US Army Corps of Engineers ®
Walla Walla District

LOWER SNAKE RIVER CHANNEL MAINTENANCE IMMEDIATE NEED DREDGING FOR COMMERCIAL NAVIGATION ENVIRONMENTAL ASSESSMENT

TIERED FROM THE LOWER SNAKE RIVER PROGRAMMATIC SEDIMENT MANGEMENT PLAN FINAL ENVIRONMENTAL IMPACT STATEMENT DATED AUGUST 2014

Appendix A

Current Immediate Need Navigation Channel Maintenance Dredging Monitoring Plan

IMMEDIATE NEED DREDGING FOR COMMERCIAL NAVIGATION IN THE LOWER SNAKE RIVER

Appendix A

Current Immediate Need Navigation Maintenance Monitoring Plan

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1 INTRODUCTION

The Walla Walla District of the U.S. Army Corps of Engineers (Corps) proposes to perform federal navigation channel maintenance dredging at two locations and ancillary/related port berthing maintenance dredging at two locations in the lower Snake River and lower Clearwater River in Washington and Idaho. The dredging would occur during the winter in-water work window, which is currently identified as December 15 through March 1, in the first window available following completion of the Immediate Need Dredging for Commercial Navigation in the Lower Snake River – Environmental Assessment. This action is tiered from the Lower Snake River Programmatic Sediment Management Plan Environmental Impact Statement (PSMP EIS). The purpose of the federal channel maintenance activities is to re-establish the congressionally-authorized dimensions of the navigation channel. Dredging would occur in the federal navigation channel at the confluence of the Snake and Clearwater Rivers and at the downstream approach to the Ice Harbor Dam navigation lock. The proposed dredging also includes ancillary/related maintenance actions by the Ports of Lewiston and Clarkston to restore the dimensions of berthing areas adjacent to the federal navigation channel in Lower Granite reservoir. The Ports are responsible for maintaining their respective berthing areas. The Ports and Corps have signed an agreement under which the Corps would include the Ports ancillary/related berthing area maintenance dredging and disposal in the Corps' federal navigation channel maintenance dredging contract, pending completion of environmental reviews. The proposed disposal for all four dredging areas would be in-water immediately downstream of Blyton Landing at Bishop Bar near river mile 118 in Lower Granite reservoir.

This monitoring plan for the maintenance dredging evaluates several issues associated with the proposed dredging and disposal. These issues include water quality, biological impacts, and structural stability of the disposed material. In compliance with the Endangered Species Act, the Corps has consulted with National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) in recent years to assess potential impacts of dredging and disposal on fish use [Endangered Species Act (ESA)-listed salmonids and bull trout in particular] in the lower Snake and Clearwater Rivers, and this plan addresses those issues as well. This plan includes water quality monitoring that has been historically required for maintenance dredging projects in the lower Snake River as well as addressing concerns raised in previous ESA consultations. These concerns include viability of fish habitat and stability of the disposal embankment. Additional monitoring requirements may be specified in the Clean Water Act Section 401 Water Quality Certification the Corps is requesting from Washington Department of Ecology, and the ESA consultation the Corps is currently performing with NMFS and USFWS. These more specific requirements would be incorporated into any future work plans of contracts associated with the dredging and disposal project.

This monitoring plan describes monitoring activities conducted during three different time periods: pre-dredging, during dredging and disposal, and post-dredging and disposal. Some of the monitoring has already occurred and was used to plan the proposed dredging and disposal activities. All the Corps' monitoring activities described in this plan may be conducted either by the Corps or its contractors, based on the availability of funds.

2 PURPOSE

The purpose of the monitoring of the dredging and disposal is to:

- Address concerns related to ESA consultation with NMFS and USFWS and their respective Biological Opinions for the current immediate need maintenance dredging action.
- Comply with the terms and conditions of the Clean Water Act, Section 401 Water Quality Certification that the Corps is requesting from Washington Department of Ecology.
- Gather information for adaptive management in planning any future dredging and disposal activities, and for mainstem habitat-related activities.

