

GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS

Project Name	<u>CONVAIR LAGOON</u>	ProjectID: 09-03
Last Updated:	02/16/99	
City:	San Diego	
County:	San Diego	
State:	CA	
Country:	USA	
Bodies of Water:	Shallow embayment in North San Diego Bay	
US EPA Region:	IX	
Status (Active, Complete, or Monitoring Only):	Complete	
Date On NPL:	N/A	
ROD/ESD Date:	N/A	
Operable Unit:	N/A	
Areas of Concern (length or acres):	10-acre embayment	
Other Characteristics of Water Body:	<p>As described in Reference E-4, "the Lagoon is a shallow embayment consisting of about 10 acres, with a water elevation of about 7.5 feet above mean lower low water (MLLW) at high tide and a maximum water depth of about 10 feet below MLLW. Most of the intertidal area consists of rip rap, broken concrete, and a concrete seawall. The lower intertidal area consists of a mixture of fine sand and silt."</p> <p>"Historically, Convair Lagoon was used as a dumping ground and retrieval area for derelict vessels. Over time, as many as 500 vessels have been deposited in the Lagoon. Debris was present in a scattered pattern along the Lagoon shoreline, in the near tidal zone and off shore from the retaining wall which borders the Lagoon. The debris included tires, boat wreckage, engine batteries, portable radios, cushions, plastic bags, miscellaneous plastic, bottles, cans, wood, and assorted rubbish."</p>	
Contaminants of Concern:	PCBs	
Source of Contamination:	Source of PCBs was reportedly machine cutting oils from aircraft manufacturing facilities which were deposited into the bay and estuary through stormwater discharge pipes.	
Contaminated Area Physical Characteristics:	As described in Reference E-4, PCBs were present in concentrations exceeding 1000 ppm in nearshore areas primarily in the vicinity of a 60-inch storm drain. The most highly contaminated sediments in Convair Lagoon were found at 2 to 5 feet below the surficial sediment. Specifically, PCBs in the zero to one foot sediment layer within several hundred feet of the storm drain (the primary target area) ranged from 0.4 to 483 ppm, with a median of 43 ppm (42 samples); PCBs in the one to two foot sediment layer ranged from 0.6 to 1600 ppm, with a median of 68 ppm (38 samples); PCBs in the two to three foot sediment layer ranged from ND to 1100 ppm, with a median of 49 ppm (38 samples).	
Type of Regulatory Action:	Cleanup and Abatement Order with the San Diego Regional Water Quality Control Board.	
Overall Status Summary:	A 5.7-acre target area contaminated with PCBs was capped in Convair Lagoon (North San Diego Bay). Convair Lagoon is a 10-acre embayment with water depths ranging from 10-18 feet. The highest PCB levels in sediment were found at depth. PCB levels range from ND to 1600 ppm in the first three feet of sediment, with a median of 54 ppm (118 samples). The cap, in ascending sequence, consisted of geogrid, then one foot of crushed rock, then two feet of sand. Eelgrass was planted at the surface. The outer boundary of the cap was defined by the 4.6 ppm PCB	

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line. Along this boundary a submerged rock berm was constructed. The purpose of the rock berm was to provide stability during placement, as well as subsequent to placement of the cap. Outside of the berm, a 50-foot width of sand was placed, 3-feet thick tapering out to zero. The outer sand layer was placed at the request of the US EPA in response to the presence of PCB levels < 4.6 ppm but > 1 ppm.

A substantial amount of submerged debris had to be removed prior to cap placement. Cap placement was completed in mid-1998. Total cost was about \$2.5 to 3 million dollars. Long-term monitoring is now in progress and consists of visual inspections by divers, cap thickness measurements through 30 probe locations, and cap coring and analysis for PCBs at three locations.

