UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

DATE: May 29, 2012

SUBJECT: Response to Contaminated Sediments Technical Advisory Group Recommendations for the Gowanus Canal Superfund Site

FROM: Christos Tsiamis, Remedial Project Manager, Region 2

TO: Stephen J. Ells, Chair, Contaminated Sediments Technical Advisory Group

From November 2 to 4, 2011, the U.S. Environmental Protection Agency's (EPA's) Contaminated Sediments Technical Advisory Group (CSTAG) conducted a review of the Gowanus Canal Superfund site. In a memorandum dated January 30, 2012, CSTAG provided comments on the remedial strategy and offered suggestions and recommendations for EPA Region 2 (the Region) to consider regarding the application of the 2005 *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites* and other relevant EPA guidance and policies appropriate for sediment sites. Each recommendation is provided below, followed by our regional response.

It should be noted that this project is somewhat unusual in that the Proposed Plan was not released with the draft FS report, since the Region wanted to get input on the report and have substantive discussions with the New York City (NYC) Department of Environmental Protection (DEP) involving combined sewer overflow (CSO) reductions prior to releasing the Proposed Plan. Extensive discussions among DEP, EPA and the New York State Department of Environmental Conservation [DEC] to discuss the CSO issues have taken place during the past several months; many of these discussions have also included representatives of National Grid, another potentially responsible party (PRP).

The Region greatly appreciates the interest demonstrated by CSTAG in the Gowanus Canal site and hopes to make maximum use of the panel's assets as the project proceeds. Some of the CSTAG recommendations will be addressed in the preparation of the Proposed Plan, others during the remedial design.

General Recommendations

Recommendation #1: CSTAG recommends that the Region work actively with all parties to encourage and coordinate the timely completion of the various source control and cleanup activities that are to be conducted by different parties. To facilitate public understanding of the entire scope of the Gowanus Canal site cleanup process, the decision document should summarize any agreements for coordinating source control and cleanups. The summary should describe the scope of the action, the timing, the law or regulation being used and the party (*e.g.,* DEP, DEC Superfund and water programs, National Grid, the Region's Superfund and water programs) responsible for conducting (and overseeing where appropriate) these activities. This will help facilitate the overall timeliness and long-term effectiveness of all current and future cleanups and lead to environmental recovery of the canal. Examples of such activities that need coordination include:

- Former manufactured gas plant (MGP) cleanups,
- Remediation of contaminated sediments,
- Replacement of bulkheads,
- Updating and modification of the flushing tunnel,
- DEP's plan to update and modify the CSOs,
- DEP's plan to dredge the top 750 yards of the canal to make sure bio-solids are not exposed at low tide, and
- Elimination of significant releases from the 200+ non-permitted discharge pipes.

Response #1: The Region has been actively working with the PRPs, DEP, DEC, and other regulatory agencies and stakeholders to plan and coordinate source control and cleanup activities for the Gowanus Canal site. In Fall 2011, the Region developed a detailed working schedule that shows the sequence, relative timing, and schedule for all of the activities required for the control of the major contaminant sources and the entity responsible for each activity (see Attachment I). The Region made adjustments to the schedule based on comments from DEC and posted it on its Gowanus Canal site website.

With regard to the **former MGP cleanups**, the Region, National Grid, and DEC have held discussions over the past two years regarding the type of source controls required and the timing. As a result of those discussions, a common understanding has been reached on a number of critical issues. These include the need for source removal and/or stabilization of the mobile sources at depths that might impact the canal bottom (in addition to a previously planned barrier wall and product recovery) at the Citizens former MGP site (located in the middle of the canal), and the immediate initiation of design work for the construction of a wall at the Fulton former MGP site (located at the head of the canal).

In its planning for the **remediation of contaminated sediments**, the Region has collected pre-design data and performed initial bench-scale testing regarding the co-generation disposal option. The Region and National Grid have agreed that during the summer of 2012 additional pre-design data will be collected relating to nonaqueous phase liquid (NAPL) upwelling areas, as well as geotechnical and *in-situ* stabilization (ISS) pilot studies. The Region is coordinating this work with National Grid and technical meetings have been held to finalize the pertinent workplans. DEP has also been invited to become engaged with this data-gathering effort.

With regard to **bulkhead replacement**, approximately 25% of the bulkhead may be replaced as a result of the construction of barrier walls for remedial work. As noted above, a barrier wall was among the components selected by NYSDEC for controlling NAPL at the Citizens former MGP site. NYSDEC has directed National Grid to begin the design process for a similar wall at the Fulton former MGP site and a similar barrier wall may also be required for the Metropolitan former MGP site. Barrier walls are also a potential component of remedies at some of the other upland parcels which the Region will address in coordination with NYSDEC. The Region has also met with several property owners who are interested in replacing their properties' bulkheads for redevelopment purposes. The Region is developing a standard site-specific administrative order pursuant to Comprehensive Environmental Response, Compensation, and Liability Act, as amended, 42 U.S.C. §9601 *et seq.* (CERCLA) for such work which will ensure that the bulkheads are upgraded in a manner consistent with the canal remedy and under regional oversight. Such an order can also provide appropriate CERCLA liability protection for the owners performing work in the canal. The format of each order may vary, depending on whether the owner is a PRP, an innocent landowner, or bona fide prospective purchaser, and whether the parcel is a NAPL source area or the upgrade is merely for structural purposes. The Region is exploring the applicability of the CERCLA permit exemption under these orders to expedite further the replacement approval process. The Region has also begun promoting coordination among interested owners to reduce their costs through economies of scale, and has held talks with the U.S. Army Corps of Engineers (USACE), DEC and DEP about cooperative approaches to address bulkhead replacement and restoration along the canal. The possible methods include a standardized design and a streamlined permitting approach to reduce transaction costs and expedite approval, as well as the enforcement of applicable regulations requiring adjacent landowners to maintain bulkheads, if appropriate. To the extent that bulkhead replacement is not otherwise required for remedial or redevelopment purposes, replacement of privately-owned and maintained bulkheads will not be part of the remedy, as this would unnecessarily increase the cost and complexity of implementing the remedy. Instead, temporary sheet-piling will be required for the implementation of a dredging and capping remedy in locations where the condition of the bulkhead would

warrant additional structural support. While the Region will continue working with all of the stakeholders, we recognize that it is not possible to insure that all of the bulkheads that need to be replaced will be replaced. Therefore, some sub-standard bulkheads may still remain. If the continued presence of such sub-standard bulkheads is judged to present a threat to the integrity of the canal remedy, we will use available CERCLA authorities and/or resources, as necessary, to ensure their repair.

