Appendix for Section 32

Economic Feasibility Considerations

Appendix for Finding 32: Cost Estimate Calculations

Alternative	Volume (yd3)	Unit Cost ($/yd3)	Cost
LAET	75,000	$ 202	$ 15,133,325
20x Background	177,000	$ 179	$ 31,683,000
15x Background	198,000	$ 175	$ 34,650,000
10x Background	401,000	$ 130	$ 52,130,000
5x Background	754,000	$ 117	$ 88,000,000
Background	1,200,000	$ 102	$ 122,000,000

NOTES: 1. Volumes based on Shipyard Report and estimates provided by NOAA (see Technical Report Section 33)
2. Cost based on unit cost x volume
3. Unit cost basis as indicated below

Alternative	Volume	Unit Cost ($/yd3)	Basis for $/yd3 Estimate
LAET	75,000	$ 202	Shipyard Report (Exponent 2003)
20x Background	177,000	$ 179	Linear extrapolation between unit costs for 10x and LAET Alternatives
15x Background	198,000	$ 175	Linear extrapolation between unit costs for 10x and LAET Alternatives
10x Background	401,000	$ 130	Linear extrapolation using the $/yd3 costs for the Background and the 5x Background Alte
5x Background	754,000	$ 117	Revised from Shipyard Report Table 18-4 (Exponent, 2003)
Background	1,200,000	$ 102	Shipyard Report Table 18-4 (Exponent, 2003)

Shipyard Preliminary Cost Estimate for Cleanup to Final Reference Pool Chemistry

(from Table 18-4, Exponent 2003)

Item	unit cost	quantity	total cost
Mob/demob	$ 200,000		$ 200,000
Site prep			$ 80,000
Demo			$ 250,000
Open-water dredging	$ 6	630,000	$ 3,780,000
Constrained dredging	$ 12	553,400	$ 6,640,800
Dredging debris	$ 80	11,800	$ 944,000
Engr. Controls			$ 100,000
Stone retaining	$ 30	9,000	$ 270,000
Stone revetment	$ 30	45,000	$ 1,350,000
Stone revetment	$ 30	5,500	$ 165,000
Upland staging			$ 100,000
Rehandling and dewatering	$ 14	540,000	$ 7,560,000
Disposal	$ 50	810,000	$ 40,500,000
Open water disposal	$ 8	575,000	$ 4,600,000
CDF sheetpiling	$ 70	46,000	$ 3,220,000
CDF tie rods			$ 1,000,000
CDF sand and gravel	$ 27	9,600	$ 259,200
Imperm. Asphalt	$ 2	94,000	$ 188,000
Mech. Placement	$ 6	33,500	$ 201,000
Volume stabilization	$ 75	4,320	$ 324,000
Purchase cement	$ 25	54,000	$ 1,350,000
	Total Direct Construction Costs		$ 73,082,000
Construction Mgmt.	8%		$ 5,846,560
Design	15%		$ 10,962,300
Contingency	30%		$ 26,967,258
Monitoring - water quality	$ 12,000	65	$ 780,000
Post-dredging confirmation	$ 10,000	284	$ 2,840,000
Long-term gw and CDF	$ 40,000	8	$ 320,000
Permitting EIR	$ 400,000	1	$ 400,000
Eelgrass mitigation	$ 100,000	1.5	$ 150,000
Habitat evaluation			
Supplemental design smpl.			$ 200,000
Construction bid support	$ 17,500	2	$ 35,000
RWQCB oversight	$ 50,000	6	$ 300,000
		Grand Total	**$ 121,883,118**

RWQCB Cost Estimate for Alternative 5x Background

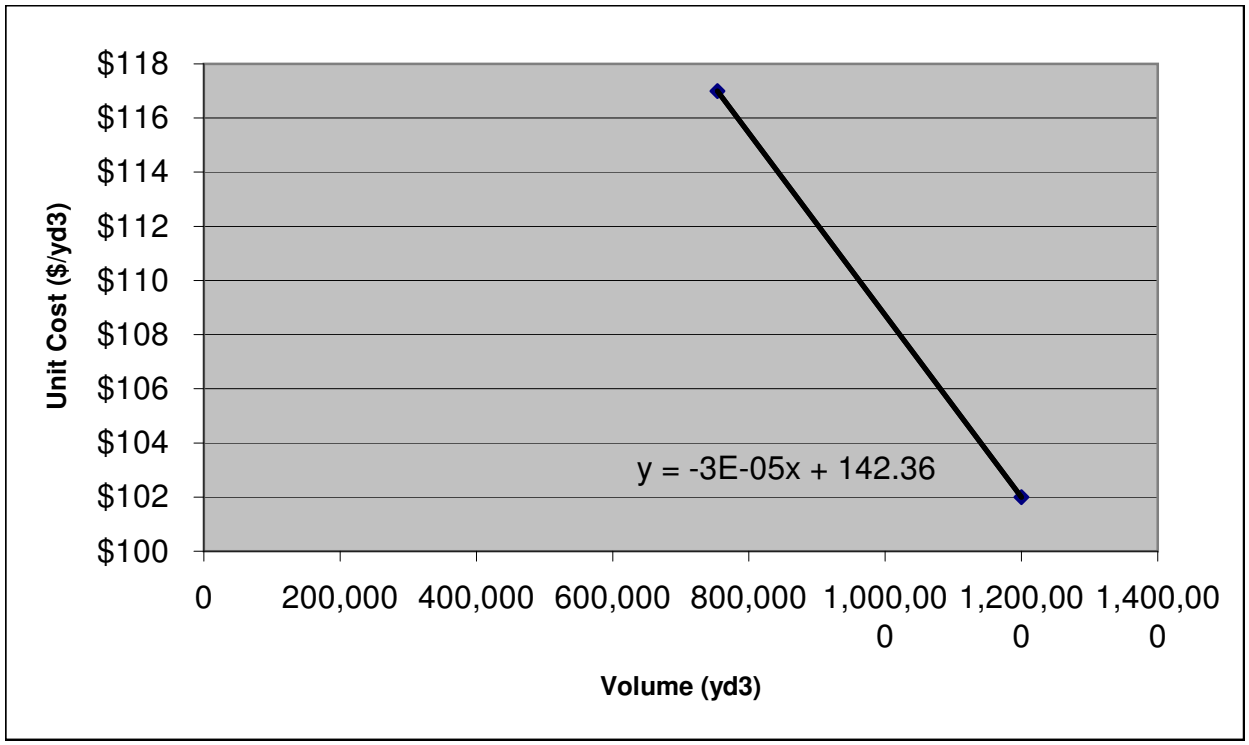
(based on Table 18-4*)

