Hudson River
PCBs SUPERFUND SITE

# HUDSON RIVER PCBS SUPERFUND SITE QUALITY OF LIFE PERFORMANCE STANDARDS

MAY 2004

EPA
United States Environmental Protection Agency

Hudson River
PCBs SUPERFUND SITE

# Hudson River PCBs Superfund Site
# Quality of Life
# Performance Standards

**May 2004**

**Prepared for:**
**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
**Region 2**

**and**

**UNITED STATES ARMY CORPS OF ENGINEERS**
**Kansas City District**

**Prepared by:**

ecology and environment, inc.
International Specialists in the Environment

**Under contract with:**

United States Army
Corps of Engineers

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

June 3, 2004

To All Interested Parties:

The U.S. Environmental Protection Agency (USEPA) is pleased to release the *Quality of Life Performance Standards* for the Hudson River PCBs Superfund Site (Site). The document presents the performance standards for air quality, odor, noise, lighting, and navigation that were developed by USEPA in accordance with its 2002 Record of Decision (ROD) for the Site.

EPA released an earlier draft version, the December 2003 *Draft Quality of Life Performance Standard – Public Review Copy* on December 19, 2003 and accepted public comments on this document from December 19, 2003 through February 17, 2004.

Copies of the *Quality of Life Performance* are available online at EPA's web site for the Hudson River PCBs Site (www.epa.gov/hudson), or at the site information repositories, or by calling the Hudson River Field Office at 518-747-4389 or toll-free at 866-615-6490. If you need additional information regarding the Quality of Life Performance Standards or the Hudson River PCBs Site in general, please contact EPA's Community Involvement Coordinator, Mr. Leo Rosales, at the Hudson River Field Office.

Sincerely yours,

George Pavlou, Director
Emergency and Remedial Response Division

# Table of Contents

**Section** **Page**

## Table of Contents (cont.)

**Section** **Page**

**Table of Contents (cont.)**

**Section** **Page**

# List of Tables

# List of Figures

# List of Abbreviations and Acronyms

| | |
|---|---|
| AGCs | annual guideline concentrations |
| ANSI | American National Standards Institute |
| ARARs | applicable or relevant and appropriate requirements |
| CAA | Clean Air Act |
| CAG | Community Advisory Group |
| CB | citizen band (radio) |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CHABA | Committee on Hearing, Bioacoustics, and Biomechanics |
| CO | carbon monoxide |
| dB | decibels |
| dBA | A-weighted decibels |
| DNL | day-night average sound levels |
| EPM | Environmental Procedures Manual (NYSDOT) |
| FHWA | Federal Highway Administration |
| FS | Feasibility Study |
| Hz | Hertz |
| IESNA | Illuminating Engineering Society of North America |
| IRIS | Integrated Risk Information System |
| $L_{eq}$ | continuous equivalent sound level |
| $L_{eq}(h)$ | hourly average equivalent sound level |

## List of Abbreviations and Acronyms (cont.)

| | |
|---|---|
| $L_{10}$ | sound pressure level exceeded 10% of the time |
| NAAQS | National Ambient Air Quality Standards |
| NAC | noise abatement criteria |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NIH | National Institute of Health |
| NIOSH | National Institute for Occupational Safety and Health |
| $NO_2$ | nitrogen dioxide |
| NOAA | National Oceanic and Atmospheric Administration |
| $NO_x$ | nitrogen oxides |
| NYCRR | Official Compilation of NY State Codes, Rules, and Regulations |
| NYSCC | New York State Canal Corporation |
| NYSDAR | New York State Division of Air Resources |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| NYSDOT | New York State Department of Transportation |
| NYSEG | New York State Electric and Gas |
| $O_3$ | ozone |
| OSHA | Occupational Safety and Health Administration |
| Pb | lead |
| PCBs | polychlorinated biphenyls |
| PM | particulate matter |
| $PM_{10}$ | particulate matter smaller than 10 microns in diameter |
| $PM_{2.5}$ | particulate matter smaller than 2.5 microns in diameter |
| ppm | parts per million |
| PUF | polyurethane foam |

## List of Abbreviations and Acronyms (cont.)

| | |
|---|---|
| RA | remedial action |
| RA CHASP | Remedial Action Community Health and Safety Plan |
| RD | remedial design |
| ROD | Record of Decision |
| RS | Responsiveness Summary |
| SIP | State Implementation Plan |
| SMU | sediment management unit |
| $SO_2$ | sulfur dioxide |
| SPLs | sound pressure levels |
| TBC | to be considered |
| TNM | traffic noise model |
| USACE | United States Army Corps of Engineers |
| U.S.C. | United States Code |
| USCG | United States Coast Guard |
| USEPA | United States Environmental Protection Agency |
| USHUD | United States Department of Housing and Urban Development |
| VHF | very high frequency (radio) |
| VOC | volatile organic compound |
| W HASP | Worker Health and Safety Plan |
| WHO | World Health Organization |

# 1 Introduction

This document describes the quality of life performance standards that will be incorporated into the Hudson River PCBs Superfund Site remedial design (RD) and used to monitor the performance of the remedial action (RA). These performance standards were prepared as required by the Hudson River PCBs Superfund Site Record of Decision (ROD). The project shall be designed to meet the final quality of life performance standards. The United States Environmental Protection Agency (USEPA), which will enforce the performance standards, will also review the RD to confirm that the design is completed in accordance with the performance standards.

This document provides the public with information regarding development of the performance standards and describes the recommended standards. Additional information regarding the project and the contents and structure of this document are presented below.

## 1.1 Background Information

The ROD for the Hudson River PCBs Superfund Site was issued by the USEPA on February 1, 2002. The ROD specifies that the selected remedy include dredging and off-site disposal (i.e., outside the Hudson River Valley) of approximately 2.65 million cubic yards of PCB-contaminated sediments from the Upper Hudson River portion of the site. Beneficial-use options for portions of the dredged sediments also will be evaluated during the design phase (USEPA 2002). The ROD identifies specific reaches of the Upper Hudson River (i.e., River Sections 1, 2, and 3) where the dredging activity will occur. River Sections 1, 2, and 3 extend from the former Fort Edward Dam to the Federal Dam at Troy (see Figure 1-1) (USEPA December 2000). The RD and the RA involve the removal, processing, transport, and disposal of the PCB-contaminated sediments.

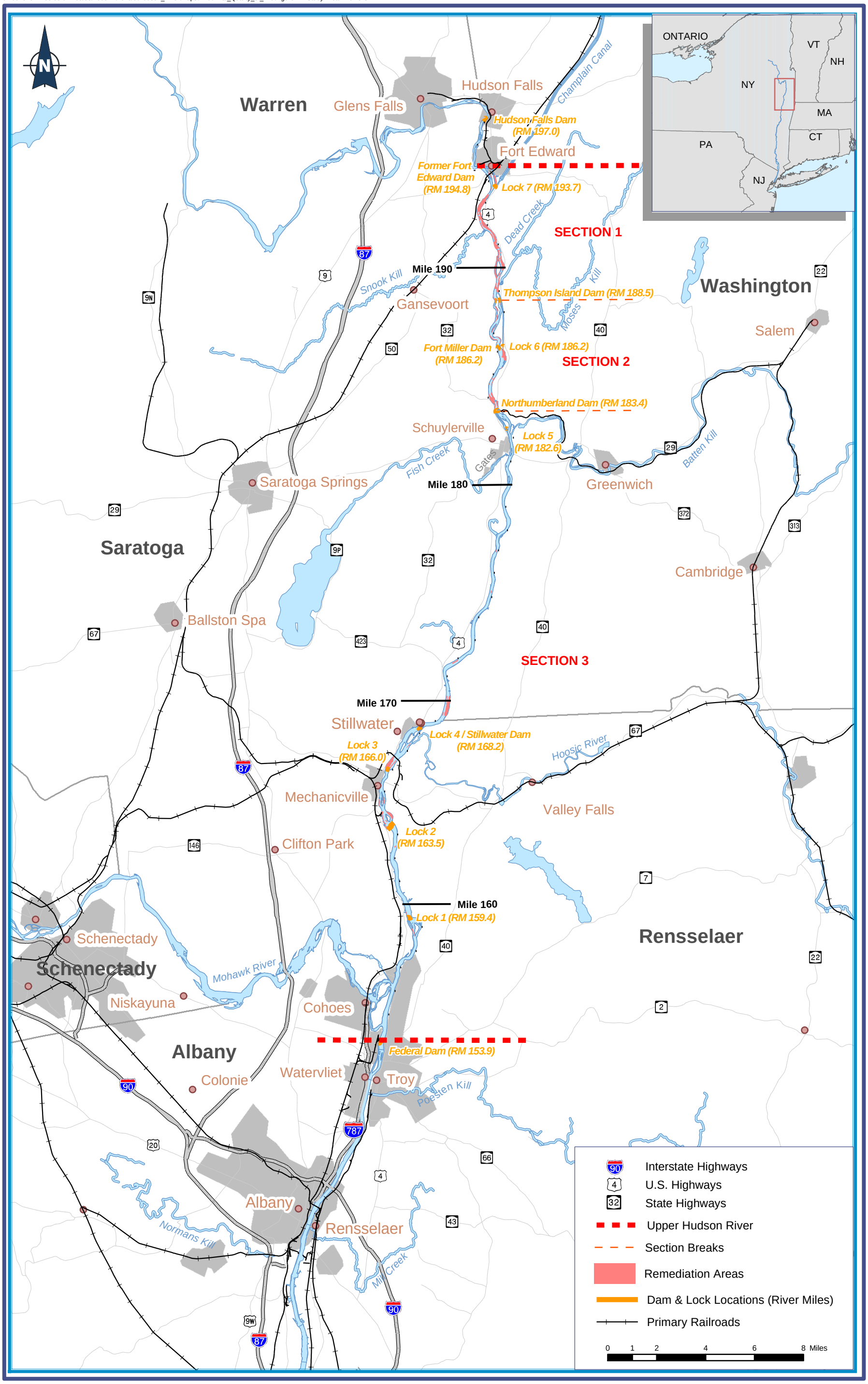
The ROD requires the development of performance standards that will serve as specific goals and requirements under which the remedial activities are to be implemented. The quality of life performance standards described in this document are separate and distinct from the engineering performance standards. The engineering performance standards address dredging-related resuspension, dredging residuals, and dredging productivity. The final engineering performance standards were issued in April 2004 (Malcolm Pirnie, Inc.).

The performance standards that address community impacts are the quality of life performance standards that are the subject of this document. These performance standards are based on regulations and objective environmental and scientific criteria. The USEPA has developed the quality of life performance standards as part of its ongoing consultation with New York State agencies, the federal Natural Resources Trustees, and the public.

## 1.2 Structure and Content of this Document

The types of activities expected to occur during the RA were used to develop the quality of life performance standards. Section 2 summarizes these activities (e.g., dredging, transport, and treatment). Section 3 describes the performance standards. Sections 4 and 5 provide a discussion of the potential impacts of the remedial activities on the community and how quality of life performance standards are developed. Section 6 specifies the performance standards, and Section 7 discusses the procedures that will be used to refine the standards, if necessary.

This document is based on the ROD, the Responsiveness Summary (RS) (TAMS Consultants, Inc. January 2002), and various other project documents. Therefore, it should be noted that some of the concepts, discussions, and conclusions set forth in those documents are included herein. Where direct quotations are used, a reference is provided.




SOURCE ECOLOGY & ENVIRONMENT, INC. 2002, ESRI 2002, USEPA 2002a
Note: RM = River Miles

**Figure 1-1: Hudson River PCBs Superfund Site Project Area, Upper Hudson River**

# 2 Description of Project Remedial Activities

In order to develop meaningful quality of life performance standards for the expected remedial activities, it is essential to have an understanding of the remediation project activities, including the sequence of those activities and the equipment that will be used to complete the work. For example, to develop a meaningful navigation performance standard it is important to understand the expected number of vessels on the river, the vessel sizes, and vessel movements. However, for some quality of life performance standards (e.g., air) where specific criteria (a measurable value) can be applied as the performance standard, the performance standard depends less on the remedial activity and more on the contaminants found in the dredged sediment.

Information regarding the expected remedial activities used to develop the performance standards described in this document was obtained primarily from the ROD, the RS, conceptual designs (developed by the USEPA), and the Remedial Design Work Plan (General Electric Co. 2003). These documents can be reviewed on the Hudson River Web site at http://www.epa.gov/hudson/.

The performance standards will be reviewed as the design progresses to ensure that they are protective of human health and the environment. The intermediate design, which follows preliminary design (conceptual design stage), is the phase during which specific methods and equipment (to meet the requirements of the performance standards) are selected.

## 2.1 Preliminary Design of the Remedial Action

The primary components of the RA will include:

- Dredging (mechanical and/or hydraulic);
- Transport of the dredged material by barge or pipeline;
- PCB-release containment, as appropriate (sheet piles, silt curtains);
- Material handling, dewatering, and water treatment;
- Transportation and disposal of processed sediments; and

- Habitat replacement and reconstruction.

Construction activities before, during, and after dredging are also part of the expected RA.

### 2.1.1 Dredging (Mechanical and/or Hydraulic)

PCB-contaminated sediments will be removed from the river bottom by dredging. The dredging work may be completed using a variety of techniques, including but not limited to any combination of the following:

- Hydraulic dredging and pipeline transport;
- Mechanical dredging and barge transport;
- Mechanical dredging and pipeline transport;
- Shoreline-based excavation (if water-side excavation is not practicable); and
- Use of specialty dredge equipment or techniques.

