7,100,000 ppb in soil, in Source Area 1) would likely require the traditional pump and treat process (Alternative 2) to continue beyond 30 years. This would make the cost effectiveness of Alternative 2 less than is indicated by the calculations based upon 30 years. The use of Fenton's reagent, is provided as an aggressive approach to treating the highly contaminated saturated Source Area 1. Using Fenton's reagent to remediate the chlorinated VOCs and DNAPLs is promising, rapid, and expected to reduce the contaminants in groundwater to acceptable levels within a more reasonable time. Therefore, Alternative 3 is preferred over Alternative 2.

As discussed in section 7 above, there are technical concerns with the use of the Fenton's reagent. Subsurface heterogeneities may inhibit the reagents from contacting the PCE, dissolved phase in water, and PCE DNAPL. The process can produce explosive gases. The change in chemistry may result in precipitation of metals, which could promote aquifer plugging. Since the site will continue to be used by the current tenant (Atlantic) during remediation, a dilute solution of the reagent will be applied in four to five phases for safety reasons. A pilot-scale treatability study will be necessary to assess the system design and address the effectiveness and safety of the Fenton's reagent process. The pilot-scale study will be expanded to full scale application only after all technical and safety concerns are resolved. If the use of the reagent is to be terminated based on the pilot-scale study, the traditional pump and treat method as described in Alternative 2 will be used to treat the high level of contamination in Source Area 1. Provision will be made in design to install additional wells in the source areas and pump and treat the additional volume of groundwater.

The estimated present worth cost to implement the remedy is \$4,576,000. The cost to construct the remedy is estimated to be \$2,153,000 and the estimated average annual operation and maintenance cost for 30 years is \$158,000.

The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.
2. A pump test and a treatability study to provide information to efficiently design the groundwater extraction and treatment system.
3. Design and implement a pilot-scale treatability study to assess the effectiveness of the Fenton's reagent (or other chemical oxidant) application. If feasible, the pilot study will be expanded to a full scale operation. If the use of the reagent is to be terminated based on the pilot-scale study, the design will be modified to include the traditional pump and treat methods described in Alternative 2 to treat the high level of contamination in Area 1. Before Fenton's reagent (or other chemical oxidant) application, hydraulic containment will be in place.
4. Design and implement a pilot test for the SVE system to confirm the effectiveness of the technology and to evaluate full-scale system design.
5. Installation of a groundwater extraction and treatment system, including extraction wells, piping and pre-treatment system.
6. Installation of a soil vapor extraction and treatment system, including piping and pre-treatment system.
7. Construction of an on-site pre-treatment building. The building will house the groundwater extraction and treatment system and soil vapor extraction and treatment system equipment.

8. Install an asphalt pavement cover over on-site Source Areas 1, 2, and 3 not currently paved, to provide a surface seal to enhance the effectiveness of the SVE system, and protect the groundwater extraction and SVE system piping from traffic.
9. Since the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program will be instituted. Groundwater and soil samples will be collected and analyzed regularly. This program will allow the effectiveness of the groundwater extraction and treatment system and soil vapor extraction and treatment system to be monitored and will be a component of the operation and maintenance for the site.
10. To prevent future exposures to subsurface contaminants, the Department will seek to have restrictions placed upon the use of the site.

SECTION 9: HIGHLIGHTS OF COMMUNITY PARTICIPATION

As part of the remedial investigation process, a number of Citizen Participation activities were undertaken in an effort 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:

- A repository for documents pertaining to the site was established.
- A site mailing list was established which included nearby property owners, local political officials, local media and other interested parties.
- A fact sheet was mailed in June 1999.
- A fact sheet and a notice of the public meeting to present the proposed remedial action plan was mailed in February 2000.
- A public meeting to present the proposed remedy was held on March 8, 2000.
- The public comment period was extended 30 days to allow for another public meeting and additional time to review the site documents.
- A follow-up public meeting was held on April 3, 2000.