	unit cost	quantity	total cost
	$ 200,000		$ 200,000
			$ 80,000
			$ 250,000
	$ 6	200,600	$ 1,203,600
	$ 12	553,400	$ 6,640,800
	$ 80	7,540	$ 603,200
			$ 62,833
	$ 30	5,655	$ 169,650
	$ 30	45,000	$ 1,350,000
	$ 30	5,500	$ 165,000
			$ 100,000
	$ 14	339,300	$ 4,750,200
	$ 50	508,950	$ 25,447,500
	$ 8	575,000	$ 4,600,000
	$ 70	46,000	$ 3,220,000
			$ 1,000,000
	$ 27	9,600	$ 259,200
	$ 2	94,000	$ 188,000
	$ 6	33,500	$ 201,000
	$ 75	4,320	$ 324,000
	$ 25	54,000	$ 1,350,000
	Total Direct Construction Costs		$ 52,164,983
	8%		$ 4,173,199
	15%		$ 7,824,748
	30%		$ 19,248,879
	$ 12,000	65	$ 780,000
	$ 10,000	284	$ 2,840,000
	$ 40,000	8	$ 320,000
	$ 400,000	1	$ 400,000
	$ 100,000	1.5	$ 150,000
			$ 50,000
			$ 200,000
	$ 17,500	2	$ 35,000
	$ 50,000	6	$ 300,000
		Grand Total	**$ 88,486,808**

* Estimate based on Shipyard Report Table 18-4 and 754,000 cubic yards. Some items reduced by ratio of volumes (754,000/1,200,000)

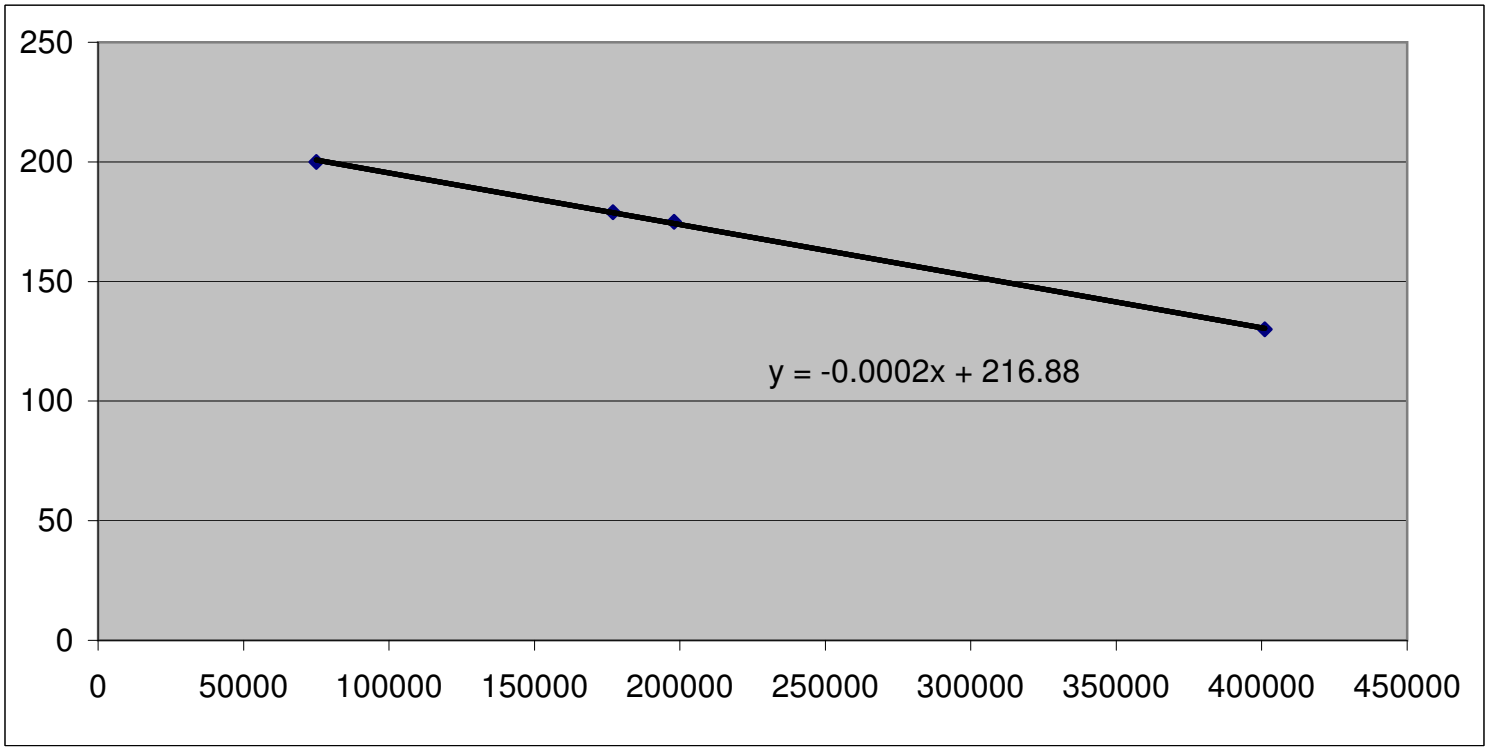
Extrapolation Between 5x Background and Background Unit Costs to Estimate 10x Background Unit Cost

	x (volume)	y ($/yd3)	
10x Background	401000	$130	determined by regression equation in chart below
5x Background	754,000	$ 117	
Background	1,200,000	$ 102	



Extrapolation between 10x Background Unit Cost and LAET Unit Cost to Estimate 20x and 15x Background Unit Cost

	x (volume)	y ($/yd3)
LAET	75000	200
20x Background	177000	179
15x Background	198000	175
10x Background	401000	130



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Regional Board's Evaluation of Economic Feasibility Criteria

This appendix evaluates the following economic feasibility criteria for the cleanup to background alternative:

- Short-term and long-term effects on aquatic life;
- Short-term and long-term effects on wildlife;
- Short-term and long-term effects on human health;
- Effects on shipyards and associated economic activities;
- Effects on local businesses and neighborhoods; and
- Effects on Recreational and Commercial Uses of Aquatic Resources.

