6 Quality of Life Performance Standards

Quality of life performance standards are designed to minimize the potential for impacts on the community. These standards shall be applied during Phase 1 dredging, as described in this document. Based on the knowledge gained during Phase 1 dredging, the standards will be reviewed, revised, and adjusted (if needed), and applied to Phase 2 dredging.

As required by the ROD, the performance standards are based on objective environmental and scientific criteria. ARARs and "to-be-considered" (TBC) environmental requirements were considered first for use as standards. When pertinent ARARs and TBCs were not available, other requirements or standards were considered and, where appropriate, were included in the performance standard. When more than one regulation or set of guidelines contained the same or similar requirements, the most appropriate requirement was selected for the standard. The standards specifically apply to the remedial activities on the river and associated with the sediment processing/transfer facilities. The quality of life performance standards will not supersede other federal and state regulations that apply to project operations, such as the Occupational Safety and Health Administration's (OSHA's) worker health and safety requirements.

As described in the ROD, community education and involvement will be emphasized regarding the performance standards. Compliance with the quality of life performance standards will be verified and documented. The USEPA will work with local officials and communities through various stakeholder groups, including the Community Advisory Group (CAG), to keep them up-to-date on compliance with the performance standards. The USEPA and/or personnel responsible for day-to-day operations will provide updates through verbal and written notifications and regularly scheduled stakeholder and CAG meetings. Community notification regarding compliance with the performance standards, including complaint evaluation, will be described in the RA CHASP.

The standards (air quality, odor, noise, lighting, and navigation) are presented in the following general format: (1) the standard is introduced and summarized; (2) the requirements from the ROD are presented; (3) the approach used to develop the standard is described; (4) the applicable requirements are defined; and

(5) procedures for demonstration of compliance (which include monitoring, contingency and mitigation plans, reporting, and notifications) are specified.

Key points regarding implementation and compliance with the standards are:

- Compliance with the performance standards must be determined through analysis performed during design and/or demonstrated during the course of the RA.

- The USEPA and, as appropriate, other agencies will monitor the remedial activities to confirm compliance with the standards.

The performance standards presented in this section were developed based on an evaluation of the potential impacts (Section 4) associated with the anticipated remedial activities (Section 2). Summaries of the applicable regulations and requirements are cited and presented in the discussion of each performance standard. A summary table of each standard is also presented. Additional information explaining technical aspects of noise and lighting, as well as regulations and factors associated with navigation, is provided in Appendices A and B to support the information presented in the standard.

6.1 Performance Standard for Air Quality

6.1.1 Introduction

The standard for air quality addresses the potential exposure of both adults and children in the project area to emissions from the project. The effects of diminished air quality on quality of life may include reduction in the enjoyment of outdoor activities and/or impacts on human health and the environment. Air pollutants released into the atmosphere disperse as they move with air currents. The degree of impact depends on the type of air pollutant released, the distance between the emission source and the receptor (i.e., person who could come in contact with the air pollutant), environmental conditions (e.g., weather conditions), the susceptibility of the receptor to the air pollutant, and the toxicity of the air pollutant. This section is concerned with the health impacts of air emissions. The potential impact of odors is discussed in Section 6.2.

Potential effects will be mitigated by implementing the air quality performance standard. This standard prescribes emission thresholds or ambient concentrations that limit the pollutants that can be emitted during remedial activities. The standard will also require an evaluation of emissions during design because they will affect the need for and selection of air pollution control equipment and the activities associated with sediment handling and processing. The primary air pollutants for this project are PCBs. In general, the greater the volume of sediment handled and processed, and the higher concentrations of PCBs in the sediments, the greater the potential for PCB emissions.

Analysis and sampling indicates that trace amounts of PCBs are entering the atmosphere from the Hudson River (see the RS White Paper, "PCB Releases to Air" [TAMS Consultants, Inc. January 2002]), although PCBs in air at the site do not pose an unacceptable health risk (e.g., ROD, Page 34). In the long-term, remediation of the PCB-laden sediments will reduce PCB concentrations in ambient air along the river because PCBs within the river sediments will be reduced. However, as observed at other PCB remediation sites, emissions of PCBs and other pollutants during remediation activities could result in a short-term increase in ambient air levels of these pollutants. The quality of life performance standard for air quality has been established to ensure that this potential impact is minimized. The USEPA does not expect project-related air emissions to exceed the requirements.

6.1.2 Technical Basis for Air Quality Performance Standard

Development of the performance standard for air quality will include an evaluation of emissions of PCBs and other air pollutants from sediments or from equipment expected to be used during the remediation process.

The Clean Air Act (CAA), 42 U.S.C. §§ 7401-7671, is the primary federal statute governing air pollution. The CAA designates six pollutants as criteria pollutants for which National Ambient Air Quality Standards (NAAQS) have been promulgated to protect public health and welfare. The six criteria pollutants are respirable particulate matter smaller than 10 microns in diameter (PM_{10}), carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), lead (Pb), and ozone (O_3). Additional standards have recently been promulgated for fine particulate matter, or particulate matter that is smaller than 2.5 microns ($PM_{2.5}$).

Federal and state standards have been established for ambient air concentrations of criteria pollutants. New York State is required to achieve and maintain compliance with the NAAQS by limiting and regulating air emissions in the state. The authority and direction to regulate these emissions is described in the State Implementation Plan (SIP). New proposed air emission sources are evaluated against these standards, ensuring that the proposed source will not interfere with the programs established in the SIP. Monitoring is conducted by the state to measure compliance in specific regions of the state.

Potential emission scenarios were examined to assess the type of pollutants that could be emitted. The primary pollutant identified as a potential risk to human health and the quality of life for this project are PCBs associated with the contaminated sediments. Other air pollutants, including PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2, and O_3, from equipment operations will also be evaluated. In addition, other possible pollutants that may be in the sediment such as metals will be evaluated.

An evaluation of the design before the project begins will be performed to ensure that the project has been designed to minimize air emissions to the extent practicable. For non-PCB emissions, this demonstration of compliance by estimating

potential project emissions will verify that impacts have been minimized. However, if the estimated potential emissions exceed the requirements established in the performance standard, emission reductions may be required to the extent practicable and/or additional monitoring of project emissions may be required.

Due to the expected variability of PCB concentrations resulting from natural environmental fluctuations associated with weather and river conditions, as well as the challenging nature of and uncertainties associated with predicting (through modeling) PCB emissions, monitoring for PCB emissions will be required to demonstrate compliance. As described previously, monitoring may not be required for non-PCB pollutants if, during design, it can be demonstrated to the USEPA (in consultation with NYSDEC and NYSDOH) that the expected emissions are within acceptable levels. Preliminary analyses have been completed as part of the RS. If the assumptions associated with those analyses remain unchanged, the RD Team can utilize those conclusions to evaluate the need for monitoring during the RA. If the assumptions used in the RS have changed, an analysis using design assumptions developed by the RD Team will be completed. The analysis completed by the RD Team will be reviewed by the USEPA to ensure that the design will minimize air quality impacts to the extent practicable.

The air quality standard is developed for the protection of public health and the environment during remedial activities. Protection of workers from air emissions will be described in W HASP, to be developed by the RD Team. Modeling, monitoring, and activity evaluation will consider the effects on the public beyond the designated work areas. For example, while monitoring to protect on-site workers may consist of real-time chemical detection monitors for PCBs in the work areas, monitoring of PCBs for public health and air quality will require sample collection outside of, or at the border of, the work area to ensure protection of the public. During remediation, the data collected for worker protection purposes may be reviewed for information, but demonstrating compliance with the air quality performance standard for PCBs will also require independent and comprehensive data collection that will demonstrate compliance without reliance on the worker health and safety monitoring data.

The quality of life performance standard for air quality that has been established in the ROD and this document has been chosen from applicable air quality standards and guidelines and have taken into consideration existing risk analyses and studies of the toxicological effects of PCBs. Demonstration of compliance shall be required as an element of the design process and/or during remedial activities.

Residents along the river are considered the primary receptors of potential air emissions. While other members of the public such as boaters or other non-permanent visitors can be affected by the RA, the permanent residents near the river are the primary consideration in the development of this performance standard. Because the standard was developed to protect the permanent receptors

(who have longer potential exposure times), they will also protect non-permanent receptors.

6.1.3 Requirements from the ROD

The ROD contains the following requirements related to air quality and quality of life considerations:

- "The design will also provide for appropriate control of air emissions, noise and light through the use of appropriate equipment that meets all applicable standards." (ROD Page 83)

- "Air impacts at dredging sites, on barges and at the land based facilities are expected to be minimal. Action levels will be established, monitoring conducted and appropriate engineering control measures employed to ensure that any air releases do not exceed acceptable levels. A community notification system, which will be established during design, will keep the residents informed regarding the data from EPA's air monitoring program." (ROD Page 84)

- "As to air emissions, operations and facilities will comply with the ARARs listed in Table 14-3 which deal with such emissions (e.g., the National Primary and Secondary Ambient Air Quality Standards)." (ROD Page 96)

- "Performance standards shall address (but may not be limited to) resuspension rates during dredging, production rates, residuals after dredging or dredging with backfill as appropriate, and community impacts (e.g., noise, air quality, odor, navigation)." (ROD Page 100)

6.1.4 Case Studies

Several new developments in the field of PCB air emission research and knowledge collected during recent remediation projects have provided informative case studies applicable to this document. The following is a brief summary of the most applicable studies.

- **Lower Fox River, Wisconsin.** The Fox River Remediation Project has been divided into several projects. Sediment Management Unit (SMU) 56/57 is located in the Fort James Turning Basin in Green Bay, Wisconsin. This 9-acre site contained the highest PCB sediment concentrations along the river. During the second half of the SMU 56/57 remediation project, in the fall of 1999, an intensive air monitoring program was instituted to determine the concentrations caused by the remediation project. Twenty-five polyurethane foam (PUF) samplers, located both on site and off site, operated every sixth day during remediation. The threshold of significance was established at 100 ng/m^3 (0.1 $\mu g/m^3$) for total PCBs. Off-site concentration averages were well below the threshold, ranging from 0.3 ng/m^3 to 1.6 ng/m^3. At some background locations, sampling periods were increased from 24 hours to 72 hours

because of limitations in detection limits. As a result of this study, air monitoring was not required for the remaining remediation operations. SMU 56/57 remediation was completed in 1999, but remediation of other sites along the river continues (Grande 1999).

- **New Bedford Harbor, Massachusetts.** The remediation of hot spots in New Bedford Harbor took place in 1995. Because of the shallow water in the remediation areas and the repeated exposure of sediments during low tides, air emissions of PCBs and other pollutants were of concern to the public. Sixteen air samplers (collecting 24-hour samples) were established to measure PCBs and other pollutants, with shutdown, action, and notice levels for PCBs established at 1 µg/m^3, 0.5 µg/m^3, and background plus 0.03 µg/m^3, respectively. These thresholds were exceeded within the operations areas on a few occasions, and mitigation measures were successfully implemented to reduce impact (National Research Council 2001).

- **St. Lawrence River, New York.** Several PCB remediation projects have been implemented in Massena, New York. In 1995, General Motors removed 13,000 cubic yards of PCB-contaminated sediment. In 2001, Alcoa, Inc., formerly the Reynolds Metals Company, began restoration of its site. At the Reynolds site an air monitoring program was established using PCB and particulate samplers on and off site. An action threshold for PCBs was established at 0.1 µg/m^3. Daily (24-hour) samples were collected for the first four weeks, with continuation of this schedule required only if PCBs were detected. PCB emissions were detected in some samples, and limited exceedances were mitigated during operations (Bechtel 2001).

- **Cumberland Bay, New York.** Cumberland Bay is located on Lake Champlain, near Plattsburg, New York. This site was remediated in 1999 and 2000, with 150,000 tons of sediment being removed from the bay. This project was implemented using hydraulic dredging, and PCB air concentrations did not result in an impact on nearby residents. An action level of 0.1 µg/m^3 was established for this project at the perimeter of the work zone. Exceedances of this standard did not occur during the project.

- **Grand Calumet River, Indiana.** The remediation site on the Grand Calumet River is located on U.S. Steel property, and the project is managed by U.S. Steel. Remediation began in November 2001. Air is sampled twice a week at four locations—three surrounding the sediment processing site and one at the dredging location. An air threshold for PCBs of 1 µg/m^3 (for 24 hours) was established for this site. There have been no exceedances of the PCB threshold, and as of May 1, 2003, the maximum PCB level measured was 33.7 ng/m^3 (0.0337 µg/m^3) and the mean was 6.8 ng/m^3 (0.0068 µg/m^3). Standards and monitoring for odor have also been implemented to protect the public (Environmental Resource Management 2003).

The projects summarized above provide some guidance in the development of monitoring and remediation strategies to protect human health from air pollutants during remediation of the Hudson River.

6.1.5 Development of the Performance Standard for PCB Air Emissions

The performance standard for PCB air emissions were primarily based upon risk assessments and calculations that were developed using information from USEPA's consensus database for toxicity information, the Integrated Risk Information System (IRIS), and thresholds established for other projects. To provide protection from both cancer risk and non-cancer hazard, a 24-hour standard has been established for daily monitoring of the project.

Daily Standard

There are no federal or state regulatory standards for daily PCB emissions. The daily standard was developed using the IRIS Reference Dose for non-cancer health effects specific for Aroclor 1016, yielding a concentration of 0.11 µg/m^3 for a child resident (0 to 6 years old) and 0.26 µg/m^3 for an adult resident for the 6-year duration of the project. Aroclor 1016 was used based on the volatility of PCBs and the findings that PCBs in sediments and water samples are considered typical of Aroclor 1016 (TAMS Consultants, Inc. 2002). The daily performance standard of 0.11 µg/m^3 for residential areas and 0.26 µg/m^3 for commercial/industrial areas will protect the public, including children (see Table 6-1). Calculation of the standards for both children and adults indicates the cancer risk is within National Oil and Hazardous Substances Pollution Contingency Plan (NCP) risk range (one in 100,000 to one in 1,000,000). This number will trigger notification of the USEPA and implementation of additional mitigation measures to reduce air emission levels (see Section 6.1.10).

Other standards and thresholds that are protective of workers were evaluated as part of developing this performance standard, including National Institute for Occupational Safety and Health (NIOSH) workplace concentration thresholds. As a point of comparison, NIOSH's recommended exposure level is 1 µg/m^3. New York State Division of Air Resources (NYSDAR) guideline concentrations for PCBs were also reviewed; however, NYS does not establish short-term guideline concentrations for PCBs. In addition, thresholds established on other projects were evaluated.

Daily monitoring standard requirements have been established to provide adequate and appropriate protection of the public during the project. PCB concentrations from vapors, aerosol, and particulate emission sources will be estimated and monitored, and contingency and monitoring plans will be designed to mitigate and sample PCBs in these forms.