Regarding issues related to **DEP's CSO work** under an Order of Consent with DEC, the Region has held CSO-related discussions with DEP since the site was proposed for the National Priorities List (NPL). Prior to the ongoing **Flushing Tunnel** improvements, acknowledging the expectation that it would likely increase dissolved oxygen levels in the canal, the Region provided DEP and DEC with a determination that such work was not inconsistent with the anticipated dredging remedy. The Region has also coordinated with DEP and DEC regarding the dredging of CSO-sediment mounds from the upper portion of the canal pursuant to the DEC Order. The Region believes that because of timing and technical considerations, this action will eventually fold into the Region's remedy for the overall dredging of soft sediment in the canal. Doing so will produce significant economies of scale for DEP, which estimates its planned dredging work to cost $15-20 million. DEC is amenable to the Region's remedial dredging approach provided that DEP's existing CSO dredging obligation is superseded by a timely CERCLA dredging obligation by the PRP group. The Region is also evaluating the potential to integrate the CSO dredging into a phased remediation program. In the interim, DEC, with the Region's support, will continue with its CSO dredging permit application review and approval process. Within that application process, the Region's coordination with DEP and DEC successfully established that DEP could utilize the Region's RI sediment data, rather than mobilizing to collect its own data, resulting in a substantial savings (approximately $1 million) to DEP.

The Region recognizes the benefits that will be realized in the middle and lower portions of the canal as a result of the CSO improvements pursuant to current and planned work under the Consent Order. Specifically, two major outfalls (RH-035 and RH-031), representing 40% of the total annual CSO discharges into the canal, will experience significant reductions of about 95% and 70% respectively; together, these reductions will reduce total CSO discharges into the canal by an estimated 34%. However, these CSO reductions will not improve conditions at the two largest outfalls in the upper canal. In fact, outfall RH-034, located at the very top of the canal, which currently accounts for 32.1% of total canal discharges, will experience an increase of about 6 million gallons per year. Together with outfall OH-007, the third largest CSO discharge point, these two upper canal outfalls account for 50% of total CSO discharges. The Region believes that some degree of CSO improvements in the upper canal will be necessary for a sustainable remedy. The Region has been holding meetings with DEP since

December 2011 regarding the need for and scope of such future measures. The Region's discussion of this issue has also included the Region's Water Program, EPA-Headquarters, other EPA Regions, DEC's Water Program, and the National Oceanic and Atmospheric Administration (NOAA). The Region has not yet achieved a consensus with DEP on the various issues relating to the CSOs. The Region recognizes that further coordination and discussions are necessary. The Region is actively seeking to maximize the level of CSO controls, while exploring opportunities for synergies and substantial capital cost savings, including such measures as: 1) locating CSO control measures in areas where upland site-related source removal work might take place, potentially saving the need for excavation and fill; 2) locating such controls on DEP-owned land, such as the Fulton Municipal and Public Place former MGPs or beneath the canal in connection with dredging work; and 3) utilizing the CERCLA National Environmental Policy Act equivalency and permit exemption provisions to expedite approvals and reduce the planning and approval costs. The Region believes that if the final CERCLA Record of Decision for the Gowanus Canal site includes a requirement for additional CSO controls in the upper canal, such controls can and will be designed and constructed in a time frame not inconsistent with the remaining remedial work.

Unpermitted pipes in the canal have been mentioned as a potential source of recontamination. The Region's investigation of these pipes in dry and wet conditions identified only minor releases from a handful of these pipes. The contaminants that were detected were at diluted concentrations even prior to discharge into the canal and did not present a significant relative risk. While discharges from these pipes do not represent significant releases to the canal, it is the Region's intention to work in coordination with DEP and DEC to either permit or permanently seal these pipes as a component of the remedy for the site. Notably, DEP itself concluded in its approved August 2008 *Gowanus Waterbody/Watershed Facility Plan* (WB/WSP), page 4-39, "Overall, the total contribution of flow from these additional point sources was determined to be insignificant relative to CSO and storm water inputs. The 154 [million gallons per day] average induced flow resulting from the Flushing Tunnel, as described elsewhere in this report, further diminishes the significance of these inputs."

Recommendation #2: Based upon the information provided to CSTAG, current and historical site-related releases of Polycyclic Aromatic Hydrocarbons (PAHs) from the former MGPs into the canal pose a risk to human health and the environment. In many locations, NAPLs and coal tar deposits in the sediment bed continue to act as significant sources of PAHs to the surface sediment, sediment pore water and the surface water. In many areas, this contamination is present in the layer of native sediment six or more feet below the bottom of the more recently deposited contaminated sediments. Some of

these NAPL deposits are very large and contain very high concentrations of PAHs; the average PAH concentration in sub-surface sediments is 3,500 milligrams per *kilogram* (mg/kg) versus 530 mg/kg for the surface sediments. The planned response actions for the three former MGP sites should significantly reduce the release of PAHs to the sediment, groundwater and surface water from these upland areas.

The CSTAG strongly recommends that the Region consider focusing this response action on remediating those sediment areas containing NAPL and coal tar deposits rather than having the response action address all of the contaminant-related risks in the canal. The CSTAG recognizes that there are long-term plans to reduce releases from the lateral inputs and from the major CSOs, but believes it may be many years if not decades before contaminant releases are reduced to levels that would not present unacceptable risks to human health and the environment. Of specific concern are releases of copper, polychlorinated biphenyls (PCBs) and PAHs from the outfalls and discharge pipes and the nonpoint source releases of PAHs typical of heavily developed urban areas bordering the canal.