For each of the criteria, the information provided in the Shipyard Report (Exponent, 2003) for Alternative C – Remediation to Final Reference Pool is summarized and Regional Board input is given where the Regional Board basis for the score differs from those in the Shipyard Report.

Scores are given on the basis of the degree of positive or negative effects relative to a reference condition (i.e., current condition). Scores range from +5 (major improvement from current conditions) to –5 (major adverse effects from current conditions).

± 5 = major

± 4 = moderate to major

± 3 = moderate

± 2 = minor to moderate

± 1 = minor

0 = no change from current conditions

A32.1 EFFECTS ON AQUATIC LIFE

Summary of Scores for Cleanup to Background:

	Short-Term Effects	Long-Term Effects
Shipyard Report Ranking	-5 (major negative effects from current conditions)	+2 (minor to moderate improvement from current conditions)
Regional Board Ranking	-4 (moderate to major negative effects from current conditions)	+4 (moderate to major improvement from current conditions)

A32.1.1 Short-Term Effects On Aquatic Life

For the short-term effects on aquatic life criterion, information provided in the Shipyard Report regarding effects of various aspects of the Cleanup to Background Alternative is summarized below. Regional Board comments are provided where the Regional Board basis for the ranking differs from those in the Shipyard Report.

Negative Effects

Shipyard Report Page 15-8. Uncontrolled release of sediment during dredging can have adverse impacts on nearby biological communities. These effects can include both immediate and long-term effects from smothering and toxicity. The potential for this type of adverse effect is likely to be greater at certain times of the year than at others. For example, effects may be greatest during spawning or migration periods of sensitive species. The potential for these types of effects is widely recognized and is typically addressed through a variety of operational constraints, including the following:

- Dredging using sealed ("environmental") dredge buckets
- Deployment of silt curtains around the dredging operation
- A prohibition on stockpiling of sediments on the bottom during dredging
- A requirement that hydraulic dredge intakes be operated only at or below the sediment surface.
- Limiting dredging to periods of low current (e.g., tidal) flow or to periods when sensitive species or life stages are absent.

Regional Board Comments. *As indicated above, the adverse effects can be mitigated by a variety of operational constraints.*

Shipyard Report Page 15-9. Dredging exposes previously buried sediments, and the chemical conditions in those sediments may result in alterations of contaminant bioavailability relative to the pre-dredging surface. Exposure of previously buried elevated concentrations clearly has the most direct potential for adverse effects. Pre-dredging sampling and post-dredging confirmation sampling are intended to prevent or remedy this situation; however, there is a possibility of exposure of elevated contaminant concentrations by dredging. This possibility is greatest where maximum contaminant concentrations occur in subsurface sediment.

Regional Board Comments. *Remediation will require removal of exposed contaminants above the target cleanup levels. Cleanup levels for chemical pollutants must be attained throughout the Shipyard Sediment Site including any sediments that are currently buried. Therefore the potential adverse effect of exposing elevated contaminant concentrations by dredging is likely to be extremely short-term and minimal.*

Shipyard Report Page 18-22. Immediate destruction of all existing mature benthic macroinvertebrate communities.

Shipyard Report Page 18-22. Immediate destruction of all eelgrass beds in both shipyards.

Shipyard Report Page 18-23. In the short term, this alternative would result in complete destruction of benthic macroinvertebrate communities and eelgrass beds. Epibenthic organisms (e.g., fish and lobsters) that feed on benthic macroinvertebrates or that use the eelgrass beds as nurseries would also be affected, because the site would not provide the resources they need.

Regional Board Comments. *Although there is the potential for negative short-term effects on aquatic life, many of them can be mitigated. Ultimately, removal of contaminants in sediment outweighs the concerns of short-term effects.*

Positive Effects

Shipyard Report. No positive effects were included in the Shipyard Report discussion.

A32.1.2 Long-Term Effects On Aquatic Life

For the long-term effects on aquatic life criterion, information provided in the Shipyard Report regarding effects of various aspects of the Cleanup to Background Alternative is summarized below. Regional Board input is provided where the Regional Board basis for the score differs from those in the Shipyard Report.

Negative Effects

Shipyard Report Page 15-10. Dredging ordinarily alters habitat suitability in a number of ways that can affect the health or type of biotic community that can become established after dredging:

- Increased water depth, with concomitant changes in pressure, temperature, and light penetration
- An exposed surface that has suitability different physical characteristics than the original surface (e.g., grain size, organic chemical content)
- An increased sediment deposition rate, as a consequence of the stilling effect of deeper water
- Removal of physical structures, such as boulders, logs, and pilings, resulting in an absence of anchoring points or shelter for some fauna.

Regional Board Comments. *In many areas, the remediation may involve removal of only a few feet or less of sediment, not significantly increasing the water depth, altering the habitat suitability, or changing the sediment deposition rate. There is no evidence of boulders at the Shipyard Sediment Site. Any old logs or pilings are likely to be creosote treated and their removal will reduce the potential for release of additional PAHs. A Navy study of San Diego Bay concluded that creosote pilings are a significant contributor of PAH pollutants and the Navy, among others, has implemented a program of replacing creosote pilings with pilings made of plastic (Chadwick et al., 1999).*

Shipyard Report Page 15-8. Uncontrolled release of sediment during dredging can have adverse impacts on nearby biological communities. These effects can include both immediate and long-term effects from smothering and toxicity. The potential for this type of adverse effect is likely to be greater at certain times of the year than at others. For example, effects may be greatest during spawning or migration periods of sensitive species. The potential for these types of effects is widely recognized and is typically addressed through a variety of operational constraints, including the following:

- Dredging using sealed ("environmental") dredge buckets
- Deployment of silt curtains around the dredging operation
- A prohibition on stockpiling of sediments on the bottom during dredging

- A requirement that hydraulic dredge intakes be operated only at or below the sediment surface.
- Limiting dredging to periods of low current (e.g., tidal) flow or to periods when sensitive species or life stages are absent.