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY
West Side Corporation Site - Operable Unit No. 1 (On Site)
Proposed Remedial Action Plan
Jamaica, Queens County
Site No. 2-41-026

The Proposed Remedial Action Plan (PRAP) for Operable Unit No. 1 (OU-1) of the West Side Corporation Site, was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on February 23, 2000. This Plan outlined the preferred remedial measure proposed for the remediation of the contaminated soil and groundwater at the West Side Corporation Site. The preferred remedy included installation of a groundwater extraction and treatment system to remove contaminated groundwater for treatment and provide for the containment of groundwater on site; a Soil Vapor Extraction and Treatment (SVET) system to treat the contaminated soils in Source Areas 1, 2, and 3; asphalt pavement in Source Areas 1, 2, and 3 to enhance the effectiveness of the SVET system; a pilot-scale study to assess the effectiveness of the application of Fenton's reagent (or other chemical oxidant, e.g., potassium permanganate) to reduce the volume of highly contaminated PCE saturated soil and groundwater in Source Area 1 (to be expanded to full scale operation if feasible); and a long-term operation, maintenance, and monitoring program.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability.

A public meeting was held on March 8, 2000 which included a presentation of the results of the Remedial Investigation (RI) and the Feasibility Study (FS) 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. In response to a written request, the comment period was extended 30 days from March 24 to April 24, 2000. In response to requests at the March 8 public meeting, a second public meeting was held on April 3, 2000 to present information about site to those who were not able to attend the March 8, 2000 meeting. Comments received at those meetings and in writing have become part of the Administrative Record for this site. This Responsiveness Summary responds to all questions and comments raised at the March 8, 2000 public meeting, April 3, 2000 public information meeting and to the written comments received.

The following are the comments received at the public meetings, with the NYSDEC's responses:

Site Related Comments:

1. Q. Where is the contamination moving? How widespread is the contamination?
 - A. The contaminated groundwater from the site appears to be moving in a southerly direction. The site is located at 107-10 180th Street, south of 180th street. The focus of this part of the overall project has been on-site contamination and its proposed remedy. Off-site contamination will be investigated and addressed in the near future. On site, we have found that subsurface soil and groundwater have been contaminated by solvents used in the dry cleaning industry. The most significant soil contamination extends approximately 40 feet below the ground surface in Source Area No. 1 and generally less than 10 feet below grade in Areas 2 and 3. Surface soil is not significantly contaminated. Therefore, the contamination does not pose a threat to people

walking on the site or to the school buses parked on the site. Tetrachloroethene, also known as perchloroethylene (PCE), was found at the highest concentrations. PCE was found in groundwater at concentrations much higher than the groundwater standards near the location of the former above ground PCE storage tanks with decreasing concentrations identified downgradient. The extent of off-site contamination is not known at this time.

2. Q. When you say groundwater, do you mean the water that is free in the ground, or water from the pipes?

A. By groundwater, we mean water that saturates the soil below what is often called the "water table." At this site, the water table is about 10 to 18 feet below the ground surface. This water can move slowly by gravity through the soil both horizontally and vertically. It can also be removed from the ground in large quantities using specially designed wells.

3. Q. Are there underground storage tanks?

A. There were several underground storage tanks installed at the site for the storage of fuel oil and heating oil. Exploratory investigations (test-pits excavated along the west property line where the tanks were believed to have been installed) indicated that the tanks have been removed. The current occupant is using natural gas for heating the building. However, a partially filled heating oil underground tank exists at the site.

4. Q. Who is paying for all this work? What priority does this site have for cleanup? What are the chances that the site will be cleaned up? Will the West Side Corporation pay for the costs associated with cleaning up the site?

A. The RI/FS has been conducted by NYSDEC under the State Superfund program, funded by the 1986 Environmental Quality Bond Act. At the completion of the investigation, the Department will seek to have the responsible parties remediate the site. If they do not, the remediation will be carried out using bond act money. After the completion of the remediation, cost recovery actions will be implemented. This site is a high priority site for the Department. After the completion of the OU-1 RI/FS, the next steps include completion of the off-site investigation and the design and construction of the on-site remedy. The completion of the off-site RI/FS should take less than one year. Completion of legal requirements and the remedial design is likely to take about two years. Although there is some uncertainty regarding whether future funding of the project will come from the State Superfund or from responsible parties, we do not expect any significant delays in beginning construction at this time. West Side Corporation is not paying for the work at the moment.

5. Q. If the value of the properties in the neighborhood go down due to the contamination, who will be responsible?

A. The law contains provisions for people to seek recovery of damages by pursuing the responsible parties.

6. Q. When did you first discover the PCE problem?

A. The first indication we are aware of came by a contact from the Corporation Counsel of the City of New York in November of 1995.