### 2.1.2 Transport of Dredged Material by Barge or Pipeline

The dredged sediments will be transported from the dredging location to a sediment processing/transfer facility. Factors that influence the transportation of the dredged sediments include:

- Location of dredging;
- Type and size of dredges;
- Location of land-based sediment processing/transfer facilities;
- Production rates (hourly, daily, and weekly) for dredging and sediment processing;
- Distance and elevation change between the sediment processing facilities and the dredge area;
- Physical attributes of the river and shoreline between the dredge area and the sediment processing/transfer facilities (water depth, hydraulic characteristics, physical barriers, adjacent land uses, and water-dependent uses); and
- Physical attributes of the sediment processing/transfer facilities (size, area land use, capacity, and ease of construction).

### 2.1.3 PCB-release Containment

Various structures to contain possible PCB releases may be used during dredging to reduce the potential for dredge-related contaminated sediment resuspension/migration. These structures may include sheet piles, silt curtains, coffer dams, and air curtains.

### 2.1.4 Material Handling, Dewatering, and Water Treatment

Dredged sediment will require material handling and dewatering to prepare (or condition) the removed sediment for transport and disposal. Water from the dewatered sediment also will require treatment. The sediment processing/transfer facilities (land and/or water-based, as applicable) will likely include:

- Barge unloading;
- Untreated sediment staging, mixing, and transport facilities;
- Solids separation facilities (e.g., screening equipment, hydrocyclones);
- Solids dewatering facilities (e.g., gravity separation, filter press, centrifuge);
- Solidification facilities;
- Dewatered or processed sediment staging and loading facilities;
- Water treatment facilities (e.g., clarification, multimedia filtration, oxidation, granular activated carbon);
- Chemical and materials unloading, staging, and loading facilities;
- Loading facilities for transport of dewatered materials to disposal facilities;
- Rail spurs and railcar staging areas;
- Loading and staging areas for backfill material (a separate facility or facilities may be used); and
- Space for staff facilities and equipment storage.

### 2.1.5 Transportation and Disposal of Processed Sediments

The ROD indicates that all processed sediments (except those that may be used for beneficial use) shall be transported to the selected disposal facilities by either rail or barge. The disposal facilities will be located outside the Hudson River Valley.

### 2.1.6 Habitat Replacement and Reconstruction

Habitat replacement and reconstruction activities primarily involve placing clean backfill where sediments have been removed. Additional details regarding these anticipated remedial activities as they relate to quality of life considerations are included in Section 4.

## 2.2 Application of Performance Standards to the Remedial Action

The performance standards described herein shall be applied to remedial activities that may affect the community and are intended to minimize quality of life impacts. Other minor activities, such as sampling, have been considered but are not expected to affect the community's quality of life; therefore, performance standards will not be developed for these activities. The USEPA and other agencies will review each activity as proposed by the RD Team to ensure that appropriate measures are implemented to minimize quality of life impacts and ensure protection of human health and the environment during the course of the RA.

# 3 Description of Performance Standards

Performance standards are established by the USEPA to guide the RD Team and RA Team toward successful completion of the remedial activities while minimizing impacts on the community and the environment. Performance standards have been developed to provide the RD and RA Teams with the flexibility to complete the remedy both efficiently and safely.

The standards developed for this project are performance-based rather than prescriptive: A performance-based approach describes the required performance (i.e., the parameters by which the task will be completed). These parameters could include requirements such as how fast the task shall be done, when it shall be done, and what impacts shall be prevented while it is in progress. A prescriptive approach describes a specific procedure or technology that will comply with certain standards. For example, a prescriptive approach would specify that a specific type of equipment or process be used to complete a certain task. Prescriptive standards work well for typical, ordinary actions where extensive experience and precedence have been established. A performance-based approach has the advantage of allowing innovation and optimization during the course of the RA.

# 4 Quality of Life Considerations

The public has expressed various concerns about possible effects of remedial activities on the quality of life of people residing near the river or using the river in the vicinity of the remediation activities. The USEPA responded to these concerns in the RS (TAMS Consultants, Inc. January 2002). As a means of ensuring that such concerns are addressed and potential impacts are minimized to the extent practicable, the USEPA decided to develop quality of life performance standards. The standards were developed early on to ensure that the public had an opportunity to provide comments and to ensure that the standards are considered in designing the remedy.

The quality of life concerns identified in the RS primarily relate to traffic, noise, construction lighting, air quality, odor, aesthetics, and recreation. While there may be short-term impacts with respect to some of these issues, the project will follow strict requirements (including adherence to the performance standards) to minimize and mitigate potential impacts to the extent practicable. The RD Team will comply with the quality of life performance standards during design. It is expected that any temporary impacts will be manageable and will be far outweighed by the long-term benefits of the remediation for human health and the environment. In addition, to ensure the protection of the community and the environment, extensive monitoring will be conducted throughout the life of the project, and the effectiveness of the performance standards will be reviewed as the remediation process continues and after Phase 1 dredging. Phase 1 includes dredging at an initially reduced scale, with extensive monitoring that will be used to compare the dredging operations against the performance standards. If necessary, the standards will be refined or adjusted for Phase 2, which will be the remainder of the dredging operation. Information collected during Phase 1 dredging will be useful in establishing the final performance standards by which the remedial activities will be completed.

Assessing impacts of the RA involves identifying and estimating the effects of remediation activities (such as facility construction and transportation operations) on quality of life factors. Modeling to evaluate quality of life impacts (e.g., air quality and noise) will also be completed by the RD Team using USEPA-approved models. Modeling is a typical method used in design processes. The USEPA will review the results of the modeling to ensure accuracy. Impact as-

sessment will proceed in conjunction with facility siting and dredging-design development.

The quality of life concerns that were determined by the USEPA to require performance standards (as established in the ROD) are defined further below. Each of these concerns was reviewed and considered in developing the performance standards. Other quality of life considerations (that have the potential to affect the community or the environment) are also presented.

## 4.1 Public Concerns

### 4.1.1 General Concerns

The following are some of the quality of life concerns that were raised by some members of the public and that have been documented in the RS:

- Dredging would severely affect the overall public's quality of life, the rural lifestyle of the Upper Hudson, and the aesthetic value of living in the region.

- Placement of the sediment processing facilities would have an adverse impact on the overall quality of life of those individuals near the processing facilities.

- Operation of the sediment processing/transfer facilities and storage of operating materials and dredged sediment could be hazardous, dangerous, and disruptive of the community's quality of life.

- Possible effects on agriculture would include changes to drainage in farmland bordering the river; possible adverse effects during spring flooding; impacts on wells that are hydraulically connected to the river; possible damage to soils and water conservation systems from heavy construction equipment; use of large areas of agricultural land for sediment processing facilities and backfill sources; and hindrances to agricultural activities during construction.

- Several waterfront festivals may be disrupted by project activities.

The USEPA acknowledges these concerns, which are being addressed by developing the quality of life performance standards and by reviewing the design and/or the facility siting reports.

### 4.1.2 Air Quality

Various remedial activities could result in the release of airborne pollutants. The public has expressed the following concerns regarding air emissions:

- The project will produce diesel fumes and exhaust, possibly release contaminants to the ambient air, and produce dust and other particles.

- Volatilization during dredging may disrupt the ecosystem, including upland areas, crops, habitat, and inland waters.

The receptors of air emissions include the public and workers at the site. The USEPA has assessed these concerns and has determined that the most significant potential for generation of air emissions is associated with the dredging and sediment processing/transfer facility operations. Air monitoring, engineering controls, appropriate personal protection equipment for workers, and standard safety procedures will be used to protect on-site workers and nearby communities. As part of the design, a Worker Health and Safety Plan (W HASP) will be developed. With public involvement, a Remedial Action Community Health and Safety Plan (RA CHASP) that will include air monitoring to address any potential risk associated with dredging and processing of PCB-contaminated sediments will be developed and implemented.

### 4.1.3 Odor

Potential sources of odor from the project include construction equipment and the dredged material from the river (including aquatic vegetation that may require removal as part of remediation). The public has expressed concern that the project will decrease air quality and produce odors and has indicated concern that poor air quality and nuisance odors will have a negative impact on local communities, tourism, local wildlife and, eventually, property values.

The USEPA has assessed these concerns and has determined that odors from construction equipment are not likely to be significant, based on experiences at other construction projects where such equipment has been used. Although hydrogen sulfide (which has an unpleasant odor) is present in the river sediments, concentrations are sufficiently low as to preclude the generation of noticeable and persistent odors from hydrogen sulfide in dredged material (RS White Paper, "Odor Evaluation" [TAMS Consultants, Inc. January 2002]). If hydrogen sulfide odors are encountered, proven strategies shall be implemented to mitigate adverse effects.

### 4.1.4 Noise

The public has expressed the following concerns regarding noise:

- Elevated noise levels will result from increased traffic and equipment use, and noise during evening and night hours will be disruptive.

- Noise from dredging operations will have a negative impact on milk production in dairy cows.

- Noise from dredging and operation of the sediment processing/transfer facilities will disrupt local wildlife, especially territorial species.

The USEPA has assessed these concerns and has determined that the noise associated with construction and continuous operation of the sediment processing/transfer facilities and hydraulic and mechanical dredging operations is not

expected to be a significant concern. A variety of equipment and proven procedures are available and shall be implemented, as appropriate, to control and mitigate noise impacts.

### 4.1.5 Lighting

Artificial lighting systems will be used to illuminate nighttime dredging and in-river transport operations as well as land-based sediment processing/transfer facility operations. The public has expressed the following concerns regarding lighting:

- Continuous lighting needed to complete the project would disrupt dairy cattle.
- Project lighting may be disruptive for local communities.
- Project lighting will adversely affect local wildlife (mammals and birds) and insects.

The USEPA has assessed these concerns and has determined that the positioning of lights, brightness, and direction are key factors in minimizing the potential for off-site impacts. While nighttime lighting requirements for the work will need to conform to established industry safety standards, it will not be necessary to use high-mast lighting systems that could cause off-site impacts at dredging sites or at the sediment processing/transfer facilities. To the extent practicable, lighting shall be directed toward work areas and away from neighboring properties. In addition, the use of low-mast lights and shielding will limit off-site glare.

### 4.1.6 Navigation

The public has expressed the following concerns regarding navigation:

- Project-generated traffic (including vessel traffic) would disrupt the community.
- Clear and safe passage of recreational vessels along the Champlain Canal will be impeded, and bottlenecks at locks will be created.

The USEPA has assessed these concerns and has determined that because of the relatively small area of the river that will be affected by dredging at any given time, recreational activities on the river will remain substantially unaffected in areas not immediately adjacent to the dredging operation. Adverse impacts are not expected for recreational boaters during implementation of the selected remedy. A portion of the dredging, when completed, will provide an expanded and safer capacity for recreational use of the river. Commercial use of the river will also be considered, and the project will be designed to minimize impacts on both commercial and recreational uses.

### 4.1.7 Other Quality of Life Considerations

#### Aesthetics

Residents who live along the riverbanks expressed concern about the dredging operations impairing their views of the river. However, the majority of residences in the project area would not be near the dredging operation, and the dredging operation is a mobile operation, targeted to limited areas of the river. In general, dredging is expected to occur directly in front of a particular location in a targeted area for a short period of time (several weeks) and be within view for several weeks longer. Thus, potential visual impacts from the dredging would apply to only a small portion of the 40 miles of river at any given time and would be temporary. The visual impact from the dredges will be short-term and limited by the geography of the targeted dredging.

#### Traffic

The public has expressed concerns regarding the increased road traffic that would be caused by this project. For example, members of the public expressed concern that the volume of sediment to be removed and the amount of stationary and mobile equipment needed to do so would put a great deal of stress on local roadways in terms of congestion and increased road maintenance.

In response to these concerns, the USEPA determined that dredged materials will be taken from the site by barge and/or rail rather than by truck, and material used for backfill will be transported within the Upper Hudson River area by barge and/or rail.

The public also had concerns about potential impacts from vehicle and truck traffic caused by workers constructing the sediment processing/transfer facilities. However, given that this increase in road usage is relatively small (based on evaluations done as part of the RS), it is unlikely that there will be an escalation in road hazards or a need for increased road maintenance as a result of implementing the selected remedy.

#### Other Uses of the River

Risks associated with exposures while swimming in the Hudson River (i.e., from ingestion of water, wading in the river, etc.), as discussed in the revised human health risk assessment (TAMS Consultants, Inc. January 2002), are reported to be within the acceptable risk range. It is anticipated that during the remediation project, PCB concentrations in the river will remain at or near current levels. Swimming in the immediate area being actively dredged will be prohibited (primarily for safety reasons). Therefore, during the project, as now, the risk associated with swimming in the river will remain within the acceptable range. It is anticipated that the impact on recreational fishing will be minimal during the remediation. Anglers will be able to find alternate sites to fish where the dredging and backfill operations are not proximate; impacts (due to remedial activities) on fish habitat will be temporary and will affect only limited areas and certain species; and mi-

nor, temporary resuspension of PCBs during dredging should not affect catch-and-release fishing. The fish consumption advisories are expected to remain in effect during the remediation. However, the PCB remediation offers long-term prospects of renewed and enhanced recreational fishing by reducing the level of PCBs found in fish.

The quality of life considerations for major project remedial activities are identified in Table 4-1.