Based upon existing data, it is not currently possible to predict accurately the levels of potential recontamination after the initial CERCLA action, or the future level of contamination and risk reduction that will be achieved after completion of all planned source control activities. However, CSTAG anticipates there would be significant recontamination of the surface sediment after any sediment remedy is implemented before the needed source control actions for other releases are completed. Therefore, CSTAG recommends that the Region consider an interim source control action that addresses the buried NAPLs and coal tar deposits. The final remedy for the Gowanus canal sediments could be implemented after additional source control activities have been implemented and their effects on improving sediment and water quality are better understood.

If the Region considers taking a source control action to cap the NAPLs in the deeper sediments, CSTAG recommends that the Region also evaluate the likelihood that a capping alternative will adequately contain the ongoing releases of contaminants and NAPL from the former MGPs and prevent contamination of the sediment and surface water above the cap. If the Region is not confident that capping will adequately contain these sources, it may be necessary to postpone this action until sufficient cleanup of the former MGP sites has occurred.

Response #2: The Region has carefully considered this recommendation and we have discussed it with DEC. We do not believe it is necessary to undertake an initial response action to remediate areas with NAPL and coal tar contamination from the former MGP sites before addressing other ongoing sources of contamination for the following reasons:

- Given the extensive NAPL and coal tar contamination in the native sediment layer beneath the soft sediments in the canal, it is not practical or cost-effective to remediate the buried NAPL without also remediating the overlying accumulated soft sediments in their entirety. The contamination in the canal is contiguous. Therefore, it has to be addressed in a systematic and sequential manner (from the head end to the tail end of the canal). Interim measures that address only a portion of the contaminated canal would not be effective in preventing contamination from migrating to adjacent areas that have not been mitigated, thereby increasing the levels of contamination in those areas. NAPL capped only in the portions of the canal where upwelling occurs from the deep sediment could disperse and become a source of significant increases in the contamination of overlying adjacent soft sediments and beyond.
- Because a multi-layer cap will be required to isolate those areas with NAPL that are deeper than the practical depth of removal, failure to control ongoing contamination from the CSOs and other sources would lead to recontamination of the newly-capped surface.
- Segmenting the overall remedy into multiple stages would create significant cost inefficiencies, would prolong the duration of disruptions to the densely populated local community and could delay opportunities for desired redevelopment of the area.

The Region agrees with CSTAG that it is essential to control the major ongoing sources of contamination to the canal before remediating the canal sediments, thereby reducing the potential for recontamination. As noted above, remediation and control of NAPL releases from the former MGP sites is underway and will be carried out pursuant to schedules agreed upon by EPA and DEC. The potential for recontamination will also be strongly influenced by the nature of the CSO controls that are implemented. If discharges from the contaminated upland sites (including the former MGP sites) and the easily addressed, incidental contribution from the limited number of the discharging unpermitted outfalls are controlled, then subsequent surface sediment concentrations will be largely determined by the contributions of solids and contaminants from CSO and storm water discharges, direct runoff, and Upper New York Bay transport. Combined sewers currently drain 92 percent of the Gowanus Canal watershed, whereas storm sewers and direct runoff drain only 8 percent. (DEP has committed to "green infrastructure" pilot projects in the upper canal watershed which have the potential to reduce direct storm runoff by some unspecified amount over the next 10-20 years.) The Region is promoting discussions with DEP to identify CSO controls that will minimize the recontamination potential, especially for the two major CSO discharges in the upper canal, RH-34 and OH-007. The Region believes that such controls could be achieved within the time frame of the canal remediation in a sequential approach and has prepared a schedule that could be implemented in tandem with the implementation

of the canal remedy. There are synergies that could be realized by performing this work in tandem. In summary, the Region believes that a more efficient, timely and cost-effective overall remedy will be achieved through a single, integrated remedial decision than with an approach that relies upon implementing an interim source control action to address the buried NAPLs and coal tar deposits, followed by implementation of the remainder of the remedy.

Although the relative contributions of solids and contaminants from CSOs, storm water, direct runoff, and Upper New York Bay have not been precisely quantified, multiple lines of evidence indicate that CSOs have a much greater influence on surface sediment quality than incoming sediments from Upper New York Bay. The data collected for the remedial investigation and feasibility study (RI/FS) suggest that the relative levels of total organic carbon and contaminants in sediments collected from the CSOs, canal surface, and harbor surface show that the CSOs are a source of substantial solids loading to the Canal. National Grid's hydrodynamic model further supports this conclusion. Additional data associated with the CSOs will, however, be collected in the near future. Notably, DEP's own 2008 WB/WSP does not identify harbor sediments as a significant source of pollutant loading. Instead, the WB/WSP, page 3-27, concludes: "CSOs dominate the loadings of biochemical oxygen demand (BOD), total suspended solids (TSS), and total coliform bacteria to Gowanus Canal. Moreover, CSO discharges from the Gowanus Pump Station (RH-034) represent between 45 and 71 percent of the total loadings of these pollutants." DEP's estimated CSO TSS loading to the canal is 252,500 kilograms per year (556,000 pounds per year) (WB/WSP, Table 3-15). Thus, NYC is discharging more than one million pounds of TSS every two years.