Regional Board Comments. *As the Shipyard Report indicates, the long-term effects can be minimized or eliminated by minimizing the release of sediment during dredging.*

Shipyard Report Page 18-22. Long-term alterations in benthic communities may result from different physical characteristics of the sediment after dredging.

Regional Board Comments. *One goal of the cleanup is to provide for a healthy benthic community free from contaminant-induced degradation. Removal of contaminants in sediment outweighs the concerns of the change in sediment physical characteristics due to dredging. If it is determined that the remediation should include some backfilling with clean material, the physical characteristics, such as grain size, can be matched to the existing material.*

Shipyard Report Page 18-22. Potentially permanent destruction of all eelgrass beds in both shipyards.

Regional Board Comments. *Loss of eelgrass beds at the shipyards as a result of this cleanup would be mitigated as a condition of the permit process required for such a dredging operation in accordance with The Southern California Eelgrass Mitigation Policy (NMFS, 2005[1]). More weight is given to the removal of contaminated sediment than to destruction of eelgrass beds, which is viewed as mitigable.*

Shipyard Report Page 18-22. The construction of the boundary-area CDF would result in the elimination of approximately 2.5 acres of subtidal habitat within the leasehold. Mitigation of these lost subtidal areas would be required, but the lack of potential mitigation sites in the vicinity of the shipyards means that compensating habitat would most likely have to be obtained in other areas of San Diego Bay, and the success of mitigation efforts is uncertain.

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[1] http://swr.nmfs.noaa.gov/hcd/policies/EELPOLrev11_final.pdf

Shipyard Report Page 18-22. Ongoing shipyard operations would also continue to physically disturb sediments in some of the leasehold areas and result in disruption of the benthic communities at these locations.

Regional Board Comments. *The physical disturbances from ongoing shipyard operations are expected to be the generally the same whether or not any remedial actions are taken. If dredging results in an increase in water depth, the physical disturbances to the benthic communities from operations would likely be less than those presently occurring.*

Shipyard Report Page 18-25. Changes in habitat are likely to result from an increase in bottom depths and changed substrate characteristics following dredging. Although benthic macroinvertebrate communities may be reestablished in 3-5 years, the type of fauna present is likely to be considerably different from current conditions and also to be different from reference conditions.

Regional Board Comments. *One goal of the cleanup is to provide for a healthy benthic community free from contaminant-induced degradation. Removal of contaminants in sediment outweighs the concerns of the change in sediment physical characteristics due to dredging. In many areas, the remediation may involve removal of only a few feet or less of sediment, not significantly increasing the water depth, altering the habitat suitability, or changing the sediment deposition rate. If it is determined that the remediation should include some backfilling with clean material, the physical characteristics, such as grain size, can be matched to the existing material.*

Shipyard Report Page 18-25. Eelgrass is currently found primarily in areas with water depths less than 10 ft, and may not be able to reestablish itself in some areas of deeper water that would exist after dredging.

Regional Board Comments. *Although eelgrass provides a favorable habitat for many species, the benthic communities currently established in the eelgrass at the Shipyard Sediment Site, and those that feed on them, are being exposed to harmful levels of chemical pollutants in the sediment. One goal of the cleanup is to provide for a healthy benthic community free from contaminant-induced degradation. Removal of contaminants in sediment outweighs the concerns associated with removal of eelgrass, which is likely to be temporary and mitigated through habitat restoration. Eelgrass has been successfully mitigated and reestablished in San Diego Bay (e.g., Navy Eelgrass Mitigation Sites)*

The permitting process required for such dredging operations would require mitigation of any unavoidable loss of eelgrass habitat in accordance with the Southern California Eelgrass Mitigation Policy (NMFS, 2005).

Shipyard Report Page 18-26. With respect to modification of sediment chemical concentrations, the effectiveness of remediation to reference pool chemistry is expected to decline over the long term. This long-term decrease in effectiveness is a consequence of likely sediment recontamination. Although all industrial and surface water discharges from the shipyards are controlled, Chollas Creek and storm drains leading from city streets beyond the shipyard property are primary sources of recontamination. In addition, because the final reference pool chemical concentrations are derived from the cleanest stations in San Diego Bay, they are not likely to be representative of nearshore conditions elsewhere along the eastern shore of San Diego Bay. Over the long term, tidal currents and ship traffic are expected to resuspend and redistribute nearshore sediments, so that sediment chemistry concentrations in the shipyard leaseholds would gradually increase from the levels present immediately after dredging.

Regional Board Comments. *The discharges from Chollas Creek are being addressed by several total maximum daily load projects (TMDLs) (e.g. Chollas Creek diazinon TMDL, Chollas Creek metals TMDL, and the Mouth of Chollas Creek sediment toxicity TMDL). The implementation of these TMDLs will include implementation plans designed to reduce pollutant loads to levels that are designed to attain water quality objectives that are necessary to support beneficial uses. In addition the San Diego Municipal Storm Water Permit requires the copermittees to reduce discharges of pollutants and flow into and from MS4s to the maximum extent practicable (MEP) to protect receiving water quality by promoting attainment of water quality objectives necessary to support beneficial uses.*

Positive Effects

Shipyard Report Page 19-3. After active remedial measures are completed, recovery of the aquatic resources is expected to occur over 3 to 5 years, but is not expected to result in significant positive improvement in aquatic resources over baseline conditions.

Regional Board Comments. *The Regional Board disagrees with the conclusion that the remediation of the chemical pollutants will not significantly improve the conditions for aquatic life, aquatic-dependent wildlife, and human health. The cleanup levels will provide for a healthy benthic community free from contaminant-induced degradation. The cleanup will also reduce the levels of pollutants that are bioaccumulating in the aquatic food chain and impacting, or threatening to impact, aquatic-dependent wildlife and human health.*

Shipyard Report Page 19-2. Because observed effects on benthic macroinvertebrate communities are likely caused by continuing offsite chemical sources or by physical disturbance attributable to shipyard operations, there are no significant differences between any of the remedial alternatives on the long-term time frame for complete recovery of the benthic communities.