7. Q. What year was the site listed?

A. The site was listed in the registry in August of 1997.

8. Q. What is an aquifer? How many aquifers are there in this area?
- A. Generally, an aquifer is one or more layers of rock or soil that is saturated and sufficiently permeable to yield economically significant quantities of water to wells or springs. An aquifer includes any geologic material that is currently used or could be used as a source of water. All geologic materials combined into one aquifer are referred to as a single hydrologic unit. We believe there are four aquifers in the area.
9. Q. How effective would the soil vapor extraction system be to clean up the contamination in the soil?
- A. Soil vapor extraction (SVE) systems are designed to remove contaminants that have a tendency to volatilize or evaporate easily. SVE removes volatile organic compounds (VOCs) and some semi-volatile compounds (SVOCs) from soils beneath the ground surface in the unsaturated zone, that part of the subsurface located above the water table. Vacuum is applied through a system of underground wells and pipes and contaminants are pulled to the surface and treated as necessary. Based on the soil and contaminant characteristics and the depth to the water table, we believe that SVE can remove a large percentage of the shallow soil contamination at this site.
10. Q. Have you taken into consideration the fact that the water table is very high in this area?
- A. We know that parts of Queens is experiencing problems with a high water table. Based on the many soil borings we have installed at this site and several water level measurements, we know that the depth to the water varies from about 10 to 18 feet below the surface. The design of the SVE system will take into consideration the location of the water table.
11. Q. What effect does the rising water table have on the contamination?
- A. The fluctuation in the water table may "smear" the contamination in soil as the water level varies. There is no evidence that water table could rise high enough at this site to create an exposure on the surface to contaminated groundwater.
12. Q. What is the effect of the site contamination on the major water supply aquifer beneath the clay layer?
- A. The clay layer starts at about 70 to 80 feet below ground surface. The thickness of the clay layer is approximately 30 feet. Significant levels of contamination are present in the shallow (up to 30 feet to 40 feet below surface) groundwater zone. The levels of contamination decreased significantly from the shallow to the deep (60 feet to 70 feet below surface) zone. Groundwater quality just above the clay layer is close to the drinking water standards. The clay layer was not penetrated during the RI since there is no indication of a threat to the aquifer below the clay and it is bad practice to penetrate a competent barrier layer without good cause and without taking great care in how that is done.
13. Q. How deep is the clay layer? Have you tested the clay? Have you tested the groundwater below clay layer?
- A. See answer to question 12 above.
14. Q. There should be a general repository for the documents for the public to see. Also there is a need to have another meeting with the community prior to the end of the comment period on April 24.
- A. A document repository for this site has been established and documents placed at the Queens

Borough Public Library, located at 89-11 Merrick Boulevard, Jamaica. Also, documents are available at NYSDEC region 2 Office, located at 47-40 21st Street in Long Island City. A follow-up meeting was held on April 3, 2000.

15. Q. Wouldn't it be better to propose an on-site remedy after the off-site investigation was completed?
- A. Based on the information available to us regarding the on-site contamination, we believe that it is best to avoid delay and move ahead now with the on-site remedy. Any off-site remedy that may be needed will either consist of elements independent of the on-site remedy or will be incorporated into the on-site remedy.
16. Q. There is another dry-cleaning industry across the street from the site. Why not investigate that site?
- A. We are aware of another dry cleaning product industry in the vicinity and we have already obtained some data from the area. As part of the off-site investigation, we will be looking into the possibility of any other sources of contamination.
17. Q. Why didn't some of the home owners in the area receive the fact sheet?
- A. The mailing list was limited to several blocks in the vicinity of the site. Due to the density of the population in the area, it was not practical to cover an extended area through direct mailing. NYSDEC also provides the fact sheets and meeting notices to the media in the area. The media generally reports the contents of the fact sheets and/or meeting notices.
18. Q. Have you planned periodic meetings for informing the public on the progress of the work? Approximately when?
- A. There will be an off-site study at the end of which there will be a similar public meeting to inform the public on the findings.
19. Q. Why cannot you give update of your progress as you go along?
- A. We would be glad to provide updates on the progress as soon as there is significant information to report.
20. Q. Quarterly progress reports and/or public meetings should be held.
- A. NYSDEC generally mails fact sheets once every six months or at important milestones. We would be glad to speak with interested individuals as often as they like and provide updates as they become available. Regarding formal public meetings, we suggest that they be held only when there is significant information to report.
21. Q. Are there any other contaminated sites in the area?
- A. There are four other Registry sites within about 5 miles of this site. Information on each of these sites was sent to the questioner in a letter dated April 12, 2000.