Table 6-1 Summary of Standard for PCBs

Use of Standard	Averaging Period	Standard/ Guideline ($\mu g/m^3$)	Demonstration of Compliance
During Remedial Action, for residential monitoring	24-hour average, total PCBs	0.11	Continuous monitoring, 24-hour samples
During Remedial Action, for commercial/industrial monitoring	24-hour average, total PCBs	0.26	Continuous monitoring, 24-hour samples

The RA Team will be required to review and mitigate exceedances of the standard while continuing project remedial activities. Exceedance of the 24-hour standard will require notification of the USEPA (see Section 6.1.12), which will review each exceedance to determine the potential effects on the public. If frequent exceedances or a pattern of exceedances occur, the USEPA may require the RA Team to temporarily stop certain operations (as needed) to review the situation and establish an appropriate course of action.

Occasional short-term exceedances are not expected to produce adverse health effects. Oversight by the USEPA will ensure that the project will not have an adverse impact on human health. Protection of workers on the site will be addressed in the W HASP.

6.1.6 Design Evaluation

Evaluation and impact analysis of the design by the RD Team before construction will provide important data necessary to demonstrate compliance. Demonstration of compliance through a review of the design, using USEPA estimation methodology, is a standard method of analysis for determining the potential for emissions from a project and the best method of controlling emissions that may be harmful to the public or the environment. The design will be reviewed by the USEPA in consultation with NYSDEC and NYSDOH to ensure that proper mitigation methods are incorporated into the design. Because quality of life performance standards are performance-based compliance criteria, the designers have the flexibility to design the remediation process. However, the RD Team also is responsible for demonstrating that the design will minimize impacts on air quality to the extent practicable.

The analysis completed during design may also provide enough evidence that monitoring is not required for some or all non-PCB pollutants from some activities. For example, previous analysis has demonstrated that the potential emissions from vehicles and equipment during construction of the project will not violate ambient air emissions standards for NO_x, SO_2, PM, and CO (see the RS White Paper, "Air Quality Evaluation" [TAMS Consultants, Inc. January 2002]). This assessment will be repeated by the RD Team with specific design data. If

the specific project information developed during design validates the assumptions used in the White Paper's analyses, this will represent determination of compliance with the performance standard such that further demonstration by on-site or off-site sampling would not be required.

The counties considered for the project sediment processing/transfer facilities and sediment removal are in attainment for PM_{10}, $PM_{2.5}$, CO, SO_2, NO_x, and lead. These counties are also located within the ozone transport region, which encompasses the northeastern United States. The CAA established several areas in the United States where ozone concentrations are a regional issue throughout the designated area because emissions are transported from surrounding areas. The ozone transport region the project is in has been designated a moderate non-attainment region for ozone. Therefore, potential for ozone generation by the project will be assessed by evaluating ozone precursors (NO_x and volatile organic compounds [VOCs]).

Criteria pollutants (PM_{10}, $PM_{2.5}$, CO, SO_2, NO_2, and O_3) may result from construction and operation of the remedial systems. Activities that are expected to be the primary sources of criteria pollutant emissions include the operation of equipment associated with the dredging, backfilling, and sediment processing/transfer facilities. In general, these operations produce criteria pollutants as an emission from the burning of fossil fuels in diesel-powered equipment.

The RD Team will be required to demonstrate, during design, that projected emissions from the project will comply with requirements for the federal NAAQS, which are listed under 40 CFR Part 50. While compliance will be demonstrated for some sources (such as major stationary sources) through permit equivalency evaluations, emissions from other sources (such as mobile sources), including tugboats and locomotives, would not be covered by permit equivalency evaluations. The emissions from these sources may have the potential to impact the quality of life. Therefore, to evaluate the impact of the cumulative effect of both stationary and mobile emission sources associated with the project, an assessment of ambient air quality concentrations for criteria pollutants that would result from project emissions (with the exception of lead, which is no longer used in fuel) will be required during design.

The USEPA has not developed a numerical performance standard for ozone precursors (NO_x and VOCs) because the project area is designated as a marginal non-attainment area for ozone, and the regulatory requirements for NO_x and VOC emissions in non-attainment areas do not apply to direct emissions from Superfund cleanup actions. See 40 CFR 93.153. Therefore, the performance standard will require the RD Team to minimize emissions of ozone precursors to the extent practical and reasonable. There are a variety of potential methods and approaches to reduce emissions from equipment and operations, such as the use of alternative fuel, maintenance requirements, and the use of newer vehicles and equipment that meet the latest air emission standards. The USEPA, in consultation with

NYSDEC and NYSDOH, will review the analysis completed during design and work with the RD Team to determine the most appropriate method(s) or approach(es) to control emissions of ozone precursors.

The impact analysis of the design shall also include identifying and quantifying additional potential air emissions specific to the chosen technologies. Pollutants that should be considered include but are not limited to metals and benzene. The regulation of these emissions in New York State is delegated to NYSDEC. The NYSDEC has established a list of emission guidelines (NYSDAR-1) (New York State Division of Air Resources, Bureau of Stationary Sources July 12, 2000 or as updated at the time of the analysis). The RD Team will compare the projected concentrations with NYSDAR-1 average annual guideline concentrations (AGCs). Based upon the results of that impact analysis, the USEPA may establish additional performance standard requirements.

The RD Team shall provide estimates of projected ambient concentration levels of PCBs, and an analysis of the impact of those emissions and concentrations. These analyses shall be conducted using a USEPA-approved modeling methodology and the results will be used to demonstrate that the project design will comply with the performance standard. The USEPA will review these impact analyses and determine if additional mitigation is required, based upon how protective the evaluations are and on the final determination of emission levels. Performance of these analyses and revisions before the remediation project is implemented will ensure all precautions are in place so that PCB emissions will not result in adverse effects on human health or the environment.

On-site CERCLA response actions are exempt from federal, state, and local permitting requirements. However, the project will comply with substantive requirements of otherwise necessary permits. Such requirements include NYCRR Part 201 (New York State Permit and Registration Review) and 40 CFR Parts 51 and 52. If it is determined that there is the potential to exceed existing emission standards, air pollution control equipment, operation restrictions, or other mitigation will be developed in conjunction with the design development and in accordance with applicable substantive state and federal requirements. The USEPA may also establish additional standards or monitoring requirements, if necessary, based on the design evaluation.

6.1.7 Project Monitoring

Due to the expected variability of PCB concentrations resulting from natural environmental fluctuations associated with weather and river conditions, as well as the challenging nature of and uncertainties associated with modeling PCB emissions, demonstration of compliance with the PCB emissions standard cannot be accomplished using only design analysis. Therefore, monitoring PCB emissions during project implementation will be required to demonstrate compliance with the performance standard.

Monitoring is expected to be conducted on public property. However, if monitoring is required on private property, the RA Team will coordinate access with the property owner.

6.1.8 Demonstration of Compliance

PCB air emissions estimated during the design will be evaluated by the RD Team as discussed above to ensure that the project is designed to meet the performance standard. This evaluation (to be conducted before remediation begins) will ensure that precautions are in place to prevent emissions from having adverse effects on human health or the environment. While design review and evaluation may predict that PCB emission levels will not impact human health or the environment, actual monitoring will be required as a part of this project to confirm this analysis and demonstrate compliance.

Air monitoring shall be conducted in accordance with a monitoring plan to ensure assessment and demonstration of compliance with the standard for PCBs listed above. The monitoring plan will be developed by the RD Team and shall be specific to the final remediation design and locations, providing details relating to sampling locations and frequency. Continuous monitoring will be required at permanent and active sampling locations, and a 24-hour sampling period will be required. The monitoring plan shall include provisions for the collection of meteorological data as well as PCB air concentrations. The USEPA will review the monitoring plan before the remediation project is implemented.

Samples will be taken at the designated sampling locations before operations begin to establish baseline concentrations for a period of time specified in the monitoring plan. To establish a baseline of data, sampling shall begin at least two days before the remedial activity is planned. Sampling may also be conducted at locations near the river and away from the river during remediation operations to determine background concentrations. To differentiate between the PCBs already present in the atmosphere and those associated with the remediation requires concurrent background sampling (Grande 1999). Establishment of baseline and background monitoring will provide the information needed by the RA Team and USEPA to determine whether the source of the ambient PCB levels is project related. This will assist in identifying the most appropriate course of action in the event of an exceedance.

Air monitoring stations shall be established around the perimeter of the sediment processing/transfer facilities and at locations designated to ensure collection of upwind and downwind data at the dredging locations. (See Figures 6-1 and 6-2 for conceptual drawings of monitoring locations.) The specific number and location of the stations will be recommended by the RD Team based upon the location of the project activities and estimated emission levels. While the air monitoring

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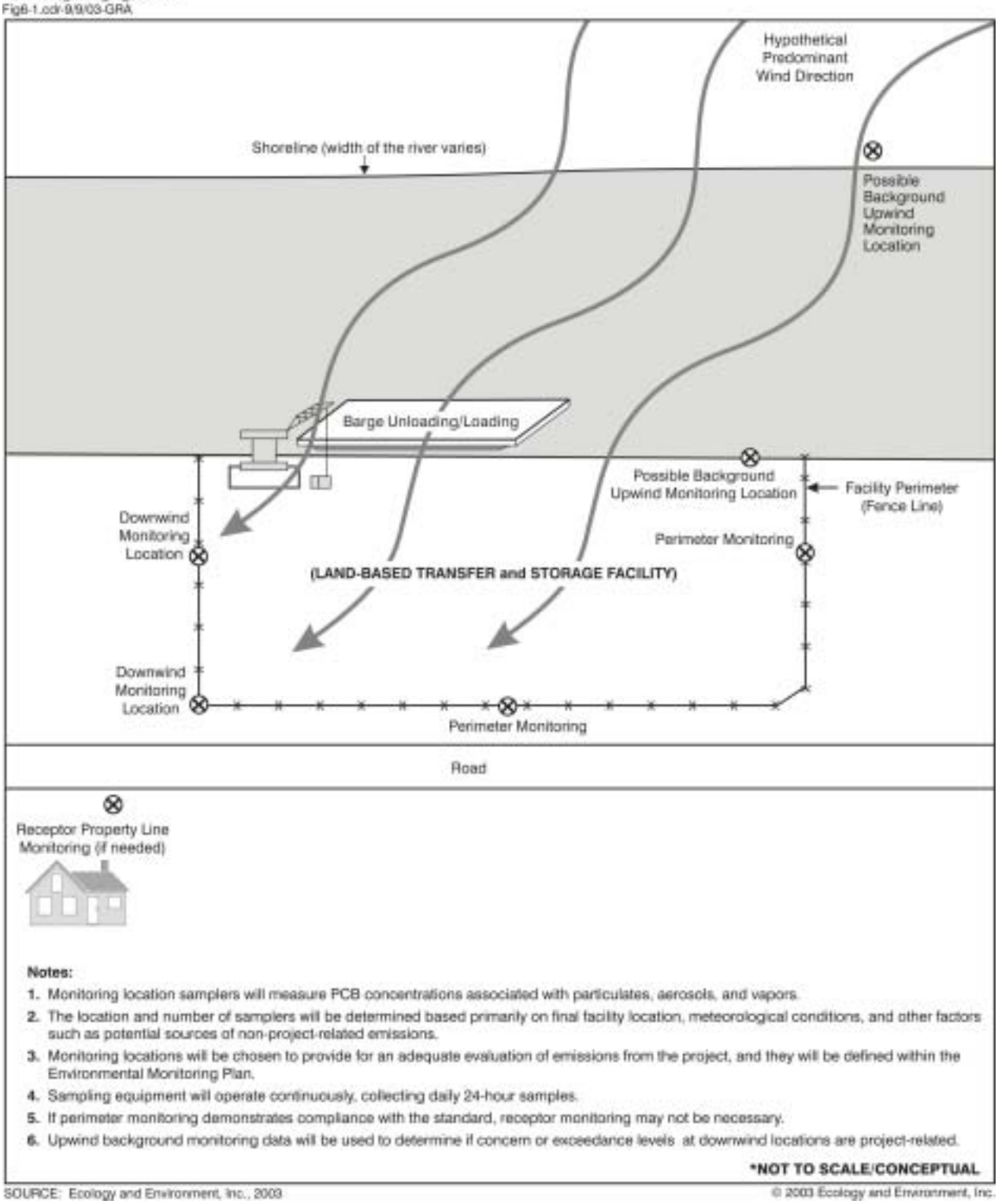

SOURCE: Ecology and Environment, Inc., 2003

Figure 6-1 Conceptual Air Quality Monitoring Layout: Land-based Transfer and Storage Facility

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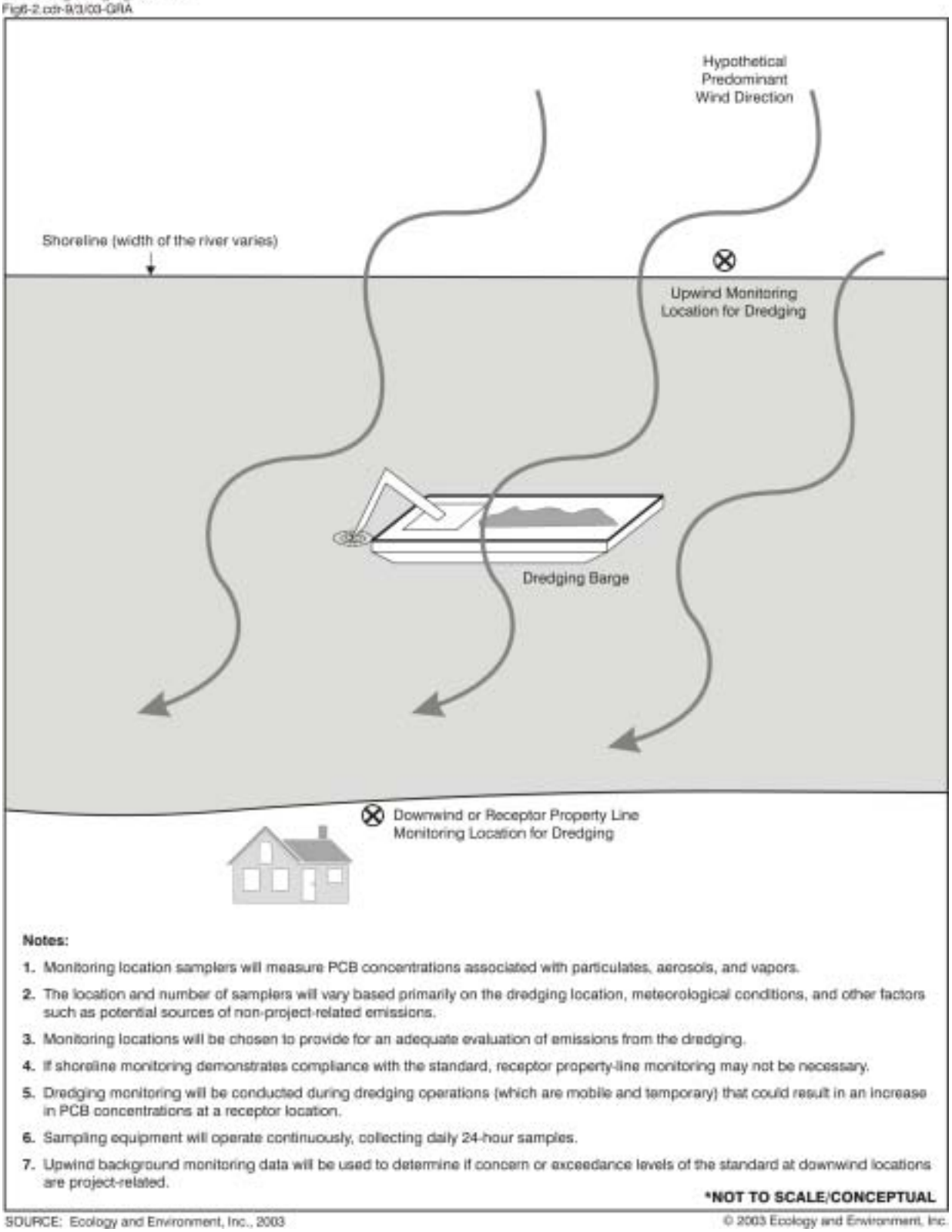
Fig6-2.cdr-9/3/03-GRA



SOURCE: Ecology and Environment, Inc., 2003

Figure 6-2 Conceptual Air Quality Monitoring Layout: Dredging Locations

stations may be mobile and temporary, permanent air monitoring stations shall be established in areas of greater population where longer periods of work are anticipated (i.e., near the sediment processing/transfer facilities).

