
RCRA FACILITY INVESTIGATION

for the
Lower Genesee River
(Operable Unit 5 of the Eastman Business Park)

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March 2017

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Acronyms

Acronym	Definition / Description
2,3,7,8-TCDD	2,3,7,8- tetrachlorodibenzo- <i>p</i> -dioxin
2,4-D	Dichlorophenoxyacetic acid
2,4-DB	2,4-dichlorophenoxybutyric acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
AOC	Area of concern
ADCP	Acoustic Doppler Current Profiler
ARARs	Applicable or Relevant and Appropriate Standards
ATSDR	Agency for Toxic Substances and Disease Registry
BAP	Biological Assessment Profile
BEF	Bioaccumulation equivalency factors
bgs	Below ground surface
BSGV	Bioaccumulation sediment guidance values
CCME	Canadian Council of Ministers of the Environment
C.F.R.	Code of Federal Regulations
cfs	Cubic feet per second
CMA	Corrective Measure Alternative
CMS	Corrective Measures Study
COEC	Contaminants of ecological concern
CPOI	Chemical parameter of interest
CSO	Combined sewer overflow
CSM	Conceptual site model
°C	Degrees Centigrade
°F	Degrees Fahrenheit
DEM	Digital elevation model
DER	(NYSDEC) Division of Environmental Remediation
DO	Dissolved oxygen
DOC	Dissolved oxygen
dynes/cm ²	Shear stresses per centimeter squared
EBP	Eastman Business Park
EFDC	Environmental Fluid Dynamics Code
ESSROC	ESSROC Italcementi Group
FEMA	Federal Emergency Management Administration
ft/sec	Foot/feet per second
FWRIA	Fish and Wildlife Resources Impact Analysis

Acronym	Definition / Description
GLNPO	Great Lakes National Program Office
H. azteca	Hyalella azteca
HQ	Hazard quotient
KLWWTP	Kings Landing Wastewater Treatment Plant
kybp	Thousand years before present
MDL	Method detection limit
µg/kg	Microgram(s) per kilogram
µg/L	Microgram(s) per liter
mg/kg	Milligram(s) per kilogram
mg/L	Milligram(s) per liter
ng/kg	Nanograms per kilogram
NKPE	Northeast Kodak Park East
NOAA	National Oceanic and Atmospheric Administration
NOEC	No observed effects levels or no-effects concentration
NRHP	National Register of Historic Places
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ODEQ	Oregon Department of Environmental Quality
OU	Operable Unit
<i>p,p'</i> -DDD	Dichlorodiphenyldichloroethane
<i>p,p'</i> -DDE	Dichlorodiphenyldichloroethylene
<i>p,p'</i> -DDT	Dichlorodiphenyltrichloroethane
PAH	Polycyclic aromatic hydrocarbon
PBDE	Poly-brominated diphenyl ethers
PCB	Polychlorinated biphenyls
QAPP	Quality Assurance Project Plan
QC	Quality control
QHHEA	Qualitative Human Health Exposure Assessment
RAO	Remedial action objective
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RG&E	Rochester Gas and Electric
RIBS	Rotating Integrated Basin Studies
RL	Reporting limit
RW&O	Rome, Watertown & Ogdensburg (railroad)

Acronym	Definition / Description
SCO	Soil Cleanup Objective
SGV	Sediment Guidance Value
SOP	Standard operating procedure
SPDES	State Pollutant Discharge Elimination System
SVOC	Semivolatile organic compound
TAL	Target analyte list
TCL	Target compound list
TDS	Total dissolved solids
TEC	Threshold effects concentration
TEF	Toxicity equivalent factor
TEQ	Toxic equivalents
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
TSS	Total suspended solids
TU	Toxicity unit
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFDA	United States Food and Drug Administration
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile organic compound

Executive Summary

This report describes and documents the results of the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) conducted at the lower Genesee River in Rochester, New York. The portion of the lower Genesee River being addressed is Operable Unit (OU)-5 of the Eastman Business Park (EBP) RCRA Site (the Site). In addition to OU-5, the study area includes two upstream stretches of the river. For the purpose of this report, the study area is defined as the stretch of river from the mouth at Lake Ontario to the Lower Falls, and includes the background (upstream) area. The lower Genesee River (or lower Genesee) consists of the area from the mouth of the river to the Lower Falls.