**Table 4-1 Quality of Life Considerations for Major Remedial Action Project Activities**

| Major Project Activities | Quality of Life Considerations[1] | | | | |
|---|---|---|---|---|---|
| | Air | Odor | Noise | Lighting[2] | Navigation |
| **Dredging** | | | | | |
| Sediment Handling | √ | √ | √ | √ | √ |
| Barge/Tug Use | √ | | √ | √ | √ |
| **Mechanical Dredging** | | | | | |
| Crane/Excavator Operations | √ | | √ | √ | √ |
| Bucket Operation (clam shell; others) | √ | | √ | √ | |
| Screening/Separation Operations | √ | | √ | √ | |
| **Hydraulic Dredging** | | | | | |
| Crane/Excavator Operation | √ | | √ | √ | √ |
| Cutter Head Operation | | | √ | | |
| Pumping | √ | | √ | | |
| Piping (to barge) | | | √ | √ | √ |
| **Containment System (Installation, Monitoring, and Removal)** | | | | | |
| Sheet Pile | √ | | √ | √ | √ |
| Silt Curtains | | | | √ | √ |
| Air Curtains or Other Methods | | | | | √ |
| **Power Generation** | | | | | |
| Generator Operations | √ | | √ | | |
| **Backfilling/Backfill Transport** | | | | | |
| Barge/Tug Operations | √ | | √ | √ | √ |
| Crane/Excavation Operation | √ | | √ | √ | |
| **Sediment Transport to Facility** | | | | | |
| **By Barge** | | | | | |
| Loading Operations/Sediment Handling | √ | √ | √ | √ | |
| Tug Operations | √ | | √ | √ | √ |
| **By Pipe** | | | | | |
| Transfer by Piping | | | √ | √ | √ |
| Use of Booster Pumps | √ | | √ | | |
| **Sediment Transfer at Facility** | | | | | |
| Sediment Handling | √ | √ | √ | √ | |
| Barge Unloading at Wharfs/Docks | √ | √ | √ | √ | |
| Excavator/Loader Use Operation | √ | √ | √ | √ | |
| Crane (clamshell) Use Operation | √ | √ | √ | √ | |

**Table 4-1 Quality of Life Considerations for Major Remedial Action Project Activities**

| Major Project Activities | Quality of Life Considerations[1] | | | | |
|---|---|---|---|---|---|
| | Air | Odor | Noise | Lighting[2] | Navigation |
| **Sediment Processing at Land-based Facility** | | | | | |
| Storage/Staging/Holding of Sediment | √ | √ | √ | √ | |
| Stockpiling | √ | √ | √ | √ | |
| Impoundment Use | √ | √ | | √ | |
| Separation, Screening, and/or Hydrocyclone Operation | √ | √ | √ | √ | |
| Dewatering, Gravity Separation, Filter Press Use, and Centrifuge Use | √ | √ | √ | | |
| **Water Treatment** | | | | | |
| Storage | √ | √ | | √ | |
| Clarification | √ | √ | | √ | |
| Filtration | √ | √ | | √ | |
| Oxidation | | | | | |
| Carbon Use | | | | | |
| **Solidification** | | | | | |
| Solidification Agents Use | √ | | | | |
| Materials/Chemical Storage | | | | | |
| **Stabilized Sediment Loading** | | | | | |
| Sediment Handling | √ | √ | √ | | |
| **To Rail** | | | | | |
| Railcar Staging | | | √ | √ | |
| Loading by Heavy Equipment | √ | | √ | √ | |
| Rail Operations (Locomotive Operation) | √ | | √ | √ | |
| **To Barge** | | | | | |
| Barge Staging | | | √ | √ | |
| Loading by Heavy Equipment | √ | | √ | √ | |
| Barge Operation with Tug | √ | | √ | √ | √ |
| **Transportation (within project area only)** | | | | | |
| Rail Transport | | | √ | √ | |
| Barge (with tug) transport | | | √ | √ | √ |
| **Other Activities** | | | | | |
| **Sampling Activities** | | | | | |
| Sampling Equipment Use | | | √ | √ | √ |
| Surveying (by boat or on land) | | | √ | | √ |
| **Deliveries/Shipments** | | | | | |
| Vehicle Use | √ | | √ | | |
| **Water Transportation (including oversight vessels)** | | | | | |
| Vessel Use | √ | | √ | √ | √ |
| **Facility Construction Activities and Decommissioning Activities** | | | | | |
| Heavy Equipment Use | √ | | √ | √ | |
| Hand Tool Use | | | √ | | |
| Truck Operation | √ | | √ | | |

**Table 4-1 Quality of Life Considerations for Major Remedial Action Project Activities**

| Major Project Activities | Quality of Life Considerations[1] | | | | |
|---|---|---|---|---|---|
| | Air | Odor | Noise | Lighting[2] | Navigation |
| Other Typical Construction Activity (hammering, etc.) | | | √ | | |

[1] Other quality of life considerations may be identified during review of the design.
[2] During night operations, lighting will be a quality of life consideration for most project activities listed in the table.

Key:

√ = Activity has potential to create a quality of life impact.

# 5 Development of Quality of Life Performance Standards

Quality of life performance standards were developed as required by the ROD. In the ROD, the USEPA identified performance standards to address air and noise emissions from the dredging operations and the sediment processing/transfer facilities. With respect to air emissions, the ROD requires the dredging and facility operations to comply with applicable or relevant and appropriate requirements (ARARs) that deal with such emissions. For noise, the ROD preliminarily adopted the Federal Highway Administration's noise ambient criteria (NAC) as the performance standard for the facility operations and the New York State Department of Transportation's (NYSDOT's) construction noise impact guidance for temporary construction noise for the dredging. The ROD further indicated that the performance standards for noise would be finalized after getting public input on those standards and that other quality of life performance standards (e.g., PCB air emissions, odor, lighting, navigation) would be developed during design with input from the public and in consultation with the state and federal Natural Resources Trustees. The performance standards set forth in the ROD are included in this document.

Developing quality of life performance standards differs from developing engineering performance standards. Engineering standards are project-specific standards that were developed for dredging resuspension, residuals, and production rates. In contrast, quality of life performance standards are primarily based on ARARs and/or other well-established environmental and scientific criteria. However, one performance standard (odor) is based on the sense of smell, which is subjective in nature and therefore can be difficult to measure and assess. For example, an odor that is objectionable to one individual may not be objectionable—or even detectable—to another individual. In those cases, information collected from those who note odors can assist with determining community impact. In general, however, quality of life performance standards were developed in a manner that resulted in a measurable requirement. In addition, they were developed to be practicable and achievable while being protective of human health and the environment.

The performance standards presented in Section 6 were developed based on the potential impacts (as discussed in Section 4) associated with the anticipated remedial activities (described in Section 2).

## 5.1 Technical Approach to Standards Development

The following steps were completed first to define the technical approach to establishing quality of life performance standards:

- **Research/Data Gathering.** Information from other environmental dredging projects was reviewed for potential applicability. However, it should be noted that only limited quality of life data for these projects were available. Use of information from other projects is noted in this document as appropriate.

- **Regulatory Review.** Development of performance standards included a review of regulatory standards, guidelines, and other requirements. Government documents and academic and other organization studies (including industry standards) were reviewed for appropriateness for this project.

- **Contingencies and Mitigation Review.** Performance standards also account for the measures required if a performance standard is not met or is exceeded. Mitigation of exceedances may include a modification in operation or activities, the use of engineering controls, and/or other mitigation methods. Engineering controls and other mitigation measures aimed at reducing quality of life-related impacts were reviewed for applicability to the remedial activities.

- **Rationale.** The performance standards development process included establishing a rationale to select and establish each of the performance standards. The rationale and reasoning for each standard are discussed below.

- **Impact Assessment.** Short-term and long-term impacts associated with pre-, during, and post-remedial activities were considered in developing the performance standards.

- **Consideration of Variability of the Locations of Remedial Activities**. Dredging operations are expected to extend through the three river sections and to vary based on the target dredge areas. Thus, location and mobility of both sources and receptors were considered.

  – **Land-based Facilities.** Potential impacts from the facilities on surroundings areas will be dictated by various factors, including facility design and layout. Although it is expected that these facilities will be land-based, the ROD requires that the use of water-based facilities be evaluated (see *Water-based Facilities Evaluation*, USEPA April 2004).

  **Dredging Near Sensitive Areas.** Some of the dredging work will occur near structures such as bridge abutments, dams, locks, and wing walls as well as areas near utilities. Remedial activities in those areas may require specialty dredging equipment.

- **Transportation of Contaminated Sediment.** Once the sediments are processed/stabilized they will be transferred to rail or barge for transport to an approved landfill for disposal or to another facility for beneficial use. Potential quality of life concerns associated with transportation activities also were considered. Remedial activities such as transportation, transfer, and loading at facilities outside the project area were not considered.

■ **Demonstration of Compliance.** The RD Team shall develop monitoring plans that address the requirements of the performance standards. These plans are expected to include, at a minimum, an Environmental Monitoring Plan and an RA CHASP. The plans will identify specific procedures, equipment, and responsible personnel in order to protect the residents and workers and to educate and inform the public on project progress. The specific plans (relative to the quality of life performance standards) that are required and the minimum requirements for these plans are described in Table 5-1 and are presented in Section 6.

**Table 5-1 Plans to be Developed by the Remedial Design Team**

| Plan | Elements |
|---|---|
| Environmental Monitoring Plan | ■ Air Monitoring<br>■ Noise Monitoring<br>■ Lighting Monitoring<br>■ Odor Monitoring |
| Remedial Action Community Health and Safety Plan and Worker Health and Safety Plan for the Remedial Action | ■ Worker Education and Monitoring<br>■ Air Monitoring<br>■ Contingency Plan<br>■ Complaint Management Program<br>■ Site Health and Safety Personnel Contact Information |

## 5.2 Quality of Life Performance Standards Development Process

The quality of life performance standards development process included the following general steps:

■ Definition of the technical approach to standards development;

■ Development of draft performance standards;

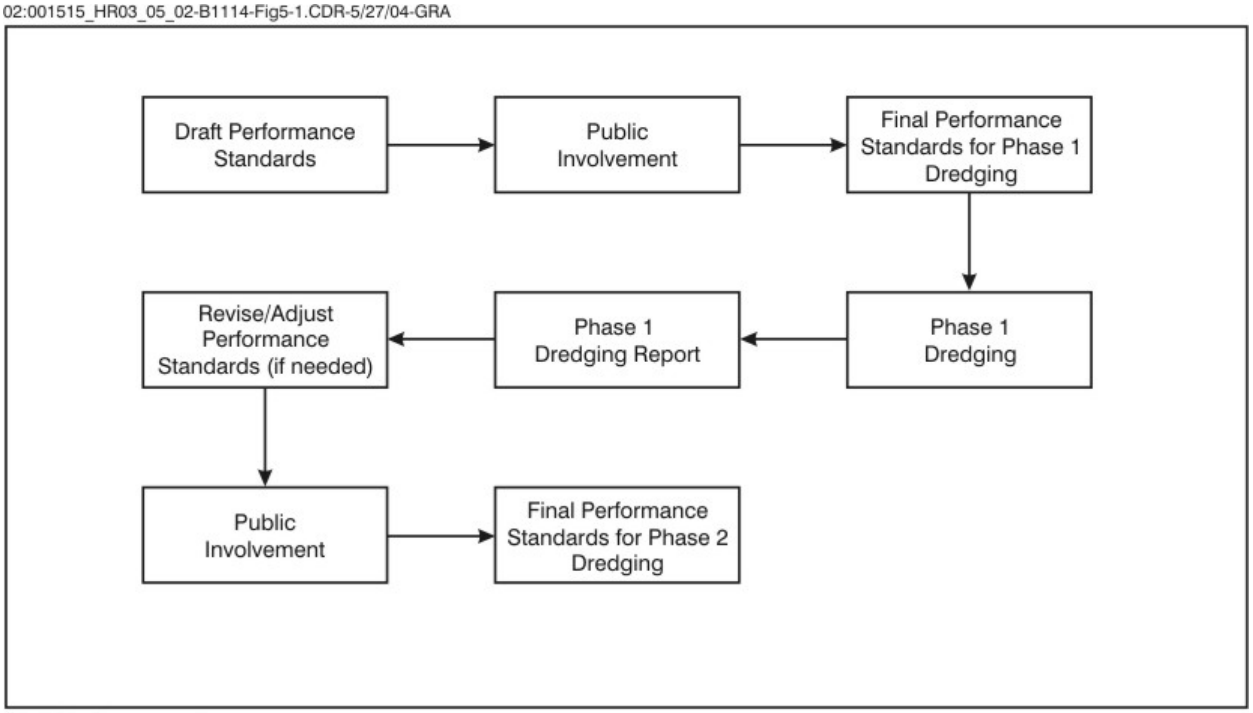
■ Development of the Final Phase 1 performance standards, including monitoring and demonstration of compliance requirements; and

■ Revision of Standards after Phase 1 dredging has been completed (as needed).

Additional information on possible revision and adjustment of standards and development of the final Phase 2 dredging standards is included in Section 7. The

quality of life performance standards development process, including expected points of public involvement, is shown on Figure 5-1.

02:001515_HR03_05_02-B1114-Fig5-1.CDR-5/27/04-GRA




SOURCE: Ecology and Environment, Inc. 2003



**Figure 5-1 Hudson River PCBs Superfund Site, Quality of Life Performance Standards Development**

# 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 and the Federal Railroad Administration 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. (See Figure 6-1, which illustrates the complaint evaluation process.)