The point of compliance for air emissions monitoring is the receptor. However, locations closer to the source of the air emission are acceptable for demonstrating compliance. For example, during dredging operations the shoreline may be considered an acceptable location for monitoring if the levels are below the standard and receptors are more distant.

Sampling data shall be evaluated to determine the accuracy of the RD Team's projections of ambient air impacts and to demonstrate compliance during operations. The RD Team may provide documentation of alternative methods for demonstration of compliance, such as reduced sampling, which will be evaluated and considered by the USEPA on an ongoing basis.

High-volume air toxics samplers with a PUF cartridge and a glass-fiber filter are an example of proven technology to use for sampling for PCBs in ambient air. PUF sampler analysis can provide detection limits of 0.03 $\mu g/m^3$ during 24- hour sampling periods. Laboratory analyses will be required to follow USEPA method TO-4A (USEPA January 1999) to ensure adequate detection limits.

The performance standard does not specify where the analytical testing will be conducted (on-site laboratory or off site); however, it does require that the analytical testing be completed by a USEPA-approved laboratory on a minimum 72-hour turn-around-time basis.

6.1.9 Other Air Quality Issues

Opacity

Opacity is a quantification of the reduction in visibility resulting from air emissions. (A visible white water vapor plume is not considered an opacity increase.) Opacity is an important quality of life issue because it could interfere with views along the river and possibly result in haze. NO_x, SO_x, and PM emitted from vessels, equipment, and vehicles can result in visible emissions. Typically, a trained observer visually measures opacity at the point of emission. An opacity observation is commonly known as a "reading." The NYSDEC is generally responsible for enforcing federal and state opacity standards in New York State.

New York State air regulations (6 NYCRR Title III, Subpart 211.3) state that no person shall cause or allow any air contamination source to emit any material having an opacity equal to or greater than 20% (six-minute average) except for one continuous six-minute period per hour of not more than 57% opacity.

This standard will be incorporated for vessels, vehicles, and equipment as a performance standard for this project, unless otherwise exempt under 6 NYCRR

211.3. Substantive New York State permitting requirements and general regulations require adherence to these standards. Vessels and vehicles shall be maintained and operated properly to prevent opacity problems, and pollution control systems for process equipment shall be designed to prevent opacity concerns.

The USEPA shall be notified of exceedances of the opacity standards. A written report on the reasons for the exceedance and mitigation measures taken to prevent future exceedances shall be submitted to the USEPA. Notification to NYSDEC shall be completed by the RA Team in accordance with applicable regulations.

Dust

While PM_{10} and $PM_{2.5}$ is to be estimated and evaluated as a criteria pollutant, additional quality of life concerns related to dust shall be addressed as discussed in Section 6.1.10. Mitigation will be required for PCB-laden dust. Process materials shall be sufficiently wet or treated with dust suppressants to inhibit dust emissions.

6.1.10 Mitigation and Contingencies

In addition to the monitoring plan, the RD Team shall prepare and submit a contingency plan for review by the USEPA that is based upon the results of the design analysis. The impact analysis of the design will be evaluated and reviewed by the USEPA against the performance standard. If it is determined that there is potential to exceed a performance standard, additional mitigation or treatment plans will be developed by the RD Team during design to ensure measures are in place such that PCB or other emissions will meet performance standards.

Since the greatest potential for emissions is during sediment handling and processing activities, those periods also represent the greatest potential for impact on the community. The potential for PCB emissions increases with higher temperatures or if sediments dry out. The potential for particulate emissions is increased when the sediments become dry and have the potential to become airborne. Engineering controls and mitigation measures are readily available and can be implemented to control such emissions. Examples of these measures include conducting sediment processing within structures or erecting wind screens, covering material stockpiles or controlling the shape and placement of the piles, adjusting the surface area/volume ratio during material handling by using larger excavation equipment, and spraying biodegradable foam over exposed dredged sediment.

6.1.11 Reporting

The monitoring plan requirements described above shall include submittal of regular progress reports that include information related to PCB emissions near the sediment processing/transfer facilities and dredging operations, ambient (background and baseline) PCB levels, and monitoring plan adjustments. The RA Team shall provide weekly reports to the USEPA in conjunction with the project implementation schedule. Specific detailed requirements for these reports will depend upon the specific nature of the design and the monitoring plan. Specific

technologies that will be determined in the design may also require reporting to other agencies (e.g., NYSDEC and NYSDOH).

6.1.12 Notification

The USEPA shall be notified immediately of an exceedance of the 24-hour PCB performance standard. In the event of an exceedance, a report shall be developed that includes a description of any immediate mitigation as prescribed by the contingency plan, additional mitigation, and analysis of the reasons for the exceedance. The written report shall be provided to the USEPA within three working days of the discovery of the exceedance. This report shall include background and baseline monitoring data to help determine whether the project is the source of the exceedance or whether there are external reasons for the exceedance. The USEPA will evaluate all information to determine whether the RA Team has adequately protected the public and may continue operations. The USEPA may require the RA Team to implement additional measures or, if work must be temporarily stopped, to adjust or engineer additional mitigation and contingencies. Table 6-2 identifies action levels and the required responses if the monitoring data approach or exceed the established PCB performance standard.

Table 6-2 Air Quality Action Levels for PCBs and Required Responses

Action Level	Concentration Levels	Required Action	Reporting/Notification
Typical Operations Level (in compliance with the standard)	Daily total PCBs under 80% of the standard y Residential areas (< 0.08 µg/m^3 for 24-hour samples) y Commercial/industrial areas(< 0.21 µg/m^3 for 24-hour samples)	y Continue with existing controls.	y Weekly reporting of monitoring data to the USEPA.
Concern Level (approaching the standard)	Daily PCBs within 20% of the standard y Residential areas (between 0.08 µg/m^3 and 0.11 µg/m^3 for 24-hour samples) y Commercial/industrial areas (between 0.21 µg/m^3 and 0.26 µg/m^3 for 24-hour samples)	y Identify cause of increased emissions. y Implement monitoring to confirm and quantify background concentrations. y Implement mitigation as outlined in the project contingency plan.	y Notify the USEPA within 24 hours of receipt of analytical results. y Weekly report to include a description of corrective actions.

Table 6-2 Air Quality Action Levels for PCBs and Required Responses

Action Level	Concentration Levels	Required Action	Reporting/Notification
Exceedance Level	Daily total PCBs exceed standard ÿ Residential areas (> 0.11 µg/m^3 for 24-hour samples) ÿ Commercial/industrial (> 0.26 µg/m^3 for 24-hour samples)	ÿ Identify cause of exceedance. ÿ Establish additional monitoring stations (as needed, including background) to evaluate cause of increased emissions. ÿ Develop action plan and implement additional mitigation. ÿ Continue monitoring to confirm compliance with the standard.	ÿ Notify the USEPA, NYSDEC, and NYSDOH immediately. ÿ Provide daily monitoring reports. ÿ Within 3 days of discovery of the exceedance, provide a corrective action report describing causes of exceedance and mitigation implemented.

6.2 Performance Standard for Odor

6.2.1 Introduction

An odor performance standard has been developed separately from the air quality performance standard (see Table 6-3). While the air quality standard has been established to protect the public and environment from harm, the odor performance standard is established to protect the public from odors that unreasonably interfere with the comfortable enjoyment of life and property. This standard is established at a level that is much lower than that which would result in a health concern. Therefore, while exceedances of this standard must be mitigated, emission levels will be corrected before these emissions would be harmful to public health. In most cases, the most reliable measurement of odor emissions is detection of a smell by workers or the public. Possible receptors include residents along the river and casual users of the river such as boaters or tourists.

Table 6-3 Summary of Odor Standard

Pollutant/Issue	Performance Standard	Averaging period	Source	Demonstration of Compliance
Hydrogen Sulfide	0.01 ppm*	1 hour	6 NYCRR 257-10.3	Ambient air monitoring, as appropriate
Odor Complaints	Complaints investigated and mitigated	N/A	Best Management Practice	Implementation of contingency plan

* or 14 µg/m^3.

Project activities, including construction, dredging, in-river sediment transport and handling, and facility-based sediment processing may generate odors. Odors may be generated when sediment is removed or relocated. Decay of organic materials, such as aquatic plants and other organisms, could also cause odors (e.g., hydrogen sulfide), and there is the potential for odors from material processing and equipment.

6.2.2 Requirements from the ROD

The ROD indicates the following related to odor and quality of life considerations:

- "EPA also will provide the public with opportunities to provide input regarding design aspects of the remedy and performance standards, so that community concerns and suggestions regarding, for example, potential noise, light, odor and traffic impacts can be considered by EPA during the design phase." (ROD Page 90)

- "Performance standards shall address (but may not be limited to) resuspension rates during dredging, production rates, residuals after dredging or dredging with backfill as appropriate, and community impacts (e.g., noise, air quality, odor, navigation)." (ROD Page 100)

6.2.3 Case Study

The remediation project at the Grand Calumet River in Indiana addressed odor resulting from sediment removal. Samples collected during a December 1998 field test, which was designed to provide worst-case values, were analyzed in a laboratory setting by a panel of odor specialists. Additional modeling was also conducted to ensure that this analysis represented a worst-case scenario. Aromatic VOCs represented the most prominent odor problems at this site. The results of this analysis demonstrated that the processing area would not have posed an odor problem for nearby residents and off-site workers. Any odor complaints would require notification of the USEPA and the local county government and would be dealt with on a case-by-case basis.

6.2.4 Development of the Performance Standard for Odor

Odors are difficult to measure because they depend upon not only the concentration of the pollutant but on the sensitivity of the person exposed to the odor. In addition, odorous compounds are interactive, not additive, in their effect. That is, the combination of several odorous compounds may create a unique odor, not several odors perceived independently. Some individuals exposed to an intense odor for a long time can experience "olfactory fatigue," losing their sensitivity to the odor. All these aspects make it difficult to establish technical standards for such a subjective impact. The odor threshold for most pollutants associated with this project is significantly below the threshold for impact on human health or the environment.

New York State Law (New York State Environmental Conservation Law Article 19, Title 3 – Air Pollution Control Law – General Prohibitions ([6 NYCRR Part 211.2]) indicates the following regarding odor:

> "No person shall cause or allow emissions of air contaminants to the outdoor atmosphere or such quantity, characteristic or duration which are injurious to human, plant or animal life or to property, or

> which unreasonably interfere with the comfortable enjoyment of life or property. Notwithstanding the existence of specific air quality standards or emission limits, this prohibition applies, but is not limited to, any particulate, fume, gas, mist, odor, smoke, vapor, pollen, toxic or deleterious emissions, either alone or in combination with others."

The RD Team will collect various sediment samples to further delineate the dredge area and will collect bulk samples for treatability studies before the start of Phase 1 dredging. As part of this work, the RD Team shall evaluate the potential for odor (including hydrogen sulfide emissions) as needed to provide information for the mitigation and control of potential odors during dredging activities.

Areas that will be dredged may contain vegetation that requires removal or control before dredging. The RD Team shall take into consideration the potential for odors from decay of removed or controlled vegetation. Odors associated with organic materials such as aquatic vegetation are typically controlled using best management practices, which include prevention by collection and proper disposal of organic matter before it accumulates and decays on the shoreline or in uncontrolled stockpiles. A likely component of concern is hydrogen sulfide. Other components, such as sulfur dioxide and ammonia, could be detected in the area of the remediation, but these emissions are expected to be present in trace amounts and likely would not be very noticeable or pose a threat to human health. The RD Team will establish a contingency plan that will provide instruction on addressing complaints and the most appropriate and responsive control for odor issues that may arise during remediation.

6.2.5 Hydrogen Sulfide Standard

Hydrogen sulfide produces a distinct "rotten eggs" smell and can be caused by decaying organic materials, particularly from the exposure of river sediments that are undergoing anaerobic decomposition. Hydrogen sulfide can be detected as an odor at a concentration far less than that which would be damaging to human health (see Figure 6-3). In most situations, the lower concentration levels are uncomfortable enough that a person would leave the area before the pollutant would be harmful. However, a person can become desensitized to the odor and might underestimate the concentration levels. Therefore, if hydrogen sulfide is detected by workers or the public, monitoring will be required to provide an accurate measurement of the concentration levels.

The New York State ambient air standard for hydrogen sulfide (6 NYCRR 257-10.3) was established to protect the public from the discomfort of disagreeable odors and therefore represents a reasonable threshold for evaluating hydrogen sulfide odors. The hydrogen sulfide emission standard is listed in Table 6-3.

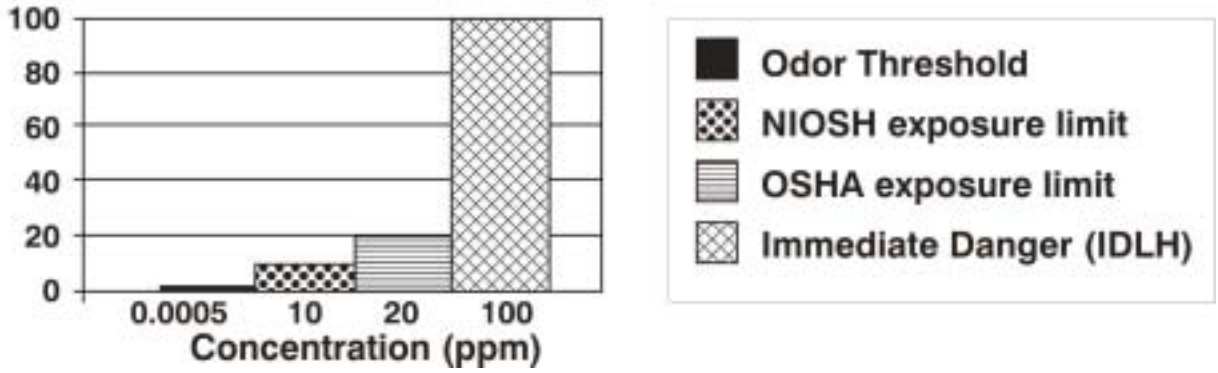


Figure 6-3 Hydrogen Sulfide Thresholds

6.2.6 Odor Complaint Management

While odor control has been deemed necessary and requires establishing quality of life standards, there are no reliable chemical indicators or testing procedures for odors caused by complex biological materials such as those that may be present in dredged river sediment.