Remedial Action Planned: ☒

Risk Assessment: ☐

Remedial Action Implemented: ☒

Status of Dredging ☐

PRPs: ☒

Contacts: ☒

References: ☒

Modeling: ☐

Fishing Advisory: ☐

Key Conditions: capping, post monitoring

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Target Sediment Cleanup Standards (TSCS):	Initially, the target was to cover all areas > 10 ppm PCBs, based on protection of aquatic biota in contact with sediments. Subsequently, the target was reduced by the Regional Water Quality Control Board to 4.6 ppm PCBs --- to ensure coverage of all 10 ppm or greater areas. Finally, the EPA posed a target of 1 ppm PCBs (which led to the installation of a peripheral sand cap; refer to Full Report 04).	
How TSCS Established:	Refer to "Target Sediment Cleanup Standards (TSCS)". The 10 ppm was set by a risk assessment.	
Target Bank and Floodplain Cleanup Levels (if applicable):		
Other Target:		
Environmental Sample Data References:	<ul style="list-style-type: none">• Sediment: Reference E-4• Water:• Fish:	
Estimated Target Volume:	22,000 cy (if removal were to be done)	
Planned Disposal Method:	N/A (capping selected)	
Estimated Calendar Time to Implement Remedy:		
Estimated Time to Implement Remedy:		
Estimated Cost to Implement Remedy:	\$2 million	
Stated Remedial Action Objectives (and Source):	<p>Source: Reference E-4.</p> <p>"Cap Thickness</p> <p>The cap material must be of adequate thickness to prevent the majority of burrowing and aquatic organisms from reaching the contaminated sediment, and to prevent erosion and settling of the cap material." . . . Studies on PCBs specifically indicated that PCBs could be effectively isolated with 12 inches of cap material. To protect against burrowing biota, an additional 8 inches of cap is recommended for a total cap thickness of 20 inches."</p> <p>"The material used for the cap should be acceptable for unrestricted open water disposal and the physical characteristics of the capping material should be compatible with the contaminated sediments. Initial studies for capping thickness (Brannon, Palermo, et. al) indicate that a cap thickness of two to three feet would be adequate for chemical and biological isolation. In the case of Convair Lagoon, bioturbation was the primary concern."</p> <p>"Bioturbation</p> <p>Ogden Environmental and Energy Services conducted bioturbation studies in the Lagoon. The bioturbation study was performed to determine if a barrier, such as rock, could be used to prevent burrowing organisms from reaching the contaminated sediments. Although the most</p>	

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highly contaminated sediments found in the Lagoon are at depth, the concern with bioaccumulation and contaminant transport from bioturbation was a key concern of the local regulators"

"The laboratory and field studies found that a rock interface prevented bioturbation. The burrowing organisms easily went through the cap material. In the laboratory the cap thickness was minimal and the rock thickness was 8 inches. When the organisms reached the rock interface, they did not burrow into the rock, but only through the interstitial spaces. Although the organisms did not burrow into the rock, a conservative rock thickness of one foot was selected as the design criteria."

"Cap Stability

Since Convair Lagoon is a shallow embayment, the impact from boat wakes and waves is a key concern. Erosion of the cap should be kept to a minimum to assure effective isolation. During the design of the in-situ cap, detailed oceanographic studies were conducted. The results of the study found that instantaneous currents from boat traffic was a key issue. Tidal currents were insufficient to cause any significant sediment transport. While the currents from boat traffic are greater in magnitude, they are not sustained for a significant time period to cause any sediment transport. Moreover, the lagoon appears to be an area for sediment accumulation given recent bathymetric studies (Pelagos, 1995). Given the limited potential for sediment transport, a median grain size of 0.3 mm of well sorted sand would be sufficient given the existing conditions."

"Cap Design

The cap design and construction was unique in that the site is extremely shallow and not readily accessible to standard marine construction equipment. Therefore, a combination of construction techniques would be required. SAI and Ogden worked with marine contractors throughout the design process to come up with the following design components:"

1. "Submerged Perimeter Berm: The intent of the perimeter berm was to provide stability during placement of the cap as well as long term stability. The perimeter berm is a minimum of one foot higher than the cap (total height of 5 feet max) and will prevent liquefaction of the cap during a significant seismic event. The perimeter berm will be in place prior to any placement of cap material."
2. "Debris Removal: A significant amount of submerged debris will need to be removed prior to construction. Debris that extends above the surface more than 6 inches or is greater than 12 inches in any dimension will be removed."
3. "Rock Layer: A layer of a rock over the contaminated sediment was found to limit bioturbation. A maximum thickness of one foot of rock will be placed over the contaminated sediment prior to the placement of the clean cap material."
4. "Extension of the Storm Drain and Pier: Given the three foot cap thickness, the storm drain and pier will need to be extended. The pier will be extended by using precast concrete sections."
5. "Removal of an adjacent Dock: An adjacent floating dock and pilings will be removed prior to cap construction."
6. "Dredging at Pier J/K for Cap Material: Dredge material from Pier J/K will be used for the sand cap (at no cost). The material has been found to be suitable for unconfined open-water disposal and is readily available, since Pier J/K is proximate to Convair Lagoon and the grain size

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meets the design criteria . . ."

