

Evaluation of Potential Losses and Fluxes within the San Jacinto Waste Pit Superfund Site

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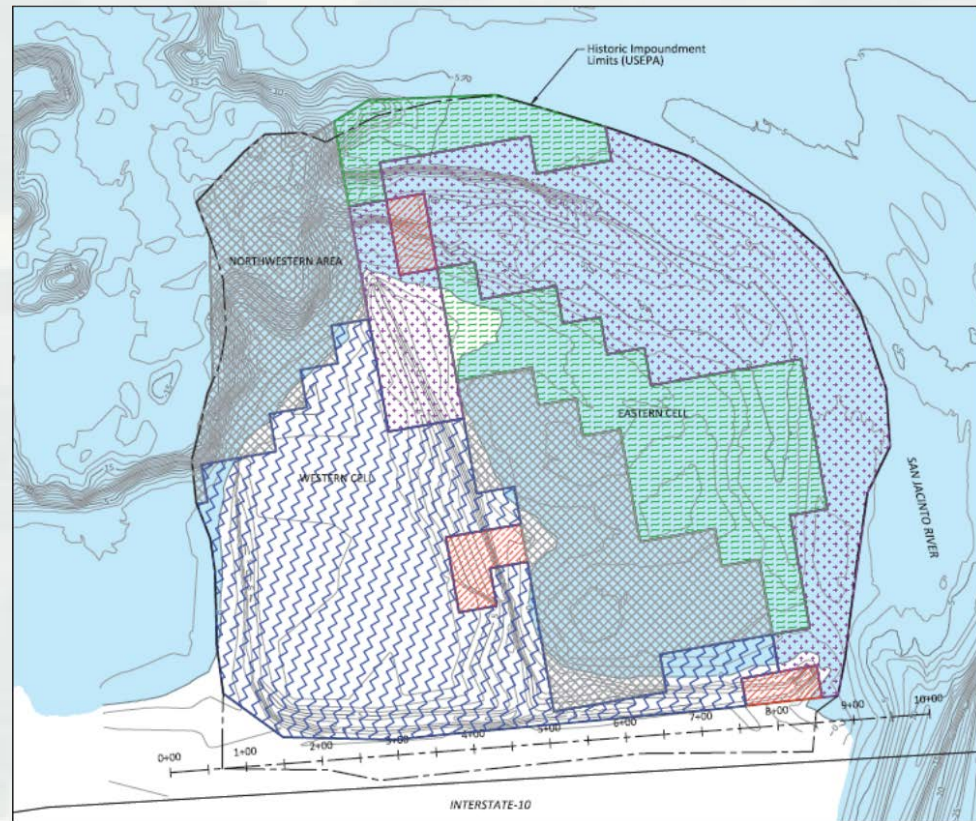
Background

- San Jacinto River Waste Pits (SJRWP) Superfund Site (Site) (about 20 miles east of Houston)
- Impoundments used for disposal of paper mill waste sludges containing high concentrations of dioxin



Site Description

- Time critical removal action (TCRA) constructed an armored cap to isolate and contain waste awaiting final remediation alternative
- Armor stone and recycled concrete up to 12 inches
- Thickness 12 to 24 inches
- Approximately 16 acres
- Contains about 200,000 cy
- Intertidal and subtidal, within 2-yr floodplain