3 MONITORING

3.1 Pre-dredging

The Corps identified a need to perform biological monitoring prior to the start of any dredging or disposal activities. Some of this monitoring has already occurred and was used in designing the proposed dredging and disposal activities. Some of the monitoring would not occur until shortly before dredging begins. Descriptions of these monitoring efforts are below.

3.1.1 Redd Surveys

The Corps would perform fall Chinook salmon redd surveys within the total boundary of the proposed dredging template for Ice Harbor navigation lock approach in the fall (November through mid-December) just prior to dredging to determine if any fall Chinook (*Oncorhynchus tshawytscha*) spawning has occurred in the navigation lock approach. Threatened Snake River fall Chinook salmon are known to spawn in the mainstem river using the type of cobble and large gravel substrate routinely found in dam tailwaters when other appropriate conditions are available. Following a thorough literature review and decades of experience surveying redds in the productive Hanford Reach of the Columbia River, Dauble et al. (1994) defined preferred ocean-type (sub-yearling) or fall Chinook salmon spawning criteria as:

- 0-25 feet depth,
- 0-20 degrees slope,
- unconsolidated large gravel, cobble, or boulder substrate,
- 2-6 feet per second water velocities.

Upon further study of refining preferred salmon spawning habitat criteria for use in predictive habitat models used for larger mainstem river reaches, Dauble et al. (2003) included hyporheic upwelling flow as an important correlative criteria required for successful redd production and increasing the probability of researchers locating redd aggregations. Fall Chinook usually spawn in the Snake River in late-November and early December. Redd surveys have been performed several times since 1993 in the tailwaters of lower Snake River dams proposed for dredging.

In 1993, the first year in which comprehensive surveys were conducted, a total of 18 redds were found, accounting for approximately 7.5% of all redds found in the Snake River basin. Additional surveys were conducted at Lower Granite and Lower Monumental dams in association with in-river dredging in 2002, 2004, and 2005 (Mueller 2003, 2006; Mueller and Duberstein 2005). These surveys were limited to only likely spawning regions (e.g., near the fish return outfall pipes) and resulted in the finding of a single redd downstream of the fish return outfall pipe at Lower Granite Dam in 2004 (Mueller and Duberstein 2005).

Dauble et al. (1994, 1995) found that while suitable spawning habitat criteria does not occur downriver of the navigation locks at Lower Granite and Lower Monumental dams, such criteria does occur downriver of the navigation locks at Little Goose and Ice Harbor dams. Mueller and Coleman (2007, 2008) and Mueller 2009 found potentially suitable spawning substrate within the immediate vicinity of the proposed dredging template at Ice Harbor Dam. However, based on the multiple years of surveys, no redds have been found within the navigation lock approaches of any of the lower Snake River projects since surveys began in 1993.

Starting in 2006, USACE Walla Walla District conducted a three year study to determine if fall Chinook salmon spawn within the immediate tailrace regions of Lower Granite, Little Goose, Lower Monumental, and Ice Harbor dams as part of developing the Programmatic Sediment Management Plan for the lower Snake River. As part of this comprehensive evaluation, zones were established downstream of all four lower Snake River dams in which habitat criteria met the requirements for fall Chinook salmon spawning (Mueller and Coleman 2007, 2008; Mueller 2009). In 2006, Mueller and Coleman (2007) confirmed one redd in the tailwaters below Lower Granite Dam and two redds in the tailwaters below Little Goose Dam during comprehensive deepwater video surveys. In 2007, six redds were found in the tailrace regions of two of the four dams—four at Lower Granite Dam and two at Ice Harbor Dam (Mueller and Coleman 2008). In 2008, surveys showed a total of 15 redds in the tailrace regions of two of the four dams – eight redds downstream of Lower Granite Dam; seven redds in the tailrace region of Lower Monumental Dam (Mueller 2009).

Since potential spawning habitat exists within the footprint of the proposed dredging area of the Ice Harbor Dam tailrace, the proposed action may have the potential to disturb and/or harm eggs and alevins in redds if found to be present immediately prior to or during the proposed dredging activities. In an effort to avoid disturbing or harming fall Chinook redds, the Corps would conduct underwater surveys of the proposed dredging site at the Ice Harbor navigation lock in November and the first 2 weeks of December prior to commencing dredging. Techniques similar to those used by Battelle from 1993 to 2008 (Dauble et al.