Parsons conducted the RFI on behalf of the New York State Department of Environmental Conservation (NYSDEC), which was designated as the primary beneficiary of the Eastman Business Park Environmental Trust. The primary objectives of this RFI were to:

- Identify and/or confirm concentrations of chemical parameters of interest (CPOIs) in lower Genesee River sediment, wetlands/floodplain soils, surface water, benthic macroinvertebrates and fish
- Characterize the physical aspects of the lower Genesee River including sediment properties, morphology and potential cultural resources
- Identify and assess any remaining significant upstream sources of sediment contamination
- Determine if significant chemical loadings are impacting the lower Genesee River from upstream sites and, if so, quantify the impacts
- Assess whether there are impacts to the lower Genesee River that warrant conducting a corrective measures study to identify and evaluate possible remedial alternatives

The RFI field activities and key findings are summarized below followed by the preliminary remedial action objectives (RAOs).

RFI Field Activities Summary

RFI activities were completed in accordance with the NYSDEC approved work plan (Parsons et al. 2015). The following investigative activities were completed within the study area during the RFI:

- Sampling and analysis of river surface water, suspended sediment, river sediment, wetlands/floodplain soils, benthic macroinvertebrates, fish, and groundwater (at the Kings Landing Wastewater Treatment Plant [KLWWTP]) to further assess the nature and extent of contamination
- Using analytical techniques to further assess environmental impacts on organisms from river sediment, including chronic sediment toxicity testing
- Assessing potential impacts to existing cultural resources (including archaeological and historical resources)
- Analyzing hydrodynamics and bed sediment transport to assess potential future movement of sediment within the river and floodplain
- Assessing potential impacts to human health in identifying pathways of exposure to contaminated media
- Assessing potential impacts on fish and wildlife in the river and adjacent wetlands/floodplain habitats

Data from these investigations were used to assess the nature and extent of contamination, develop a hydrodynamic and sediment transport model, and conduct human health and ecological risk assessments.

Nature and Extent of Contamination

Historical sample results and analytical data compiled as part of this RFI were compared to applicable and appropriate screening levels for each media to assess potential impacts to the lower Genesee River and to develop an understanding of the distribution of environmental contaminants. Contaminants of concern identified in the lower Genesee River based on exceedances of NYSDEC criteria or guidance values include the following:

- Silver and other metals
- Polycyclic aromatic hydrocarbon (PAHs)
- Pesticides/herbicides
- Polychlorinated biphenyls (PCBs)
- Dioxins/furans

While these compounds have been identified as contaminants of concern, they are not all necessarily attributable to historic EBP operations.

Surface Water

Depth-integrated surface water samples were collected in three rounds to assess potential contaminant loading to the lower Genesee River during different flow events. Historical and RFI samples were compared to the applicable NYSDEC Class B Surface Water Criteria. The following key findings were observed:

- Total silver was observed downstream of the KLWWTP in exceedance of Class B surface water criteria; however, the criteria used for comparison is specific to ionic silver. Silver was not speciated (tested to determine whether it was in ionic form) during the RFI. All exceedances observed were therefore based on the assumption that all silver detected by the total silver (unfiltered) test method was present in ionic form, which may not be the case. Further, filtered samples were also analyzed during the RFI at all locations during the three rounds to determine dissolved silver concentrations. Dissolved silver results were below the detection limit at all sample locations. These results suggest that total silver detections in surface water collected from the lower Genesee River are related to the solids fraction and that silver is not present in ionic form.
- Total aluminum, total iron, dissolved mercury, and total vanadium were also detected above the Class B surface water criteria. However, these metals were observed at consistent concentrations in samples from both upstream and downstream of KLWWTP, and are therefore unlikely to be attributable to historical operations at the EBP.
- The only total PCB detection in surface water was at a concentration in exceedance of Class B criteria and was observed in a sample collected during the higher flow wet weather sampling event (Round 2) at a location upstream of the KLWWTP. This exceedance was likely associated with suspended sediment particles generated during the high flow event. PCBs in lower Genesee River surface water are not likely associated with the EBP.