Alternatives

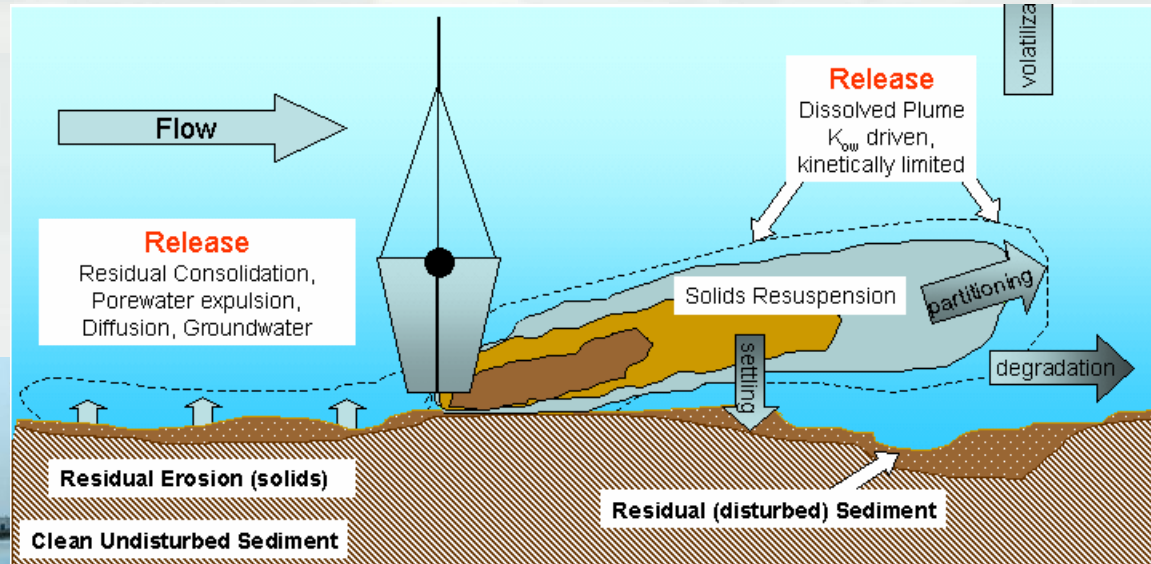
- Alternative 1N – Armored Cap and Ongoing OMM (No Further Action)
- Alternative 2N – Armored Cap, ICs and Monitored Natural Recovery
- Alternative 3N – Permanent Cap, ICs and MNR
- Alternative 4N – Partial Solidification/Stabilization, Permanent Cap, ICs and MNR
- Alternative 5N – Partial Removal, Permanent Cap, ICs and MNR (4 acres, 50,000 cy of Western Cell exceeding 13,000 ng/kg)
- Alternative 5aN - Partial Removal, Permanent Cap, ICs and MNR (11 acres, 140,000 cy, <10-ft water depth, exceeding the PCL (220 ng/kg))
- Alternative 6N – Full Removal of Materials Exceeding the PCL, ICs and MNR (16 acres, 200,000 cy)



Assessments

Short-term Losses

- ▶ Resuspension
- ▶ Residuals Transport
- ▶ Cap Defects, Barge Strikes



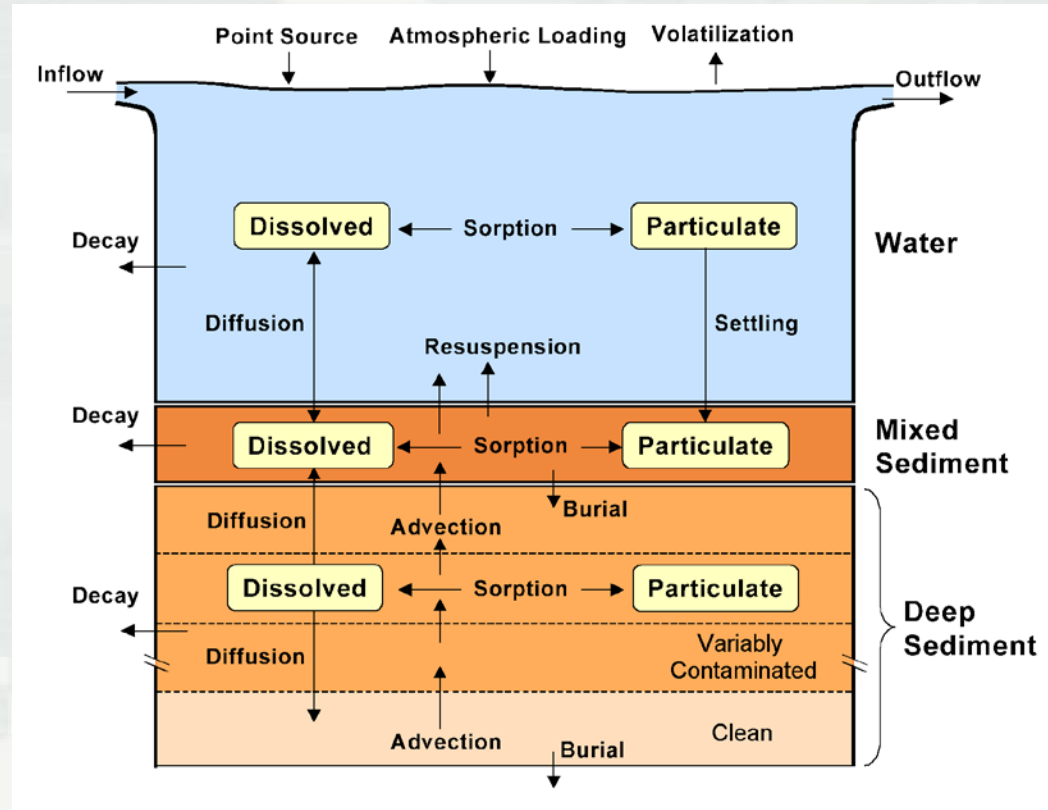
- Estimated using USACE Characteristic Loss Method for Resuspension
- Residuals estimated using USACE Environmental Dredging Guidelines