Jamaica Water Supply and Drinking Water Related Comments:

22. Q. In 1975, when it was found that Jamaica Water Supply (JWS) well number 24 was contaminated, why did it take so long to shut down the well?
- A. The Jamaica Water Supply Company operated the wells at Station 24 (well number 24, 24A, 24B and 24C) intermittently based on demand, generally during the summer season. In 1975, an

odor was detected in well 24. Water samples from well 24, well 24A and the storage tank (storage for finished water) were analyzed for organics and found to contain 17,100 ppb, 18 ppb and 1.3 ppb of PCE respectively. Well 24 was taken out of service immediately. Well 24A was closed in 1979, reopened in 1981 and last closed in 1982. Well 24B was last closed in 1982. Well 24C was also taken out of service in 1982. Drinking water standards for PCE were not created until after the Safe Drinking Water Act of 1978 and were initially set at 50 parts per billion (ppb). With the exception of well 24, the other wells were only used if the concentrations were below the standard.

23. Q. What are the sources of drinking water for the Jamaica area?

A. Approximately 90% of the drinking water supplied to the residents in Jamaica area comes from upstate surface water sources. The rest comes from groundwater wells in Jamaica area but not from wells near this site. All water regardless of source is tested and treated to insure that it is safe for consumption.

24. Q. Do water supply pipes go through the areas of contamination at the site?

A. No, water supply pipes do not go through the areas of contamination at the site.

25. Q. You said that the Jamaica Water Company wells were closed due to contamination. Why did we not know about it?

A. See answer to question 22 above. Also, water quality standards for PCE did not exist in 1975 and procedures for providing this type of information to community were not available.

26. Q. How big an area did the previous supply wells pull from?

A. We don't have the information needed to specifically answer the question but the data we have collected indicates that the capture zone of the previous supply wells (nos. 24, 24A, 24B and 24C) included the site area.

27. Q. The reason the JWS wells were closed was because of petroleum-related contamination from the runoff from JFK Airport. Where is that contamination going now?

A. The wells in the impacted area of the West Side Corporation site (nos. 24, 24A, 24B and 24C) were closed because of PCE contamination. JFK Airport is located at a considerable distance downgradient of the site and well outside of the area of influence of Station 24. Petroleum-related contamination from JFK Airport could not impact the wells in the vicinity of the site.

28. Q. How was the water mixed? When is the water tested, before mixing or after mixing? How often is the testing done?

A. Water from the production wells at Station 24 was pumped into the tanks located at Jamaica Water Supply property at 177th street where it was mixed and stored before distribution. Available information indicates that the testing was done from wells before mixing as well as from tanks after mixing and that there was no fixed schedule for testing.

Currently, samples for volatile organic chemicals are routinely collected from wells, not requiring treatment, on a quarterly frequency, and for wells that are being treated by air-stripping, on a monthly frequency.

29. Q. Where is pumping Station number 5 located?

- A. Pumping Station number 5 is located on 199th Street just north of Jamaica Avenue. It is not affected by contamination from this site.
30. Q. There are several tanks located at Jamaica Water Supply property at 177th street. What are these tanks used for?
- A. These tanks are used to store the water during off-peak hours.
31. Q. Is it true that the Jamaica area cannot receive upstate surface water for drinking water until water tunnel number 3 is complete?
- A. No, currently approximately 90% of the drinking water supplied to the residents in Jamaica area comes from upstate surface water sources.
32. Q. You said that the wells were closed in 1975. Are all the wells in the Jamaica Water Company closed?
- A. Well number 24 was closed in 1975. All other wells at Station 24 (well nos. 24A, 24B, and 24C) were taken out of service by 1982.
33. Q. What is the closest operating well?
- A. Wells 5 and 5A are the closest active wells in the vicinity of the site. These wells are located at 93-02 199th Street in Hollis Queens. See answer to question 29 above. Other active wells are well #59 and well #14. Well #59 is located south east of the site at Springfield Boulevard, north of Lucas Street in Springfield Garden area. Well #14 is located south west of the site at 144th Street north of Foch Boulevard. These wells have been used regularly for the last several years and are taken off line only when system demand are met.
34. Q. What is the source of water supply for the school bus company currently operating at the site?
- A. The school bus company located at the site is connected to the same public water supply as the surrounding area. Groundwater from the site is not used.
35. Q. Why is my drinking water murky and cloudy sometimes?
- A. Whenever there is some unusual activity in the distribution system (water main breakdown or sudden heavy demand) the sediment deposits in the system is disturbed and makes the water murky and cloudy.