River Sediments

The NYSDEC Screening and Assessment of Contaminated Sediment freshwater guidance values were used to compare historical and RFI sediment data to determine the nature and extent of contamination within the lower Genesee River. Key findings include the following:

- Silver has been identified as the primary chemical parameter of interest (CPOI) for river sediments within the lower Genesee River and is attributable to historical EBP operations and practices. Silver concentrations exceeded the Class C sediment guidance value (SGV) at all transects downstream of the KLWWTP (although not necessarily in every sample).
- Other metals (arsenic, chromium [total], copper, lead, mercury, and nickel) were detected in exceedance of the Class A and Class C SGVs within the lower Genesee River. However, it is unlikely they are associated with historical operations at the EBP. Cadmium and zinc also exceeded Class A and sometimes Class C SGVs within the lower Genesee River. Based on data collected, it is possible that the presence of cadmium and zinc in the lower Genesee River sediments is attributable to EBP operations.
- Total PAHs are widely distributed in lower Genesee River sediments, identified by exceedances of the Class A and Class C SGVs both upstream and downstream of the KLWWTP. Calculations of PAH toxicity units indicated that PAHs could pose toxicity to sediment-dwelling biota throughout the lower Genesee River. However, it is notable that the majority of sediments evaluated for benthic toxicity to PAHs via equilibrium partitioning are at depths greater than one foot and are therefore not biologically available. In addition, it is evident that sources upstream of the EBP contributed to the distribution of PAHs in lower Genesee River sediments.

Further, in the downstream segment of the river (near the mouth), total PAHs may be influenced by commercial activities (e.g., marinas) and proximity to development.

- Class A SGV exceedances for total PCBs were observed throughout the lower Genesee River; however, exceedances of the Class A SGV in sediments upstream of KLWWTP indicate that historical EBP operations were not the source of PCBs.
- Sediments were screened for dioxins and furans by deriving a toxicity equivalents value for the sum of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin and its equivalents in order to compare concentrations to the Class A SGV (corrected for study area-specific total organic carbon). Results indicate the potential for adverse effects due to the presence of these compounds throughout the study area, including upstream of the falls within a background sampling area. However, it is unlikely they are a contaminant of concern associated with historical EBP operations given the wide distribution of dioxin/furans in sediments and a lack of pattern in occurrence or concentration evident for these constituents.
- A limited distribution of pesticide exceedances of the Class A SGVs were observed in lower Genesee River sediments, including elevated concentrations detected upstream of KLWWTP. Therefore, it is unlikely pesticides in lower Genesee River sediments are associated with the EBP.

Geochronology

Geochronology analysis was used to determine the age and sedimentation rate of river sediments within the lower Genesee River. Geochronology and sediment contaminant data are consistent with sediment stability. They generally show a surficial layer enriched with cesium-137 (indicating deposition around 1960) overlaying a deeper layer of more contaminated sediments with relatively unmixed depth profiles. This suggests that the 1972 Hurricane Agnes flooding event did not cause significant widespread scour of the lower Genesee River sediments. This result indicates that future erosion of a buried peak silver concentration layer is not likely.

Wetlands/Floodplain Soils and Sediments

To support the evaluation of the nature and extent of contamination in wetlands/floodplain soils, detected sample concentrations were compared to the 6 NYCRR¹ Part 375 Restricted Use Soil Cleanup Objectives for the protection of ecological resources due to the presence of habitat available to support ecological receptors. Data from wetlands/floodplain samples collected in areas where materials were characteristic of sediments (locations FP-01, FP-05, and FP-11) were compared to the NYSDEC Screening and Assessment of Contaminated Sediment freshwater guidance values in order to evaluate the nature and extent of contamination at these locations. Key findings include the following:

- Silver is the predominant, wide-spread CPOI in wetlands/floodplain soils and sediments. Higher concentrations of silver in wetlands/floodplain samples occur downstream of the

¹ NYCRR - New York Codes, Rules and Regulations

KLWWTP. Vertically, silver concentrations in both the 0- to 0.5-foot and 0.5- to 2-foot zones generally tend to be higher than deeper (greater than 2 feet) soils and sediments.