Odor measurement is difficult because no instrument has been found to successfully measure odor and all of its components. The human nose is the only thing that can really measure odor, but personal preference affects what is considered acceptable or offensive. Instruments can measure some compounds that make up odor (such as hydrogen sulfide), but odor is a combination of many compounds. A high or low concentration of just one compound is not generally a good indicator of whether an offensive odor is present.

Although odor measurements are difficult, monitoring can be implemented to demonstrate compliance with the ambient air concentration standards. The RD Team shall evaluate potential activities and conditions that could result in exceeding the hydrogen sulfide standard or in the detection of other odors and shall provide this evaluation to the USEPA for review.

As a part of the RA CHASP, a contingency plan established by the RD Team will require the documentation and evaluation of odors at and around the project site. Figure 6-4 is a diagram of the complaint evaluation process. Complaints will be recorded in tabular format and will include the necessary information regarding the complaint and follow-up action needed to resolve the complaint. In the event that there are complaints from the public related to odors, these complaints shall be investigated, monitored (if determined attributable to the project), and mitigated as necessary. Multiple complaints regarding the same potential odor source may be treated as one complaint. Monitoring will be conducted to ensure adequate demonstration of compliance with the hydrogen sulfide standard listed in Table 6-3.

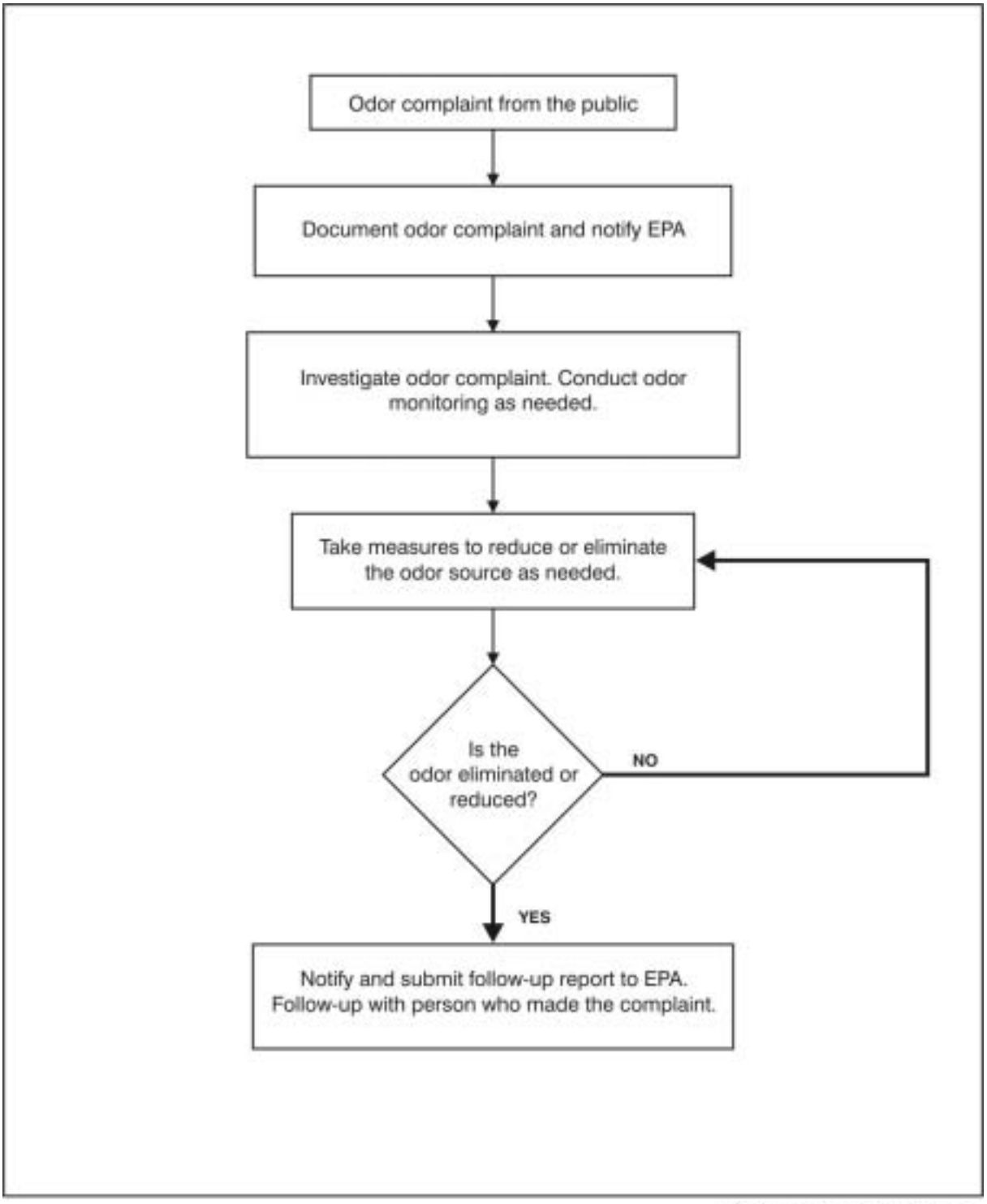


Figure 6-4 Odor Complaint Procedure

A monitoring plan shall be developed specific to the final remediation design and will be reviewed and approved before implementation. Hydrogen sulfide levels are determined by the cadmium hydroxide-methylene blue method and expressed as parts of hydrogen sulfide per million parts of ambient air (ppm) by volume. Direct-reading hydrogen sulfide meters may also be used to supplement analytical test data.

6.2.7 Mitigation and Contingencies

The RD Team shall develop a contingency plan as a part of the RA CHASP, describing mitigation of odors caused by the project. In the event of an exceedance of the standard, mitigation methods will be evaluated and implemented specific to the area of concern. Some potential mitigation methods may include:

- Adjusting handling procedures;
- Minimizing material accumulation;
- Adjusting moisture content;
- Using tarps, foams, and containers;
- Using masking agents and deodorants; and
- Aerobic treatment.

If sediment testing indicates the presence of additional components at levels that would result in odor problems not expected by preliminary analysis, other mitigation for those components may be established. In the event of an odor complaint, the complaint shall be recorded and investigated. Mitigation shall be evaluated and implemented as appropriate, and this action shall be recorded in a log.

6.2.8 Reporting

The RD Team's evaluation of potential odor emissions shall be provided to the USEPA to allow for review and approval before implementation of the project.

Odor complaints shall be documented and reported in accordance with the RA CHASP, including investigation, monitoring, and resolution. During operations, a monthly report shall be sent to the USEPA summarizing the monitoring activities for the previous month. The summary shall be in a tabular format and include a log of any odor complaints and the necessary information and follow-up actions needed to resolve the complaint.

6.2.9 Notification

The USEPA shall be notified of odor complaints from the public or of an exceedance of the hydrogen sulfide performance standard within 24 hours of dis-

covery. A report outlining the reasons for the exceedance and the mitigation used to reduce or minimize the odor levels and prevent further exceedances/complaints shall be submitted to the USEPA within ten days of the event. Table 6-4 provides a summary of action levels and required responses for odor problems.

Table 6-4 Odor Action Levels and Required Responses

Action Level	Odor Levels	Required Action	Reporting/Notification
Typical Operations Level (in compliance with the standard)	No presence of uncomfortable odors	ÿ Continue with existing controls.	ÿ Monthly reports.
Concern Level (approaching the standard)	Presence of uncomfortable, project-related odors is noted by RA Team OR Odor complaint from the public	ÿ Investigate cause of odor problem and verify that the problem is project-related. ÿ If the odor is project-related and identified by workers as hydrogen sulfide (by odor), monitoring will be conducted to confirm and measure hydrogen sulfide concentrations. ÿ Implement mitigation as outlined in the project contingency plan.	ÿ Notify USEPA within 24 hours of receipt of an odor complaint from the public that is project-related. ÿ Follow-up report to include a description of corrective actions. ÿ Complaint follow-up will include communication with the person making the complaint.
Exceedance Level	Exceedance of the hydrogen sulfide standard OR Frequent, recurrent odor complaints related to project activities	ÿ Investigate cause and type of odor ÿ Establish regular monitoring to evaluate hydrogen sulfide concentrations ÿ Develop action plan and implement additional mitigation. ÿ Continue regular odor observations or hydrogen sulfide monitoring until compliance with the standard is confirmed.*	ÿ Notify USEPA within 24 hours. ÿ Within ten days of discovery of the exceedance provide a corrective action report describing causes of exceedance or reoccurring odor problems and mitigation implemented. ÿ Complaint follow-up will include communication with the person making the complaint.

* If hydrogen sulfide odors are identified by observations of the RA Team, concentration monitoring will be required because observers could become desensitized and high concentrations that could be harmful would no longer be perceivable. Therefore, perceptions of hydrogen sulfide emissions will be evaluated immediately.

6.3 Performance Standard for Noise

6.3.1 Introduction

The principal objective of the noise performance standard is to minimize noise impacts from the project on the quality of life of the surrounding communities.

The performance standard shall be the basis for design of a monitoring and assessment program that confirms that noise impacts are minimized during the dredging and associated activities. The noise performance standard (see Table 6-5) was developed using noise guidelines established by federal and state agencies.

Noise (or unwanted sound pressure) is measured in decibels (dB). Important concepts of note regarding noise are that it is measured on a logarithmic scale (not linear) and sound pressure levels of two separate sounds are not directly additive. For the purpose of this standard, it is assumed that measured sound pressure attributable to project remedial activities is considered noise. Noise levels expected at the dredging and sediment processing/transfer facilities sites are illustrated in Figure 6-5. Appendix A provides additional scientific and technical information about noise.

During the removal of PCB-contaminated sediments from the targeted areas of the Hudson River, many of the associated activities will have the potential to produce noise impacts at nearby receptor locations. These activities include the following:

- Hydraulic and/or mechanical dredging;
- Shoreline-based excavation;
- Construction of the sediment processing/transfer facilities and associated buildings, roads, and parking lots;
- Unprocessed-sediment mixing and pumping;
- Dredged material and backfill unloading, staging, and loading;
- Transfer of processed, dredged materials via barge, truck, or railroad;
- Booster pump operation along the river (if hydraulic dredging is used); and
- Increased traffic in the project area from project workers commuting to and from the site.

Table 6-5 Noise Standard Summary

Receptor Location	Performance Standard/ Control Level	Performance Standard/ Control Level Values (exterior)	Demonstration of Compliance[1]	Location of Monitoring[2]
Short-term Impacts: facility construction, dredging, and backfilling				
Residential	Control Level (established as the threshold at which mitigation is recommended)	Daytime: 75 dBA (maximum hourly average)	Regular daily monitoring during RA activities.	At shoreline or as needed at receptor locations.
	Standard (established as the threshold at which mitigation is required)	Nighttime: (10:00 p.m. to 7:00 a.m.) 65 dBA (maximum hourly average) Daytime: 80 dBA (maximum hourly average) *Source: NYS Department of Transportation*		
Commercial/ Industrial	Standard	80 dBA (maximum hourly average) *Source: NYS Department of Transportation*	Regular daily monitoring during remedial activities	At shoreline or as needed at receptor locations.
Long-term Impacts: sediment-processing facility and transfer operations				
Residential	Standard	65 dBA (day-night, 24-hour average)[3] *Source: U.S. Department of Housing and Urban Development*	Regular daily monitoring during remedial activities	At site perimeter or as needed at receptor locations
Commercial/ Industrial	Standard	72 dBA (maximum hourly average) *Source: Federal Highway Administration*	Regular daily monitoring during remedial activities	At site perimeter or as needed at receptor locations

[1] See Section 6.3.7.
[2] See Section 6.3.9.
[3] Day-night average sound level is the 24-hour average sound level obtained after the addition of 10 decibels (as a penalty) to sound levels in the night from 10 p.m. to 7 a.m. Additionally, maximum hourly readings cannot exceed the short-term residential daytime (80 dBA) and nighttime (65 dBA) standard.

Key:

DBA =A-weighted decibels.

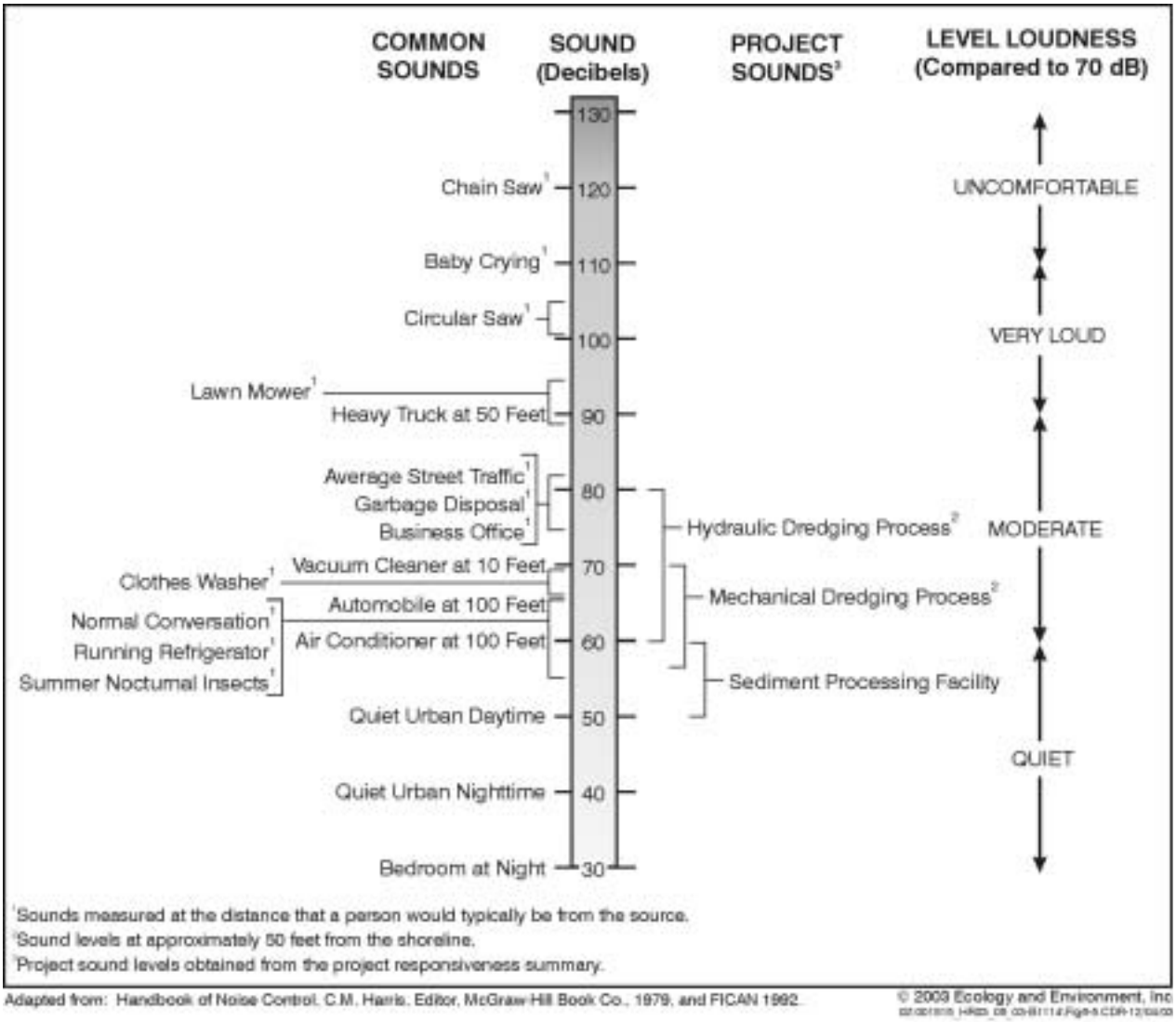


Figure 6-5 Comparison of Predicted Hudson River PCBs Superfund Site Noise Levels and Other Sources of Noise