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

02:001515_HR03_05_04/FigX-X.cdr-5/5/04-GRA

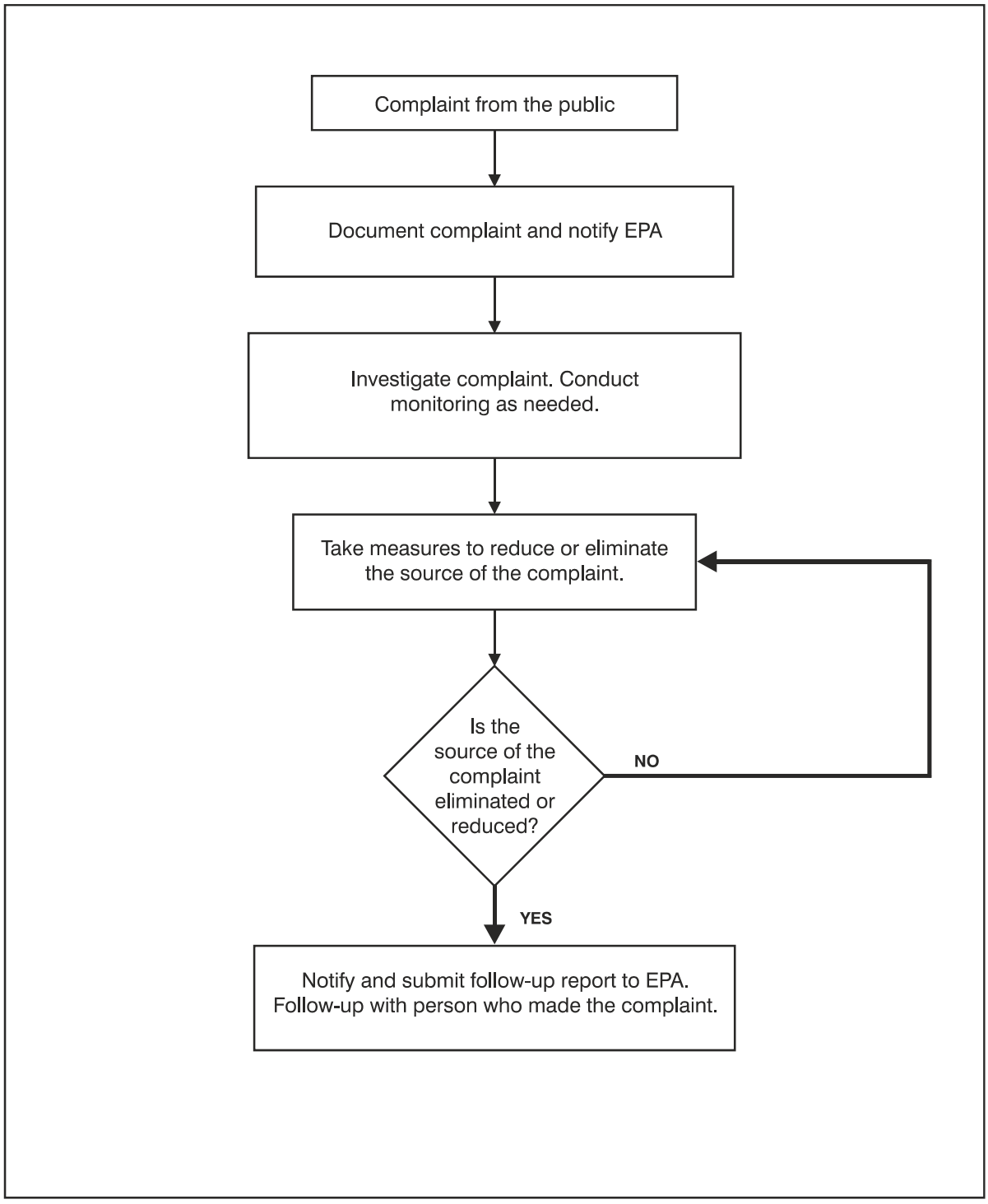



**Figure 6-1 Complaint Evaluation Process**

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 and 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., the 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 requires an evaluation of emissions during design because it 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., see the ROD, p. 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 included 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). Newly 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 pollutants 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 such as metals that may be in the sediment 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 and 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 the New York State Department of Environmental Conservation [NYSDEC] and the New York State Department of Health [NYSDOH]) that the expected emissions are within acceptable levels. Preliminary analyses were 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 the 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 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 has 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 p. 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, p.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, p. 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, p.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 moni-

toring 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 $\mu g/m^3$, 0.5 $\mu g/m^3$, and background plus 0.03 $\mu g/m^3$, 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 $\mu g/m^3$. 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 June 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 $\mu g/m^3$ 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 $\mu g/m^3$ (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 $\mu g/m^3$) and the mean was 6.8 $ng/m^3$ (0.0068 $\mu g/m^3$). Standards and monitoring for odor have also been implemented to protect the public (Environmental Resources Management 2003).

The projects summarized above provided 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 the 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. Where commercial and residential areas are mixed, the residential standard for PCBs will apply. The residential standard will also apply to commercial or industrial locations where children may be present for extended periods of time (i.e., schools, day care facilities).

#### 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 10,000 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).

**Table 6-1 Summary of Standard for PCBs**

| Use of Standard | Averaging Period | Standard/ Guideline (µg/$m^3$) | 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 |

Other standards and thresholds that are protective of workers were evaluated as part of developing this performance standard, including National Institute for Oc-

cupational Safety and Health (NIOSH) workplace concentration thresholds. As a point of comparison, NIOSH's recommended exposure level is 1 $\mu g/m^3$. New York State Division of Air Resources (NYSDAR) guideline concentrations for PCBs were also reviewed; however, New York State 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, aerosols, 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.

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 "Air Quality Evaluation" 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, the 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 [Code of Federal Regulations] Part 50. The RD Team is required to review on-site processes and equipment to determine if an air quality permit would be required under state and federal air permitting programs (permit equivalency evaluation). The substantive requirements of such a permit, including emission controls, are required to be implemented for the process or equipment, while a permit itself is not required. 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 Super-

fund 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 (i.e., low and ultra-low sulfur 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. 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 precautions are in place so that PCB emissions will not result in adverse effects on human health or the environment.

On-site Comprehensive Environmental Response, Compensation, and Liability Act (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 [the Official Compilation of New York State Codes, Rules, and Regulations] 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 Monitoring

Due to the expected variability of PCB concentrations resulting from natural environmental fluctuations associated with weather and river conditions and 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. Differentiating 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 the 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 6-2 and 6-3 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 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. Where commercial and residential areas are mixed, the residential standard for PCBs will apply. The residential standard will also apply to commercial or industrial locations where children may be present for extended periods of time (i.e., schools, daycare facilities).

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.

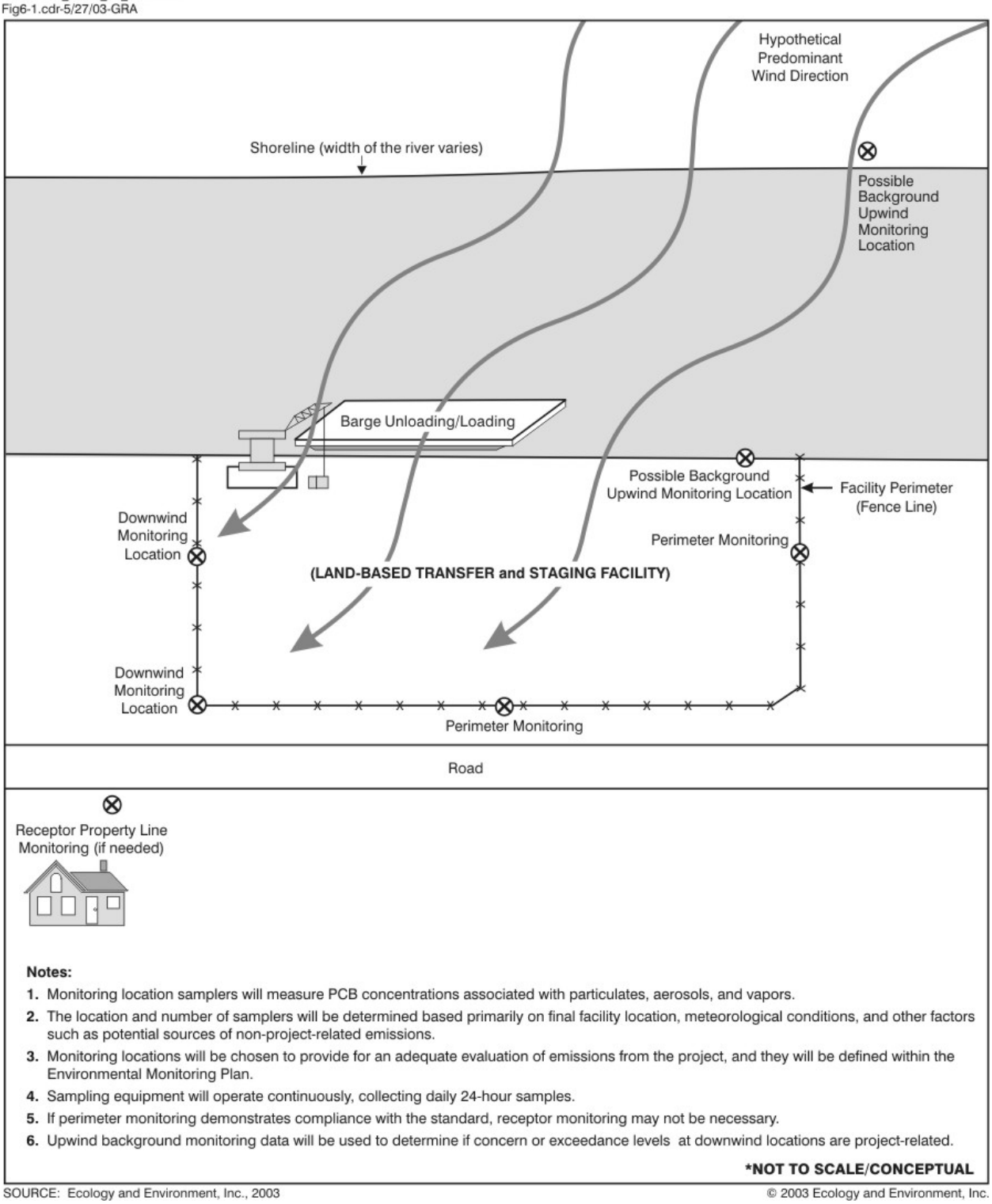
The performance standard does not specify where the analytical testing will be conducted (on-site laboratory or off-site); however, it does require that the analytical testing be completed by a USEPA-approved laboratory on a maximum 72-hour turnaround-time basis. EPA will require a shorter turnaround time during start-up of operations or changes in operations. Additionally, EPA will require shorter turnaround time in situations where data is within concern or exceedance levels.

### 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

02:001515_HR03_05_02-B1114
Fig6-1.cdr-5/27/03-GRA

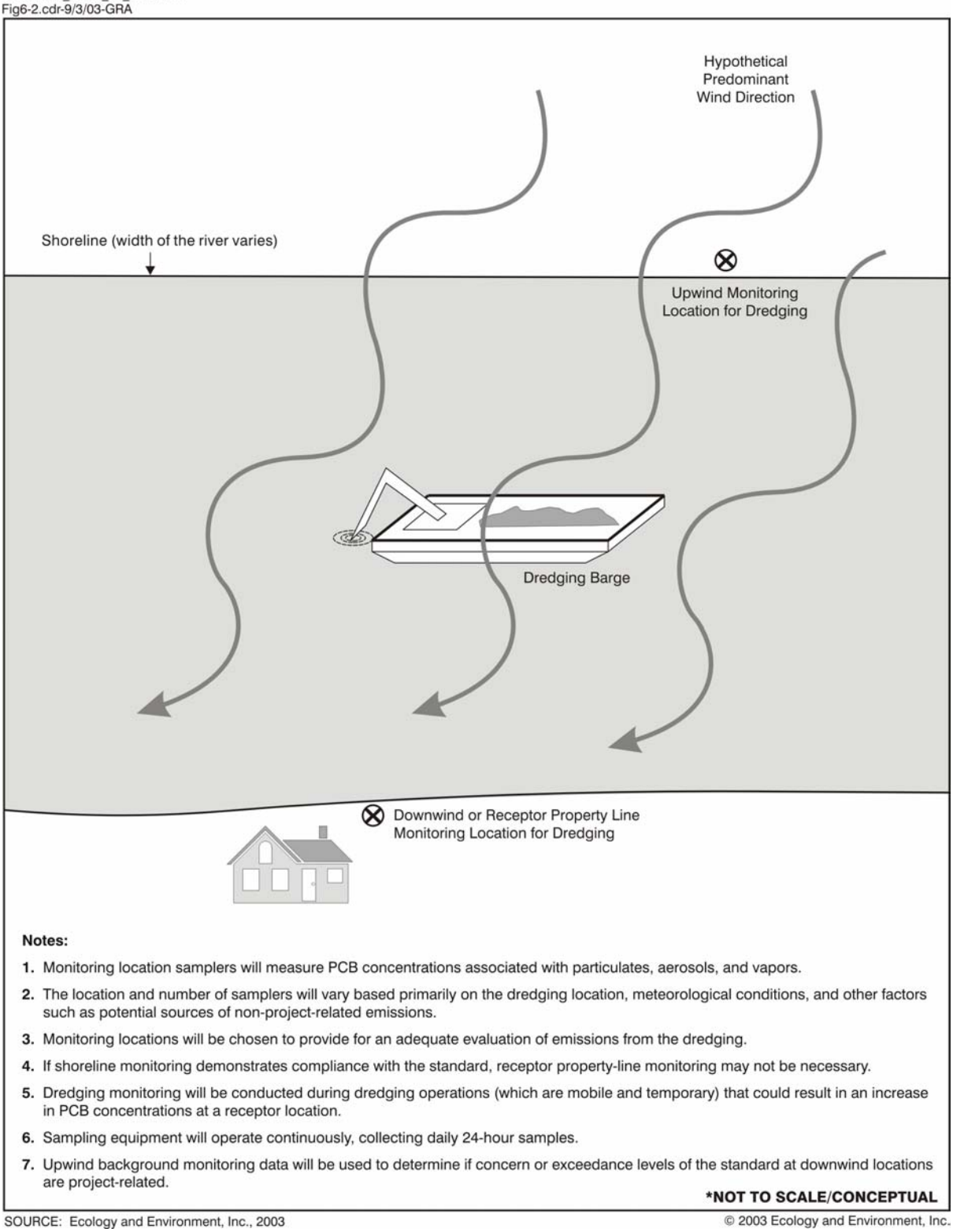



SOURCE: Ecology and Environment, Inc., 2003



**Figure 6-2 Conceptual Air Quality Monitoring Layout: Land-based**

02:001515_HR03_05_02-B1114
Fig6-2.cdr-9/3/03-GRA




SOURCE: Ecology and Environment, Inc., 2003



**Figure 6-3 Conceptual Air Quality Monitoring Layout: Dredging Locations Transfer and Staging Facility**

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." 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 $PM_{2.5}$ are 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. 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. 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 con-

trolling the shape and placement of the piles, minimizing staging time, adjusting the surface area/volume ratio during material handling by using larger excavation equipment, spraying biodegradable foam over exposed dredged sediment, and covering exposed sediment on barges and trucks.