- Ten other metals (arsenic, barium, cadmium, chromium [total], copper, lead, mercury, nickel, selenium, and zinc) were detected in exceedance of applicable criteria in one or more wetlands/floodplain soil and sediment samples. However, several of these metals (arsenic, barium, chromium (total), copper, lead, mercury, nickel, and selenium) either observed limited detections, were detected at consistent concentrations both upstream and downstream of the KLWWTP, or were wide-spread without a pattern in distribution, and therefore are not likely attributable to EBP. Based on data collected, it is possible that the presence of cadmium and zinc in lower Genesee River soils and sediments are attributable to EBP operations.
- PAHs were detected in samples from all wetlands/floodplain soil and sediment locations. No individual PAHs were detected in wetlands/floodplain soils at concentrations in exceedance of the protection of ecological resources Soil Cleanup Objectives (SCOs). There is no protection of ecological resources SCO for total PAHs. However, total PAH concentrations in wetlands/floodplain sediment samples were detected in exceedance of the Class A SGV at locations FP-01, FP-05, and FP-11. As discussed above, it is evident that sources upstream of EBP and potentially near the mouth of the river also contribute to the distribution of PAHs in the lower Genesee River.
- Limited PCBs were detected in wetlands/floodplain soils and sediments in exceedance of associated criteria; however, no strong trend in concentration was evident among the samples. Further, results of the surface water and river sediment investigations suggest that it is unlikely PCBs in the lower Genesee River are associated with historical EBP operations.
- Dioxins/furans were detected in all wetlands/floodplain soil and sediment samples analyzed, including those upstream of the KLWWTP. The calculated toxic equivalents for wetlands/floodplain sediment samples (FP-01, FP-05, and FP-11) were observed in exceedance of the sum of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin and equivalents SGV (corrected for wetlands/floodplain-specific total organic carbon) in all samples analyzed. However, based on river sediment investigation results, it is unlikely that dioxins/furans are contaminants of concern related to historical EBP operations.
- Although pesticides were detected in both wetlands/floodplain soils and sediments, few protection of ecological resources SCO exceedances were identified in soil. These included dichlorodiphenyldichloroethane at a location near the KLWWTP and dichlorodiphenyldichloroethylene and dichlorodiphenyltrichloroethane upstream of the KLWWTP. No exceedances of SGVs for pesticides were observed in wetlands/floodplain sediment samples. Pesticides in the lower Genesee River are not likely associated with the EBP.

Biota

The nature and extent of contamination within biota in the lower Genesee River, organism response to sediment exposure, and health of the benthic community was investigated as part of the RFI. Community assessment and chemical analysis was performed on benthic macroinvertebrates, fish

were sampled for chemical analysis, and toxicity bioassays on test organisms were conducted. Key findings are summarized below.

Mussels

- Silver exceeded the no-effect level in eight out of nine benthic macroinvertebrate (mussels) tissue samples collected from the lower Genesee River between just upstream of the Turning Basin and just downstream of the KLWWTP. Silver concentrations were highest in mussels sampled at the location nearest the KLWWTP.
- Two other metals (lead and zinc) were detected in benthic macroinvertebrate (mussels) tissue from all sampled locations (Transects 4, 5, and 6) at concentrations above selected body burden no-effect levels. The highest concentrations of metals within tissues were observed just downstream of the KLWWTP (Transect 6) and declined further downstream.
- PAH concentrations detected in benthic macroinvertebrate tissue were highest in the samples collected near the KLWWTP, and declined further downstream. However, based on the distribution of PAHs in sediments (as described above), it is evident that sources upstream of EBP contributed to the presence of PAHs in the lower Genesee River.
- Three pesticides were detected in benthic macroinvertebrate tissue samples, however only *p,p'*-DDT exceeded its corresponding NYSDEC guideline concentration in one of three samples collected from the location nearest to the KLWWTP (T-06). Further, results of the river sediment investigation suggest that it is unlikely pesticides in the lower Genesee River are associated with historical EBP operations.

Fish

- Overall, the majority of constituents detected in fish tissue samples collected within the lower Genesee River were also detected in samples collected within the background reach (Reach 5).
- Silver was detected most often in whole body forage fish samples collected from the State Route 104 Bridge to the Turning Basin (Reaches 2 and 3) and rarely detected upstream in Reach 4. Silver was not detected in samples collected downstream of the Turning Basin (Reach 1) or in the background area (Reach 5). Silver was not detected in benthic game fish fillets and was detected in only one predatory game fish fillet sample (Reach 3).

Sediment Toxicity Study

A toxicity bioassay study was conducted as part of the RFI in order to quantify the potential for river sediment to have a toxic effect on organisms. Eighteen sediment samples were collected and evaluated for acute and chronic toxic effects to *Hyalella azteca*, a sediment-dwelling amphipod crustacean. Key findings are summarized below.