Cloudiness (miliness) alone is often caused by air becoming entrapped in the water as it travels within the distribution system. This condition is not a public health concern. The cloudiness is temporary and clears quickly after the water is drawn from the tap and the excess air is released.

Health Related Comments:

36. Q. What can we do as homeowners to protect ourselves? Do we need filters for our water?
- A. The contamination at the site is below ground and there is no threat of exposure to the public. The water supply to the community is not affected by site contamination and is tested and treated to insure that it meets NYS drinking water standards.
37. Q. What are the health impacts from the site today and why did it take so long to get to this point?
- A. Because the contamination is below ground and no one is exposed to contaminated soil or

groundwater from the site, we do not believe there are any health impacts from the site today. There are indications that contaminated groundwater got into the water supply in the 1970s. It is not possible to say how much contaminated groundwater may have gotten to any particular user or what the concentration of contaminants in the water was at the time. The data we do have indicates that the concentrations were likely low and may have been below the current drinking water standards but these are only indications; specific data is not available. The length of time needed to get to this point is a reflection of many factors. These include the time needed to determine if the responsible parties are able and willing to undertake the work, the complexity of the site, the need to responsibly control the cost of the work (taking into consideration that there are no current exposures which lessens the urgency of the work), and the fact that the Department is simultaneously working on hundreds of similar sites.

38. Q. What is the implication of the groundwater contamination getting into the water supply? Are there any statistical analyses on the development of cancer and other diseases in the area?
- A. The Center for Environmental Health will work with the Cancer Surveillance Program to evaluate cancer incidence in the census tract that include the areas most likely to have been affected by PCE from public water supply wells. The area is contained in six census tracts that have boundaries that coincide with Liberty Avenue to the north, 180th Street to the east, Linden Boulevard to the south and Merrick Boulevard to the west. Overall cancer rates and rates of specific types of cancer among men and women will be evaluated for the period 1980 to the most recent year available.
39. Q. What changes have there been in the water supply in the last 20 years?
- A. There were no guidelines to look for organic chemicals prior to 1978 and the required analyses were primarily focused on bacterial contamination and hardness of water supplies. We have only been concerned with contamination from volatile organic contaminants such as PCE in the last 20 years. The water supply from the supply wells around the site were discontinued as soon as they were reported to have contaminants above acceptable health-based levels.
40. Q. You said that the site is paved and there is no health risks. What about the residential areas surrounding the site which are not paved?
- A. The data indicates that off-site contamination is only in groundwater that exists 10 feet or deeper below the ground surface and at relatively low concentrations. The goals of the off-site investigation to be completed over the summer include finding the full extent of the off-site groundwater plume of contamination, verifying the depth to water, and determining if there are any places where people could be exposed to contaminated groundwater. We will also obtain the data needed to evaluate possible off-site remedies.
41. Q. What if we are doing gardening, will we be exposed to contaminants?
- A. No. The contamination in the off-site areas is in the groundwater which is about 10 feet below the surface. There is no exposure threat to performing near-surface activities.
42. Q. What is impact of the contaminations on our children? They grew up in the neighborhood. Is any research being done in this area? Is a cancer study planned? In any neighborhood do you keep watch how people die of a particular ailment? We request that a study be done.
- A. There is no way to know the impact the PCE exposure may have had on the children living in this area in the 1970's. A request for a cancer study for the area has been made and is under

review. See answer to question 38 above.

43. Q. Several teachers at the local school located at 108-35 167th Street came down with cancer. There have been incidences of flooding of the basement at this school. Can water in the basement be the cause of the cancer? Can a cancer study be done among the teachers/students of the school?
- A. The off-site investigation to determine the extent off-site plume is underway. Teachers/students at the school would be included in a cancer study providing they reside in the study area. See answer to question 38 above.