### 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 available 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** | Daily total PCBs under 80% of the standard<br>■ Residential areas (< 0.08 µg/m$^3$ for 24-hour samples)<br>■ Commercial/industrial areas (< 0.21 µg/m$^3$ for 24-hour samples) | ■ Continue with existing controls. | ■ Weekly reporting of monitoring data to the USEPA. |

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

| Action Level | Concentration Levels | Required Action | Reporting/Notification |
|---|---|---|---|
| **Concern Level** | Daily PCBs within 20% of the standard<br>■ Residential areas (between 0.08 µg/m$^3$ and 0.11 µg/m$^3$ for 24-hour samples)<br>■ Commercial/industrial areas (between 0.21 µg/m$^3$ and 0.26 µg/m$^3$ for 24-hour samples) | ■ Identify cause of increased emissions.<br>■ Implement monitoring to confirm and quantify background concentrations.<br>■ Reduce laboratory turnaround time to 24 hours.<br>■ Implement mitigation as outlined in the project contingency plan. | ■ Notify the USEPA within 24 hours of receipt of analytical results.<br>■ Weekly report to include a description of corrective actions. |
| **Exceedance Level** | Daily total PCBs exceed standard<br>■ Residential areas (> 0.11 µg/m$^3$ for 24-hour samples)<br>■ Commercial/industrial (> 0.26 µg/m$^3$ for 24-hour samples) | ■ Identify cause of exceedance.<br>■ Establish additional monitoring stations (as needed, including background) to evaluate cause of increased emissions.<br>■ Reduce laboratory turnaround time to 24-hours.<br>■ Develop action plan and implement additional mitigation.<br>■ Continue monitoring to confirm compliance with the standard. | ■ Notify the USEPA, NYSDEC, and NYSDOH immediately.<br>■ Provide daily monitoring reports.<br>■ 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, p. 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, p. 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.

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. 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 6-4). 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.

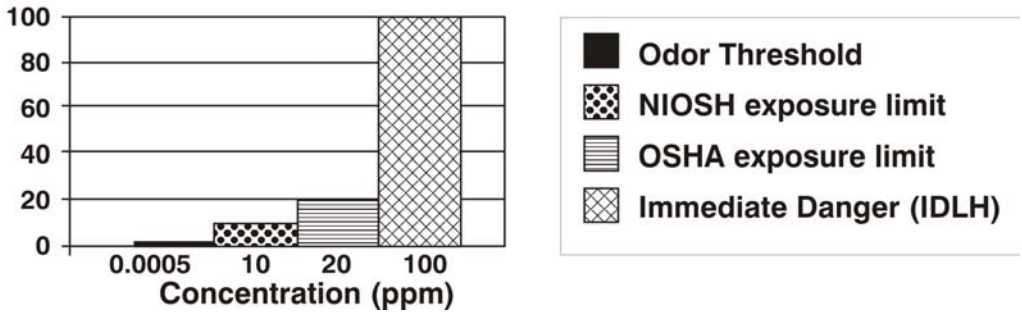



**Figure 6-4 Hydrogen Sulfide Thresholds**

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.

### 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. (See Figure 6-1 for a diagram of the complaint evaluation process.) This complaint evaluation process will be used for each quality of life standard and will be developed further in the RA CHASP. 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.

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 shall 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 discovery. 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** | No presence of uncomfortable odors | ■ Continue with existing controls. | ■ Monthly reports. |
| **Concern Level** | Presence of uncomfortable, project-related odors is noted by RA Team<br><br>OR<br><br>Odor complaint from the public | ■ Investigate cause of odor problem and verify that the problem is project-related.<br>■ 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.<br>■ Implement mitigation as outlined in the project contingency plan. | ■ Notify USEPA within 24 hours of receipt of an odor complaint from the public that is project-related.<br>■ Follow-up report to include a description of corrective actions.<br>■ Complaint follow-up will include communication with the person making the complaint. |

**Table 6-4 Odor Action Levels and Required Responses**

| Action Level | Odor Levels | Required Action | Reporting/Notification |
|---|---|---|---|
| **Exceedance Level** | Exceedance of the hydrogen sulfide standard<br><br>OR<br><br>Frequent, recurrent odor complaints related to project activities | ■ Investigate cause and type of odor.<br>■ Establish regular monitoring to evaluate hydrogen sulfide concentrations.<br>■ Develop action plan and implement additional mitigation.<br>■ Continue regular odor observations or hydrogen sulfide monitoring until compliance with the standard is confirmed.* | ■ Notify USEPA within 24 hours.<br>■ Within ten days of discovery of the exceedance provide a corrective action report describing causes of exceedance or recurring odor problems and mitigation implemented.<br>■ 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 objectives of the noise performance standard are to prevent noise levels that are harmful to humans and 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.

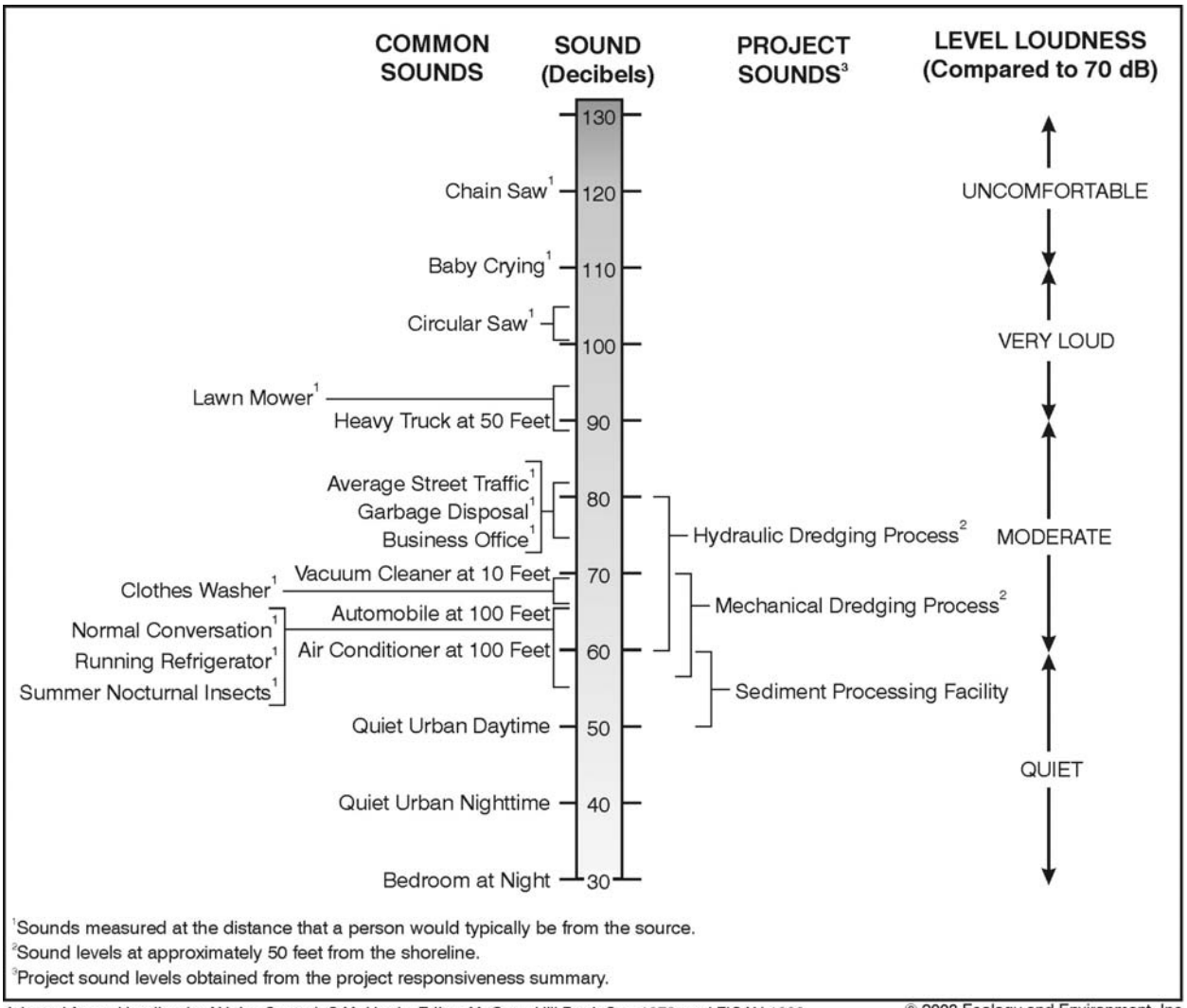
Noise (or unwanted sound pressure) is measured in decibels (dB). Important concepts of note regarding noise are that it is measured on a logarithmic scale (not linear) and sound pressure levels of two separate sounds are not directly additive. For the purpose of this standard, it is assumed that measured 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.

**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)<br><br>Daytime: 80 dBA (maximum hourly average) *Source: NYS Department of Transportation* | | |
| Commercial/ Industrial | Standard | 80 dBA (maximum hourly average)<br><br>*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]<br><br>*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)<br><br>*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.




Adapted from: Handbook of Noise Control, C.M. Harris, Editor, McGraw-Hill Book Co., 1979, and FICAN 1992.



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

### 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, p. 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, p.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, p. 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, p. 96)
- "The dredging will comply with New York State Department of Transportation construction noise impact guidelines 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, p. 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, p. 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, p.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 sediment processing activities, 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 that the FHWA considers to be the acceptable limits for noise levels for exterior land uses and outdoor activities. According to the FHWA noise abatement criteria, 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. These criteria were 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 different 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.

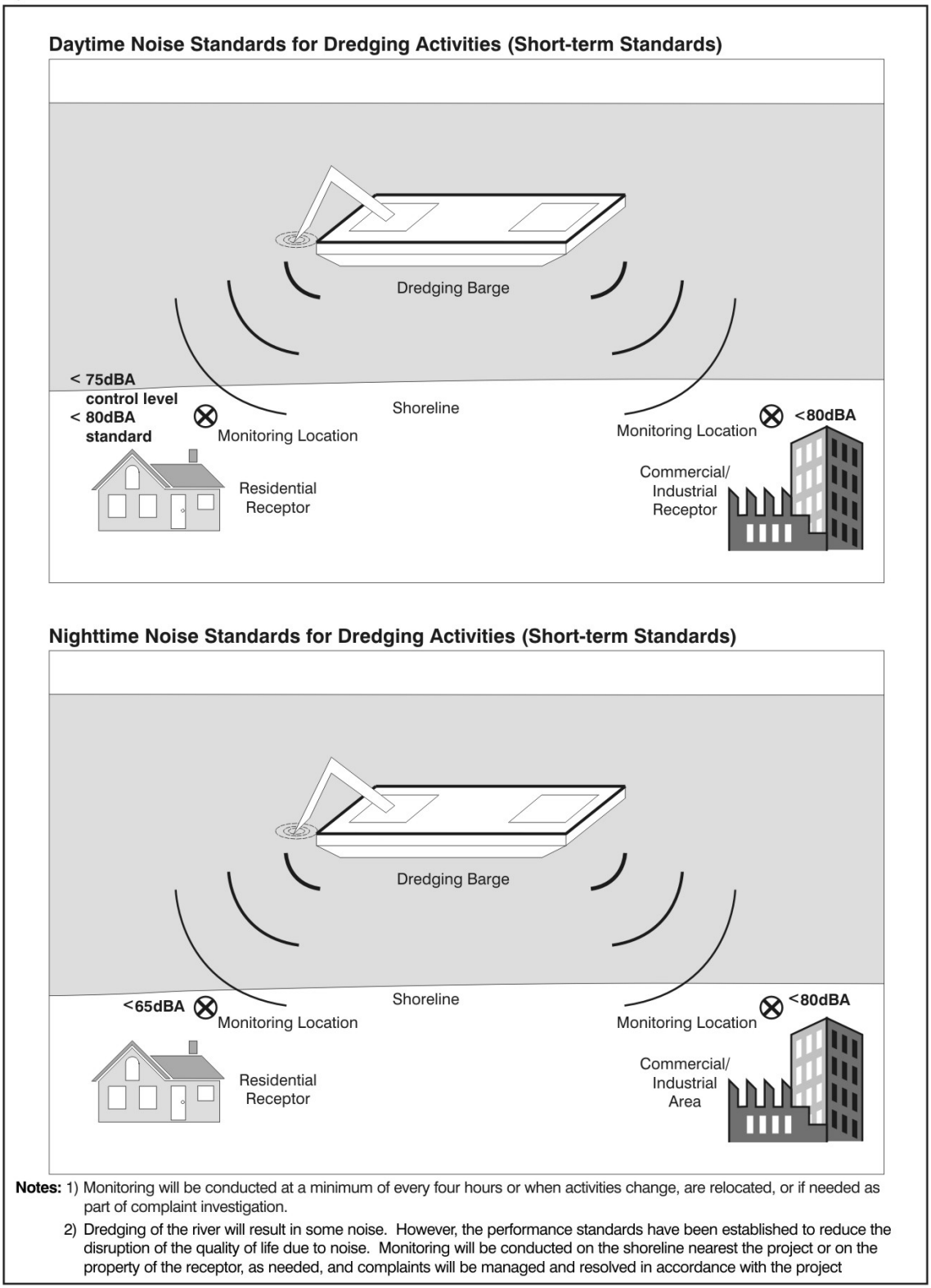
It is anticipated that there will be a minimum of 30 weeks available each year to conduct dredging operations, unconstrained by work-hour limitations. Potential impacts associated with dredging activities are expected to be short-term. Short-term activities could vary from several weeks to several months.

