The U.S. Army Corps of Engineers' August 2016 Comparison of Removal vs. Capping Remedial Alternatives at the San Jacinto River Waste Pits Superfund Site

At the request of the U.S. Environmental Protection Agency (USEPA), the U.S. Army Corps of Engineers (USACE) evaluated removal vs. capping alternatives for the San Jacinto River Waste Pits Superfund Site in Channelview, Texas (Site). The Site contains a set of impoundments that were constructed in 1965 in a location approved by Harris County and used from September 1965 until May 1966 for the disposal of paper mill waste (a highly fibrous, dense material with very low permeability). In 2011, the impoundments were the subject of a $9 million time critical removal action to completely isolate the paper waste under an engineered armored cap (Armored Cap).

USACE issued an August 2016 final report (2016 USACE Report) in which it evaluated the Armored Cap and remedial alternatives involving removal (excavation of the waste material) and capping (retaining and enhancing the Armored Cap). USACE's conclusions, summarized and then further discussed below, demonstrate that excavation of the waste material (the removal alternative) will necessarily result in significant releases of dioxin and delay the reduction of dioxin concentrations in fish, potentially for decades. At the same time, USACE concludes that resuspension and short-term releases from capping would be "virtually non-existent" and that capping will be highly effective in controlling releases. Therefore, selecting removal as a remedy for the Site would directly conflict with the USACE's conclusions. More specifically:

- Short-term losses during removal (excavation) will be more than 100 times the predicted losses over 500 years from capping.*(1)*

- During removal, at least 0.1% and most likely 0.3% of the contaminant mass would be released to the San Jacinto River.*(2)*

- Those releases from removal activities could be up to five times greater if any significant storms occur during the construction period and the "best management practices" ("BMPs") implemented to minimize releases are overtopped.*(3)*

- Removal-related releases would result in the transport of contaminants in the water column and cause increases in fish tissue concentrations that would persist for a number of years.*(4)*

- Under the removal alternative, not all of the contaminants will be removed from the Site. A layer of contaminated material with dioxin concentrations similar to the capped waste material will remain in place*(5)* and must be covered by a newly installed cap.*(6)* In addition, implementing a removal alternative will result in increased air emissions, risk of injuries and other impacts from the thousands of barge and truck trips involved in excavating and transporting the waste to a disposal site.

- In contrast to removal, the proposed capping remedy (the Armored Cap with enhancements) is expected to be stable and highly effective in controlling the transport of contaminants and reducing the exposure concentration of contaminants in the water column, with resuspension and short-term releases during remedy implementation being "virtually non-existent."*(7)*

Armored Cap

The Armored Cap, installed in 2011, was designed to USACE standards to withstand 100-year storm and 500-year flood events, including events such as the October 1994 flood (a 50- to 100-year flood), Hurricane Ike (a 2-year flood), and Tropical Storm Allison (a 5-year flood). The Armored Cap was constructed using geotextile and geomembrane to isolate the waste and stone as the upper protective armor layer to prevent movement or erosion. It was enhanced in January 2014 by flattening some slopes and adding larger rock to implement USACE recommendations.

Under one of the proposed remedial alternatives for the Site (Alternative 3N), the Armored Cap would be further enhanced, strengthened, and made permanent by adding additional armoring, further flattening submerged slopes, and implementing measures to protect it from vessel traffic (Permanent Cap).

USACE's Conclusions – Risks and Effectiveness of Removal vs. Capping

- Removal will cause significant short-term releases of contaminants to the San Jacinto River compared to capping, particularly if storm events occur during construction.

USACE concludes that removal will cause significant contaminant releases to the San Jacinto River compared to capping, and *" … short-term releases for the new full removal [alternative] is about **400,000 times greater** than the releases from the intact cap … "*[8] If flooding occurred during remedial construction "***releases may be up to five times greater"***[3] if BMPs constructed to prevent releases during removal are overtopped. This is consistent with USACE's statement in its 2015 draft report that "[t]he short-term losses from removal are more than 100 times the predicted losses from an intact cap over the 500 years following placement."[1]

The 2016 USACE Report further states that *"[i]f a storm … occurred during the actual removal/dredging operation, **the likelihood of extremely significant releases of contaminated sediment occurring is very high**."*[9] In 2016 alone, there have been at least two flood events that exceeded the 10-year flood in the San Jacinto River, one of which approached the 50-year flood. Even in the absence of storm events, *"[m]odeling* [by USACE 2016] *clearly demonstrated that sediment residuals are predicted to be eroded from the areas that would be dredged … **even during non-storm, i.e., normal, conditions** …."*[10]

- Removal will result in a significant increase in fish tissue concentrations of dioxin that will persist for a number of years and will delay environmental recovery.