Written Comments:

A letter dated March 15, 2000 was received from Mrs. Valerie Lewis of Jamaica, New York, which included the following comments:

- W-1. I am concerned about the report in The Queens Chronicle about the contamination at the Jamaica site about the toxin in the groundwater. Because a lot of people are getting cancer, I had my water tested on March 16, by the DEP. I haven't heard from them yet. The water smells and looks dirty and you can see things moving around in the water. Both me and my husband got cancer and I know a lot of other people have it. We used to live in that area. On my block a lot of neighbors die of cancer. I counted 20 people that have died just on my block. This is why I'm concerned.

Response: See answer to question 38 above. DEP has informed us that the laboratory test results were mailed to Ms. Lewis on March 27, 2000 and that the samples met all NYSDOH drinking water quality standards.

A letter dated March 20, 2000 was received from Monique Charlier of Jamaica, New York, which included the following comments:

- W-2. I read the article in the Chronicle, March 9, 2000, about a toxic spill in Jamaica. I live on 149th Street, Jamaica. I would like to know if that spill affects my area. My brother is a 78 year-old man, who had a lung operation about 3 years ago. Every time he goes out, he starts coughing. I thank Mr. Michael Sheridan, the assistant editor, about that article.

Response: The site is located on 180th Street. The source of the contamination is all below ground just on the site itself. To become exposed, people would have to dig into the soil on the site. There is an indication that contaminated groundwater extends to the south off-site but this water is approximately 10 feet below ground and we are not aware of any persons using groundwater in the area. It is very unlikely that the area of contaminated groundwater extends to 149th Street.

A letter dated March 18, 2000 was received from Marcella Young of Jamaica, New York, which included the following comments:

- W-3. I am writing in regards to the PCE that was disclosed and found in our water in 1992. I am very much concerned about the damage to all of us that live in the area where PCE is located. As residents of this community we are right in the middle of a very serious health hazard. Many of

our residents have experienced all sorts of illness, which may be caused by these chemicals which may be found in the water in which we drink, and cook with. Its extremely important for you to act upon this dangerous situation. Just think of how many families are in jeopardy. Why has this problem not been taken care of before. Now it's the year 2000, and this problem still has not been act upon. It seems as if this problem does not affect others because its not in their neighborhood. But it does affect us. Please look into this matter immediately. Thank you.

Response: As described above, at the public meetings, and in the documents available at the document repositories, the results of our investigation indicate that no one is being exposed to contamination that exists on this site today. Because there cannot be a health hazard if there is no exposure to contamination, we do not believe that this site presents an imminent threat. There are, however, very high levels of contamination in the soil below the ground surface and in the groundwater that begins about 10 feet below the surface. The Department has proposed an aggressive remedy to clean up this contamination to insure that it does not continue to spread or create a future threat to public health or the environment. An investigation will be completed this year to determine the extent of the off-site contaminated groundwater and to make sure that no one is exposed to this groundwater.

A letter dated April 18, 2000 was received from Sheldon F. Schiff, owner of the West Side Corporation, which included the following comments:

W- 4. After reading the study and attending the public hearing on April 3, 2000, I have the following comments:

The West Side Corp. business operation was a very "clean" operation from the day it moved to Jamaica in 1969. All products arrived in resalable containers, ready for delivery except for one chemical, perchloroethylene. This arrived in bulk form, via rail car or tanker truck and was stored in an "above ground" tank complex, with a maximum holding capacity of 50,000 gallons. It was never filled to capacity since delivery was always available on a next day basis. This tank farm was repeatedly inspected on a daily basis for any possibility of a leak. The product was very expensive and had all the proper petrometers and measuring devices in place.

The entire storage system was designed by the major chemical companies i.e.: Dupont, Dow, PPG, Ethyl etc. These companies periodically inspected the premises. No product was ever "dumped" spilled or leaked. The above ground tanks never showed any leakage up until the last day that the company was in business. To say that 2 or 3 other areas seem affected, seems highly impossible. I wonder if this could be caused by the chemical company, "Chemisales" that was a tenant across the street on 180th Street or from their neighbor, "Sootmobile".

You announced that the water table was safe under the clay layer below ground. Why can't the contaminated soil, in the one area of the tank farm be removed physically and save the state these millions of dollars. The cost of the clean up is far in excess of the property value. Why not "watch" the other 2 areas and only treat the one spot.