1994-1998; Mueller 2005, 2009; Mueller and Coleman 2007, 2008) would be employed. This technique has used a combination of a boat mounted underwater video camera tracking system to look at the bottom of the river to identify redds. On at least 2 separate sampling periods (one in November when spawning activity is active and one in December when spawning activity is complete or near-complete), a one-pass search pattern would be conducted throughout a consistent transecting grid of the navigation lock approach template using a systematic tracking method employing a Global Positioning System (GPS) to determine both location of the redds on the river bottom and the position of the boat as it navigated through its search pattern. Results of the surveys would be transferred to the Corps within 2 days of the survey dates for compilation prior to December 15, at which time the Corps can communicate results to NMFS for appropriate action. If no redds are located, then the Corps would proceed with proposed dredging within the boundaries of the surveyed template. If any redds are located within the proposed dredging template and such redds are verified with video, the Corps would coordinate with NMFS to determine the appropriate avoidance and protection actions to take prior to dredging the affected location.

3.2 During Dredging and Disposal Activities

The Corps proposes to perform water quality and biological monitoring during the dredging and disposal activities. This monitoring would be to ensure the Corps is meeting environmental compliance requirements.

3.2.1 Water Quality Monitoring

The Corps, through its dredging contractor, would conduct water quality monitoring during dredging and disposal activities to ensure it is meeting applicable state water quality standards while performing these activities. Depth and turbidity would be monitored before, during, and after all in-river work at each active dredging site and at the disposal site. Additional water samples may be collected for laboratory analyses for 4-methylphenol, total suspended solids, and turbidity when dredging occurs at the Port of Clarkston Cruise Dock and Crane Dock.

The water quality monitoring equipment used would meet industry standard sensitivity and accuracy levels available at the time the dredging and disposal takes place. The equipment would have the capability to transmit the data via satellite or cell phone telemetry rather than having to be downloaded at each station in the field.

All of the equipment would be calibrated prior to use according to the manufacturer’s specifications using recognized industry standards. Cleaning and recalibration would occur according to the manufacturer’s recommendation, or whenever there is any indication that the equipment is not performing properly.

Turbidity data would be measured by sondes (i.e., multi-parameter probes) and would be verified periodically in the field. This verification would consist of collecting water samples when the sondes are calibrated, and when questionable values appear in the data set. Sample turbidity would be measured using a portable, calibrated turbidimeter.

Monitoring locations for all parameters would follow the specifications in the Washington Administrative Code (WAC) 173-201A, Idaho Administrative code (IDAPA) 58.01.02, the requirements in the 401 certification the Corps is requesting from the Washington Department of Ecology, and the requirements in the current ESA consultations with NMFS and USFWS. Monitoring would be performed at several points to evaluate water quality, but would generally include:

1. Active dredging site (Figure 1)
    a. A monitoring zone approximately 800-ft long and 600-ft wide would be created around the dredge area.
    b. A background station would be placed a minimum of 300-ft upstream of the monitoring zone.
    c. One early warning station would be located 300-ft downstream of the monitoring zone. This station would be located in the main direction of the river flow using the best professional judgment of the monitoring crew to place it in the direct path of the plume. The data from this array would be used for informational purposes as described in Section 4.2.
    d. A compliance monitoring station would be located 900-ft downstream of the monitoring zone, also using the best professional judgment of the monitoring crew to place it in the direct path of the plume.
    e. When all dredging is completed inside the zone a new monitoring zone would be defined and the monitoring network repositioned. The actual GPS coordinates of all monitoring locations would be recorded in the field documentation and entered into a database.

2. In-river disposal site (Figure 2)
    a. A monitoring zone approximately 800-ft long and 600-ft wide (measured from the shoreline) would be created around the disposal area.
    b. A background station would be located a minimum 300-ft upstream of the monitoring zone.
    c. A compliance station would be located downstream at a distance of 900-ft outside the disposal area to evaluate whether disposed material moved down-slope towards the thalweg before it is entrained in the river current.
    d. When disposal is completed inside the zone, a new monitoring zone would be defined and the monitoring network repositioned. The actual GPS coordinates of all monitoring locations would be recorded in the field documentation and entered into a database.