The multi-layer cap would be designed to prevent ongoing releases of contaminants from NAPL-contaminated sediments beneath the cap to the canal. NAPL is also seeping into the canal via other transport pathways, primarily lateral seepage through the bulkheads at the former MGPs and a limited number of other parcels. The FS includes remedial action objectives (RAOs) for NAPL mitigation that will require a combination of upland source control measures and the application of sediment remediation technologies. These measures may include excavation, solidification, NAPL collection wells and barrier walls. DEC has selected, and National Grid is implementing, excavation, collection, and a barrier wall at the Citizens former MGP. The Region anticipates that similar components will be selected at the other two MGPs. As noted above, the Region intends to implement the upland source control measures prior to or in coordination with remediating the sediments in the canal, so that the surface water above the cap would not be re-contaminated by releases from the former MGP sites. As with the former MGPs, the Region plans to coordinate closely this uplands work with DEC. The Region has met with several property owners and developers regarding such work and is currently negotiating a CERCLA administrative consent

order for three parcels which may serve as a model for uplands cleanup along the canal.

Principle-Specific Recommendations

Recommendation #3: Control Sources Early (Principle 1)

As discussed earlier, CSTAG is concerned about recontamination following any remedial action that is undertaken before sources are controlled. There are unpermitted pipe discharges and loadings from the CSOs which may increase due to new planned residential developments. We recommend that the Region work with the appropriate regulatory authority to develop a plan to eliminate expeditiously unpermitted, piped discharges that may be responsible for significant contaminant loading to the canal. The Region's decision documents should summarize how DEP plans to address the CSOs, including the expected reductions in CSO discharges and potential degree of recontamination of sediments by the CSOs following a remedy.

Response #3: The Region agrees that early, permanent control of the sources will provide the most effective, permanent remedy. For this reason, the Region believes that Principle 1 supports a timely, coordinated and comprehensive remedial approach to the sediments, CSOs, former MGPs, and other, lesser, ongoing sources.

Maximum accumulated sediment removal has many advantages over capping, including elimination of the canal sediment source for PCBs, thus, reducing the PCB uptake for fish. The fish consumption exposure pathway directly impacts a number of the residents of the Environmental Justice communities near the canal who utilize the canal and its mouth for subsistence fishing. Sediment removal will also reduce the risk of re-contamination through cap failure caused by propeller wash, storms, and other events. Also, DEP projects that the frequency and severity of storms will increase as a result of climate change (see http://www.nyc.gov/html/dep/html/stormwater/flooding_causes.shtml).

Sediment removal and CSO controls are also warranted to prevent the transport of contaminated sediments and untreated sewage, which may be carried by flood waters blocks from the canal during severe storms. Current and pending development within the sewershed includes the Barclay Center Arena, a $4 billion mixed used project, a Whole Foods market, and three potential major residential developments (the former Toll Brothers project, Gowanus Green at Public Place, and Gowanus Village). Each of these projects has the potential to bring more people to upland portions of the canal. It should be noted that the RI/FS data indicate that contaminants discharged from the unpermitted pipes are not significant when compared to the discharges from the former

MGP sites and the CSOs. The volume of flow from the sampled pipes was limited. The contaminants detected were at diluted concentrations even prior to discharge *into the* canal and did not present a significant relative risk. Also, see Responses # 1 and 2.

While discharges from the unpermitted pipes do not represent significant releases to the canal, it is the Region's intention to work in coordination with DEP and DEC to either permit or permanently seal these pipes as a component of the remedy for the site.

Based upon the results of the Region's RI, the Region believes that two CSO outfalls at the head of the canal (they are not being addressed by DEP's current upgrade program) are presently and will remain major ongoing sources of solids to the surface sediments of the canal following DEP's planned work. This conclusion is based upon the results of a comparative analysis of physical and chemical characteristics of the CSO effluent and the surface sediment in the canal. Consequently, the Region believes that controls for solids discharges are necessary at these CSO outfalls for a sustainable sediment remedy. Based on the results of the RI/FS and prior studies by National Grid and DEP, as part of the remedy, the Region will seek solids reductions for the nonaddressed CSOs consistent with or less than levels that will be achieved for the outfalls under DEP's current CWA program and maintenance of sediment quality in the canal over the long term. The Region recognizes that there are numerous ways to accomplish solids reduction (*e.g.,* sediment traps, outfall treatment, and storage, including increased in-line storage). It is anticipated that the most cost-effect approach would be utilized. Pre-design and design sampling and design analysis would be used to optimize the CSO control levels.

Recommendation #4: Involve the Community Early and Often (Principle 2)

CSTAG recommends that the Region clearly communicate to the local communities and other stakeholders what the Superfund remediation can and cannot be expected to achieve at this site. The Region's authority under CERCLA is limited to addressing specific hazardous substances, pollutants, and contaminants (*i.e.,* a Superfund sediment remedy will typically not address pathogens). The Region needs to describe clearly realistic expectations for risk-reduction, future conditions, and uses of the waterbody following remediation. Furthermore, it needs to be understood by the community that as long as the CSOs continue to discharge (even at the reduced rate once the current upgrades are completed), one should expect some level of continued ecological risks from copper and PAHs, and potential human health risks from PCBs. CSTAG is concerned that the excellent working relationship that has been built between the Region and the local communities will suffer without such transparency. The following steps are recommended:

- Translate the materials into Spanish for the Red Hook Community and consider holding a meeting to further engage this community,

- Discuss the timing of any CERCLA sediment cleanup in relation to the timing of the other planned non-CERCLA cleanups that may take much longer to implement,
- Although it is very uncertain, discuss the level of human health and ecological risk reduction that may be achieved after various sediment cleanup alternatives. This would reflect the level of risks from fish consumption and direct contact that may remain until the other non-Superfund source control and cleanup actions have been completed, and
- Work with all stakeholders to establish what the future uses of the waterbody are expected to be in the near and long-term. This includes acceptable recreational uses and identifying the areas where navigational depths need to be maintained to allow specified types of barges and tugs needed by existing commercial entities.

Response #4: The Region agrees with CSTAG's general recommendations regarding the need for clear communication about the remedial process and its scope. There has been a tremendous public outreach effort by the Region since the site was initially proposed for inclusion on NPL. Local residents strongly supported NPL listing and currently support the Region's approach. The community is very appreciative of the Region's efforts to achieve the promised milestones related to the completion of the RI/FS.