- Concentrations of silver observed in sediment during the toxicity study were much lower than concentrations observed in the 0- to 0.5-foot interval during the initial river sediment sampling effort; however, silver concentrations still ranged from below the detection limit to a concentration of 69 milligrams per kilogram.
- After 42 days, only two samples (T-05-E and T-07-C) exhibited statistically lower survival relative to the laboratory control. However, the lower survival appeared to be unrelated to contaminant levels in the sediment.
- Growth rates were lower than in laboratory control samples after 42 days for certain river sediment locations. A lower male-to-female ratio may have contributed to these results, since male *Hyalella azteca* tend to be larger than females. There were no statistically significant differences in reproduction rates between river sediment samples and control samples.

Groundwater

Existing monitoring wells at the KLWWTP were sampled due to the proximity of the KLWWTP facility to the lower Genesee River, situated directly adjacent to the river. Groundwater sample analytical results are compared to the NYSDEC Ambient Water Quality Class GA Groundwater Standards/Guidance Values. Key findings include the following:

- Three metals (iron, manganese, and sodium) were detected above NYSDEC Class GA Groundwater standards/guidance values throughout the KLWWTP. Barium, lead, magnesium, and selenium were detected above NYSDEC Class GA standards/guidance values in limited areas of the KLWWTP, but did not display wide-spread exceedances.
- Groundwater up-gradient of the KLWWTP at the EBP is hydraulically controlled through a system of pumping wells and collection trenches to prevent migration of contaminated groundwater.
- Groundwater at KLWWTP is not contributing any significant contaminant loading to the lower Genesee River.

Sediment Transport Modeling

Section 7 discusses results of the hydrodynamic and sediment transport model that was developed for the Lower Genesee River. Results of the hydrodynamic and sediment transport model show that the lower Genesee River is subject to high shear stress under high flow conditions. Shear stress continues to increase with increasing flows because of the relatively narrow floodplain. Specifically:

- High shear stresses (up to 85 dynes per square centimeter) occurred in the lower Genesee River during simulation of the Hurricane Agnes flood of 1972, the highest flow event since construction of the Mount Morris flood control dam in the early 1950s.
- Overall, the physical properties of the bed (e.g., armoring, high bulk density, low moisture content, and clay content), combined with presence of contaminants buried below with the peak Cesium-137 layer, suggest that widespread erosion is not likely for a high shear stress (30,000 cubic feet per second [cfs]) flood event.
- Although the model shows that buried peak silver concentrations are unlikely to be resuspended even under high flow conditions, erosion and re-deposition of surface sediments may occur.
- An event with flows greater than 40,000 cfs could potentially generate sufficient scour to resuspend sediments with higher contaminant levels. However, the 1972 flood event simulated by the model is the highest flow on record upstream of the Mount Morris dam. An event that produces flows in the range of 40,000 cfs within the study area would be unlikely without modifications to the upstream dam and reservoir system.

Human Health CSM and Qualitative Human Health Exposure Assessment (QHHEA)

Section 8 provides an update to the preliminary conceptual site model (CSM) submitted with the RFI work plan and discusses potential impacts of contaminants to human health. Key findings include the following:

- Contaminants in both solid and aqueous media can migrate from upland sources into the lower Genesee River through surface water runoff, atmospheric deposition and groundwater infiltration. Once in river water, fish may be exposed to contaminants in surface water and sediment during normal life activities. Contaminants in river sediments can also be redistributed physically as sediment is transported through the lower Genesee River and into wetlands/floodplain areas by erosion and subsequent deposition.
- Impacted media applicable to the QHHEA include surficial river sediments, wetlands/floodplain soils and sediments, and fish tissue.
- Metals, PAHs, PCBs, and dioxins/furans have been identified as contaminants of concern related to human health based on sampling conducted as part of this RFI. However, the majority of these contaminants are not related to historical operations at EBP.
- The most likely exposure by human receptors to contaminants of concern related to human health is via passive recreational use, such as fishing, boating and hiking.

- The presence of PAHs above criteria applicable to human health represent a potential exposure pathway of concern under the current and foreseeable use. The pathways for human contact with impacted river sediments, wetlands/floodplain soils and sediments, and fish are complete. It is evident that sources upstream of EBP and potentially near the mouth of the river also contribute to the distribution of PAHs in the lower Genesee River.