Measurements would be taken *in situ* at two depths in the water column at each floating platform. At the active dredge site, one probe would be located 1 meter (3.3 feet) below the surface and the second one would be situated approximately 1 meter (3.3 feet) above the sediment. At the disposal site, one probe would also be located 1 meter (3.3 feet) below the surface. Since the total depth of the water is deeper at the in-water disposal site the second probe would be situated approximately 3 meters (10 feet) above the sediment.

The timing of sampling would be as follows:

1. Pre-activity levels would be measured for 1-hour prior to work each new day at a given dredging location and at the disposal site if the workday is 10 hours or less. If work proceeds for 20 hours, or more, during a given day then the work would be considered continuous and pre-activity monitoring would only be required prior to the first day of operation. Instrument readings for each parameter would be taken every 15 minutes and reported near-real time.
2. During all dredging and in-river disposal activities, real-time water quality monitoring would be performed. The 15-minute measurements would be transmitted via telemetry to a website where they can be monitored by the contractor, Corps, and regulatory or cooperating agencies.
3. Post-activity levels would be measured for 1 hour following completion of the work at each dredging site and the disposal site. Readings would be taken every 15 minutes and also reported real time.

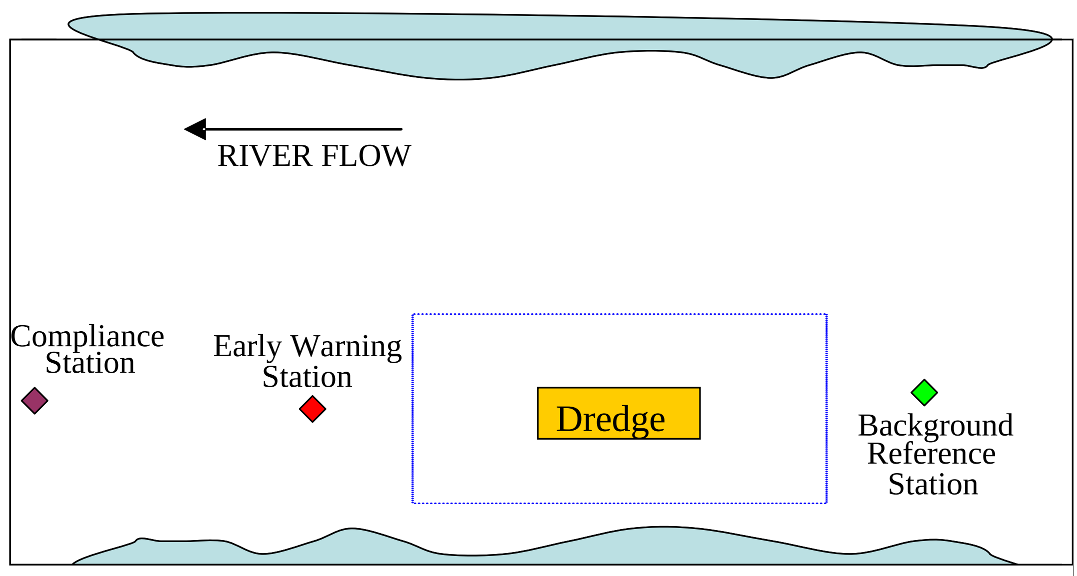

Figure 1. Conceptual Plan of Monitoring Station Locations during Dredging Activities Relative to the Dredging Monitoring Zone (not to scale).