Regional Board Comments. *As stated above, one goal of the cleanup is to provide for a healthy benthic community free from contaminant-induced degradation. Another goal is to reduce the impacts on aquatic-dependent wildlife and human health. The chemical pollutants present in the sediment are from the dischargers named in the Cleanup and Abatement Order and any ongoing discharges of pollutants is a violation.*

Shipyard Report Page 18-21. A potentially positive long-term effect on the aquatic life beneficial use may result from removal of all sediment from locations that currently have moderate toxicity or alterations of benthic macroinvertebrate communities. However, because existing sediment toxicity is believed to be caused by continuing offsite sources, and because current alterations of the benthic community are attributable, at least in part, to physical disturbance, any benefits from sediment removal are likely to be temporary. A gradual return to approximately the baseline conditions is to be expected as sediment from neighboring areas is redistributed and contaminants from urban runoff in Chollas Creek and storm water discharges are continually introduced to the site.

Regional Board Comments. *See previous Regional Board Comments.*

Shipyard Report Page 18-25. Over the long term, benthic macroinvertebrate communities are expected to become re-established in areas where they were removed by dredging, and aquatic dependent wildlife are expected to then be able to resume using the site for foraging.

Regional Board Comments. *The Regional Board agrees that the benthic communities will eventually re-colonize and be free from contaminant–induced degradation, a long-term benefit to both the benthic communities and the higher trophic levels.*

A32.2 EFFECTS ON AQUATIC-DEPENDENT WILDLIFE

Summary of Scores for Cleanup to Background:

	Short-Term Effects	Long-Term Effects
Shipyard Ranking	-2 (minor to moderate negative effect from current conditions)	-1 (minor negative effect from current conditions)
Regional Board Ranking	-2 (minor to moderate negative effect from current conditions)	+4 (moderate to major improvement from current conditions)

A32.2.1 Short-Term Effects On Aquatic-Dependent Wildlife

For the short-term effects on aquatic-dependent wildlife criterion, information provided in the Shipyard Report regarding effects of various aspects of the Cleanup to Background Alternative is summarized below. Regional Board comments are provided where the Regional Board basis for the ranking differs from those in the Shipyard Report.

Negative Effects

Shipyard Report Page 18-23. The destruction of benthic macroinvertebrate communities and likely absence of epibenthic fish (see short-term negative effects on aquatic life) would likely cause short-term effects on some aquatic-dependent wildlife that feed at the site.

Regional Board Comments. *The Regional Board assigns the same –2 score for short-term effects on aquatic-dependent wildlife.*

Positive Effects

Shipyard Report. No positive effects were included in the Shipyard Report discussion.

A32.2.2 Long-Term Effects On Aquatic-Dependent Wildlife

For the long-term effects on aquatic-dependent wildlife criterion, information provided in the Shipyard Report regarding effects of various aspects of the Cleanup to Background Alternative is summarized below. Regional Board input is provided where the Regional Board basis for the score differs from those in the Shipyard Report.

Negative Effects

Shipyard Report Page 18-25. Alteration and loss of benthic communities and eelgrass beds would affect aquatic-dependent wildlife. Lost eelgrass beds would not be achievable as nursery areas for juvenile fish and other species, and the greater water depths and changed benthic communities may provide fewer feeding opportunities for epibenthic feeders such as diving birds. Reconstruction or restoration of eelgrass beds would be required, a process of uncertain success.

Regional Board Comments. *As stated above, the Regional Board disagrees with the conclusion that the remediation of the chemical pollutants will not significantly improve the conditions for aquatic life, aquatic-dependent wildlife, and human health. The cleanup levels will provide for a healthy benthic community free from contaminant-induced degradation. The cleanup will also reduce the levels of pollutants that are bioaccumulating in the aquatic food chain and impacting, or threatening to impact, aquatic-dependent wildlife and human health.*

Removal of contaminants in sediment outweighs the concerns associated with removal of eelgrass, which is likely to be temporary and is mitigable. Eelgrass removal has been successfully mitigated or reestablished in San Diego Bay (e.g., Navy Eelgrass Mitigation Sites). The permitting process required for such dredging operations requires mitigation of any unavoidable loss of eelgrass habitat in accordance with the Southern California Eelgrass Mitigation Policy (NMFS, 2005).

Shipyard Report Page 18-22. The construction of the boundary-area CDF would result in the elimination of approximately 2.5 acres of subtidal habitat within the leasehold. Mitigation of these lost subtidal areas would be required, but the lack of potential mitigation sites in the vicinity of the shipyards means that compensating habitat would most likely have to be obtained in other areas of San Diego Bay, and the success of mitigation efforts is uncertain.

Positive Effects

Shipyard Report Page 18-22. Because there are currently no adverse effects on aquatic-dependent wildlife or human health at the site, remediation to reference pool chemistry would not result in any improvement of these beneficial uses.

Regional Board Comments. *The Regional Board disagrees with the conclusion that there are currently no adverse effects on aquatic-dependent wildlife or human health at the site. Remediation to background would have significant improvement on the quality of habitat because the cleanup levels will provide for a healthy benthic community free from contaminant-induced degradation for aquatic-dependent wildlife. The cleanup will also reduce the levels of pollutants that are bioaccumulating in the aquatic food chain and impacting, or threatening to impact, aquatic-dependent wildlife and human health.*

Shipyard Report Page 18-25. Over the long term, benthic macroinvertebrate communities are expected to become re-established in areas where they were removed by dredging, and aquatic dependent wildlife are expected to then be able to resume using the site for foraging.

Regional Board Comments. *The Regional Board agrees that it is expected that the benthic communities will eventually re-colonize after dredging, and that aquatic dependent wildlife would resume foraging. The cleanup will provide habitat free from contaminant–induced degradation that will provide a long-term benefit to both the benthic communities and the higher trophic levels.*

A32.3 EFFECTS ON HUMAN HEALTH

Summary of Scores for Cleanup to Background:

	Short-Term Effects	Long-Term Effects
Shipyard Ranking	-5 (major negative effect from current conditions)	0 (no change from current conditions)
Regional Board Ranking	-4 (moderate to major improvement from current conditions)	+5 (major improvement from current conditions)

A32.3.1 Short-Term Effects On Human Health

For the short-term effects on human health criterion, information provided in the Shipyard Report regarding effects of various aspects of the Cleanup to Background Alternative is summarized below. Regional Board comments are provided where the Regional Board basis for the ranking differs from those in the Shipyard Report.