Response: The remedial investigation conducted at the site during 1999 showed high concentrations of tetrachloroethylene (also known as PCE) in subsurface soils and groundwater at the site. PCE

was found at significant levels in subsurface soils and groundwater at source area 1, which is the location where above ground tanks were installed and PCE was stored. PCE was also found at significant levels in source areas 2 and 3. Aerial photographs indicated that source area 2 was used for tanker trucks unloading. Although it is possible for PCE to migrate in the dissolved phase in groundwater from one place to other, it is unlikely that the PCE in soils in areas 1, 2 and 3 could have come from any other source than the site. The Soil Vapor Extraction (SVE) is intended to clean the highly contaminated soils in source area 1. Since the soils in source areas 2 and 3 are also highly contaminated, the proposed remedy includes the cleanup of the soils in those areas with the same SVE system. This will require increasing the size of the SVE system slightly and extending the piping to source areas 2 and 3 at minimal cost. All of the piping will be installed with minimum disturbance to the current operation. The cost of excavation and disposal of the contaminated soil is exorbitantly high due to the quantities and depth of the soil involved. Therefore, to physically remove the soil from any area would not be cost effective. Also, any physical removal would disturb the current operation at the site.

A letter dated April 24, 2000 was received from Douglas S. Greeley, P.E., Deputy Commissioner and Director, Bureau of Water and Sewer Operation, New York City Department of Environmental Protection (NYCDEP), which included the following comments:

W-5. We understand that this is an abandoned hazardous waste site which has been placed in the New York Registry, and that the NYSDEC is taking the lead on the investigation and cleanup of the site. The PCE contamination that you have documented in the soil and groundwater is a great concern to us given the site's proximity to several permitted water supply wells which are part of the New York City Groundwater System. We appreciate your efforts to remediate this site, and offer the following comments:

We have already lost the use of the water supply wells at Station 24 due to the contamination at this site, and are concerned that the same contamination has, or will, impact our wells at Station 6 and 33. The NYCDEP regards the aquifers as a resource to be protected. Have you studied the impacts of these water supply due to the contamination at the West Side site, and have you considered the protection of these supply wells in the evaluation of your remedy? Additionally, have you considered the long-term effects of the proposed remedy on the NYCDEP's ability to renew pumping from the groundwater system in this area?

Have you conducted a thorough well inventory to identify all the public water supply wells and commercial/industrial pumping wells in the vicinity in the West Side site? Have you evaluated the impact that pumping at those locations will have on your proposed remedy, particularly your planned groundwater extraction system which is intended to prevent further migration on contaminants from the site?

Have you identified all the groundwater de-watering sites located in the vicinity of the West Side site which may influenced the movement of the plume of contaminated groundwater from the site? Among others, the junior high school (IS-8) is of particular concern, since it is directly downgradient of the West Side site and has a permanent, full time drain system used to alleviate groundwater flooding problems in the basement of the school. This and other dewatering sites could influence the direction of the groundwater flow and movement of the off-site PCE plume.

Have you considered hot spot removal to accelerate completion of the remedy? The NYCDEP is concerned about the time required to achieve the remediation goals, particularly since the off-site investigation has not yet been implemented. Considering that the NYSDEC has always maintained a policy of requiring source removal at contamination sites, how will that policy be applied here?

Has the Remedial Investigation and Feasibility Study provided a thorough characterization of aquifer conditions in the vicinity of the site? There is an abundance of information available, both published and unpublished, regarding pumping rates and the resulting water level drawdown. This information could be very useful in evaluating the effectiveness, or lack of effectiveness, of the proposed groundwater extraction system.

The NYCDEP is very interested in working together with the NYSDEC to arrive at the most effective and expedient remedy for the West Side Corporation site. We believe that there may be several options available to work in collaboration toward the successful completion of this remediation project, and we look forward to discussing this with you further.