The Region has hosted a number of public informational meetings and the Region's Community Involvement Coordinator (CIC) helped the community form a Community Advisory Group (CAG), which has three committees and over 40 members, making it among the largest Superfund CAGs in the country.

The CAG has held over 25 general and committee meetings since the group formed in October 2010, and has considered a number of important topics, including management of upland contaminated sites, CSOs, legal responsibility for bulkhead repairs, the end use of the canal, development issues, historical and archeological preservation, and others.

The Regional team members, which include the Remedial Project Manager, CIC, and site attorney typically meet one or more times per week with the public, including the CAG, business and property owners, community advocacy groups, elected officials, and individuals with questions and concerns. The Region also utilizes a site-specific webpage and a Facebook page to make documents and information widely available.

The Regional Administrator and Regional Superfund Division Director have also been personally and extensively involved in the community outreach efforts. The RA has met on numerous occasions with city, state and federal elected officials regarding the site. The Regional team met with members of the Red Hook community in February and March 2012 and explained the findings and the status of the canal work and their

potential impacts on the community. The Region recognizes the importance of outreach and will continue to meet with the CAG, other community groups, and the *public in* general.

Regarding CSTAG's specific recommendations:

- The Region has begun providing Spanish translations of materials to the public. Color-coded materials describing canal risk data were prepared in both English and Spanish versions and distributed to the community. These were also posted on the Region's website. The Region will continue to provide additional Spanish translation documents to the public as the remedy moves forward.
- In both public meetings and CAG meetings, the Region has consistently explained that the Superfund cleanup is intended to address chemical contamination in canal sediments, surface water and on-going discharge sources, rather than water quality impairments caused by CSOs. The Region has further explained to the public and the CAG the relationship between CERCLA and the Clean Water Act (CWA), and described the Region's coordination efforts between the Superfund and water programs, as well as the potential for CERCLA-related CSO controls to provide CWA benefits. Regarding timing, the Region has, in consultation with DEC, developed a remedial schedule for the MGP cleanups, has an on-going collaboration with DEC regarding the CWA, and has shared this schedule and process with the public.
- The Region agrees with CSTAG regarding the need to discuss expectations and likely outcomes of the cleanup with the public, including for risk reduction from the sediment remedy and other source control components. The Region will address these issues in future meetings with the public.
- The Region believes that current and future reasonably anticipated uses of the waterbody and riparian areas can be adequately established for remedy selection purposes through existing use information and other sources such as NYC's recently suspended re-zoning process. The upper canal, north of 3rd Street, the land use around the canal will transition to a more residential and commercial nature, with some industrial use remaining. No commercial navigation exists or is likely in this reach other than for infrastructure maintenance. Recreational boating, including canoes, kayaks, motorboats and houseboats, currently occurs on this reach and is likely to increase here and throughout the canal as residential density increases and as the canal becomes cleaner. In the middle and lower section of the canal, the land use is currently and is likely to remain medium to heavy industrial and commercial with the exception of Public Place, for which high density, moderate income housing has been proposed. These sections of the canal currently include commercial navigation by a variety of entities including NYC, oil terminals, scrap yards and

concrete plants. This waterbody use is likely to continue, augmented by the increased recreational boating noted above. Fishing, including for consumption, currently occurs within the canal and at its mouth, despite posted fishing advisories. As the local population increases, this use is likely to increase as well. The Region meets regularly with and will continue to consult with the stakeholders on these issues, including with area brownfields groups, developers and the local development agencies. Regarding navigational depths, the Region has consulted with the USACE, DEC, NYC and commercial users. The Region will consider and address comments received from the public regarding waterbody uses and navigational depths.

Recommendation #5: Coordinate with States, Local Governments, Tribes, and Natural Resource Trustees (Principle 3)

CSTAG recommends increasing communication and coordination with the natural resources trustees, such as NOAA. As stated earlier, close coordination with the New York State and NYC regulatory agencies is essential and should continue.

Response #5: Consistent with CSTAG's recommendation, the Region has worked with NOAA and other natural resource trustees during the performance of the RI/FS and has and will continue to work with them in developing the preferred remedy and Proposed Plan. In particular, the Region has worked closely with NOAA in refining the approach for the development of a long-term ecological-based performance goal for the sediment for the site. A NOAA representative attended the CSTAG meeting in November 2011, as well as meetings with DEP, DEC and National Grid in April 2012. Representatives of the Trustees also attended a March 2012 briefing given by the Region to the PRPs.

As was noted in the response to General Recommendation #1, the Region is actively coordinating with DEC, DEP, PRPs and with other agencies and stakeholders. Since the completion of the FS, the Region has held several meetings with DEC, DEP and National Grid to discuss the FS findings and their implications relative to implementing a canal remedy. Many of these were working meetings, where project coordination was discussed in terms of near-term pre-remedial work and schedules for implementation of source control.

Recommendation #6: Develop and Refine a Conceptual Site Model that Considers Sediment Stability (Principle 4)

If the Region proposes a remedy that is expected to be the final action for the site,

CSTAG recommends development of a clearer conceptual site model (CSM) that evaluates all current and potential future exposure pathways. There is a *substantial* difference between DEP's and the Region's estimates of the solids loading and contaminant sources to the canal from the CSOs. This can affect the CSM and should be resolved before proposing a final remedy for the site. Before a final remedy is proposed, CSTAG recommends that the following additional data be collected to improve the conceptual understanding of sediment and contaminant transport in the Gowanus canal, and for quantifying the mass balance of sediments and contaminants at this site. These data are important for more accurately estimating, for example, the burial rate of contaminated sediments in the canal by clean sediments that are transported into the canal from the harbor during flood tides.