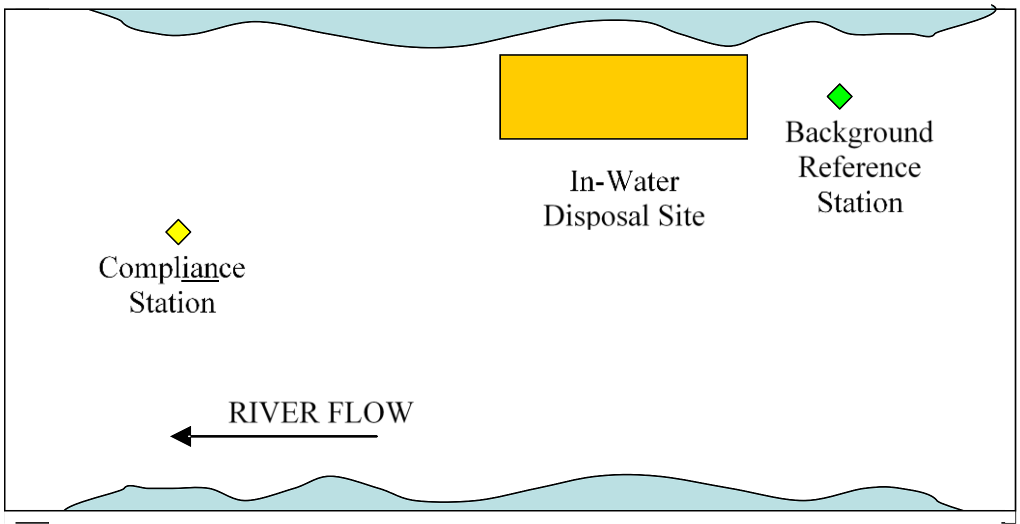

Figure 2. Conceptual Plan for Monitoring Station Locations at the In-water Disposal Site (not to scale).

3.2.2 Biological Monitoring

Fish Monitoring

During dredging and disposal activities, the Corps would monitor for sick, injured, or dead fish. The Corps would continuously visually monitor the waters surrounding the dredging and disposal activities as well as observing the content of each clamshell bucket as it discharges in the barges. If a sick, injured, or dead specimen is encountered, it would be placed in a container of cold river water until it could be determined if it was a species listed under the ESA. If it is a listed species, the Corps would then contact the Vancouver Field Office of NOAA Fisheries Law Enforcement and the USFWS Division of Law Enforcement in Redmond, Washington, as soon as possible for further instructions. If a healthy fish has been entrained by the dredging operations, the Corps would make every reasonable attempt to return the specimen safely back to the river.

3.3 Post-dredging and Disposal

Monitoring performed at the disposal area following completion of disposal activities would consist of hydrographic surveys and biological surveys. The hydrographic surveys would be performed at least twice, if funding is available, to determine if the embankment has sloughed, settled, or moved. The Corps would use the information from these efforts to assess the stability of the embankment in the short-term and long-term to determine if changes need to be made in grain size composition of construction methods for any future in-water disposal of dredged material.

3.3.1 Hydrographic Surveys

The Corps would perform a series of hydrographic surveys of the disposal site. The Corps would perform hydrographic surveys for both the pre- and post-disposal condition of the disposal area. The Corps would provide survey control to be utilized, a horizontal alignment with stationing, and a drawing representing the required area to be surveyed. The cross sections would be required to be surveyed at specific 25-foot interval spacing for both the pre and post condition surveys performed. The Corps would perform a follow up survey after the first spring runoff (July-September time frame) following disposal utilizing the same control, alignment, and interval requirements. The Corps proposes to replicate the survey one year later if funding is available.

The results obtained would provide the following data:

1. Dredged material disposal site bathymetry before material placement.
2. Bathymetry of the disposal site after embankment construction (accepted configuration).
3. Embankment bathymetry after first runoff season is complete. Comparing (2) and (3) would identify any erosion and/or settlement that have occurred.

4. Bathymetry of the embankment after second runoff season is complete (if funding is available). Comparing (2) and (4) would identify the overall settlement of the embankment, and any additional erosion that may have occurred. Comparing (2), (3), and (4) would also provide curves that could be used for predicting settlement rate and erosion rate for any future in-water disposal sites.

This information would provide a good picture of the embankment performance regarding its shape and final geometry.

4 MONITORING CRITERIA AND SUBSEQUENT ACTIONS

4.1 Biological

4.1.1 Redd Surveys

The Corps would discuss the results of the pre-dredging research with NMFS personnel prior to initiating dredging. If a redd is found in the proposed dredging footprint, the Corps would coordinate with NMFS under Section 7 of the ESA to determine what the appropriate avoidance and protection actions would be prior to dredging the affected location. This potentially would include modifying the dredging footprint to avoid the redd and/or postponing dredging in that footprint to a later date after emergence of young fish from the redd in the spring.