6.3.2 Requirements from the ROD

The ROD contains the following requirements related to noise and quality of life considerations:

- "Although it is EPA's expectation that the facilities will be located in an industrial or commercial area, the determination of which NAC will apply will depend on where the sediment processing/transfer facilities are sited." (ROD Page iv)

- "The design will also provide for appropriate control of air emissions, noise and light through the use of appropriate equipment that meets all applicable standards." (ROD Page 83)

- "EPA also will provide the public with opportunities to provide input regarding design aspects of the remedy and performance standards, so that community concerns and suggestions regarding, for example, potential noise, light, odor and traffic impacts can be considered by EPA during the design phase." (ROD Page 90)

- "Regarding noise emissions, operations at the sediment processing/transfer facilities will comply with the relevant noise abatement criteria (NAC) of the Federal Highway Administration set forth at 23 CFR 772." (ROD Page 96)

- "The dredging will comply with New York State Department of Transportation construction noise impact guideline for temporary construction noise, which defines "impact" as occurring at levels exceeding L_{eq} (1) [continuous equivalent sound level for 1 hour] = 80 dBA." (ROD Page 97)

- "The performance standards referred to above regarding noise are being adopted preliminarily. During the design phase, EPA will invite public input regarding these standards before finalizing the noise standards. Once implementation of the dredging begins, if the air or noise performance standards are exceeded, EPA will implement engineering controls or other mitigation measures, as appropriate, in order to address such exceedances." (ROD Page 97)

- "Performance standards shall address (but may not be limited to) resuspension rates during dredging, production rates, residuals after dredging or dredging with backfill as appropriate, and community impacts (e.g., noise, air quality, odor, navigation)." (ROD Page 100)

6.3.3 Case Study

A noise investigation was conducted in July 2002 for dredging activities on the Hoosic River in Saratoga County, New York (Dergosits 2003). Measurements were taken at each location for a two-minute duration to evaluate noise levels from hydraulic dredging equipment. Noise levels on the deck of the dredging barge were between 50 dBA during non-dredging activities (likely attributable to nearby automobile and boat traffic) and between 82 and 85 dBA during dredging. At a distance of 50 feet from the operating dredging barge, the levels were reduced to 70 to 73 dBA, and at 900 feet, the levels were reduced to a range of 54 to 65 dBA. It was noted by the monitoring team that the higher noise levels at each location seemed to be generated when rocks or gravel passed through the hydraulic equipment.

6.3.4 Noise Effects on Hearing

Considerable information on hearing loss has been collected and analyzed. It has been well established that continuous exposure to high noise levels will damage human hearing (USEPA 1974). Hearing loss is generally interpreted as the shifting of the ear's sensitivity or acuity to perceive sound to a higher threshold level (threshold shift). The USEPA has established 75 dBA for an 8-hour exposure and

70 dBA for a 24-hour exposure as the average noise level threshold. Similarly, the National Academy of Sciences Committee on Hearing, Bioacoustics, and Biomechanics (CHABA) identified 75 dBA L_{eq} as the minimum level at which hearing loss may occur. However, it is important to note that a continuous, long-term (40-year) exposure is assumed by both the USEPA and CHABA before hearing loss may occur. The World Health Organization (WHO) publication on community noise states that the risk for hearing impairment would be negligible for a lifetime exposure to a L_{eq}, 24-hour value of 70 dBA (WHO 1999).

Based on information from the American Academy of Pediatrics, noise-induced hearing loss in children is not expected to occur at levels below 85 dBA, and the National Institute of Health (NIH) has indicated that sounds less than 80 dBA (after long exposure) are not likely to cause hearing loss.

Performance Effects

The effect of noise on the performance of activities or tasks has been the subject of many studies. Some of these studies have established links between continuous high noise levels and performance loss. Noise-induced performance losses are most frequently reported in studies employing noise levels in excess of 85 dBA. Based on the information reviewed during the development of the noise performance standard, the noise levels anticipated for this project (as limited by the performance standard) are not expected to cause long-term health or performance effects in the community (including effects on sensitive receptors such as children).

6.3.5 State and Federal Noise Standards and Criteria

A number of standards and guidelines for assessing noise impacts have been adopted by federal and state agencies. Although none of these were established to specifically regulate dredging and processing activities such as will be conducted under this project, the four primary sources that are appropriate for developing the performance standards for the Hudson River project are described below.

Federal Highway Administration (23 CFR 772*)*

The Federal Highway Administration (FHWA) provides policies and guidance for the analysis and abatement of highway traffic noise that were adopted by NYSDOT. The current FHWA procedures for highway traffic noise analysis and abatement are contained in 23 CFR 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise. While the sediment dredging activity is not a highway project, the FHWA noise regulations offer guidelines that can be used to develop performance standards for sediment dredging, facility construction, and backfilling.

The FHWA noise regulations contain noise abatement criteria (NAC) that the FHWA considers to be the acceptable limits for noise levels for exterior land uses and outdoor activities. According to the FHWA NAC, if noise levels from highway traffic at an impacted receptor location exceed the corresponding L_{eq} (listed

in Table 6-6), abatement measures such as the installation of noise barriers, if feasible or reasonable, need to be considered. FHWA policies and guidance provide a demonstrated basis for considering noise and its effects on the public. Therefore, the noise performance standard takes the FHWA procedures and guidance into account.

Table 6-6 FHWA Noise Action Levels

Activity Category	$L_{eq}(h)$	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	–	Undeveloped lands.

Key:
$L_{eq}(h)$ = hourly average equivalent sound level.

New York State Department of Transportation (NYSDOT) Environmental Procedures Manual, 3.1, New York State Noise Analysis Policy

The FHWA issued a directive on June 12, 1995, stating that within one year from that date, the state transportation departments must adopt a written statewide noise policy and have it approved by the FHWA. This policy was required to demonstrate substantial compliance with the federal noise regulation in 23 CFR 772 and with the reissued June 12, 1995, FHWA Policy and Guidance document. To comply with this directive, NYSDOT issued the New York State Noise Analysis Policy to provide specific policies and procedures for noise studies and noise abatement recommendations pursuant to 23 CFR 772 and to be in substantial conformance with the intent and provisions of the FHWA noise regulation.

Under this policy, major urban projects require more extensive analysis: particularly sensitive receptors should be identified and construction noise impacts should be determined. The policy states that construction noise impact will not normally occur at levels under an L_{eq} of 80 dBA.

NYSDOT's Environmental Procedures Manual (EPM), Chapter 3.1, provides the framework for implementing and evaluating compliance with FHWA noise policies and guidance. Therefore, the EPM methods were considered during development of the noise performance standard for dredging, facility construction, and backfilling operations.

U.S. Department of Housing and Urban Development (USHUD) Environmental Criteria and Standards

USHUD has adopted environmental standards, criteria, and guidelines for determining the acceptability of federally assisted projects and has proposed mitigation measures to ensure that activities assisted by USHUD will achieve the goal of a suitable living environment. These guideline values are strictly advisory. These standards, outlined in 24 CFR Part 51, establish a site acceptability standard based on day-night average sound levels (DNL). The DNL is the 24-hour average sound level, in decibels, obtained after the addition of 10 decibels (as a penalty) to sound levels in the night from 10 p.m. to 7 a.m. These standards are presented in Table 6-7.

Table 6-7 USHUD Site Acceptability Standards

	Day-Night Average Sound Level in Decibels (DNL)
Acceptable	Not exceeding 65 dB
Normally unacceptable	Above 65 dB but not exceeding 75 dB
Unacceptable	Above 75 dB

Source: 24 CFR 51.103

"Acceptable" sites are those where noise levels do not exceed a DNL of 65 dB. USHUD guidelines include a goal of 45 dB for interior noise levels. It is assumed that, with standard construction, any building will provide sufficient attenuation such that if the exterior level is 65 L_{dn} or less, the interior level will be 45 L_{dn} or less. Housing on acceptable sites does not require additional noise attenuation other than that provided in customary building techniques. "Normally unacceptable" sites are those where the DNL is above 65 dB but does not exceed 75 dB. Housing on normally unacceptable sites requires some means of noise abatement, either at the property line or in the building exterior construction, to ensure that interior noise levels are acceptable. "Unacceptable" sites are those where the DNL is 75 dB or higher. The term "unacceptable" does not necessarily mean that housing cannot be built on these sites, but rather that more sophisticated sound attenuation would likely be needed and that there must exist some benefits that outweigh the disadvantages caused by high noise levels.

Since the USHUD criteria are applicable to potentially long-term residents, the use of the criteria for short-term activities such as facility construction or dredging activity may not be appropriate. However, these criteria should be taken into consideration for long-term activities such as the operation of the sediment processing/transfer facilities.

USEPA Levels

Through the Noise Control Act of 1972, Congress directed the USEPA to publish scientific information about the kind and extent of all identifiable effects of dif-

ferent qualities and quantities of noise. The USEPA was also directed to define acceptable levels under various conditions that would protect public health and welfare with an adequate margin of safety. The USEPA collaborated with other federal agencies and the scientific community to publish a "Levels Document" in 1974 that would fulfill these requirements in the Noise Control Act.

In this document, the USEPA states that "since an individual often experiences intense noise exposure outside of working hours (for example, while using noisy appliances or pursuing noisy recreation), protection on a 24-hour basis 365 days per year requires exposure of an intermittent variety at an equivalent level of less than 71.4 dB. This value is rounded to 70 dB to provide a slight margin of safety. Exposure to greater levels would produce more than 5 dB hearing loss in at least some of the population." The 70 dB value is a 24-hour average level to which an individual can be exposed for 365 days a year (for 40 years).

6.3.6 Development of the Performance Standard for Noise

A performance standard for noise has been established for this project considering the available federal and state criteria described above. Potential noise impacts due to project activities can be divided into long-term impacts and short-term impacts. Long-term impacts could be generated as a result of equipment operations at the sediment processing/transfer facilities; the transfer of processed, dredged materials via barge or railroad; or booster pump operation along a given section of the river. These long-term activities are expected to be ongoing during the six-year life of the project. Short-term impacts could result from the construction of the sediment processing/transfer facilities and associated buildings, roads, and parking lots; dredging and backfilling activities; and increased street traffic due to construction employee commuting and transport of material and equipment. Short-term potential noise impacts from construction of the sediment processing/transfer facilities and associated traffic due to transport of materials and equipment would last in the range of 3 to 6 months. Daytime and nighttime standards as well as a control level for daytime have been established to protect residential areas from excessive noise. The daytime control level provides a value at which mitigation of noise emissions is recommended.

It is anticipated that there will be a minimum of 30 weeks available each year to conduct dredging operations, unconstrained by any work-hour limitations. Potential impacts associated with dredging activities are expected to be short-term. Short-term activities could vary from several weeks to several months.

Table 6-5 presents noise emission limits to be used for both long-term and short-term impact activities. Noise standards have been developed for both residential and commercial/industrial areas. These standards consider the sources and criteria described in Section 6.3.5. In an effort to minimize sleep disturbance and because background noise levels are lower at night, a nighttime residential noise standard has been established. Nighttime considerations are not required for commercial/industrial areas due to the minimal potential for sleep disturbance in

those areas. Where commercial and residential areas are mixed, the residential standard will apply. The periods defined as nighttime and daytime are well-established common intervals used in various noise guidelines. Considering that nighttime ambient noise levels are typically 10-dBA lower than during the day, the standard practice for establishing nighttime levels is to apply a 10-dBA penalty to the daytime standard (i.e., decrease the daytime level by 10 dBA).

Short-term Impacts

The short-term impact standard of 80 dBA has been established for facility construction, dredging, and backfilling operations. This limit is based on NYSDOT's EPM Section 3.1, New York State Noise Analysis Policy, which applies to construction noise impacts. The residential nighttime and daytime standards as well as a daytime control level are established to protect the quality of life. These standards and the control level meet limits to protect health and welfare recommended by the USEPA Levels Document when adjusted for the short-term nature of the noise (as directed in the document). The nighttime standard also meets USHUD goals as outlined in Section 6.3.5 (see Figure 6-6 for a Conceptual Noise Monitoring Layout).

Long-term Impacts

The limits for the long-term impacts are based on the USHUD guideline for residential areas (65 dBA) and FHWA noise abatement criteria (72 dBA) for developed lands.

6.3.7 Demonstration of Compliance

The RD Team shall design the project to comply with the guidance outlined in this standard. Noise modeling shall use the noise emission values obtained from the equipment manufacturer, when possible, or from standard noise-level reference tables, source and receptor coordinates, atmospheric conditions, existing barriers, ground conditions, and terrain. Construction activity noise levels for the project shall be predicted at the nearby receptor locations using methodology contained in the U.S. DOT Highway Special Report, *Construction Noise: Measurement, Prediction and Mitigation* (1976). Traffic noise shall be predicted using the FHWA Traffic Noise Model (TNM 2.1) by using traffic information and predicted additional project-related traffic. An acceptable stationary model or other appropriate calculations for attenuation of noise over distance and combining noise sources shall be used for predicting noise from dredging and sediment processing and transfer activities. Other suitable predictive models may be used if approved by USEPA. The RA Team shall measure noise during remedial activities to confirm compliance with the standard (see Section 6.3.9).