**Measures of Success to
be Used:**

Success will be based on the demonstrated effectiveness of the cap as an isolation barrier.

**Planned Monitoring and
Restoration:**

Source: Reference E-4.

"Frequent diver surveys will be conducted during the debris removal, perimeter berm placement and cap placement to ensure proper construction. Monitoring stakes and possibly settlement plates will be used as a guide for cap thickness and settlement."

"Long-term monitoring will require ongoing sediment sampling and biological testing. Some surface contamination of the cap, which has been found in other urban bays (i.e., Elliott Bay), is anticipated. However, sediment cores should indicate any vertical movement of contamination. Biological studies will indicate the potential for uptake due to bioturbation. The long-term monitoring program will encompass from 20-50 years of monitoring in the Lagoon."

**Agency Position on Sediment
Removal (and Source):**

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Physical Target:	10-acre embayment	
Goals:		
Primary Contractor:	R.E. Staite Engineering	
Other Contractors:	Ogden Environmental and Energy Services and Sanders and Associates (permitting, design); Pacific Treatment (debris removal); JNE & Associates (monitoring)	
Generic Remediation Method:	Capping	
Equipment:	Refer to "Material Handling"	
Material Handling:	Source: Reference E-68. "Prior to installing the stiff structural geogrid the containment area was cleared of all underwater obstructions (rocks and sunken debris) to provide a generally flat surface for placement of the geogrid. The stiff structural geogrid was floated into position in large integrated panel sections over the site area. Gravel was then spread to sink the geogrid into position at the bottom of the bay. A one foot gravel layer and subsequent two foot sand layer were both then placed by use of a barge and crane that was set up with clam shell bucket equipment. In addition to the underwater cap area, a 1600 foot long, riprap energy dissipater was installed along two sides of the perimeter of the containment area. The width of the top crest of the riprap perimeter berm is five feet and is built with 3:1 slopes on each side. The other two perimeter sides were shore line with concrete or riprap seawalls. Stiff structural geogrid was also placed under the entire base of the new riprap wave break to support and contain the gravel of the base." "Installation of the stiff structural geogrid underwater proved to be very easy as the geogrid's specific gravity (0.905) is just slightly less than that of water (1.0) and therefore had slight buoyancy making movement of the geogrid in the water easy. Additionally, the stiffness of the geogrid prevented wrinkles from occurring during placement. Tying the geogrid panels securely together with electrical type plastic ties made simple the assembly of the panel sections. The apertures of the geogrid provided confinement of the stone at the sediment interface which not only reduced the amount of stone needed but also reduced the undesired disturbance of the PCB contaminated sediments."	
Volume Removed:	N/A	
Calendar Time:	Late fall 1996 - mid 1998	
Time To Implement:		
Total Cost:	\$2.5 - \$3 million (\$440K - \$530K per acre of engineered cap) (\$90K - \$110K per cy of cap)	
Dredging Cost:	N/A	
Disposal of Sediment:	N/A	
Volume of Water:	N/A	
Method of Water Treatment:	N/A	

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Water Discharge Limit: N/A

**Air Monitoring During
Remediation:**

**Water Monitoring During
Remediation:**

Outcome: A 3-foot thick cap was successfully placed over 5.7 acres in the Convair Lagoon. On two water-side boundaries, a rock berm was placed (1-1.5 foot diameter rocks). Outside of the rock berm is a 50-foot width of placed sand, starting at 3-feet deep and tapering to zero.

Restoration and Post-Monitoring: Periodic inspections by divers. Periodic probing through 30 probe locations to monitor cap thickness (the probes hit refusal at the rock layer). Once per year, cores are obtained at three locations and analyzed to demonstrate no upward migration of PCBs.