- Flux of suspended sediment and at least one contaminant of potential concern (COPC) across the downstream site boundary (DSB). This will require the measurement of the vertical velocity, suspended sediment and COPC profiles at several stations along the DSB over complete semi-diurnal neap, mean and spring tides. The COPC profiles should include measurement of both particulate and dissolved phase concentrations.
- Flux of suspended sediment and at least one COPC across the downstream end of the flushing channel once it becomes operational. This will require the measurement of the velocity, and the suspended sediment and COPC concentrations over complete semi-diurnal neap, mean and spring tides. The COPC profiles should include measurement of both the particulate and dissolved phase concentrations. If the flushing channel is not influenced by tidal conditions, then this recommendation can be appropriately modified.
- Flux of suspended sediment and at least one COPC at several locations across the four largest CSOs. This will require the measurement of the velocity, the suspended sediment and COPC concentrations over complete runoff hydrographs. The COPC profiles should include measurement of both the particulate and dissolved phase concentrations.

Estimations of the groundwater flux of COPCs into the canal also are needed during both dry and a range of runoff producing events. Ensure that the variability in the sediment discharge is appropriately considered. This information may also be useful if capping is selected as a component of the remedy.

Response #6: The Region believes that its CSM adequately identifies current and potential future exposure pathways. The sources and relative contributions of the various contaminant pathways have been established in studies performed by the Region, National Grid, USACE, and DEP's own 2008 WB/WSP, as indicated in the responses to General Recommendations 1 and 2, above. Since the November 2011

CSTAG meeting, additional data have been collected by National Grid, which are consistent with those developed by the Region. While the Region initially utilized the two-dimensional hydrodynamic model obtained from the USACE, National Grid has since developed and refined a detailed hydrodynamic model. Outputs from National Grid's model (which the company continues to refine) are consistent with EPA's CSM. National Grid's work confirms the importance of additional CSO controls in the upper canal.

Regarding the degree of loading postulated by DEP, the Region believes that the cumulative data obtained to date, including chemical profile data, physical characteristic data, three recent bathymetric studies, and modeling support the conclusion that annually, the CSOs contribute approximately six inches of contaminated sediment in the upper portions of the canal.

As DEP stated in its own 2008 WB/WSP on page 4-30: "Historical discharges by CSOs and stormwater have impacted almost the entire canal bottom, which can be described as 'black mayonnaise' - a dark, black material containing large amounts of organic matter and a low percentage of solids. This is most predominately observed upstream of Hamilton Avenue." In that report, DEP concluded that "CSOs dominate the loadings of ... total suspended solids .... to Gowanus Canal," (page 3-27) and that discharges from the outfall at the head of the canal (outfall RH-034) "dominate the CSO impacts throughout the entire canal" (page 4-41).

While the Region agrees that additional data collection will be helpful, it is not necessary to delay the remedy selection process while the data are being collected. Data collection can be performed in parallel with remedy selection as well as during the design. National Grid and the Region plan to collect additional data to support a timely and sustainable remedy for the site. Work is planned beginning in Summer 2012 to further characterize NAPL mobility and contaminant flux in groundwater discharge to support the design of a sediment cap. Additional data associated with the CSOs will also be collected. Additional focused data collection and analysis related to sediment and contaminant transport will be performed, as needed, in order to develop effective source control measures and to support the remedial design. These investigations, some of which will also be initiated this spring and summer, will be performed as part of pre-design and remedial design activities.

Recommendation #7: Use an Iterative Approach in a Risk-Based Framework (Principle 5)

CSTAG recommends that the Region consider an Interim ROD to remediate the NAPL sources near the three former MGPs and a final ROD (that may call for additional

action, if needed) after the CSOs, groundwater, permitted and unpermitted discharges have been further controlled and their impacts on reducing risks are better understood.

Response #7: The Region believes that because essentially all of the canal sediments are contaminated, to proceed with remediation of only the major PAH sources would be inefficient. For example, in many areas, CSO-contaminated sediments (which have elevated levels of PAHs) are overlying and commingled with sediments contaminated with PAHs associated with MGP coal tar wastes. The Region recognizes that residual contamination will remain and will need to be capped.

The Region and DEC have agreed to a coordinated schedule for remediation of the upland former MGP sites that would allow the start of the CERCLA remedy in 2016. It appears that CSTAG is recommending an interim ROD, primarily, because it believes that the CSO contributions cannot be timely addressed prior to the implementation of the CERCLA remedy. CSTAG has also suggested that 200+ nonpermitted discharge pipes be addressed. As was noted in Response #1, the Region's investigation of these pipes in dry and wet conditions identified only minor releases from a handful of these pipes. The contaminants that were detected were at diluted concentrations even prior to discharge into the canal and did not present a significant relative risk. The Region's objective is to ensure that the continuing contaminant sources, including the former MGP sites and the CSOs, are addressed in a timely fashion. The Region believes that a final ROD which identifies the need to address these sources is the best way to ensure that the sources and the entire canal are addressed in a reasonable time frame. The Region believes that the more effective approach will be to remediate all contaminated sediments, starting at the head or top of the canal and proceeding downstream systematically with different capping options depending on the extent and type of sediment contamination.

The Region will consider an iterative approach to monitor the effectiveness of the selected upland source control measures and their implementation and modify the approach, as needed, to facilitate the long-term success of the remedy. The Region believes that it has been effectively utilizing an iterative approach through its collection and dissemination of data in the draft RI and FS reports and its on-going collaborative efforts with the major stakeholders. The Region intends to continue this iterative approach through the division of the remedy into three Remediation Target Areas intended to address the variation of conditions within the canal sediments and upland source areas, as well as the potential use of an ISS pilot and other iterative processes after selection of an overall remedial approach.

Recommendation #8: Select Site-Specific, Project-specific, and Sediment-

specific Risk Management Approaches that will Achieve Risk-based Goals (Principle 7)

The FS should consider whether bulkhead upgrades should be included in the remedy. CSTAG's understanding is that property owners will generally be responsible for upgrades, but there are properties where an owner has not been found or may not be able or willing to upgrade. The timing of bulkhead work is likely to be important relative to sediment remediation, because bulkhead replacement activities are likely to release contaminants from behind the bulkhead into the canal.