4.2 Water Quality

Turbidity created by in-river activities and measured in nephelometric turbidity units (NTU) would be maintained below the following standards at the locations described in 3.2.1.

- **Washington**
  - 5 NTUs above background when background levels are 50 NTUs or less.
  - Maximum 10 percent increase when the background is more than 50 NTUs.

- **Idaho**
  - Shall not exceed the background by more than 50 NTU instantaneously below the compliance boundary or by more than 25 NTU for more than 10 consecutive days.

Measured turbidity data would be evaluated using 15-minute intervals. The contractor's monitoring crew would compare individual readings from the early warning station and/or the compliance zone boundary with the readings from the background sample location, taking into consideration the estimated amount of time it takes for the water to travel from the background station to the monitoring station (hereafter referred to as travel time) to determine compliance with the water quality standards. The deep compliance boundary sample would be compared to the deep background sample, and the shallow compliance boundary sample would be compared to the shallow background sample. The 300-ft early warning readings would similarly be compared to the background measurements.

Active Dredging Site

Early Warning Station

The intent of the early-warning station is to provide the contractor with information that can be used to adjust the dredging operation to mitigate elevated readings at the compliance boundary downstream. As such, actions triggered by elevated turbidity readings at this station may be modified using adaptive management, with the goal being to not have any turbidity exceedances at the point of compliance.

The data acquisition system would be programmed to notify field managers (e.g., use of red, yellow, green color coding or an audible alarm) when the turbidity at one of the sensors is greater than the NTU over background criteria. An elevated value would initiate the following sequence of responses:

1. If a calculated value surpasses the water quality criteria for two consecutive 15-minute instances the monitoring crew would:
    a. Verify that the sonde is functioning correctly (e.g., check whether the sensor or wiper is working properly and during daylight hours take a grab sample at the same depth as the sonde reporting the elevated value with a van Dorn, Niskin, or equivalent sampler and verify the reading with the lab turbidimeter).
    b. Visually assess the station vicinity, if conditions allow, for potential outside influences such as malfunctioning dredging equipment or turbidity produced by a tugboat propeller, wake, barge, or wind, and
    c. Evaluate the data at the Compliance Boundary, taking into consideration the water travel time from one station to the other (see compliance Boundary Station section).
2. If the monitoring crew determines that the turbidity is attributed to the dredging, then:
    a. If there are signs of elevated turbidity at the point of compliance (i.e., turbidity is above background – even if it is below the standard) the monitoring crew would notify the contractor's dredge operator. The contractor would assess the current work methodology and implement best management practices (BMPs) to reduce turbidity. These BMPs may include slowing the speed of the bucket through the water column, avoiding overfilling of the bucket, allowing water to drain from the bucket at the surface, ensuring that sweeping to smooth contours is not done, and not overfilling the dredge scow. The monitoring crew would wait at least 30 minutes to one hour after implementing any additional BMPs and re-evaluate the Early Warning measurements.
    b. If turbidity at the point of compliance is equal to or less than background, then no further action is required.
    c. If repeated elevated turbidity at the Early Warning point is not associated with either elevated turbidity or turbidity exceedances at the point of compliance then the turbidity trigger for BMPs may be re-assessed for the Early Warning point.

The contractor must meet with Corps and Ecology to modify the Early Warning point turbidity trigger.

3. Special sampling for 4-methylphenol may be required in the Snake River when dredging occurs at the Port of Clarkston Cruise Dock or Crane Dock. If a calculated turbidity value surpasses the water quality criteria for two consecutive 15-minute intervals during daylight hours, a 1-liter water sample would be collected with a van Dorn, Niskin, or equivalent sampler. Samples would be collected up to three times per day over as broad of range of turbidity values as practical. These samples would be forwarded to a certified laboratory to be analyzed for 4-methylphenol (EPA Method 8270D), total suspended solids, and turbidity. The results of these analyses would be made available to the Corps when they have been received by the contractor. Samples taken the first day would have an expedited process time of no more than one week. All subsequent samples would have the normal laboratory turnaround time. Due to the anticipated time lag between sample collection and receipt of the results, the analytical data would only be used for informational purposes. However, if the concentration level of 4-methylphenol exceeds 2.8 mg/L, the Corps would contact Ecology, NMFS, and USFWS to discuss what actions to take, if any.