The 2016 USACE Report states that fish tissue contaminant concentrations are considered to be directly related to releases to the water column. For several years after removal, fish tissue contamination will be dozens to hundreds of times greater than under current conditions (*i.e.,* with the Armored Cap in place), depending on the types of BMPs used during construction.[11] Removal therefore would exacerbate concerns that local fishermen could be exposed to contaminants as a result of eating local fish and shellfish. Increases in fish tissue concentrations of contaminants have been documented at other Superfund sites where environmental dredging was conducted (Connolly and others, 2007).

If removal occurs, natural recovery now occurring at the Site will be delayed for ten to 20 years, even assuming use of enhanced BMPs.[12] Flooding during construction that causes additional releases – up to five times greater, as noted above – would further lengthen the recovery period.

- Removal will leave dioxin-contaminated material in place under a newly constructed cap.

The 2016 USACE Report acknowledges that following removal, dioxin-impacted material would remain in place at the Site and that " ***… short-term releases*** [of remaining material] ***… would subsequently be available for redistribution during erosion events from high flows or storm events."*** [(13)]

The USACE assumes that long-term releases of this contaminated material will need to be controlled by placing a new cap over the excavated area.[(6)] So, with removal, the existing Armored Cap which effectively isolates dioxin-impacted waste material would be removed and the waste material would be excavated. The remaining "residual" waste material – which would have dioxin concentrations similar to that of already capped waste material - would then again be capped.

- Removal involves significant safety, health and environmental impacts and risks that can be avoided if a capping remedy is selected.

Removal will involve significant safety, health and environmental impacts and risks over the course of the extended implementation period. The impacts and risks will include increased air emissions, risk of injuries and other impacts from the excavation of the waste material and the thousands of barge and truck trips required to transport the excavated waste to a disposal site. For example, an estimated **15,000 truck trips** (or 140 miles of trucks parked end to end) will be required to transport the excavated material to a disposal facility that is 250 miles from the Site, a total of 7.5 million truck miles.

- Conversely, the 2016 USACE Report concludes that the Permanent Cap will be highly effective in permanently preventing releases of contaminants to the environment.

The 2016 USACE Report states that *"[t]he **expected resuspension and short-term releases from capping are virtually non-existent** … "* [(7)] The Permanent Cap would also include slope improvements for better slope stability, and the installation of pilings or other barriers to provide protection from barge strikes.

The 2016 USACE Report also concluded ***"that reliability has been routinely achieved at other armored cap sites and facilities"*** [(14)], and, following an extensive literature search, stated that there appears to be no documented cases of any armored cap, or armored confined disposal facility breaches.[(15)] The USACE 2016 Report's effectiveness evaluation of the Permanent Cap concluded that ***"the cap is expected to be highly effective in controlling the [transport] of contaminants and reducing the exposure concentration of contaminants in the water column."***[(16)]

Conclusions

In summary, selecting removal (excavation) as the preferred remedy would directly conflict with the USACE's conclusions. According to the USACE, removal will result in substantial releases of waste materials to the San Jacinto River and resulting increases in fish tissue concentrations of dioxin. These releases will occur regardless of what construction practices are used. The magnitude of the releases will be exacerbated if significant storms occur during the extended construction period required for removal. Removal will also result in significant environmental impacts and risks and will set back the environmental recovery that has occurred since the Armored Cap was installed in 2011 by 10 to 20 years.

In contrast, the USACE concludes that a Permanent Cap (which includes improvements to limit the potential for barge strikes) is expected to be stable and highly effective in controlling the transport of contaminants and reducing the exposure concentration of contaminants in the water column.

The Responsible Parties therefore recommend that USEPA select a remedy consistent with the conclusions in the 2016 USACE Report.

References:

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(1) Page 6, 1st paragraph
(2) Page 4, 1st paragraph
(3) Page 7, 2nd paragraph
(4) Page 6, 1st paragraph
(5) Page 99, 1st paragraph
(6) Page 113, 1st paragraph, Page 115, 4th paragraph, Page 116, 2nd paragraph
(7) Page 4, 1st paragraph
(8) Page 6, 1st paragraph
(9) Page 185, 2nd paragraph
(10) Page 185, 2nd paragraph
(11) Page 6, 1st paragraph
(12) Page 5, 2nd paragraph
(13) Page 5, 2nd paragraph
(14) Page 3, 2nd paragraph
(15) Page 82, 2nd paragraph
(16) Page 3, 3rd paragraph

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