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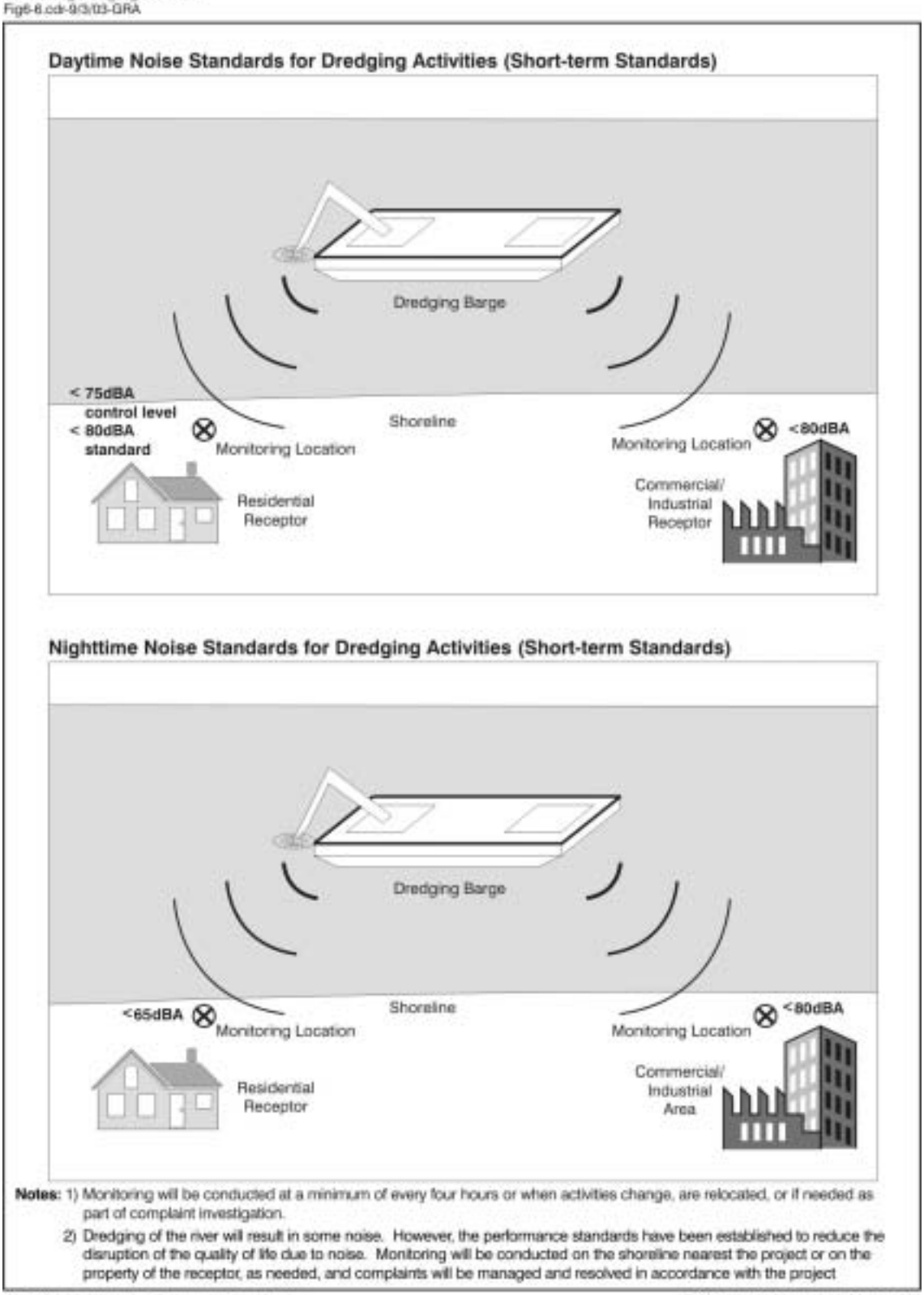

SOURCE: Ecology and Environment, Inc., 2003

Figure 6-6 Conceptual Noise Monitoring Layout

6.3.8 Mitigation and Contingencies

Modeling results shall be reviewed by the RD Team during the design against the standards defined above. If the modeling indicates that there is a potential to exceed the standard at a receptor, mitigation measures to attenuate the noise emissions shall be developed as appropriate and included in the design. Mitigation measures may include but are not limited to the following approaches or other proven techniques for noise attenuation:

- Specifying the use of newer models of machinery that are quieter and maintaining equipment so that noise-related performance is optimized throughout the remedial program;
- Substituting electric drives for diesel engines where practicable;
- Using electric conveyor belts for material handling where practicable;
- Enclosing noise-producing equipment and areas where possible;
- Isolating and damping vibrating elements;
- Performing routine maintenance;
- Using high-performance mufflers for dredges and other diesel-driven equipment and reducing vehicle running speed (locomotives, trucks, etc.);
- Avoiding excessive gear shifting and throttling;
- Placing operating restrictions on equipment, as appropriate, where engineered approaches are not otherwise available;
- Sequencing construction and dredging operations; and
- Maximizing equipment location using distance and natural or artificial features to attenuate noise and limiting time of operation of construction activities.

Certain noise conditions could disturb domestic animals, such as farm animals, and disrupt wildlife habitats. Areas that are sensitive (as defined by habitat delineation) may require special mitigation measures such as the use of quieter equipment or noise shielding to minimize impact.

As a secondary measure, once the techniques outlined above have been initiated, the installation of portable noise barriers may be necessary. Design shall include mitigation to address predictable noise problems, while the contingency plan will be prepared to address additional issues and complaints.

6.3.9 Monitoring

A type 1 or type 2 sound level meter as rated by the American National Standards Institute (ANSI) shall be used to measure noise levels. Records of the measurement, including specifics of the measurement location, time of measurement, meteorological conditions during the measurement, identification of significant sound sources, model and serial numbers of all equipment used, and calibration results shall be maintained.

Monitoring shall be conducted in the slow response mode for continuous equivalent sound level over a 1-hour period ($L_{eq}(h)$) at the receptor location while the process or activity is at peak load. The L_{eq} monitoring duration can be shortened for sources having steady noise emission levels.

Monitoring requirements are outlined in Table 6-8. Monitoring shall be conducted on a regular basis (every 4 hours) during the construction of the sediment processing/transfer facilities (during periods expected to create greater noise levels). Once construction has been completed, monitoring shall be conducted at the startup of the facility (to validate design) and on a regular basis during typical facility operations. If residential receptors have been determined to be within range of the project so that noise levels at the locations could exceed the control level or limits established by the standard, these locations shall be monitored (every 4 hours) to demonstrate compliance. Increased monitoring will be required if the control level (established for daytime) is exceeded. In addition, monitoring shall be conducted as needed to evaluate changes in operations.

Table 6-8 Noise Monitoring Requirements[1]

Operation	Monitoring Frequency	Duration	Location
Sediment Processing/ Transfer Facilities construction activities	Every 4 hours	1-hour average	At site perimeter or as needed at receptor locations
Sediment Processing/ Transfer Facilities	Every 4 hours	1-hour average	At site perimeter or as needed at receptor locations
Phase 1 dredging and/or backfilling	Every 4 hours	1-hour average	At shoreline or as needed at receptor locations
All dredging and facility operations (including traffic) – upon receipt of noise complaint related to the project	As soon as practical after complaint is received	1-hour average	Origin of complaint (site perimeter for the facility or shoreline for the dredging or at the nearest receptor)

[1] Alternative methods for demonstrating compliance, such as reduced sampling and monitoring, will be evaluated and considered by the USEPA on an ongoing basis.

At the start of each type of Phase 1 dredging operation (i.e., mechanical or hydraulic; the type of dredging equipment for Phase 1 has not yet been decided), a noise study shall be conducted to collect noise level data from the dredging operation at various distances. Data gathered from this study will be used to validate design and select mitigation approaches and to confirm that the design will comply with the noise performance standard. In addition, based on this information and using calculations for noise attenuation over distance, noise-monitoring requirements can be modified during the dredging of some locations where the nearest receptors are distant or noise levels are consistent. During Phase 1 dredging, monitoring shall be conducted on a regular basis (every 4 hours) while the dredging and backfilling operations are ongoing if residential receptors have been determined to be within range of the project. Alternative methods for demonstrating compliance, such as reduced sampling and monitoring, will be evaluated and considered by the USEPA on an ongoing basis.

The primary location for noise monitoring is at the receptor. However, if it is determined that the noise levels are in compliance closer to the source of noise, then those locations are acceptable for demonstrating compliance. For example, during dredging operations the shoreline may be considered an acceptable location for monitoring if the levels are at or below the standard and receptors are more distant.

In the event of a noise complaint, an investigation shall be conducted as soon as it is practical. Complaint follow-up will include documentation, investigation to determine if the complaint is attributable to the project, and communication with the person making the complaint. Additional monitoring, mitigation, and notification will be conducted as needed. Complaints that are not attributable to the project will be noted but would not require follow-up monitoring. If required, monitoring shall be conducted at the site from which the complaint was received. This monitoring shall be conducted for 1 hour or as long as needed to collect the data required to resolve the complaint. The person making the complaint may be asked to note any time periods when noise levels are disturbing. This information will be used to correlate the noise level recorded on the sound-level meter with the disturbance.

6.3.10 Reporting

Monitoring results shall be documented on daily noise monitoring field data sheets. Noise complaints shall be documented by the RA Team as described in the contingency plan.

A monthly report shall be sent to the USEPA by the RA Team summarizing the monitoring activities for the previous month. The summary shall be in a tabular format that includes the date, time, location, activity being conducted, and results in dBA. The summary shall also include a log of any noise complaints in the tabular format and include the necessary information and follow-up action needed to resolve the complaint.

6.3.11 Notification

The RA Team shall notify the USEPA of the exceedance of this performance standard within 24 hours after discovery. A report outlining the reasons for the exceedance and the mitigation employed to reduce the noise levels and prevent further exceedances shall be submitted to the USEPA within 10 days of the event. Table 6-9 provides a summary of action levels and required responses related to noise.

Table 6-9 Noise Action Levels and Required Responses

Action Level	Noise Levels	Required Action	Reporting/Notification
Typical Operations Level	Noise monitoring in compliance with the control level and standard.	ÿ Continue with existing controls and monitoring.	ÿ Monthly reporting of monitoring data to the USEPA.
Concern Level	Noise levels are above control level. OR Noise levels are above the standard although exceedance can be easily and immediately mitigated. OR Project-related noise complaint received from the public.	ÿ Investigate cause of noise increases and verify that the problem is project-related. ÿ In the event of a public complaint, conduct monitoring at the site of complaint if necessary to determine if the control level or standard has been exceeded. ÿ Mitigation (as outlined in the project contingency plan) is recommended when the control level is exceeded. ÿ Implement mitigation (as outlined in the project contingency plan) if the standard is exceeded.	ÿ Follow-up report to include a description of immediate actions taken to mitigate temporary exceedances of the standard. ÿ Complaint follow-up will include communication with the person making the complaint.

Table 6-9 Noise Action Levels and Required Responses

Action Level	Noise Levels	Required Action	Reporting/Notification
Exceedance Level	Exceedance of the noise standard that could not be easily and immediately mitigated. OR Frequent, recurrent noise complaints related to project activities.	ÿ Investigate cause of exceedance ÿ Establish additional monitoring (as needed) to evaluate cause of noise increases ÿ Develop action plan and implement additional mitigation ÿ Continue noise monitoring until compliance with the standard is confirmed.	ÿ Notify the USEPA within 24 hours of discovery ÿ Provide daily monitoring reports ÿ Within ten days of discovery of the exceedance provide a corrective action report describing causes of exceedance and mitigation implemented. ÿ Complaint follow-up will include communication with the person making the complaint.

6.4 Performance Standard for Lighting

6.4.1 Introduction

The lighting performance standard requires the RD Team to develop a monitoring and assessment program and conduct lighting measurements to confirm that the lighting impact is minimized during remedial activities (see Table 6-10). The standard includes the following elements: lighting limits, monitoring requirements, strategies and techniques, data recording, and possible actions to be taken in the event the standard is exceeded. Appendix A summarizes scientific and technical information about lighting.

Table 6-10Lighting Standard Summary [1]

Land Use Categories	Performance Standard	Demonstration of Compliance
For Dredging, Backfilling, and Facility Operations:		
Rural and suburban residential areas (areas of low ambient brightness)	0.2 footcandle	Monitoring at receptor property line as described in Section 6.4.6
Urban residential areas (areas of medium ambient brightness)	0.5 footcandle	Monitoring at receptor property line as described in Section 6.4.6
Commercial/industrial areas (areas of high ambient brightness)	1 footcandle	Monitoring at receptor property line as described in Section 6.4.6

[1] Standard applies only to light emissions attributable to the project.

6.4.2 Requirements from the ROD

The ROD contains the following requirements related to lighting and quality of life considerations:

- "The design will also provide for appropriate control of air emissions, noise and light through the use of appropriate equipment that meets all applicable standards." (ROD Page 83)

- "Design of sediment processing/transfer facilities will include requirements for the control of light, noise, air emissions, and water discharges." (ROD Page 87)

- "EPA also will provide the public with opportunities to provide input regarding design aspects of the remedy and performance standards, so that community concerns and suggestions regarding, for example, potential noise, light, odor and traffic impacts can be considered by EPA during the design phase." (ROD Page 90)

- "Performance standards shall include (but may not be limited to): resuspension during dredging, production rates, residuals after dredging and community impacts (e.g., noise, air, odor, lights and navigation)." (ROD Page 100)

6.4.3 Lighting Effects

It is anticipated that there will be minimum of 30 weeks available each year to conduct dredging operations, unconstrained by any work-hour limitations. Potential impacts associated with dredging activities are expected to be short-term. Short-term activities could vary from several weeks to several months. To meet the project schedule, nighttime activities—and lighting—may be necessary. Artificial lighting may be needed for dredging activities at night and may affect nearby receptors. Figure 6-7 shows an example of a barge lighting configuration.

Lighting may affect the quality of life by causing glare, light trespass, and/or sky glow:

- **Glare** is the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, causing annoyance, discomfort, or loss in visual performance and visibility.

- **Light trespass** effects are caused by light that strays from the intended purpose and becomes an annoyance, a nuisance, or detrimental to visual performance.

- **Sky glow** is the brightening of the night sky that results from the reflection of radiation (visible and non-visible) scattered from the constituents of the atmosphere (gaseous molecules, aerosols, and particulate matter) in the direction of the observer.