Site-Specific Difficulties:

- The original source of sand was to be free of charge from a nearby Navy dredge project. However, part was too fine and the other part had unexploded ordnance present. Accordingly, there was a 4-5 month project delay to locate an alternate source of sand and receive agency approval. An upland source was ultimately identified; \$25-30 per ton for the 30,000-35,000 tons of sand required. The delay, during which the contractor was paid standby costs, plus the cost of the sand, were the two primary reasons that the project cost exceeded the estimated cost.
- El Nino last winter (1997-1998) brought substantially more rain than normal. The increased volume of water (with velocities up to 40 fps) was scouring sand inside the rock berm. Sand did not have to be replaced (hadn't completed construction yet) - - moved it back into place. Then sand was stabilized with ARMORFLEX (concrete blocks tied-together with stainless steel; 3 of these, 25' wide by 150' long each) - - positioned on the shore side of the cap.
- A seiche period of 6 minutes brings water into the lagoon - - also, so do wakes from large ships. Some spots that are starting to bulb on the cap are noticeable. The PRP is hoping that sediment deposition over time will act to "cement" the cap, along with the planted eelgrass.

Monitoring Data

References:

- *Sediment*
- *Water:*
- *Fish:*

POTENTIALLY RESPONSIBLE PARTIES

Project Name **CONVAIR LAGOON**

ProjectID: 09-03

PRP Name: PRP INFORMATION NOT RELEASED

PRPID:

Street Address:

City:

State:

KEY CONTACTS

Project Name CONVAIR LAGOON

ProjectID: 09-03

Last Name: KEY CONTACT INFORMATION NOT RELEASED

Contact ID:

First Name:

Title:

Company:

Address:

City:

State:

Postal Code:

Work Phone # :

Other Phone #:

Fax # :

Email Address:

REFERENCES

Project Name CONVAIR LAGOON

ProjectID: 09-03

Reference Type: B

ReferenceID: 373

Title: *Letter to AEM, Inc. from Sanders & Associates: Response to Questions on Convair Lagoon*

Location: AEM

Category: Capping/Placement

Prepared by/Author: Carol M. Sanders, President

Preparer/Author Address: 12204 Northeast 64th Street
Kirkland, WA 98033

Prepared For: AEM, Inc.

Date Published: October 7, 1997

Key Words and Phrases:

Reference Type: C

ReferenceID: 36

Title: *Capping of Contaminated Sediments in San Diego Bay*

Location: AEM

Category: Capping/Placement

Prepared by/Author:

Preparer/Author Address:

Prepared For: Contaminated Sediment News (CSN), No. 17

Date Published: September 1996

Key Words and Phrases:

Reference Type: E

ReferenceID: 4

Title: *A First / In-Situ Capping Project Convair Lagoon*

Location: AEM

Category: Site Update

Prepared by/Author: (1) Eileen Maher and (2) Carol Sanders

Preparer/Author Address: (1) Port of San Diego and
(2) Sanders Associates, Inc.

Prepared For: Western Dredging Association Seventeenth Technical Conference

Date Published: June 11-14, 1996

Key Words and Phrases:

REFERENCES

Project Name CONVAIR LAGOON

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Reference Type: E
Title: *Closure Techniques for Soft Sludge Impounds*
Location: AEM
Category: Capping/Placement
Prepared by/Author: V.E. Chouery-Curtis and P.D. Romocki
Preparer/Author Address: Tensar Earth Technologies, Inc.
Prepared For: Superfund XVIII Conference
Date Published: December 2, 1997
Key Words and Phrases:

ReferenceID: 68

Reference Type: L
Title: *Sediment Remediation Projects in the U.S. Using Capping or Burial*
Location: AEM
Category: Capping/Placement
Prepared by/Author: AEM, Inc.
Preparer/Author Address:
Prepared For: Distribution
Date Published: September 25, 2001
Key Words and Phrases:

ReferenceID: 112

Reference Type: P
Title: *Spreadsheet of PCB Data in Sediment from Reference E-4*
Location: AEM
Category: Analytical Data
Prepared by/Author: AEM, Inc.
Preparer/Author Address: Malvern, PA 19355
Prepared For: AEM, Inc.
Date Published: February 16, 1999
Key Words and Phrases:

ReferenceID: 10