Negative Effects

Shipyard Report Page 18-23. Remediation activities would pose a relatively high risk to human health, primarily from transportation of the sediment through the community to an offsite uplands landfill.

Regional Board Comments. *The Regional Board agrees that there is some risk due to transportation of sediment through the community to an offsite upland landfill. However, this risk can be minimized and mitigated by using alternative modes of transportation, such as railway, alternative routes, and/or alternative time scheduling of shipments.*

Shipyard Report Page 18-23. Under this alternative, there would be short-term human health risks associated with the remedial construction and with transportation, both for remediation workers and for the public. All remediation workers involved with activities associated with handling sediments would need to comply with OSHA health and safety regulations. However, risks remain for potential injury or fatality from safety hazards associated with working on the water and with heavy equipment, and those associated with transport of materials by truck to an offsite landfill.

Handling and transport of the dredged material would have a significant effect on the public, primarily as a result of impacts to traffic, businesses, and jobs. Transport to a

landfill would generate substantial truck traffic through the community, and the concomitant impacts including exposure to dust, noise, and truck emissions, as well as the potential for truck-related accidents. These impacts are similar to the traffic-related effects previously discussed for Alternative B1, but they are much larger because of the significantly greater sediment volume included under Alternative C.

- **Traffic.** Approximately 537,600 yd3 of sediment would be disposed of at an offsite landfill under Alternative C, approximately 8 times the volume estimated under Alternative B1. Transport of sediments using trucks with a capacity of 15 yd3 would result in more than 71,000 truck trips (35,800 loaded and 35,800 returning empty). Sediment processing rates would be similar to those expected under Alternative B1 (approximately 1,500 yd3 per day); therefore, truck traffic rates would also be similar (i.e., approximately 26 trucks per hour (13 loaded and 13 returning empty) through the community). The duration of the traffic impacts would be significantly longer for Alternative C than for Alternative B1.
- **Accidents.** Given a distance of 250 miles to the nearest regional disposal site with available capacity, the total distance for truck traffic would be 17,920,000 miles. The accident risk for non-hazardous material shipments by truck is 7.3 x 10-7 per mile, the fatality rate per accident is 3.95 percent, and the non-fatal injury rate per accident is 86.56 percent (Battelle, 2001). Consequently, the volume of truck traffic required for offsite landfill disposal is expected to result in 13 truck accidents. The corresponding probability of a fatality is approximately 51 percent, and an additional eleven or so non-fatal injuries are expected. If some of the sediment currently assumed acceptable for open-water disposal should instead need to be disposed of at an offsite landfill, human health risks would increase further. Because of the heavy usage of Sampson Street by employees of Southwest Marine, Kelco, and Continental Maritime, and by Navy personnel, risks from truck traffic may be even higher. Additional risks are associated with dredging and dewatering activities, so that the overall impact on human health of remediation to reference pool chemistry would be higher than the estimate based solely on transportation risks.
- **Noise.** With the number of trucks passing through the community every hour, there would be an ongoing noise impact over the course of the work.
- **Air Quality.** Diesel emissions from the trucks would have an effect on aesthetics, health, and quality of life. Health effects resulting from air quality impacts could result in some incremental health care costs that would be borne by the community. Approximately 386,800 g (852 lb) of particulate emissions would be released per month from the trucks (calculations based on 200 trucks per day (100 loaded and 100 returning unloaded), 250 miles each way to the nearest landfill with available space (500 miles total per trip), and idling time and emissions factors from CARB [2000] and U.S. EPA [1998b]). Diesel emissions from dredging equipment will add to this particulate load.

Regional Board Comments. *As stated above, the Regional Board agrees that there is some risk due to transportation of sediment through the community to an offsite upland landfill. However, this risk can be minimized and mitigated by using alternative modes of transportation, such as railway, alternative routes, and/or alternative time scheduling of shipments. In addition, disposal options may be available closer than the estimated 250 miles, thus reducing the estimates for traffic accident risk, noise, and emissions.*

Positive Effects

Shipyard Report. No positive effects were included in the Shipyard Report discussion.

A32.3.2 Long-Term Effects On Human Health

For the long-term effects on human health criterion, information provided in the Shipyard Report regarding effects of various aspects of the Cleanup to Background Alternative is summarized below. Regional Board comments are provided where the Regional Board basis for the ranking differs from those in the Shipyard Report.

Negative Effects

Shipyard Report. No negative effects were included in the Shipyard Report discussion.

Positive Effects

Shipyard Report Page 18-22. Because there are currently no adverse effects on aquatic-dependent wildlife or human health at the site, remediation to reference pool chemistry would not result in any improvement of these beneficial uses.

Regional Board Comments. *The Regional Board disagrees with the conclusion that there are currently no adverse effects on aquatic-dependent wildlife or human health at the site. Currently, there are contaminants present in sand bass and lobster tissue posing unacceptable risks to recreational and subsistence anglers at the site. Remediation to background would have significant improvement on the quality of habitat because the cleanup levels will provide for a healthy benthic community free from contaminant-induced degradation for aquatic-dependent wildlife. The cleanup will also reduce the levels of pollutants that are bioaccumulating in the aquatic food chain and impacting, or threatening to impact, aquatic-dependent wildlife and human health.*

A32.4 FINANCIAL EFFECTS ON SHIPYARDS AND ASSOCIATED ECONOMIC ACTIVITIES

Summary of Scores for Cleanup to Background:

	Financial Effects
Shipyard Ranking	-5 (major negative effect from current conditions)
Regional Board Ranking	-4 (moderate to major negative effect from current conditions)

The Regional Board Ranking of –4, only slightly less than the –5 shipyard ranking, recognizes that there will likely be "moderate to major negative effects."

Information provided in the Shipyard Report regarding financial effects on shipyards and associated economic activities related to various aspects of the Cleanup to Background Alternative is summarized below. Regional Board comments are provided where the Regional Board basis for the ranking differs from those in the Shipyard Report.