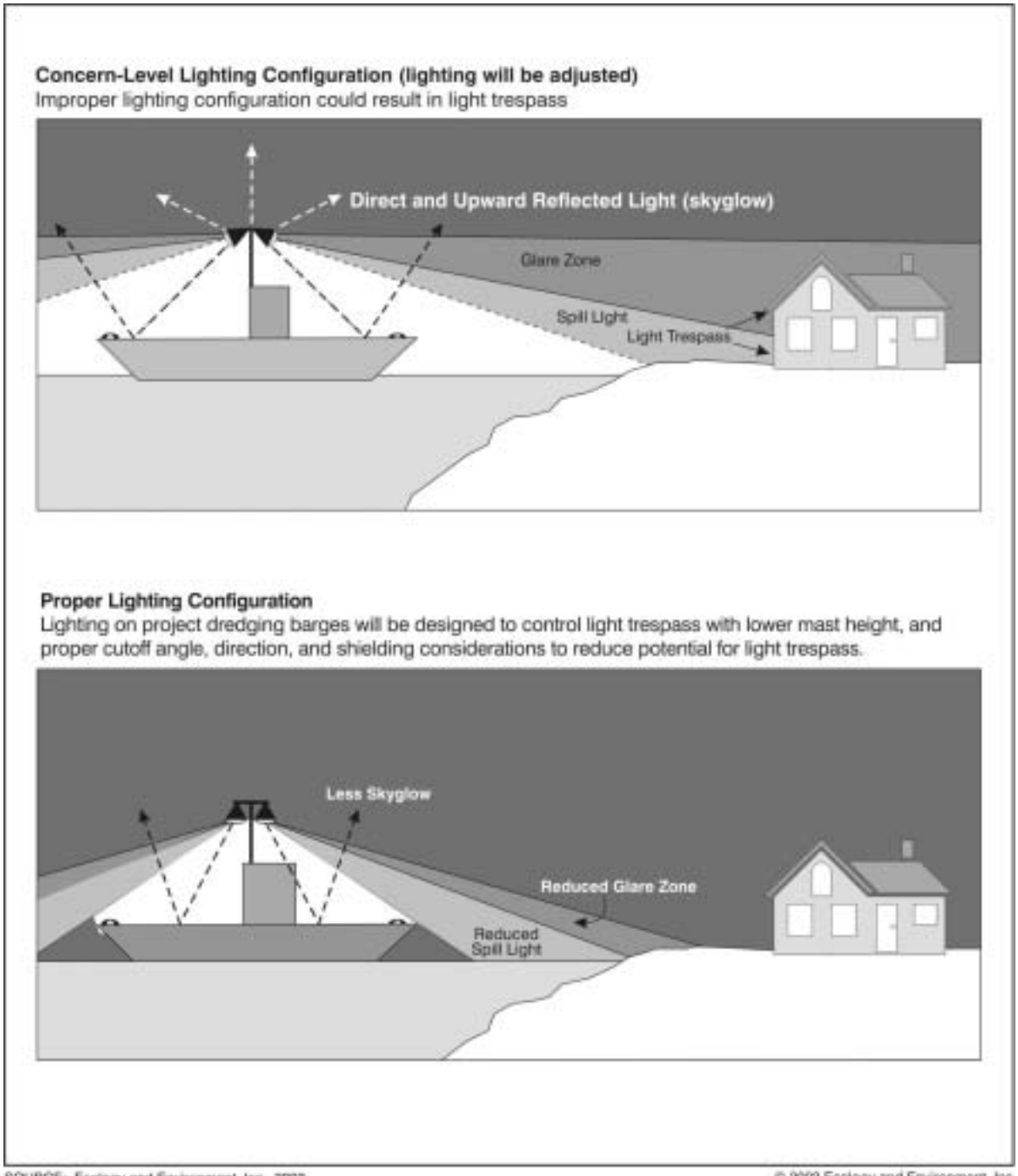

Figure 6-7 Conceptual Barge Lighting Configurations

In general, this project should be accomplished without any adverse impacts caused by lighting used for the operation. However, certain unique situations, such as a home (receptor) located immediately adjacent to the river at a dredge area, may be encountered during the project.

Positioning of lights, brightness, and direction are key factors in minimizing the potential for off-site impacts. During nighttime dredging operations, lighting would be needed for vessel navigation, for illuminating decks and railings of work equipment, and for interior lighting for operating control areas. While nighttime lighting requirements for the proposed work shall conform to established industry safety standards, the use of high-mast lighting systems that can increase the potential for lighting impacts at dredging sites and at the sediment processing/transfer facilities shall be avoided.

Worker safety will require lighting during nighttime operations at the sediment processing/transfer facilities, including the dock area, rail yards, staging areas, administrative buildings, parking lots, and roads. Lighting at the land-based facilities will be directed toward work areas and away from neighboring properties. Low- or high-pressure-sodium (LPS and HPS) or metal-halide lamps should be used with wattages that do not cause overlighting. Proper siting and careful layout of the land-based operations should effectively eliminate any lighting nuisance to the local community. It should be noted that the lighting performance standard will not supersede worker health and safety lighting requirements established by OSHA.

Certain lighting conditions also could disrupt domestic animals and wildlife, including farm animals, migrating birds, insects, and nocturnal mammals. Mitigation measures may need to be implemented in areas that are sensitive to lighting (as defined by habitat delineation).

6.4.4 Development of the Performance Standard for Lighting

There are few standards and guidelines available for assessing lighting impacts. The Illuminating Engineering Society of North America (IESNA) has developed recommendations that address light trespass. These recommendations are found in IESNA Technical Memorandum TM-11-00, *Light Trespass: Research, Results and Recommendations*.

Lighting required for nighttime in-river activities shall conform to 33 CFR 154.570, pertaining to lighting requirements for bulk transfer of waste. 33 CFR 154.70 states that lighting must be located or shielded so as not to mislead or otherwise interfere with navigation on the adjacent waterways. Other requirements for lighted vessels include:

- 33 U.S.C. §§ 2020 through 2024, which address the lighting requirements for vessels navigating on inland waterways of the United States; and

- New York State Navigation Law Article 4, Section 43, which sets forth the required lighting for vessels as determined by class of vessel. There are six classes of vessels designated by the length of each vessel (see Appendix B).

The United States Coast Guard issues regulations for avoiding collisions at sea. These regulations, referred to as "Rules of the Road," include a Part C – *Lights and Shapes, Rule 20, Application, the required lighting of vessels at sea from sunset to sunrise: masthead forward light, sidelights, stern light, and towing light* (see Appendix B).

The lighting performance standard was developed based on a review of existing federal and state requirements, available literature, and standards pertaining to lighting. The following are the variables that were considered during development of performance standards for lighting:

- Number of sources;
- Types of light sources;
- Expected duration of lighting use;
- Location of each source (water-based and land-based);
- Ambient light levels; and
- Lighting technologies and applications.

IESNA guidance was the primary source used to develop the lighting performance standard, which is summarized in Table 6-10. Additional information and references are included in Appendix A. The following land uses in the project area were identified:

- Rural and suburban residential areas: Areas of low ambient brightness where some roadways would have infrequent street lights.
- Urban residential areas: Areas of medium ambient brightness where most roadways would have street lights that conform to traffic route standards.
- Commercial/industrial areas: Dense areas of high ambient brightness that accommodate a high level of nighttime activity.

6.4.5 Demonstration of Compliance

The RD Team is required to complete the design in accordance with the performance standard for lighting as defined above. Remedial activities shall also be conducted in accordance with the standard.

Once the site locations have been established for the sediment processing and transfer facilities and the lighting design has been completed for the dredging, material transfer, and dewatering processes, the lighting design completed by the RD Team will be reviewed by the USEPA to determine whether light trespass and glare reduction guidelines have been incorporated into the design.

When receptors are close to the dredging operation, monitoring will be conducted at the property line of the receptors nearest to the dredging operations, to the extent practicable, to evaluate compliance with the performance standard. Alternative methods for demonstration of compliance, such as reduced sampling and monitoring, will be evaluated and considered by the USEPA on an ongoing basis.

6.4.6 Monitoring Requirements

A footcandle meter shall be used to measure illumination at the property line of the nearest receptors. Records of the measurement shall be made, including specifics of the measurement location, time of measurement, meteorological conditions during the measurement, identification of significant light sources, and model and serial numbers of all equipment used to measure illumination. Other impacts such as glare and sky glow cannot be easily measured. Visual observations must be relied upon in monitoring any potential impacts of this nature.

The primary location for light monitoring is at the receptor. However, if it is determined that the light levels are in compliance closer to the source, then such locations are acceptable for demonstrating compliance. For example, during dredging operations the shoreline may be considered an acceptable location for monitoring if the levels are at or below the standard and receptors are more distant.

Monitoring shall be conducted three times between 10:00 p.m. and dawn during dredging activities at the nearest receptors (or closer to the lighting source, e.g., the shoreline) to the dredging operation. Monitoring will occur only near receptors that have the potential to experience an exceedance of the lighting standard. Monitoring shall be repeated whenever the dredging operation is moved to a new location on the river. Monitoring shall be performed during Phase 1 at the perimeter of the sediment processing/transfer facilities and the receptor property line (as needed) when the facility initially begins evening activities and when any significant changes in lighting for the facility have been made. Complaints will also be handled as specified in the contingency plan. Complaint follow-up will include documentation, investigation if the complaint is attributable to the project, mitigation, and notification (as needed).

6.4.7 Mitigation and Contingencies

In order to minimize lighting impacts, proper beam direction and shielding shall be included in the lighting design for both stationary and navigating vessels.

Mitigation measures could include use of vegetative and landscape buffers, screens, barriers, and other site and project elements to avoid or minimize im-

pacts. Although the presence of these barriers would not be a primary consideration in the selection of a site for the sediment processing/transfer facilities, if present at the chosen site, the facility would be positioned to maximize their use to the extent practicable. If the selected site requires additional mitigation, these buffers, barriers, and screens would be constructed. The RD Team shall design the project appropriately so that the need for additional unplanned mitigation steps during remedial activities is minimized.

6.4.8 Reporting

Monitoring results shall be documented on daily light monitoring field data sheets. The RA Team will document any lighting complaints and provide for follow-up investigation and resolution as directed by the USEPA.

A monthly report summarizing the monitoring activities for the previous month shall be sent to the USEPA by the RA Team. The summary shall be in tabular format and include the necessary information and follow-up action needed to resolve the complaint. The summary shall also include a log of any lighting complaints received and provide the date, time, location, and the action taken to resolve the complaint.

6.4.9 Notification

The USEPA shall be notified of any exceedance of this performance standard within 24 hours of discovery. A report outlining the reasons for the exceedance and the mitigation employed to reduce the lighting levels and prevent further exceedances shall be submitted to the USEPA within ten days of the event. Table 6-11 provides a summary of action levels and required responses for lighting problems.

6.5 Performance Standard for Navigation

6.5.1 Introduction

Use of the river in the project area by recreational and commercial watercraft is expected to continue during implementation of the RA. The performance standard for navigation, which is designed to limit project-related navigation impacts, establishes the requirements by which the remedy can be implemented safely and without unnecessarily hindering overall non-project-related vessel movement.

Navigation has been impeded, to a certain extent, due to dredging limitations associated with the presence of PCB contamination in the sediment. The project, when completed, will improve conditions on the river for commercial and recreational users.

Table 6-11 Lighting Action Levels and Required Responses

Action Level	Lighting Levels	Required Action	Reporting/Notification
Typical Operations Level	Lighting is used so that lighting levels comply with the standard.	ÿ Continue with existing controls, including regular monitoring and readjustment when activities are relocated.	ÿ Monthly reports
Concern Level	Lighting levels are above existing standard, although exceedances can be easily and immediately mitigated. OR A project-related lighting complaint is received from the public.	ÿ Immediately investigate cause of lighting problem and verify that the problem is project-related. ÿ Implement mitigation, including reorientation or additional shading of lighting as outlined in the project contingency plan. ÿ Reevaluate lighting levels to confirm compliance with standard.	ÿ Follow-up report to include a description of immediate actions taken to mitigate temporary exceedances of the standard. ÿ Complaint follow-up will include communication with the person making the complaint.
Exceedance Level	Recorded exceedance of the lighting standard is not easily and immediately mitigated. OR Frequent, recurrent complaints related to project activities.	ÿ Investigate cause of exceedance. ÿ Establish regular monitoring (as needed) to evaluate lighting conditions. ÿ Develop action plan and implement additional mitigation. ÿ Continue regular monitoring until compliance with the standard is confirmed.	ÿ Notify the USEPA of an unmitigated exceedance within 24 hours of discovery. ÿ Within ten days of discovery of the exceedance provide a corrective action report describing causes of exceedance and mitigation implemented. ÿ Complaint follow-up will include communication with the person making the complaint.

The majority of the dredging is expected to occur outside the navigable portion of the river channel (i.e., in shallower parts of the river). However, the movement of project vessels up and down the river will occur primarily in the navigation channel and associated locks. The number of vessels required on the river to accomplish the remedy has not yet been determined and may vary based, in part, on the type of dredging selected. Mechanically dredged sediment will likely be transported primarily by barge; hydraulically dredged sediment will be transported primarily by pipeline. While the former method will require the use of more vessels on the river, the pipeline used to transport hydraulically dredged sediment will necessitate certain navigational considerations. The methods for dredging (by dredge area) will be determined during design.

The remedy will comply with applicable federal and state navigation rules and regulations that have been established to promote safe and effective vessel movement.[1] This standard also includes additional requirements developed to protect the quality of life for users of the river. The RA Team's adherence to the requirements established in this performance standard for navigation will minimize potential impacts on the community and other entities that also use the river (e.g., commercial and recreational vessels) during remedial activities.

Summary of the Performance Standard for Navigation

The navigation performance standard was developed to ensure that remedial dredging activities can be completed safely and on schedule while minimizing inconvenience to recreational and commercial watercraft. Achieving the standard will require close coordination between the RA Team, USEPA, and the New York State Canal Corporation (NYSCC). The RA Team vessels (bulk transport and tugs) will be considered to be commercial vessels for purposes of navigation on the Champlain Canal system.

The RA Team will be expected to comply with applicable navigation laws, rules, regulations, and other applicable requirements as indicated in Section 6.5.7. Notification of the NYSCC by the RA Team will be required when remedial activities are anticipated. The RA Team will be required to use all reasonable means of providing Notices to Mariners via NYSCC and the U.S. Coast Guard (USCG) to facilitate navigation of the river channel by other watercraft and to properly notify mariners of anticipated delays in the use of the channel and/or locks. In addition, the RA Team will provide the public with a schedule of anticipated project activities. The navigation performance standard is summarized in Table 6-12 and is supported by the laws, regulations, and other requirements summarized in Appendix B.

6.5.2 Requirements from the ROD

The following statements were made in the ROD in reference to navigation quality of life considerations:

- "EPA will consider the New York State regulations that specify Champlain Canal navigational channel dimensions in developing the navigation performance standard." (ROD Page 83)

[1] CERCLA contains a permit exemption, set forth at Section 121(e)(1), for the portion of a remedial action that is conducted on site. USEPA guidance interprets this permit exemption to apply to all administrative requirements, whether or not they are actually styled as "permits." To the extent that an applicable navigation requirement is procedural rather than substantive in nature, the USEPA will evaluate, in consultation with NYSCC, whether such a requirement should be met for this project.