CSTAG recommends that the Region further evaluate the expected limited effectiveness of dredging based on the relatively large amount of debris in the canal and the fact that the deeper sediments are much more contaminated than the surface sediments. Alternatives that focus on capping and minimize removal of sediments may be more effective based on CSTAG's understanding of site conditions and contaminant profiles.

CSTAG recommends that the Region consider developing and evaluating a range of remedial alternatives in the FS that include the following additional remedial alternatives:

- Use of a low permeability, reactive capping material to control NAPL migration. Gas ebullition from under the cap that can facilitate NAPL transport through the cap can be addressed with vents and activated carbon to treat gas;
- Temporarily draining the canal and redirecting the water flow to allow sediments to consolidate before placing a cap or dredging, this should include consideration of installing a passive French-drain style NAPL collection system under a cap as part of a capping alternative;
- Monitored Natural Recovery (MNR) as a remedial alternative for the lower reach;
- For areas where maintaining a minimum navigational water depth is not an issue, evaluate further if a cap can be placed without pre-dredging. Based upon experiences at other sites with soft sediment and low bearing strength, a cap can often be placed by using several thin lifts of sand allowing time for consolidation between placing lifts;
- Retain one or more capping-only remedies that may use different in-situ amendments such as activated carbon or organo-clays within the cap; and
- Consider use of in-situ amendments to reduce the bioavailability of surface contaminants for other areas of the site.

Response #8: At the time of the CSTAG evaluation, the FS report was still under development and was, therefore, not available to CSTAG. All of the FS alternatives include a component that addresses bulkhead stabilization and repair. The FS report

details the approach for bulkhead upgrade/restoration. The FS assumes that new bulkheads would be installed outside of the existing bulkheads, rather than removing and replacing the existing bulkheads. The bulkheads would be upgraded, as needed, before the implementation of the sediment remedy so that the existing bulkheads do not fail during sediment removal. The Region anticipates that temporary sheet-piling will be required for the implementation of a dredging and capping remedy in locations where the condition of the bulkhead would warrant additional structural support in those areas where bulkhead replacement is not otherwise being performed for remedial purposes (barrier walls) or re-development. The Region has held talks with USACE, DEC and DEP about cooperative approaches to address bulkhead replacement and restoration along the canal. (See our further bulkhead discussion in Response #1, above.)

Combined observations from geophysical surveys and field observations confirmed the widespread presence of debris, such as tires, sunken barges, concrete rubble, timbers, gravel and general trash throughout the canal. It is presumed that debris removal would be performed using an excavator positioned on a barge. Larger debris might require removal using a crane and clamshell bucket. The debris would be removed after each dredge cell is constructed so that sheens and turbidity releases can be controlled. Upon removal, the debris would be decontaminated, sorted, and recycled or disposed of as appropriate. This process and the associated waste streams would be determined during remedial design.

With regard to alternatives that focus on capping, some of the alternatives developed in the FS report included limited removal of soft sediment. However, these alternatives were screened out because capping extremely soft, fine-grained sediments with high water content would pose technical challenges due to the sediments' low load-bearing capacity. Additionally, capping the soft sediments could destabilize any NAPL that is present. The remedial alternatives in the FS report consider the recommendations provided above as follows:

- The capping alternatives that were retained for detailed analysis include a multi-layer cap with an oleophilic clay treatment layer as the representative process option for reactive capping. However, low permeability reactive capping material to control NAPL migration was retained in the technology screening step as an alternative process option.
- Dry excavation is addressed in the technology screening evaluation in the FS report. Dry excavation could be utilized in portions of the canal and was retained in the technology screening step as an alternative process option. However, mechanical dredging was selected as the representative process option for detailed development and evaluation. Draining the canal and installing a passive French drain-style NAPL collection system under a cap was not considered, because it is

unlikely that the canal could remain dewatered long enough for a French drain to be effective. In addition, the physical NAPL transport processes found in the canal may not be consistent with a French drain-style system.

- MNR was screened out as an alternative for the lower reach of the canal since the accumulated sediments are grossly contaminated with a broad range of pollutants that are unlikely to naturally attenuate and which may be subject to some degree of transport via propeller wash, storms, and tidal action to areas of the canal that were capped.
- As noted above, alternatives that included placement of a cap over soft sediments were screened out because of the expected low load-bearing capacity of the sediment. National Grid and the Region will, however, perform a geotechnical evaluation of the placement of a cap over soft sediments. It is the Region's intention to allow flexibility in the ROD to permit such capping if it is feasible and would be effective. EPA will consider the results for potential use during the design of the remedy.
- In-situ stabilization was the only in-situ treatment technology retained in the technology screening step. Other in-situ technologies were screened out for various reasons, primarily, because they were not likely to be effective for treating high metals concentrations and NAPL.

In summary, as indicated in Response #3, above, the primary reason for the removal of the accumulated sediment is the permanent removal and treatment of the principal threat waste represented by the grossly-contaminated accumulated sediments. Removal of the accumulated sediments would result in the removal of contaminants of concern other than the NAPL, thereby reducing the risk of recontamination in the event of a cap failure.

In addition, the removal of the majority of the accumulated sediments is necessary for constructability reasons. Land-based dredging would be highly restricted due to the presence of buildings and other structures along much of the canal. Furthermore, barge operations would be necessary for bulkhead upgrades, installing/removing sheet piling, debris removal, sediment and cap materials handling. Thus, nearly half of the soft sediment must be removed to create sufficient depth for workboats that will implement the remedy; maintain the cap and conduct future repairs to bulkheads and other infrastructure throughout the canal; and to avoid propeller wash cap damage by existing commercial barge navigation in the lower two thirds of the canal. In addition, to provide proper cap stability, the soft sediments need to be removed to the native sediments.