Response: The remedial investigation conducted at the site during 1999 showed that significant amounts of PCE contamination are in soil and groundwater at the site. The groundwater flow direction is generally towards the south and southwest and there are indications that the contaminated groundwater is moving off-site in the direction of the groundwater flow. The highest concentrations of PCE in groundwater were found in source area 1, with rapidly decreasing concentrations at the south property line. Wells nos. 24, 24A, 24B and 24C at Station 24 are located around the site. The groundwater flow direction at the site was affected by the operation of these wells and contaminated groundwater was pulled towards these wells during 1970's. These wells have been closed for a number of years and the flow direction appears to have reoriented with natural conditions. The pump and treat remedy will prevent the off-site migration of significantly contaminated groundwater. An investigation will be completed this year to determine the extent of the contamination off site. We do not recommend the renewal of pumping of the wells at Station 24. Wells at Station 6 and 33 are located downgradient of the site. These wells are not directly in line with the groundwater flow from the site. However, any renewal of pumping for the purpose of lowering water table may pull the plume towards these wells and, if done, should be done in consultation with the NYSDEC. Pumped water may need to be treated before disposal if contaminated.

A well inventory in the vicinity of the site was done based on information from USGS, NYCDEP, and the NYSDEC Region 1 Office in Stony Brook. We do not believe that the continued operation of any existing commercial/industrial wells will have any appreciable impact on the proposed on-site remedy. A physical well inventory (by door-to-door survey or through mail) will be undertaken based on the evaluation of the off-site investigation (in area affected by the plume) if deemed necessary. The Junior High School (IS-8) is located about a mile southwest of the site. The full time drain system to alleviate the flooding problem at this school is not likely to impact the proposed on-site remedy. The impact of off-site dewatering systems upon any off-site remedy will be evaluated in the future.

We do consider this to be a source control remedy. The highly contaminated source areas will

be remediated by a combination of SVE and in-situ chemical oxidation. Excavation and off-site disposal of contaminated soils was considered but found to not be cost-effective due to the large quantities and depth of soil involved. Also, any physical removal would disturb the current operation at the site. Therefore, hot spot removal to accelerate completion of the remedy was not selected. Even with excavation, long-term groundwater controls would still be needed. Any available information, both published and unpublished, regarding aquifer conditions, local extraction, and other data will be considered during the design phase.

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APPENDIX B

Administrative Record

**Administrative Record
Remedial Investigation/Feasibility Study
West Side Corporation Site
Operable Unit No. 1 (On-Site)
Site I.D. No. 2-41-026**

1. File Index
2. Record of Decision - July 2000, prepared by NYSDEC.
3. Proposed Remedial Action Plan (PRAP), dated February 2000, prepared by NYSDEC.
4. Notice of site classification dated August 11, 1997, and Inactive Hazardous Waste Disposal Report Form.
5. Phase II Subsurface Report February 1992, prepared by EEA, Inc.
6. RI/FS Health and Safety Plan - Dated December 1998, prepared by TAMs Consultants.
7. RI/FS Field Activity Plan - Dated December 1998, prepared by TAMs Consultants.
8. RI/FS Quality Assurance Project Plan - Dated December 1998, prepared by TAMs Consultants.
9. RI/FS Project Management Plan - Dated January 1999, prepared by TAMs Consultants.
10. Work Plan Addendum - dated May 2000.
11. Final Remedial Investigation (RI) Report dated July 2000, prepared by TAMs for NYSDEC (Volume 1).
12. Final Remedial Investigation (RI) Report dated July 2000, prepared by TAMs, for NYSDEC (Volume 2).
13. Final Remedial Investigation (RI) Report dated July 2000, prepared by TAMs, for NYSDEC (Volume 2).
14. Final Feasibility Study (FS) Report dated July 2000, prepared by TAMs, for NYSDEC.
15. Citizen's Participation Plan prepared by NYSDEC - May 1999.
16. Fact Sheets dated June 1999, February 2000, prepared by NYSDEC.
17. Letter dated July 22, 1998 from NYSDEC to TAMS Consultants, Inc., regarding work assignment.
18. Letter dated December 2, 1998 from NYSDEC to TAMS Consultants, Inc., regarding comments on work plan.
19. Letter dated March 13, 2000 from Mrs. Valerie Lewis to NYSDEC regarding comments on PRAP.
20. Letter dated March 20, 2000 from Monique Charlier to NYSDEC regarding comments on PRAP.
21. Letter dated March 18, 2000 from Marcella Young to NYSDEC regarding comments on PRAP.
22. Letter dated April 18, 2000 from Sheldon F. Schiff to NYSDEC regarding comments on PRAP.
23. Letter dated April 24, 2000 from New York City Department of Environment Protection to NYSDEC regarding comments on PRAP.

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