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).

02:001515_HR03_05_03-B1114
Fig6-6.cdr-9/3/03-GRA




**Notes:** 1) Monitoring will be conducted at a minimum of every four hours or when activities change, are relocated, or if needed as part of complaint investigation.

2) Dredging of the river will result in some noise. However, the performance standards have been established to reduce the disruption of the quality of life due to noise. Monitoring will be conducted on the shoreline nearest the project or on the property of the receptor, as needed, and complaints will be managed and resolved in accordance with the project

SOURCE: Ecology and Environment, Inc., 2003



**Figure 6-6 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 the USEPA. The RA Team shall measure noise during remedial activities to confirm compliance with the standard (see Section 6.3.9).

### 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 machinery that is 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. Domestic animals are not expected to be located close enough to project activities that noise would have an adverse effect. If potential adverse effects are identified (related to disturbance of domestic animals) as the remedy is designed and implemented, measures will be taken to minimize these effects. The EPA will consult with appropriate federal and state agencies with respect to wildlife habitats to determine whether especially sensitive or unique habitats (i.e., threatened and endangered species) exist in the Upper Hudson River that may warrant special consideration as the remedy is designed.

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 (at a minimum of every four 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 deter-

mined 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 (at a minimum of every four hours) to demonstrate compliance. Increased monitoring will be required if the control level (established for daytime) is exceeded. In addition, more frequent monitoring (i.e., hourly monitoring) shall be conducted as needed to evaluate changes in operations or complaints. The RA Team may need to measure background levels in cases where noise levels approach the standard or to distinguish between project-related and non-project related noise.

**Table 6-8 Noise Monitoring Requirements[1]**

| Operation | Minimum 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 (a minimum of every 4 hours) while the dredging and backfilling operations are ongoing if 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 noise levels are in compliance closer to the source of the 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 one 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. See Figure 6-1, which illustrates the complaint evaluation process.

### 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 RA CHASP.

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. | ■ Continue with existing controls and monitoring. | ■ Monthly reporting of monitoring data to the USEPA. |
| **Concern Level** | Noise levels are above control level.<br><br>OR<br><br>Noise levels are above the standard although exceedance can be easily and immediately mitigated.<br><br>OR<br><br>Project-related noise complaint received from the public. | ■ Investigate cause of noise increases and verify that the problem is project-related.<br>■ 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.<br>■ Mitigation (as outlined in the project contingency plan) is recommended when the control level is exceeded.<br>■ Implement mitigation (as outlined in the project contingency plan) if the standard is exceeded. | ■ Follow-up report to include a description of immediate actions taken to mitigate temporary exceedances of the standard.<br>■ Complaint follow-up will include communication with the person making the complaint. |
| **Exceedance Level** | Exceedance of the noise standard that could not be easily and immediately mitigated.<br><br>OR<br><br>Frequent, recurrent noise complaints related to project activities. | ■ Investigate cause of exceedance.<br>■ Establish additional monitoring (as needed) to evaluate cause of noise increases.<br>■ Develop action plan and implement additional mitigation.<br>■ Continue noise monitoring until compliance with the standard is confirmed. | ■ Notify the USEPA within 24 hours of discovery.<br>■ Provide daily monitoring reports.<br>■ Within ten days of discovery of the exceedance provide a corrective action report describing causes of exceedance and mitigation implemented.<br>■ 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 6-10 Lighting 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, p.83)

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

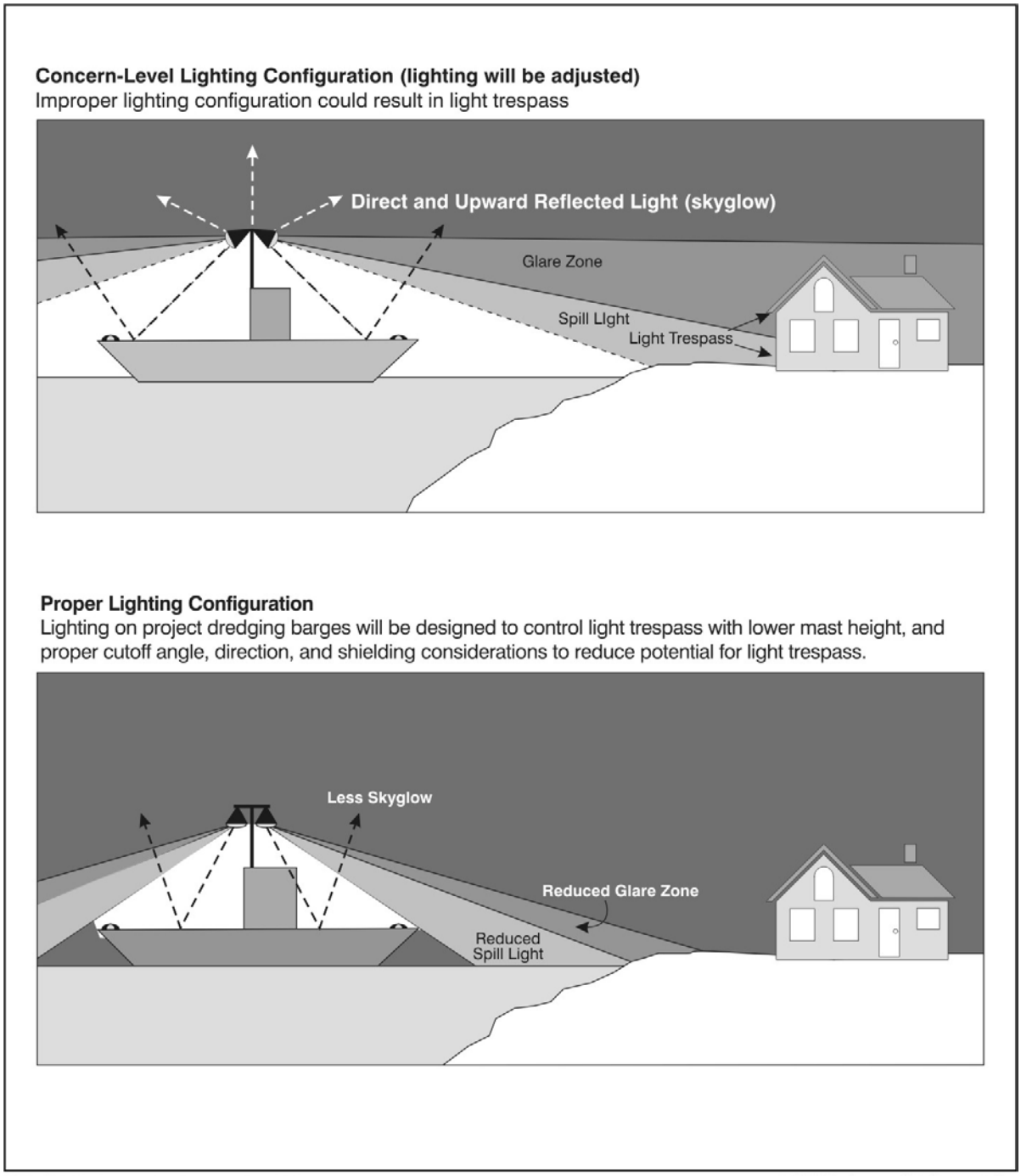
- **Light trespass** effects are caused by light that strays from the intended purpose and becomes an annoyance, a nuisance, or detrimental to visual performance.

- **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.

In general, this project should be accomplished without 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.

Light position, 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. Proper siting and careful layout of the land-based operations should effectively eliminate lighting nuisance in the local community. It should be noted that the lighting performance standard will not supersede worker health and safety lighting requirements established by OSHA.




SOURCE: Ecology and Environment, Inc., 2003


02:001515_HR03_05_02-B1114

**Figure 6-7 Conceptual Barge Lighting Configurations**

Certain lighting conditions could disturb domestic animals such as farm animals and disrupt wildlife habitats. Domestic animals are not expected to be located close enough to project activities that lighting would have an adverse effect. If potential adverse effects related to disturbance of domestic animals are identified as the remedy is designed and implemented, measures will be taken to minimize effects. The EPA will consult with appropriate federal and state agencies with respect to wildlife habitats in determining whether especially sensitive or unique habitats (i.e., threatened and endangered species) exist in the Upper Hudson River that may warrant special consideration as the remedy is designed.

### 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, which pertains 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 streetlights.
- 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

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 potential impacts of this nature.

The primary location for light monitoring is at the receptor. However, if it is determined that light levels closer to the source are in compliance, 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 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). (See Figure 6-1, which illustrates the complaint evaluation process.)

### 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 impacts. 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 they were 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 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 com-

plaints 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.

**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. | ■ Continue with existing controls, including regular monitoring and readjustment when activities are relocated. | ■ Monthly reports |
| **Concern Level** | Lighting levels are above existing standard, although exceedances can be easily and immediately mitigated.<br><br>OR<br><br>A project-related lighting complaint is received from the public. | ■ Immediately investigate cause of lighting problem and verify that the problem is project-related.<br>■ Implement mitigation, including reorientation or additional shading of lighting as outlined in the project contingency plan.<br>■ Reevaluate lighting levels to confirm compliance with standard. | ■ Follow-up report to include a description of immediate actions taken to mitigate temporary exceedances of the standard.<br>■ 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.<br><br>OR<br><br>Frequent, recurrent complaints related to project activities. | ■ Investigate cause of exceedance.<br>■ Establish regular monitoring (as needed) to evaluate lighting conditions.<br>■ Develop action plan and implement additional mitigation.<br>■ Continue regular monitoring until compliance with the standard is confirmed. | ■ Notify the USEPA of an unmitigated exceedance within 24 hours of discovery.<br>■ Within ten days of discovery of the exceedance provide a corrective action report describing causes of exceedance and mitigation implemented.<br>■ Complaint follow-up will include communication with the person making the complaint. |

## 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.

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, the USEPA, and the New York State Canal Corporation (NYSCC). The RA Team vessels (bulk transport

[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.

and tugs) will be considered 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 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.

**Table 6-12 Summary 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);<br>New York State Canal Corporation Rules and Regulations;<br>Title 21, Miscellaneous;<br>Chapter III NYS Thruway Authority,<br>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 the USEPA in consultation with NYSCC. | Perform required monitoring, reporting, and notifications as described in the standard. |

**Table 6-12 Summary of Applicable Navigation Regulations and Requirements**

| Navigation Laws, Rules, Regulations and other Applicable Requirements | Performance Standard | Demonstration of Compliance[1] |
|---|---|---|
| **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. |
| Notice to Mariners | As necessary, file and distribute Notice to Mariners as required by the performance standard and NYSCC and/or USCG. | 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.

### 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, p.83)

- "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, p. 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, p.90) [It should be noted that, according to 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, p.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, p.00)

### 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 in 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 the 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

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 RA CHASP and will include investigation, monitoring (as needed), mitigation, and follow-up procedures. (See Figure 6-1, which illustrates the complaint evaluation process.)

### 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 disassembled and reassembled.

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

**Table 6-13 Navigation Action Levels and Required Responses**

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

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 the USCG. Before placement of temporary navigational aids, the RA Team will consult with NYSCC and/or the USCG. The NYSCC and/or the 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, NYSCC, and/or the USCG):

- 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); using 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 of the USEPA and NYSCC is required. NYSCC will provide the RA Team with information (concerning 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).

## 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 air quality, odor, noise, lighting, and navigation) were determined to require the establishment of a performance standard.

The USEPA did not establish a quality of life standard for water quality because communities will be protected from impacts to water quality through other standards (such as the engineering performance standards for resuspension) and regulatory requirements.

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, p. 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, p.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, p.97)

### 6.6.3 Approach

Other quality of life considerations (including road traffic) were evaluated in a manner similar to the performance standards for 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. The RD Team will evaluate traffic and complete the design to ensure that roadways and entrances are appropriate and to minimize the potential for community traffic impacts. 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.

# 7

# Finalizing the Standards

The *Draft Quality of Life Performance Standards – Public Review Copy, Hudson River PCBs Superfund Site,* was released on December 19, 2003 by the USEPA for public comment through February 17, 2004. This document has been revised based on public comment.

The USEPA will review the RD to confirm that the design is completed in accordance with the final quality of life performance standards contained in this document. If during design EPA determines that adjustments to the quality of life performance standards are warranted, EPA may adjust the standards and will involve the public in any such adjustment. In addition, the USEPA will enforce these performance standards during the cleanup.

The information and experience gained during the first phase of dredging will be used to demonstrate compliance with the performance standards. Further, the data gathered will enable the USEPA to determine whether adjustments to operations or monitoring requirements are needed in the succeeding phase of dredging or if performance standards need to be reevaluated. However, it is anticipated that the methodology used during reevaluation will not be significantly different than that used to develop the standards. The USEPA will provide the public with data from Phase 1 dredging and an evaluation of the success or failure of the work in meeting the performance standards. Based on the results of Phase 1 dredging, the standards may be modified for Phase 2 dredging.

# 8 References


Bechtel Environmental. June 2001. *Final Dredging Program Remedial Action Work Plan for the River Remediation Project at the Alcoa St. Lawrence Reduction Plant, Massena, NY*. Oak Ridge, TN.

Dergosits, John R. February 13, 2003. NYS Canal Corporation, letter addressed to Thomas Siener, Ecology and Environment, Inc., regarding noise levels adjacent to dredging activities and the Hoosic River in Saratoga, NY.