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Assessments

- Long-term Losses
 - ▶ Cap Flushing
 - ▶ Diffusion
 - ▶ Resuspension
 - ▶ Bioturbation
 - ▶ Groundwater Advection
- Estimated using USACE Cap/Recovery Model



Releases for Alternatives

- Monitored Natural Recovery – Long-term
 - ▶ Bioturbation
 - ▶ Gas Ebullition of Particles
 - ▶ Diffusion
 - ▶ Erosion and Resuspension
- TCRA Armored Cap – Long-term
 - ▶ Diffusion
 - ▶ Gas Ebullition
 - ▶ Defects
- Dredging – Short-term
 - ▶ Resuspension
 - ▶ Erosion of Residuals
- Dredging Residuals – Long-term
 - ▶ Bioturbation
 - ▶ Gas Ebullition of Particles
 - ▶ Diffusion
 - ▶ Erosion and Resuspension



Site Characteristics

Parameter	Western Cell	Northwestern Area	East Cell: Shallow Water	East Cell: Deep Water
Surface Area (hectares)	1.7	0.69	2.3	0.73
Volume Dredged (m³)	51,000	14,900	35,200	10,900
Average Surface Sediment Concentration (ng/kg)	6471	7799	6048	5127
Weighted Average Contaminant Conc. (ng/kg)	15,806	3095	2394	2023



Dredging Short-Term Releases

Alternative	BMP	Total mass of contaminant lost (mg)	Percentage of contaminant lost (%)
Original Remedial Alternatives			
Alternative 5N	Silt Curtain	15,800	3.21
	Sheet Pile Wall (Wet)	3,820	0.78
	Sheet Pile Wall (Dry)	6	0.001
Alternative 5aN	Silt Curtain	19,400	3.34
	Sheet Pile Wall	4,520	0.78
Alternative 6N	Silt Curtain	19,600	3.34
	Sheet Pile Wall	4,560	0.78



Sources of Releases

- 0.15% losses are predicted in shallow water areas from construction activities to clear portions of the TCRA cap for installation of berms and sheet pile walls as well as dewatering TCRA Armored Cap
- 0.03% from TCRA cap removal where geotextile exist, 0.8% by dredging resuspension and 2.5% by residuals erosion where a silt curtain is used
- Where a sheet pile wall is used, predicted contaminant losses averaged about 0.8% (0.1% from construction, and 0.7% by dredging resuspension)



Long-term Losses

Scenario	Total Release over 500 years (mg)
Surrounding Conditions (MNR)	28,900
TCRA Cap	10.37
Bulk Dredging Residuals Cover	20,320
Broadcast Dredging Residuals Cover	8.07
Layered Dredging Residuals Cover	2.E-15



Conclusions

- Short-term releases from dredging greatly exceeds dioxin losses by other alternatives unless performed in the dry
- Partial confinement by dredging in the wet in an sheet pile wall enclosure can reduce releases by 75%
- Dredging releases exceeds 50 years of background releases in the vicinity
- Long-term releases are comparable between the armored cap and a well-placed dredging residuals cover
- Broadcast or layered residuals cover placement are needed to control mixing with the residuals and long-term releases.