It should be noted that the Region is not proposing any dredging solely for non-environmental purposes. The canal's narrow 100-foot width represents the entire navigational channel, unlike many rivers and harbor sites where the shipping channel

represents a fraction of the total area. In the upper two thirds of the canal, the NYC has primary responsibility for maintaining navigational depths. No significant upper *canal* dredging has been conducted by NYC since 1975. NYC has obtained state approval for successive water quality improvement-related dredging (1983, 1993, and 2008) ranging from select areas to the entire canal down to 13 feet mean low water. However, other than a nominal amount to re-start the Flushing Tunnel, NYC has yet to implement any approved dredging during the intervening three decades. The current plan for dredging the CSO mounds at the head of the canal is not scheduled for completion until approximately 2017.

Recommendation #9: Ensure that Sediment Cleanup Levels are Clearly Tied to Risk Management Goals (Principle 8)

If the remedy proposed by the Region is intended to be a final action to reduce all contaminant-related risks to acceptable levels, additional work should be done to refine the RAOs. The RAOs should be supported by quantifiable statements that specify the media and the contaminant cleanup levels to be achieved by the remedy in the short- and long-term, including interim targets that will impart some level of risk-reduction. In particular, the decision documents should specifically present the time frames for the expected short-term and long-term reductions in concentrations of contaminants in sediments needed to ultimately attain the "acceptable levels" of risk described in the RAOs. If these RAOs are not expected to be reached, the Region should consider an interim ROD that is focused on source control.

The CSTAG recommends that the Region quantify risk reduction expectations for all remedies evaluated in the detailed analyses of alternatives in the FS. This would include estimates of the levels of recontamination that are expected to occur.

Response #9: The decision documents will include refined ecological-based RAOs, cleanup goals, and the plan and time frame for developing and implementing the source control actions that are expected to make these cleanup goals sustainable. For the reasons noted above, the Region believes that it can address potential sources of recontamination of the canal concurrent with the remediation of the sediments and, therefore, does not intend to utilize an interim ROD approach at the site.

Recommendation #10: Maximize the Effectiveness of Institutional Controls and Recognize their Limitations (Principle 9)

CSTAG expects that if an interim (or final) source control remedy that focuses on

capping of the NAPLs is proposed, protective concentrations in fish are not likely to be achieved. Institutional controls to limit fish consumption and possibly direct exposures to the surface sediments may still be needed.

Response #10: The human health risk assessment concluded that PCBs pose a risk to human health from the consumption of fish and shellfish. The sediment remedy is expected to reduce, but not eliminate this risk because PCB concentrations in fish and shellfish from the Upper New York Bay reference area also pose a human health risk. A fish consumption advisory for PCBs is already in place for the Upper Bay of New York Harbor. While the Region has no control over the State's fish consumption advisory, we are entirely confident that it will remain in place in the future. As recommended by CSTAG, the Region has translated into Spanish materials regarding fish consumption and other exposure pathways.

The human health risks associated with direct exposure to surface sediment can be attributed to the locations that are heavily contaminated with PAHs from the former MGP sites in the middle reach of the canal. Any remedy that addresses this contamination will address this human health risk; therefore, an institutional control to address this pathway will not be necessary.

Recommendation #11: Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness (Principle 11)

If the Region proposes a final action to reduce all risks to acceptable levels, CSTAG recommends that the site database be evaluated for its adequacy to establish baseline conditions against which the RAOs and remedy effectiveness can be evaluated after the remedy has been implemented. Ideally, results from several sampling episodes over several years should be available.

Response #11: The results of the RI have already established baseline conditions against which the RAOs and remedy effectiveness will be evaluated after the remedy has been implemented. Some of the additional sampling that will be performed during the upcoming investigations (including data associated with the CSOs) and the remedial design will further support the baseline database. The Region will further address this recommendation when developing the post-remediation long-monitoring plan for the canal.

Gowanus Canal, Former Manufactured Gas Plant, and Combined Sewer Overflow Cleanup Coordination Schedule

EPA Canal Cleanup

- Remedial Investigation (RI): 12/2009-12/ 2010
- Feasibility Study (FS): 3/2011-12/2011
- Proposed Plan: 9/2012
- Record of Decision (ROD): 3/2013
- Remedial Design (RD) and RD/RA CD: 2013- 2015
- Dredging of Area 1, Butler Street to 3rd Street: 2016-2017
- Dredging of Area 2, 3rd Street to 9th Street: 2017-2018
- Dredging of Area 3, 9th Street to 21st Street: 2019-2020

Grid Fulton MGP State SF Site

- RI: Started April 2008; completion date: 12/2011
- FS completion date: 6/2012
- Proposed Remedial Action Plan Completion date: 9/2012
- ROD completion date: 12/2012
- RD completion date: 12/2013
- Thomas Greene Park issues
- **RA: Must be Implemented By 12/2015**

Grid Public Place MGP VCP Site

- Phase 1 and 2: 1984-1989
- RI: 2002-2005; Supplemental sampling ongoing
- FS: 2005- 3/2007
- ROD: 2007
- RD: Work Plan 9/2007; 50% Design 6/2011; 100% Design completion date 12/2012
- Ferrara Bros. Relocation; Property Access Resolution
- **RA: Must be Implemented By 12/2016**

Metropolitan MGP State SF Site

- Lowe's VCP work completed 2003
- RI: started January 2010; completion date 12/2012
- FS completion date: 9/2013
- Proposed Remedial Action Plan completion date: 3//2014
- ROD completion date: 9/2014
- RD completion date: 12/2016
- **RA: Must be Implemented By 12/2018**

NYC Combined Sewer Overflow Upgrades

- Flushing Tunnel/ Pump Station Work: to be completed in 2013
- 3/2013 ROD will include Superfund – related overflow and solids controls
- Design Superfund-related overflow/solids controls: 2013-2015
- Dredge Area 1 Superfund-related outfall controls: Must be Implemented By 12/2015
- Dredge Area 2 Superfund-related outfall controls: Must be Implemented By 2/2016
- Dredge Area 3 Superfund-related outfall controls: Must be Implemented By 12/2018