Table 6-12Summary of Applicable Navigation Regulations and Requirements

Navigation Laws, Rules, Regulations and other Applicable Requirements	Performance Standard	Demonstration of Compliance[1]
U.S. Code Title 33 – Navigation and Navigable Waters Chapter 9 (Protection of Navigable Waters and of Harbors and Rivers) and Chapter 34 (Inland Navigational Rules of the United States)	Comply with existing regulations related to obstructions, avoiding collisions, safe navigation, and signaling as described in Appendix B.	Perform required monitoring, reporting, and notifications as described in the standard.
New York State Consolidated Law Chapter 37 (Navigation Law)	Comply with existing NYS regulations as they apply to free and safe navigation (aid and lighting to be displayed) and are related to protection of navigable waters as described in Appendix B.	Perform required monitoring, reporting, and notifications as described in the standard.
New York State Consolidated Law, Chapter 5 (Canal Law); New York State Canal Corporation Rules and Regulations; Title 21, Miscellaneous; Chapter III NYS Thruway Authority, Subchapter D Canal System	Comply with existing regulations related to signals and vessel operation to provide safe and timely navigation as described in Appendix B. Dredging to NYSCC specifications may be needed in areas designated during design, as determined by USEPA in consultation with NYSCC.	Perform required monitoring, reporting, and notifications as described in the standard.
Other Applicable Requirements		
Evaluate Vessel Movement	Use appropriate models or analysis. Use the results of the analysis to assist in the design of vessel movement and dredging operations so that non-project-related vessel movement is not unnecessarily hindered.	Submit completed analysis (during design) for USEPA approval in consultation with NYSCC.
Restricting Access to Work Areas	Restrict access and provide safe access around work areas as described in Appendix B. Minimize channel encroachment (to the extent practicable) in consultation with NYSCC.	Perform required monitoring, reporting, and notifications as described in the standard.
Scheduling Activities	Develop a schedule for remedial activities such that the movement of non-project-related vessels is not unnecessarily hindered. See Appendix B.	Perform monitoring, reporting, and notifications in consultation and coordination with USEPA and NYSCC.

Table 6-12Summary of Applicable Navigation Regulations and Requirements

Navigation Laws, Rules, Regulations and other Applicable Requirements	Performance Standard	Demonstration of Compliance[1]
Notice to Mariners	As necessary, file and distribute Notice to Mariners as required by the performance standard and NYSCC.	Notices to mariners are provided with ample time; mariners are notified using all reasonable means prior to performance of activities in the river channel.
Other Temporary Aids to Navigation	As necessary, manage temporary aids to navigation (i.e., lighting, signs, and buoys) as described in the performance standard and Appendix B.	River channel is properly marked for navigation of other watercraft in the channel; occurrences of river channel congestion are limited.

[1] Compliance with applicable laws, rules, and regulations that are part of the navigation performance standard will be monitored by USEPA and other the applicable agencies as appropriate. In addition, the USEPA will review vessel monitoring data and input from mariners via questionnaires and investigate complaints to evaluate compliance with all requirements that are established as performance standards.

- "To help ensure that navigation is not impeded, EPA will consult with the New York State Canal Corporation during remedial design and construction phases on issues related to canal usage, navigational dredging, and other remedy-related activities within the navigational channel." (ROD Page 84)

- "Construction activities will also be coordinated with the New York State Canal Corporation, which operates the locks on the Upper Hudson River from May through November and controls navigation in the Champlain Canal." (ROD Page 90) [It should be noted that, according to the NYSCC, the typical navigation season for the Champlain Canal extends only through the first Sunday of November].

- "Dredging of the navigation channel, as necessary, to implement the remedy and to avoid hindering canal traffic during implementation." (ROD Page 95)

- "Performance standards shall address (but may not be limited to) resuspension rates during dredging, production rates, residuals after dredging or dredging with backfill as appropriate, and community impacts (e.g., noise, air quality, odor, navigation)." (ROD Page 100)

6.5.3 Federal and State Navigation Laws, Rules, and Regulations

The RA Team will be required to comply with applicable federal and state navigation regulations, as further indicated below. Compliance with these regulations will aid in completing the remedy without unnecessarily interfering with river navigation. Where rules and regulations overlap, the RA Team will adhere to the more stringent requirement. The laws, rules, and regulations identified Table 6-12 are the primary sources of the navigation performance standard. A summary of the applicable components of the navigation rules and regulations is presented in Appendix B.

6.5.4 Development of the Performance Standard for Navigation

Maintaining current levels of public use of the river is considered a quality of life issue. Measuring a person's quality of life with respect to use of the river is subjective and, therefore, open to opinion and individual interpretation. For example, the length of delay at a lock that would be tolerated by typical users of the river to facilitate passage of dredging vessels may vary from mariner to mariner, depending on factors such as their final destination, purpose of their travel on the river, and their idea of what constitutes an impact on the quality of boating on the river. Project information related to navigation and the various factors relevant to development of this standard are included in Appendix B. Table 6-12 provides a summary of the performance standard.

Appropriate measurement of the level of compliance to the performance standard for navigation will be based on quantification of observable events (e.g., wait times at locks or the number of vessels able to use a segment of the waterway) before and during the RA. The data required for these quantitative measurements would be obtained through vessel-traffic monitoring, questionnaires completed by mariners, and investigations of complaints filed by users of the river.

6.5.5 Demonstration of Compliance

The RD Team is required to develop the design in accordance with the components of the performance standard for navigation. The RD Team shall evaluate vessel movement using appropriate models or analyses (acceptable to USEPA in consultation with NYSCC and/or other appropriate agencies). The results of such analyses will be used to assist in the design of vessel movement and dredging operations, including scheduling of remedial activities. The scheduling of remedial activities, including vessel movement, should also be consistent with the engineering performance standard for productivity.

The requirements for demonstrating compliance are summarized in Table 6-13 and described in Appendix B.

6.5.6 Monitoring

The NYSCC is responsible for monitoring in-river activities that may have an effect on navigation of the river by commercial and recreational watercraft. The RA Team will be responsible for demonstrating compliance with the performance standard for navigation, in part by compiling daily record logs of river navigation activities and issues (with mitigation steps recorded). The RA Team will be responsible for submitting these daily records to NYSCC, the USEPA, and other involved agencies on a monthly basis for review to ensure that monitoring of adherence to the performance standard for navigation is adequate and appropriate.

Quantitative measurement of the performance standard will involve demonstrating the level of compliance through consultation with NYSCC, vessel-traffic monitoring, questionnaires completed by mariners, and/or complaints. Vessel traffic will be monitored by the RA Team as a method to demonstrate compliance

with the standard. Questionnaires also will be provided to non-project mariners to assess and identify the boating community's quality of life concerns. In addition, complaint response will be established in the contingency plan and will include investigation, monitoring (as needed), mitigation, and follow-up procedures.

6.5.7 Mitigation and Contingencies

Primary factors that shall be considered during design to promote efficient vessel movement and minimize the potential for traffic congestion include the following:

- **Maneuverability.** The equipment shall be capable of maneuvering through the locks, navigation channel, and in shallow portions of the river.

- **Vertical Clearance.** Equipment must be able to pass through the vertical 12- to 15.5-foot clearances above the mean river level, or must be able to be lowered or assembled and reassembled.

- **Draft.** Equipment shall be capable of navigating through shallow areas (including near Lock 5).

Consideration of these dredging equipment factors will aid in mitigating the project's potential impact on non-project-related watercraft using the navigation channel.

Other Applicable Requirements

It is expected that there will be restricted access around work areas undergoing remediation. These restrictions to river access will be coordinated with NYSCC and are not expected to block access to vessels moving up and down the river. Work areas in the river will be isolated (access-restricted) where necessary and as determined by the physical characteristics of the river (width and depth of navigation channel). Where access is restricted around work areas, an adequate buffer zone will be required to ensure that commercial and recreational watercraft can safely pass. To the extent practicable, these buffer zones should allow vessels to remain in the navigation channel while avoiding such areas. A buffer zone will be established only in areas of anticipated remedial work. Buffer zones shall not be established until needed to prevent unnecessary restriction of movement that could cause vessel congestion.

Project-related river traffic will be controlled and scheduled to minimize, to the extent practicable, adverse effects on commercial or recreational use of the Upper Hudson River. For sections of the river where access cannot be restricted due to the physical characteristics of the river channel, non-project-related watercraft will need to follow the information provided by the RA Team and/or NYSCC to safely pass through the channel while remediation is being performed.

Scheduled times for navigation of project-related vessels through the locks may need to be adjusted so that the river can be used by other watercraft while dredging occurs. The remedial operations in the river will need to be coordinated with NYSCC and its lock operators to the extent the locks will be used.

Temporary aids to navigation in areas of active work may be necessary and will consist of those items specified by NYSCC or an equivalent alternative source of information authorized for use by NYSCC and/or USCG. Before placement of temporary navigational aids, the RA Team will consult with NYSCC. The NYSCC and/or USCG will issue a Notice to Mariners. In addition to the Notice to Mariners, the public will be informed of the planned action using methods that may include the following (after consultation with the USEPA and NYSCC):

- Communication with lock operators during lock usage;
- Broadcasting on appropriate marine frequencies (e.g., channel 13 [VHF] and/or 9 [CB]);
- Posting notices at marinas, boating docks/ramps, and locks;
- Contacting commercial and recreational user groups; and
- Posting on a publicly accessible Web site.

The following contingencies/mitigation measures may be used to minimize traffic congestion on the river if determined during design or during remedial activities to be safe and appropriate:

- Placement of dredging equipment to limit the overall areas used at any one time in order to minimize channel encroachment during dredging operations;
- Scheduling work (including in areas adjacent to the channel) to minimize delays, which may include scheduling certain remedial activities to occur during off-peak hours of canal use;
- Establishing times of dredging vessel and equipment movement from one location on the river to the next;
- Creating new areas (by widening the existing navigation channel) or using existing areas along the channel where primarily project-related vessels can move out of the main navigation channel (i.e., passing lanes) to allow other vessels to pass;
- Establishing areas (in strategic locations) where vessel traffic can be controlled to allow safe passage;

- Adhering to an established dredging schedule in terms of hours of operation and location;

- Applying restrictions to other watercraft traffic in the immediate vicinity of the dredging operations (for safety purposes and efficient vessel movement); use of in-river postings; and/or temporary aids to navigation;

- Coordinating with NYSCC to regulate vessel movement at the locks;

- Adhering to required clearance in the navigational channel so that non-project-related vessels can move through the area without being unnecessarily impeded; and

- Dredging in selected areas of the navigation channel as necessary to one or more of the channel dimensions set forth at 21 NYCRR § 155.2(b). Such dimensions include an overall channel depth of 12 feet and a channel bottom width of 200 feet in the canalized river.

6.5.8 Reporting

A monthly navigation monitoring report summarizing monitoring activities for the previous month shall be sent by the RA Team to the USEPA and NYSCC. If monitoring of the remedial activities indicates noncompliance with the performance standard for navigation, the RA Team shall be required to submit daily reports for USEPA and NYSCC review with appropriate action plans until such time that monitoring indicates compliance. The navigation report shall be in a tabular format and shall include a log of navigation complaints and include the necessary information and follow-up actions needed to resolve the complaint.

6.5.9 Notification

The USEPA, NYSCC, and other appropriate agencies shall be notified by the RA Team within 24 hours of discovery of a deviation from the performance standard that can be easily and immediately mitigated (at concern level). Where potentially unsafe conditions or conditions that impact navigation (exceedance level) may result from project-related activities in the river, immediate notification to the USEPA and NYSCC is required. The NYSCC will provide the RA Team with information (associated with interference with navigation) on the types of situations that require immediate notification. A report outlining the reasons for the deviation and the mitigation employed shall be submitted to the USEPA within ten days of the event (see Table 6-13).

Table 6-13 Navigation Action Levels and Required Responses

Action Level	Navigation Conditions	Required Action	Reporting/Notification
Typical Operations (in compliance with the standard)	Remedial operations allow for continuous use of the river with minimal impacts.	ÿ Continue with existing controls.	ÿ Monthly reports to the USEPA and NYSCC.
Concern Level	Deviation from the performance standard, although the issue can be easily and immediately mitigated.	ÿ Identify navigation problems. ÿ Implement additional mitigation as described in the contingency plan. ÿ Additional monitoring may be required to evaluate conditions.	ÿ 24-hour notification to the USEPA and NYSCC. Follow-up report to include summary of navigation issues and mitigation. ÿ Complaint follow-up will include communication with the person making the complaint.
Exceedance Level	Remedial activities unnecessarily hinder overall non-project-related vessel movement and create project-related navigation impacts. OR Frequent, recurrent complaints indicating project activities are unnecessarily hindering overall non-project-related vessel movement.	ÿ Identify navigation problems. ÿ Develop action plan and implement additional mitigation. ÿ Continue monitoring until compliance with the standard has been confirmed.	ÿ Notify the USEPA, NYSCC, and other appropriate agencies immediately. ÿ Daily submission of log and status. ÿ Within 10 days of discovery of a deviation of the standard, provide a corrective action report describing causes of problems and mitigation implemented.* ÿ Complaint follow-up will include communication with the person making the complaint.

* If frequent deviations from the standard occur, the USEPA may require the RA Team to modify operations as needed to address deviations. If potentially unsafe conditions occur, the RA Team may be required to temporarily halt project operations, review the situation, and establish an appropriate course of action.

6.6 Other Quality of Life Considerations

6.6.1 Introduction

Other quality of life considerations (including road traffic) were reviewed as part of the performance standard development. No other quality of life concern (other than for air quality, odor, noise, lighting, and navigation) were determined to require the establishment of a performance standard. The USEPA will further consider quality of life concerns as part of design review.

6.6.2 Requirements from the ROD

The ROD indicates the following regarding to other quality of life considerations:

- "EPA also will provide the public with opportunities to provide input regarding design aspects of the remedy and performance standards, so that community concerns and suggestions regarding, for example, potential noise, light, odor and traffic impacts can be considered by EPA during the design phase." (ROD Page 90)

- "EPA has identified performance standards that address air and noise emissions from the dredging operations and the sediment processing/transfer facilities. Performance standards for other issues will be developed during design …" (ROD Page 96)

- "In addition, during the remedial design phase, EPA will develop other performance standards with input from the public and in consultation with the State and federal natural resource trustees." (ROD Page 97)

6.6.3 Approach

Other quality of life considerations (including road traffic) were evaluated in a manner similar to the performance standards (air quality, odor, noise, lighting, and navigation). Concerns regarding traffic (congestion that could be caused by increased activity in the area associated with the remedial activities) have been raised by the public. The evaluation included a review of potential impacts on the community based on the anticipated remedial activities. After careful review, it has been determined that, at this time, development of quality of life performance standards for other potential concerns such as traffic is not required. This decision was based, in part, on the limited potential for these concerns to adversely impact the quality of life of the community within the project area. In addition, equipment and procedures are readily available to mitigate these concerns. However, the RD Team will take these quality of life considerations into account during design. The USEPA will review the RD Team submittals related to other potential quality of life considerations to ensure protection of the public and the environment. If other quality of life concerns (other than those discussed in this document) are discovered as the design progresses, they will also be reviewed for potential standards development.