Environmental Resources Management. April 11, 2003. *US Steel Gary Works Air Monitoring and Operations Plan (Grand Calumet River Sediment Remediation Project)*.

General Electric Co. August 2003. *Remedial Design Work Plan, Hudson River PCBs Superfund Site*.

Grande, David. 1999. *Fox River Remediation Air Monitoring Report: Ambient PCBs During SMU 56/57 Demonstration Project*. PUBL-AM-310-00, Wisconsin DNR Bureau of Air Management, August-November 1999.

Malcolm Pirnie, Inc. April 2004. *Engineering Performance Standards, Peer Review Copy, Hudson River PCBs Superfund Site, New York*.

National Research Council. 2001. *A Risk-Management Strategy for PCB-Contaminated Sediments*. Washington, D.C.: National Academy Press.

New York State Division of Air Resources, Bureau of Stationary Sources. July 12, 2000. NYS DAR-1, 2000, "DAR-1 AGC and SGC Tables."

6 NYCRR Title III, Subpart 211.2, "Air Pollution Prohibited."

6 NYCRR Title III, Subpart 211.3, "Visible Emissions Limited."

6 NYCRR Title III, Subpart 257, "Air Quality Standards."

TAMS Consultants, Inc. December 1997. *Report: Hudson River PCBs Reassessment RI/FS Landfill/Treatment Facility Siting Survey*. Prepared for U.S. EPA Region II and the U.S. Army Corps of Engineers, Kansas City District.

_____. January 2002. *Responsiveness Summary: Hudson River PCBs Site Record of Decision for U.S. Environmental Protection Agency Region 2 and U.S. Army Corps of Engineers, Kansas City District*.

United States Environmental Protection Agency (USEPA). 1974. Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.

_____. December 2000. *Hudson River PCBs Reassessment RI/FS Phase 3 Report: Feasibility Study*, New York, New York.

_____. 2002. *Record of Decision, Hudson River PCBs Site*, New York, New York.

_____. April 2004. *Water-based Facilities Evaluation, Hudson River PCBs Superfund Site, New York*.

United States Department of Health and Human Services. June 1994. Pocket Guide to Chemical Hazards. National Institute for Occupational Safety and Health.

_____. January 1999. USEPA Center for Environmental Research Information, Compendium Method TO-4A: Determination of Pesticides and Polychlorinated Biphenyls in Ambient Air Using High Volume Polyurethane Foam (PUF) Sampling Followed by Gas Chromatographic/Multi-Detector Detection (GC/MD). USEPA/625/R-96/010B.

United States Department of Transportation. 1976. *Construction Noise: Measurement, Prediction, and Mitigation*.

World Health Organization (WHO). 1999. Guidelines for Community Noise.

# A Fundamentals and Definitions (Noise and Lighting)

## Lighting Background Information

Unwanted light in the nighttime environment is becoming a growing concern worldwide. Numerous local communities, cities, counties, and states have developed ordinances to control unwanted light. Unwanted or stray light can take the form of sky glow, light trespass, and glare.

"Sky glow" is the term used to describe the added sky brightness caused by the scattering of electric light into the atmosphere, particularly from outdoor lighting in urban areas. This phenomenon is of concern to astronomers and, to a lesser extent, the general public.

Light that strays from its intended purpose can become a visual annoyance or even temporarily disabling. The term "light trespass" is used to describe this effect. Most complaints about light trespass come from people upset by stray light entering their windows or intruding upon their property. In an effort to solve light trespass problems, various communities are now adopting outdoor lighting ordinances or regulations. Some of these specify measurable limits for light trespass in terms of horizontal illuminance at or within property lines.

A severe form of light trespass involves glare. 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. It is often considered to restrict the vision of people performing driving tasks.

## Light Measurement

A "lumen" is the unit of light output from a source. Lumens indicate a rate of energy flow and are therefore a power unit, like the watt or horsepower. The illumination level is the amount or quantity of light falling on a surface and is measured in footcandles or lux. The footcandle is equal to one lumen per square foot, and the lux is equal to one lumen per square meter. In monitoring light trespass, illuminance is measured with a footcandle meter and the results are then compared to allowable levels of light trespass found in local ordinances or other appropriate guidance documents.

## References

Illuminating Engineering Society of North America, 2000, IESNA Technical Memorandum Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunctions with Roadway Lighting, IESNA TM-10-2000, New York, NY.

Illuminating Engineering Society of North America, 2000, IESNA Technical Memorandum on Light Trespass: Research, Results and Recommendations. IESNA TM-11-2000, New York, NY.

United States Code Title 33 - Navigation and Navigable Waters, Chapter 34 - Inland Navigational Rules, Part C - Lights and Shapes, Sections 2020 through 2024.

United States Code of Federal Regulations, 2003, 33 CFR - Chapter I - Part 154.

## Noise Background Information

*Noise* is defined as any unwanted sound, and *sound* is defined as any pressure variation that the human ear can detect. The human ear is capable of detecting pressure variations of less than one billionth of atmospheric pressure. Air pressure changes that occur between 20 and 20,000 times a second, stated as units of hertz (Hz), are registered as sound.

Sound is often measured and described in terms of its overall energy, taking all frequencies into account. However, the human hearing process is not the same at all frequencies. Humans are less sensitive to low frequencies (less than 250 Hz) than mid-frequencies (500 Hz to 1,000 Hz). Humans are most sensitive to frequencies in the 1,000 to 5,000 Hz range. Therefore, noise measurements are often adjusted or weighted as a function of frequency to account for human perception and sensitivities. The most common weighting networks used are the A- and C-weighting networks. These weight scales were developed to allow sound level meters to simulate the frequency sensitivity of the human hearing mechanism. They use filter networks that approximate the hearing characteristic. The A-weighted network is the most commonly used and sound levels measured using this weighting are noted as dB(A). The letter "A" indicates that the sound has been filtered to reduce the strength of very low and very high frequency sounds, much as the human ear does.

Because the human ear can detect such a wide range of sound pressures, sound pressure is converted to sound pressure level (SPL), which is measured in units called decibels. The decibel is a relative measure of the sound pressure with respect to a standardized reference quantity. Decibels on the A-weighted scale are termed dBA. Because the scale is logarithmic, a relative increase of 10 decibels represents a sound pressure that is 10 times higher. However, humans do not perceive a 10-dBA increase as 10 times louder. Instead, they perceive it as twice as loud. The following is typical of human response to relative changes in noise level:

- A 3-dBA change is the threshold of change detectable by the human ear,
- A 5-dBA change is readily noticeable, and
- A 10-dBA change is perceived as a doubling or halving of noise level.

The SPL that humans experience typically varies from moment to moment. Therefore, various descriptions are used to evaluate noise levels over time. Some typical descriptors are defined below:

1. $L_{eq}$ is the continuous equivalent sound level. The sound energy from the fluctuating SPLs is averaged over time to create a single number to describe the mean energy, or intensity level. High noise levels during a monitoring period will have a greater effect on the $L_{eq}$ than low noise levels. The duration of the measurement would be shown as $L_{eq(1)}$. A 24-hour measurement would be shown as $L_{eq(24)}$. The $L_{eq}$ has an advantage over other descriptors because $L_{eq}$ values from various noise sources can be added and subtracted to determine cumulative noise levels.

2. $L_{dn}$ is the day-night equivalent sound level. It is similar to an $L_{eq(24)}$ but with 10 dBA added to all SPL measurements between 10:00 p.m. and 7:00 a.m. to reflect the greater intrusiveness of noise experienced during these hours.

3. $L_{max}$ is the highest SPL measured during a given period of time. It is useful in evaluating $L_{eq}$ for time periods that have an especially wide range of noise levels.

4. $L_{10}$ is the SPL exceeded 10% of the time. Similar descriptors are the $L_{50}$, $L_{01}$, and $L_{90}$.

When adding sound pressure levels created by multiple sound sources there is no mathematical additive effect. For instance, two proximal noise sources that are 70 dBA each do not have a combined noise level of 140 dBA. In this case, the combined noise level is 73 dBA (see table below).

**Approximate Addition of Sound Levels**

| Difference Between Two Sound Levels | Add to the Higher of the Two Sound Levels |
|---|---|
| 1 dB or less | 3 dB |
| 2 to 3 dB | 2 dB |
| 4 to 9 dB | 1 dB |
| 10 dB or more | 0 dB |

(USEPA, Protective Noise Levels, 1974)

The decrease in sound level due to distance from any single noise source normally follows the "inverse square law." That is, the SPL changes in inverse proportion to the square of the distance from the sound source. In a large open area with no obstructive or reflective surfaces, it is a general rule that at distances greater than 50 feet the SPL from a point source of noise drops off at a rate of 6 dB with each doubling of distance away from the source. For "line" sources (such as vehicles on a street), the SPL drops off at a rate of 3 dB(A) with each doubling of the distance from the source. Sound energy is absorbed in the air as a function of temperature, humidity, and the frequency of the sound. This attenuation can be up to 2 dB over 1,000 feet. The drop-off rate will also vary with both terrain conditions and the presence of obstructions in the sound propagation path.

Wind can further reduce the sound heard at a distance if the receptor is upwind of the sound. The action of the wind disperses the sound waves, reducing the SPLs upwind. While it is true that sound levels upwind of a noise source will be reduced, receptors downwind of a noise source will not realize an increase in sound level over that experienced at the same distance without a wind.

In certain circumstances, sound levels can be accentuated or focused by certain features to cause adverse noise impacts at specified locations. At a hard rock mine, curved quarry walls may have the potential to cause an amphitheater effect while straight cliffs and quarry walls may cause an echo.

The three principal types of noise sources that affect the environment are mobile sources, stationary sources, and construction sources. Mobile sources are those noise sources that move in

relation to a noise-sensitive receptor—principally automobiles, buses, trucks, aircraft, and trains. Stationary sources of noise, as the name implies, do not move in relation to a noise sensitive receptor. Typical stationary noise sources of concern include machinery or mechanical equipment associated with industrial and manufacturing operations or building heating, ventilating, and air-conditioning systems. Construction noise sources comprise both mobile (e.g., trucks, bulldozers, etc.) and stationary (e.g., compressors, pile drivers, power tools, etc.) sources.

## References

City of New York. October 2001. City Environmental Quality Review Technical Manual.

New York State Department of Environmental Conservation. June 2003. Assessing and Mitigating Noise Impacts.

New York State Department of Transportation Environmental Analysis Bureau. 1998. Environmental Procedures Manual, Chapter 3.1, Attachment 3.1.D (New York State Noise Analysis Policy).

United States Code of Federal Regulations. 1999. Part 772-Procedures for Abatement of Highway Traffic Noise and Construction Noise, 23 CFR Ch. I (4-1-99 edition).

# B Supplemental Navigation Information (Regulations and Factors Affecting Navigation)

# Applicable Navigation Law, Rules, Regulations, and Other Factors Pertaining to the Navigation Performance Standard

## 1.0 Introduction

Navigation law, rules, regulations, and other factors were considered in the development of the navigation performance standard. This appendix documents a summary of federal and state law, federal and state regulations, and other factors adopted as the navigation performance standard. These requirements were selected for inclusion in the standard because they are applicable to the project; they promote safe and effective vessel movement and will allow the remedy to be completed without unnecessarily hindering overall non-project-related vessel movement. The navigation performance standard was specifically designed to minimize added traffic congestion (due to remedial activities); it does not specify additional requirements such as licensing. The following is a brief summary of the overall applicable and adopted laws, rules, and regulations, followed by a description (with citations) of the applicable components of each (see Section 2). Other factors pertaining to the navigation performance standard are included in Section 3.

### Federal Protection of Navigable Waters

The River and Harbors Act of 1899, as amended, prohibits certain activities that would interfere with navigation without prior approval. The U.S. Army Corps of Engineers has administrative authority to protect navigable waters. The substantive elements of the rules are detailed within the U.S. Code.

### Federal Inland Navigational Rules

The Inland Navigation Rules Act of 1980 sets out Rules 1 through 38 (33 U.S.C. §§ 2001-2038), and five Annexes (33 CFR §§ 84-88) were published through the U.S. Coast Guard as regulations, also in Chapter 1. These Inland Navigation Rules are very similar to the International Regulations for Preventing Collisions at Sea (commonly called 72 COLREGS) in content and format In addition, the incorporation of the U.S. Coast Guard into the Department of Homeland Security by the Homeland Security Act of 2002 resulted in the creation of new rules and regulations regarding inland and international navigation.

### New York State Navigation and Canal Law and Regulations

The New York State Navigation Law is primarily administered by the Department of Parks and the Department of Environmental Conservation. The Navigation Law itself is very detailed. Few regulations have been promulgated by NYSDEC or the Parks Department related to the Navigation Law. The Canal Law governs operation of the canals in New York State, and it provides authority to the New York State Canal Corporation (NYSCC )for the administration and promulgation of regulations. While the majority of New York State navigation requirements are contained in the Navigation Law, the Canal Law is not as specific and leaves much of the detailed requirements to the discretion of the Canal Corporation to create and administer through the regulatory process.

Canal Navigation Law is contained in New York State Consolidated Laws, Chapter 5, Article 8, §§ 70-85. The NYSCC regulations pertaining to navigation were reviewed in the development of the navigation quality of life standards. The applicable regulations are contained in Title 21 (Miscellaneous) of the New York State Code, Rules and Regulations, Chapter III (New York State Thruway Authority) Subchapter D (Canal System) Part 151 (Navigation Rules) (21 NYCRR 151).

## 2.0 Applicable Navigation Laws, Rules, and Regulations

## 2.1 Obstruction of Waters

Obstruction of navigable waters could interfere with the objective of the navigation performance standard. Therefore, the following requirements are included in the standard.