Ecological CSM and Fish and Wildlife Resources Impact Analysis

Section 9 updates the preliminary CSM submitted with the RFI from an ecological standpoint and discusses the contaminant impacts to fish and wildlife. The key findings from this section are described by category below.

- Ecological resources are present in the study area and are collocated with various media exceeding criteria for contaminants of ecological concern (COECs) in surficial soil and sediment, and in surface water. Exposure pathways between affected media and ecological receptors are complete.
- Constituents detected in mussel tissue exceed tissue effect levels from downstream of the KLWWTP to the Turning Basin (Transects 6 through 4). Silver is the only constituent that exceeds its mussel tissue effect level at Transects 4 and 5.
- Fish collected from the Turning Basin downstream to the river mouth (Reach 1) had the most constituents with effects-level exceedances. Silver in whole-body forage fish exceeded effect levels from Seth Green Island to the Turning Basin (Reaches 2, 3, and 4), with the highest concentration observed in Reach 3 tissue.
- Population-level impacts to benthic macroinvertebrates, fish, and piscivorous wildlife from potential exposure to COECs are uncertain but not expected, based on multiple lines of evidence.
- Community-level impacts to benthic macroinvertebrates, fish, plants and soil invertebrates from potential exposure to COECs are uncertain but not expected, based on multiple lines of evidence.
- Ecosystem-level impacts, although not directly evaluated, are considered unlikely based on the probable absence of impacts at the population and community levels of biological organization.

Cultural Resources and Underwater Debris Survey

Section 10 discusses the findings of the cultural resources and underwater debris survey conducted as part of the RFI. No significant cultural resources were identified within the lower Genesee River.

Preliminary Remedial Action Objectives

Pursuant to U.S. Environmental Protection Agency (USEPA) and NYSDEC guidance, preliminary RAOs for the lower Genesee River are derived from key findings of the investigation, the nature and extent of contamination, hydrodynamic and sediment transport modeling, and the exposure assessments. The key findings from this RFI for the purposes of developing RAOs include the following:

- Silver has been identified as the primary CPOI for sediments within the lower Genesee River. Silver concentrations exceeded the Class C SGV at all sampling transects downstream of the KLWWTP.
- PAHs and other metals exceeded the Class A and Class C SGVs throughout the study area. In addition, dioxins/furans exceeded the Class A SGV throughout the study area. However, it is unlikely that most of these constituents are associated with EBP operations. Based on data collected, it is possible that the presence of cadmium and zinc in the lower Genesee River is attributable to EBP.
- Results of the wetlands/floodplain soil and sediment investigation indicated similar conclusions as those made for river sediment.
- Although the sediment transport model shows that buried peak silver concentrations in sediment are unlikely to be resuspended even under high flow conditions, erosion and re-deposition of surface sediments may occur.
- The presence of PAHs above criteria applicable to human health represent a potential exposure pathway of concern under the current and foreseeable use. It is evident that sources upstream of EBP and potentially near the mouth of the river also contribute to the distribution of PAHs in the lower Genesee River.
- The pathways for human contact with impacted river sediments, wetlands/floodplain soils and sediments, and fish are complete.
- The potential for organism-level impacts to benthic macroinvertebrates nearest the KLWWTP (T-06) and forage fish in Reaches 2 and 3 through exposure to silver in sediment has been identified.
- Population and community-level impacts to benthic macroinvertebrates, fish, plants and soil invertebrates are not expected based on multiple lines of evidence.
- Ecosystem-level impacts, although not directly evaluated, are considered unlikely based on the probable absence of impacts at the population and community levels of biological organization.

The following preliminary RAOs for the lower Genesee River will be addressed pursuant to a corrective measures study:

- Prevent further migration of contaminants related to EBP operations that would result in the potential for surface water, sediment, and soil contamination.
- Eliminate or reduce, to the extent practicable, existing and potential future adverse risks from EBP operations to the health of future recreational uses and/or construction workers due to exposure to the lower Genesee River wetlands/floodplain soils/sediments.
- Eliminate or reduce, to the extent practicable, impacts from EBP operations to biota from ingestion/direct contact with sediments and surface water resulting in impacts from bioaccumulation through ecological food chains.