Shipyard Report Page 18-15. Without restrictions on dredging, a major negative effect on employment would be expected at the shipyards, because shipyard production would have to be curtailed or delayed during CDF construction and during dredging in operational areas of the yards. These job losses would have a ripple effect on other businesses and the economy of the area.

Regional Board Comments. *The Regional Board acknowledges that there may be effects on shipyard productivity, associated employment, and the local business economy as a result of the cleanup. However, the Shipyards will have the opportunity to develop a remedial action plan that can minimize or avoid delays or interruptions. For example, some remedial operations (e.g., staging of equipment, dewatering) may be performed elsewhere to minimize effects on shipyard productivity.*

Shipyard Report Page 18-15 through 18-16. Both NASSCO and Southwest Marine perform strategically important ship maintenance, repair, and modernization work and are currently performing important multiyear contracts for both military and commercial customers. The ships under construction play vital roles in national defense and in transporting crude oil under improved environmental conditions. Delays or interruptions in the delivery of these ships would have potentially broad consequences affecting important national goals.

For the Navy, NASSCO is under a long-term contract to deliver T-AKE Class ships, which deliver supplies to armed forces conducting national defense operations throughout the world. NASSCO is also building four 1.3 million barrel capacity commercial tankers for BP to transport crude oil from Valdez, Alaska, to oil refineries on the West Coast. These double-hull ships contain state-of-the-art environmental controls and will replace single-hulled tankers that must be phased out to meet the requirements of the Oil Pollution Act of 1990, enacted in response to the Exxon Valdez spill.

Both NASSCO and Southwest Marine conduct maintenance and repair activities on Navy and commercial vessels, collectively including all types of Navy vessels homeported in San Diego. This work is scheduled several years in advance, and shipyard berths and dry docks are generally fully utilized. NASSCO and SWM are the only two shipyards in California that are capable of providing both dry docking and pier-side berthing for these contracts.

Interruptions and delay in ship construction activities not only would cause a breach of the schedule terms of those contracts, but would substantially drive up the costs of performing those contracts as scheduled work was disrupted and performed in later periods. Interruptions in ship repair activities would cause layoffs of shipyard employees, and would have similar potential disruptive effects on subcontractors and Navy AITs, who perform specialized onboard ship modernization activities. The shipyards could be exposed to millions of dollars of potential damages to both their customers and subcontractors. Interruptions in repair activities would have significant adverse consequences to shipyard employees, subcontractors, and Navy contractors.

Although some work could go to other shipyards, if larger contracts cannot be completed because of extensive remediation, this work would have to be done at facilities outside of California. The local tax base would also be affected, because taxable revenue from the shipyards and other local businesses would be reduced.

Regional Board Comments. *The Regional Board acknowledges that there may be effects on shipyard productivity and the local economy as a result of the cleanup. However, the Shipyards will have the opportunity to develop a remedial action plan that can minimize or avoid delays or interruptions. For example, some remedial operations (e.g., staging of equipment, dewatering) may be performed elsewhere to minimize effects on shipyard productivity.*

Shipyard Report Page 18-30. The implementation of Alternative C [Remediation to Final Reference Pool Chemistry] would have substantial negative economic impacts on the shipyards, the shipyard customers, local businesses, the local employment rate, and the local tax base.

Regional Board Comments. *The Regional Board acknowledges that there may be effects on shipyard productivity and associated impacts on shipyard customers, the local business economy, and employees as a result of the cleanup. However, the Shipyards will have the opportunity to develop a remedial action plan that can minimize or avoid delays or interruptions that could lead to such impacts.*

Shipyard Report Page 19-11. Substantial operational and economic conflicts are associated with dredging alternatives. Berth space at the shipyards is scheduled 3 to 5 years in advance of the work to be performed, and access to berth areas will limit or delay dredging activity. The locations and extent of dredging operations under Alternatives B1, B2, and C make conflicts with shipyard operations unavoidable, and would result in layoffs and harmful effects on the San Diego economy. The magnitude of these negative effects is directly related to the size and duration of the onsite activities.

Regional Board Comments. *The Regional Board acknowledges that there may be effects on shipyard productivity, associated employment, and the local business economy as a result of the cleanup. However, the Shipyards will have the opportunity to develop a remedial action plan that can minimize or avoid delays or interruptions.*

A32.5 QUALITY-OF-LIFE EFFECTS ON NEIGHBORHOODS

Summary of Scores for Cleanup to Background:

	Effects On Neighborhoods
Shipyard Ranking	-5 (major negative effect from current conditions)
Regional Board Ranking (assumes rail not feasible)	-4 (moderate to major negative effect from current conditions)
Regional Board Ranking (assumes rail feasible)	-2 (minor to moderate negative effect from current conditions)

The Regional Board Ranking of –4, only slightly less than the –5 shipyard ranking, recognizes that there will likely be "moderate to major negative effects."

Information provided in the Shipyard Report regarding quality-of-life effects on neighborhoods related to various aspects of the Cleanup to Background Alternative is summarized below. Regional Board comments are provided where the Regional Board basis for the ranking differs from those in the Shipyard Report.

Shipyard Report Page 18-30. Transport of sediments to a landfill would result in truck traffic through the community of approximately 200 trucks per day (100 loaded and 100 returning empty) for 45 weeks, for a total of more than 71,600 truck trips (35,800 loaded and 35,800 returning empty). Because truck traffic through the community during off-hours is presumed to be unacceptable, an 8-hour workday is assumed for trucking. During the 8-hour workday, there would be about 26 trucks per hour (13 loaded and 13 returning empty) through the community. This truck traffic could result in a variety of impacts on health, safety, and overall quality of life for the community, including:

- **Noise.** With the number of trucks passing through the community every hour, there would be an ongoing noise impact over the course of the work affecting both residences and local businesses.
- **Air Quality.** Diesel emissions from the trucks would have an effect on aesthetics and quality of life, and they may negatively impact businesses as well. Health effects resulting from air quality impacts could result in some incremental health care costs that would be borne by the community. The health risk aspects of air quality were addressed in further detail in Section 18.2.1.1.