### 2.1.1 Federal Protection of Navigable Waters and Harbor and River Improvements

Under U.S. Code Title 33, Chapter 9, Section 409 - Obstruction of navigable waters by vessels; floating timber; marking and removal of sunken vessels is applicable to the Hudson River PCBs Superfund Site:

"It shall not be lawful to tie up or anchor vessels or other craft in navigable channels in such a manner as to prevent or obstruct the passage of other vessels or craft." In general, this law minimizes obstruction of navigation.

## 2.2 Lights, Signals, and other Aides to Navigation

The Federal Inland Navigation Rules, and New York State Navigation Law and Canal Regulations dictate the type, size, location, color, and use of lighting and sound signals on all ships and vessels that use the Canal system. It is important for these requirements to be followed in order to facilitate safe and efficient vessel movement. Applicable rules, laws, and regulations pertaining to lights and signals are described below.

### 2.2.1 Lights and Shapes

The following requirements apply to the type, size, location, color, and use of lighting on all ships.

#### 2.2.1.1 Federal Inland Navigation Requirements

33 CFR §§ 84 to 88, under Chapter I (Coast Guard, Department of Homeland Security) Subchapter E, Annex I, describe requirements for positioning and technical details for lights and shapes for inland navigation in the United States. These requirements include vertical and horizontal positioning and spacing of lights, details of location of direction-indicating lights for dredges and vessels engaged in underwater operations and other requirements for screens, color, shape, and intensity of lights. In addition, Annex V describes additional requirements for lighting of moored barges and dredge pipelines.

#### 2.2.1.2 New York State Navigation Law

Lighting requirements are described under New York State Navigation Law Article 4, Part 1, Section 43, "Lights to be displayed."

#### 2.2.1.3 New York State Canal Regulations

New York State Canal Corporation Regulations describe lighting requirements for Moored Floats under 21 NYCRR Part 151.11.

### 2.2.1 Sound and Light Signals

The following requirements apply to the type, intensity, and use of lighting and sound for signaling on all vessels. Lighting and horn signals are important means of communication on the canal. These requirements also cover the use of aids to navigation such as signage and posted information.

#### 2.2.2.1 Federal Inland Navigation Requirements

Annex III of the Inland Navigation rules (33 U.S.C. Part 86) provides requirements for the technical details of sound signal appliances, including frequency, intensity, range of audibility, directional properties, and information on the positioning and use of whistles. Annex IV (33 U.S.C. Part 87) provides requirements for distress signals.

#### 2.2.2.2 New York State Navigation Law

NY CLS Nav § 35 - Aids to Navigation. Allows the placement of navigation aids to mark obstructions to navigation if it provides for safety of navigation. Each aid to navigation is to be displayed in a conspicuous place and in legible condition the letters "NYS." Section 35a - Floating Markers also applies.

#### 2.2.2.3 New York State Canal Regulations

New York State Canal Corporation Regulations describe signaling, day markers, and shapes. The following sections are applicable:

- 21 NYCRR Part 151.6. Draft Marking on Floats
- 21 NYCRR Part 151.15 Buoys and Lights Displaced
- 21 NYCRR Part 151.23 Warning Signal Approaching Bends 21 NYCRR Part 151.26 Aids to Navigation

## 2.3 Piloting and Movement

Federal, and state rules, laws, and regulations regarding the piloting and movement of vessels were reviewed. Compliance with applicable and substantive requirements is necessary to ensure safe use of the river and prevent the unnecessary hindering of vessel traffic.

### 2.3.1 Federal Inland Navigation Rules

Annex V, "Pilot Rules" (33 CFR 88), of the Inland Navigation Rules, provides requirements for public safety activities, obtaining copies of rules, and law enforcement vessels.

### 2.3.2 New York State Navigation Law

NY CLS Nav § 41 Pilot Rules, provides piloting requirements that shall be observed on all mechanically propelled vessels on the navigable waters of the state.

### 2.3.3 New York State Canal Regulations

New York State Canal Corporation regulations describe piloting and other similar requirements. The following sections are applicable:

- 21 NYCRR Part 151.7. Number of Units in Tow
- 21 NYCRR Part 151.8. Formation of Tows
- 21 NYCRR Part 151.9. Propulsion of Barges by Pushing
- 21 NYCRR Part 151.17. Speed on Canals
- 21 NYCRR Part 151.18. Speed when Passing
- 21 NYCRR Part 151.19. When Passing Dredging etc.
- 21 NYCRR Part 151.20. Preference of Floats in Passing
- 21 NYCRR Part 151.21. Locks
- 21 NYCRR Part 151.24. When Traffic Congested

## 3.0 Factors Affecting Navigation

### 3.1 Basic Factors

The following is a summary of factors that will affect navigation in the project area and require consideration during design:

- **Existing width and depth of the navigational channel.** In an effort to determine the existing depth and width of the navigational channel, National Oceanic and Atmospheric Administration (NOAA) charts and information in existing project documents were reviewed. Because the river is a dynamic system, the width and depth of areas in the navigation channel change seasonally. Since the channel has not been dredged since 1979, the dimensions and depth of the channel shown on the NOAA charts may no longer be accurate. It is anticipated that new river surveys performed by the RD Team will yield information to establish specific clearance requirements by area of activity. The NYSCC will have to be consulted directly regarding the adequacy of clearance in each area.

- **Type of dredging operation and associated equipment/support vessels.** Mechanical and hydraulic dredging requires different types of equipment and methods for transferring the dredged sediments to the processing facility. The vessels may be self-propelled or require the assistance of tugboats.

- **The river conditions (seasonal flow variations) and weather conditions.** Weather conditions such as rainfall, snow melt, high winds, etc., will impact the amount and

depth of water and the current. These factors play a significant role in the immediate ability to navigate the channel in potentially adverse weather/current conditions and by changing the topography of the riverbed through scouring and deposition of suspended materials. In addition, the drawdown caused by the use of water by the New York State Electric and Gas (NYSEG) power-generating facility can change available water levels, causing changes in depth and current strength.

- **Duration and time of day of operation.** Vessel-traffic congestion is often a function of the time of day and/or duration of activities on or near the river.

- Vessel traffic patterns. The direction of traffic movement and the volume of traffic in different segments can affect congestion. Movements upstream and downstream impose different maneuvering requirements on vessels, depending on vessel design, mode of power, draft, etc. Areas where side channels and other traffic confluences (e.g., boat launches, marinas) occur may add or remove vessels from the traffic flow.

- Vessel working configuration (fleeting) requirements. Spuds, anchors, cables, and other equipment used to secure/tie off a vessel may affect navigation. The mooring or rafting of multiple vessels together in a specific location may encroach upon the channel in one area or offer a solution to traffic problems in another. Anchor chains, buoys, pipelines (whether on or below the surface), and the movement of vessels at anchor or while shifting positions may impede transit through an area.

- **Vessel operation and tow clearance.** Movement of vessels within confined areas may impede traffic flow. Barges may be towed alongside, astern, or pushed ahead of tugs, and the method of tow may change during a transit to account for changes in channel width or depth. Vertical and horizontal clearance at the surface (e.g., bridge height above water and clearance between support piers) as well as depth may impose restrictions in maneuvering that could cause traffic congestion while project vessels are in transit.

## 3.2 Unique Factors

The following is a summary of unique features in the project area that may affect navigation. Areas where specific navigational concerns exist along the channel include Locks 3, 4, 5, and 6. The following discussion presents key navigational concerns in the project area.

- **Lock 3 and Lock 4.** The navigational channel located between Lock 3 (in Mechanicville) and Lock 4 (in Stillwater) is currently dredged at the mouth of the Hoosic River. This portion of the channel receives large amounts of silt and coarse-grained sediment from the flow of the Hoosic River into the Hudson River. Dredging is performed by the NYSCC to maintain a navigational channel depth of 12 feet. Located north of Lock 3 is a fixed railroad bridge where the vertical clearance fluctuates between 12 and 15.5 feet, depending on the water drawdown from the downstream NYSEG power plant and natural fluctuations in the depth of the navigational channel.

The width of the river at this location varies from 40 to 60 feet. During times of operation, the power facility controls the level of water between Locks 3 and 4 through hydraulically operated steel gates that serve as a dam.

The introduction of dredging vessels into this area could potentially interfere with recreational and commercial watercraft due to the narrowness of the river, coupled with the existing bridge support piers and fluctuation of the river levels. Furthermore, NYSEG has a planned improvement project at the Mechanicville plant to replace the hydraulically operated steel gates with bladder- (air-) operated steel gates. This project will require installation of flashboards in the area of the replaced unit to aid in the control of river levels during construction. Water drawdowns associated with this project may affect navigational clearance under the fixed bridge. The RD Team shall take into account potential impacts (if any) to the RD and the RA.

- **Area North of Lock 5.** Depth measurements taken in 2002 by the NYSCC in the vicinity of buoy R160, located north of Lock 5 and south of the Route 4 bridge, indicated that as little as 4 feet of water exists along the west side of the navigation channel and, on average, only 7 feet of water is available in the navigation channel for vessel passage. Vessels passing through this relatively narrow area currently must veer to the east side of the channel, resulting in some risk to vessels (TAMS Consultants, Inc. 2002).

- **Lock 5 and Lock 6.** The greatest movement of recreational river traffic occurs during the months of July and August, when Locks 5 and 6 experience the greatest amount of use in the project area. Because of the level of use this section experiences under normal conditions and the length of time required to travel through these locks and associated land cut areas, potential traffic congestion along this section of the river during implementation of the RA is a concern. In particular, Lock 6 requires passage through an approximate 2-mile long land cut section that may provide passage only for larger vessels in one direction. The White Paper - River Traffic (TAMS Consultants, Inc. 2002) indicates that under a mechanical dredging scenario, an estimated nine vessels (not including support and supply vessels) would be expected to move through these canal locks daily, and under a hydraulic dredging scenario, three vessels would be expected to move through these canal locks daily (not including support and supply vessels). During the peak canal season of July and August there is a potential for congestion at these locks.

  Project-related river traffic will be controlled and scheduled to minimize, to the extent practicable, adverse effects on the commercial or recreational use of the upper Hudson River. For example, use of the locks by project-related vessels during off-hours would aid in reducing potential river congestion, if not eliminate it entirely. Positioning the backfill vessel near the dredging vessel would aid in keeping a passage open for non-project-related vessels.

## 3.3 Jurisdiction Factors

Various law enforcement agencies, including the New York State Police, county and local sheriffs, the USCG, and local law enforcement, also (in addition to the NYSCC) have jurisdiction on the river, depending on the area and situation. These agencies enforce the various laws, including the New York State Canal Law on behalf of and in cooperation with the NYSCC. The river is patrolled primarily by the New York State police. Activities in the navigable portion of the project (the channel and the locks) are under the jurisdiction of the NYSCC. The NYSCC employs two principal methods of control in their jurisdiction. The first is a set of rules and regulations, 21 NYCRR Part 151 (Canal Corporation Regulations). Vessels that are in their jurisdiction must follow 21 NYCRR Part 151. The second method is a work permit program. The program includes a review process that includes NYSDEC, the USACE, and the NYSCC[2]. According to the NYSCC, there are no written guidelines or requirements that one can review to determine whether a specific activity would be permitted. Rather, such requirements are determined by the NYSCC on a case-by-case basis. For example, when dredging is performed in the navigation channel, the required clearance for safe movement around the work area is situation-specific (i.e., a standard clearance distance is not specified). The process is interactive and is based on situation and circumstances. The NYSCC sends staff out to view the area and, based on their assessment of the situation, provide input on what is required. Circumstances such as expected vessel traffic in the proposed work area may dictate whether the situation meets the NYSCC's requirements (e.g., if a commercial vessel is scheduled to come through an area on a certain day, proposed work in the navigation channel may not be allowed on that day, or such work must be performed in a way that would allow the vessel to pass.). In addition, the lockmaster has direct control over movement through the locks. The lockmaster decides how many vessels (based on various factors such as size, etc.) are included in a lockage (one complete lock opening and closing cycle) and which vessels have priority to go through. Therefore, the lockmaster's decisions have a direct impact on the flow of vessel traffic.

Enforcement on the river in the project area can vary based on jurisdiction and situation. For example, the NYSCC has jurisdiction over the navigation channel and the locks, and it has established rules and regulations governing their use; however, the New York State police provide enforcement by boat patrols and also enforce a broader set of laws and regulations. Other law enforcement agencies such as local police and agencies such as NYSDEC, which has jurisdiction over recreational activities (e.g., fishing), also have enforcement roles on the river. Therefore, these other agencies and their associated enforcement roles and requirements could affect vessel movement on the river. For example, NYSDEC has established several public boat launching ramps in the project area, and the number of vessels that use these areas is not readily predictable. Though the number of lockages per day and by year is recorded by the NYSCC, detailed surveys (that include vessel size and type) of the number of vessels that pass through the project area have not been completed, according to the NYSCC and NYSDEC. The navigation channel is currently partially restricted by sediment in some areas since dredging has not

[2] CERCLA contains a permit exemption for the portion of the remedial action that is conducted on-site. However, the project will comply with substantive requirements of any otherwise necessary permits.

occurred in the project area since 1979. It is expected that some navigational dredging will be required in the early part of Phase 1 dredging. Once boaters know that the navigation channel has been dredged, additional mariners may wish to use the river in the project area. In addition, the potential exists for increased traffic due to those interested in observing the remedial activities. This potential increased vessel traffic is not readily predictable.

The standard applies solely to the RA Team activities and does not dictate the movement of non-project-related vessels. The standard requires the RA Team to take into consideration the various sources of river traffic (as described above and including such things as tours, fishing tournaments, and festivals) and complete the RD/RA in a manner that minimizes the potential for additional vessel congestion that could affect the community's quality of life.

The quality of life performance standard for navigation was developed taking into account these factors and with attention to providing a reasonable, implementable, and measurable performance standard.