Compliance Boundary Station

The 15-minute data from the compliance boundary location would also be set-up with an alarm system to alert the monitoring crew if the compliance station data, allowing for estimated water travel time between stations and sensor accuracy, exceeds the applicable NTU level.

1. If a 15-minute calculated value from either of the turbidity sensors exceeds the applicable NTU level, the monitoring crew would:
    a. Verify that the sonde is functioning correctly.
    b. Visually assess the station vicinity, if conditions allow, for potential outside influences such as malfunctioning dredging equipment or turbidity produced by a tugboat propeller, wake, barge, or wind.
    c. Determine if there is a correlation to a similar event at the Early Warning station, taking into consideration the estimated water travel time between stations, and
    d. Determine if the elevated turbidity is confirmed by a consecutive reading above the turbidity criteria.

2. If a turbidity exceedance is confirmed by the evaluations listed above, the monitoring crew would notify the dredge contractor. In addition,
    a. The contractor would take appropriate corrective action (beyond those taken to modify the work activity for the elevated measurements at the Early Warning station) as necessary in order to meet turbidity standards and would submit contingency response action(s) to the Corps immediately.
    b. The monitoring crew would wait one hour after the dredge operator has implemented its contingency response actions to allow time for the changes to take effect, and then evaluate the 15-minute data again.
    c. The monitoring crew would also take one or more turbidity readings downstream of the Compliance Boundary station twice per day during daylight hours for the

first two weeks of dredging when turbidity is greater than the criteria. The purpose of the readings would be to determine the downstream extent of the turbidity plume. The first reading would be taken at 1,200-ft downstream from the monitoring zone along the anticipated path of the plume and at the same relative depth (i.e., 3.3-ft below the surface or 3.3-ft above the sediment) as the Compliance Boundary sonde recording the exceedance. If turbidity exceeds criteria at this location, a second reading would be taken 1,500-ft downstream from the monitoring zone at the same relative depth as the first reading. Additional readings would be taken every 300 feet at that same relative depth until turbidity has returned to background levels, taking into consideration the estimated water travel time between monitoring locations. GPS coordinates would be recorded for each of the additional locations beyond the 900-ft compliance boundary where turbidity levels are evaluated.

3. In the event that the contractor's contingency response actions do not achieve compliance with the water quality criteria, or in case of repeated exceedances at the point of compliance, the contractor would:
   a. Discontinue any additional in-water work until the problem is resolved
   b. Meet with the Corps and Ecology to discuss the water quality monitoring observations and contingency response actions taken by the contractor, and to identify additional contingency response actions that the contractor could implement to comply with the water quality criteria.

In-Water Disposal Site

Water quality monitoring at the in-water disposal site would follow a protocol similar to the one presented for the active dredging site. However, since the discharge from the bottom-dump barge is episodic (approximately three to six events per 24-hour period) compared to the near-continuous activity at the dredging site, the bottom-dump phase of the monitoring would be modified.

In-Water Disposal

The Early Warning would not be utilized when only in-water disposal is occurring. The 15-minute data from the Compliance Boundary station would be used to assess whether turbidity is produced by the bottom-dump barge operation. Since the scow would have completed its bottom-dump action by the time any increase in turbidity is registered at the monitoring station, real-time management is not practical. However, if the resulting turbidity at the Compliance Boundary is greater than the water quality criterion, the feasibility of increasing the rate of discharge from subsequent barges to minimize turbidity effects would be assessed.

4.3 Hydrographic Surveys

The results of the hydrographic surveys of the disposal site would be used to assess slope stability and long-term structural stability of the disposal area. Changes in elevations would indicate movement of material. The Corps would compare pre-dredging sediment sampling records to the locations of material movement to evaluate the composition of the dredged material (i.e., percent sand vs. percent silt) disposed at that location. Based on the results of the comparison, the Corps may modify its disposal plans for future dredging. Modifications could include altering the percent of silt in in-water disposal areas, or constructing a berm of sand or cobble at the toe of the disposal area slope.

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