[From 18.2.1.1] Diesel emissions from the trucks would have an effect on aesthetics, health, and quality of life. Health effects resulting from air quality impacts could result in some incremental health care costs that would be borne by the community. Approximately 386,800 g (852 lb) of particulate emissions would be released per month from the trucks (calculations based on 200 trucks per day (100 loaded and 100 returning empty), 250 miles each way to the nearest landfill with available space (500 miles total round trip), and idling time and emission factors from CARB [2000] and U.S. EPA [1998b]). Diesel emissions from dredging equipment will add to this particulate load.

- **Service Life of Road Infrastructure.** Repetitive truck traffic may reduce the service life of road infrastructure by wearing out pavement. Ultimately, this could mean damaged roads that 1) may reduce the quality of the driving experience for residents, 2) may result in damage to vehicles, and 3) may result in a possible increase in the level of taxation and/or fees associated with road maintenance.

- **Accidents.** Accidents are likely to occur in the normal course of the transport process. The average cost of a truck accident for nonhazardous shipments is $340,000 in 1996 dollars (Batelle 2001), or about $431,000 in 2004 dollars (at a discount rate of 3 percent). For the eighteen transportation accidents expected to occur as a result of offsite landfill disposal (see discussion in Section 18.2.1.1), the total economic cost is estimated to be $3.4 million.

  [From Section 18.2.1.1] Given a distance of 250 miles to the nearest regional disposal site with available capacity, the total round trip distance for truck traffic would be 2,245,000 miles. The accident risk for non-hazardous material shipments by truck is 7.3 x 10-7 per mile, the fatality rate per accident is 3.95 percent, and the non-fatal injury rate per accident is 86.5 percent (Battelle 2001). Consequently, the volume of truck traffic required for offside landfill disposal is expected to result in two truck accidents with 1 to 2 injuries and an 8 percent chance of a fatality. Truck traffic to an upland disposal site would transit Sampson Street, which is used daily by thousands of civilian and Navy pedestrians to access SWM, Kelco, and Continental Maritime. The risk of accidental injury may therefore be greater than is indicated by Battelle (2001). Additional risks are associated with dredging and dewatering activities, so that the overall impact on human health of remediation to LAET criteria would be higher than the estimate based solely on transportation risks.

Regional Board Comment. *Truck traffic could be reduced or even eliminated if transportation by rail or barge is implemented. In addition to NASSCO and SWM leaseholds, adjacent properties could potentially provide access to rail and/or additional staging areas. In addition, there may be some disposal options closer thatn the estimated 125 miles (250 mile round trip) for some of the material depending upon the actual waste characterization.*

Shipyard Report Page 16-6. Rail transport to a suitable landfill was also evaluated. SWM does not have a rail siding, and NASSCO's rail sidings are in the center of its shipyard. Because these sidings are actively used, additional rail traffic cannot be accommodated. Also, there is insufficient room for staging, stockpiling, and loading at those sidings. There are no known waterfront properties in the area that have both the requisite rail spur and sufficient area for staging. Transport to an offsite rail spur would require trucking and a secondary handling step, as well as the requisite staging space at that spur. This would result in truck traffic through the neighboring community, which would have similar impacts on the community as would trucking the material directly to an offsite landfill. As a result of these considerations, rail transport is considered infeasible for the landfill disposal technology.

Regional Board Comments. *While implementing rail transport may present some challenges, a potential exists that adjacent or nearby properties could provide access to rail and/or additional staging areas.*

Shipyard Report Page 19-11. For those remedial alternatives that include uplands disposal of sediments (Alternatives B1 and C), there will be negative financial, noise, safety, and quality-of-life effects on local businesses and the public caused by the significant increase in truck traffic on local roads. These effects will be especially pronounced under Alternative C because of the extended period (several years) over which sediment haulage will be required. The total economic cost estimated for transportation accidents alone is estimated at $3.4 million for Alternative C. By comparison, the estimated economic cost for transportation accidents under Alternative B1 is approximately $0.4 million and these costs are avoided under Alternatives A and B2.

Regional Board Comments. *The Regional Board acknowledges that there may be effects on the neighboring community as a result of the cleanup. However, the Shipyards will have the opportunity to develop a remedial action plan that can minimize or avoid such effects. For instance, truck traffic may be reduced or even eliminated if transportation by rail can be implemented.*

A32.6 EFFECTS ON RECREATIONAL & COMMERCIAL USES OF AQUATIC RESOURCES

Summary of Scores for Cleanup to Background:

	Effects on Aquatic Resources
Shipyard Ranking	-1 (minor negative effect from current conditions)
Regional Board Ranking	+4 (moderate to major improvement from current conditions)

Information provided in the Shipyard Report regarding effects on recreational and commercial uses of aquatic resources related to various aspects of the Cleanup to Background Alternative is summarized below. Regional Board input is provided where the Regional Board basis for the score differs from those in the Shipyard Report.

Shipyard Report Page 18-31. Few or no adverse effects are expected on sport or commercial angling and on shellfish harvesting/aquaculture. Commercial and sport fishing, shellfish harvesting/aquaculture, and recreational uses are all prohibited within the security boom at the shipyards. Outside of these areas, these uses would be affected in the short term during the course of the dredging and also during the recovery of the benthic community and higher trophic levels following dredging.

Shipyard Report Page 19-12. Alternative C [Remediation to Final Reference Pool Chemistry] is the only remedial alternative that is expected to have an effect on sport or commercial angling, shellfish harvesting, or recreational uses. Remedial activities associated with all other alternatives occur only within the leasehold boundaries where these uses are all prohibited. The dredging and barging activities performed outside the leasehold boundaries under Alternative C will interrupt these activities but is not expected to have a significant effect because of the short duration of active remedial operations in this area (estimated at approximately 5-6 months) and the ability of these users to avoid these remediation operations.

Regional Board Comments. *Removal of contaminants in sediment would have an overall significant long-term positive effect. The cleanup will provide for a healthy benthic community free from contaminant-induced degradation and reduce the levels of pollutants that are bioaccumulating in the aquatic food chain. Additionally, the use of the site may change in the future (i.e., shipyards removed) and a reasonable potential exists that public access for sport and commercial angling, shellfish harvesting, and recreational uses may occur at the site.*