

Appendix A

Air Quality Analysis and Record of Non-Applicability

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Record of Non-Applicability For Clean Air Act Conformity San Diego County

The Proposed Action, including all of the three action alternatives described below, falls under the Record of Non-Applicability (RONA) category and is documented with this RONA.

The U.S. Environmental Protection Agency (USEPA) published *Determining Conformity of General Federal Actions to State of Federal Implementation Plans; Final Rule* on November 30, 1990 (58 Federal Register [FR] 63214; 40 Code of Federal Regulations [CFR] Parts 6, 51, and 93). The U.S. Department of the Navy (Navy) published Navy Guidance for Compliance with the Clean Air Act (CAA) General Conformity Rule (30 July 2013), as referenced in Chief of Naval Operations Instruction 5090.1E, *Environmental Readiness Program Manual* dated 3 September 2019. These publications provide implementing guidance to document CAA Conformity Determination requirements.

Federal regulations state that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan. It is the responsibility of the federal agency to determine whether a federal action conforms to the applicable implementation plan, before the action is taken (40 CFR Section 51.850[a]).

The General Conformity Rule applies to federal actions proposed within areas that are designated as either *nonattainment* or *maintenance* for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants. Emissions of criteria pollutants within an area that is designated as *attainment* are exempt from general conformity analyses.

Federal actions within *nonattainment* or *maintenance* areas may be exempt from conformity determinations if their emissions of criteria pollutants do not exceed designated *de minimis* thresholds for the criteria pollutants (40 CFR Section 51.853[b]). The San Diego Air Basin has been determined by USEPA to be a serious and moderate *nonattainment* area for 8-hour O₃ under the 2008 and 2015 standards, respectively. The applicable *de minimis* thresholds for San Diego Air Basin are listed in Table 1.

Table 1
***de minimis* Levels for Criteria Pollutants in the San Diego Air Basin**

<i>Criteria Pollutants</i>	<i>de minimis</i> Thresholds (tons per year [tpy])
Volatile Organic Compounds (VOC)	50
Oxides of Nitrogen (NO _x)	50

Note: VOC and NO_x emissions are used to represent O₃ generation because they are precursors of O₃.

PROPOSED ACTION

Action Proponent: Naval Facilities Engineering Command Southwest, Naval Base San Diego (NBSD)

Title of Proposed Action: Floating Dry Dock Project

Project Location: South Berth of the Mole Pier and Marine Group Boat Works, LLC (MGBW) maintenance piers

Proposed Action and Emissions Summary: The Navy is proposing emplacement and operation of up to two floating dry docks, including all required dredging and sediment disposal as well as all required demolition and construction activities, necessary to support the forecasted surface ship maintenance requirement at NBSD as identified by the Commander of the U.S. Pacific Fleet (CPF). The emplacement and operation of dry dock space is necessary to ensure NBSD's capability to conduct berth-side complex repair and maintenance of Navy vessels.

The Navy has identified three action alternatives associated with the NBSD Floating Dry Dock Project:

- Alternative 1: Emplacement of a floating dry dock at the South Berth of the Mole Pier;
- Alternative 2 (Preferred Alternative): Emplacement of a Commercial Out Lease (COL) floating dry dock near the Marine Group Boat Works, LLC (MGBW) maintenance piers; and
- Alternative 3: Emplacement of a floating dry dock at both the South Berth of the Mole Pier and near the MGBW maintenance piers. Due to required permitting timelines, the floating dry docks would not be installed concurrently.

Air Emissions Summary: The proposed emplacement and operation of up to two floating dry docks would result in air emissions from dredging, sediment disposal, and in-water and landside construction. Three options for sediment disposal have been identified, one of which will be selected on the basis of the results of sampling and laboratory testing pursuant to the U.S. Environmental Protection Agency (USEPA) and U.S. Army Corps of Engineers (USACE) Green Book (1991) and Inland Testing Manual (1998). If the sediment characterization and chemistry results determine that dredged sediments meet allowable parameters for beneficial reuse, this preferred option would be pursued to the maximum extent feasible pursuant to Clean Water Act (CWA) Section 404(b)(1), which requires selection of the Least Environmentally Damaging Practicable Alternative. If the sediment characterization and chemistry results do not meet allowable parameters for beneficial reuse, ocean disposal, or upland disposal options would be considered. Testing results could also dictate a combination of disposal options.

The results of the air emissions modeling for Alternative 1 are shown in Tables 2 and 3 and the results of the air emissions modeling for Alternative 2 (Preferred Alternative) are shown in Tables 4 and 5. Alternative 3 would involve emplacement of a floating dry dock at both the South Berth of the Mole Pier and near the MGBW maintenance piers. However, due to required permitting timelines, the floating dry docks would not be installed concurrently. Therefore, additional air emissions modeling was not prepared for Alternative 3 as the emplacement of the two floating dry docks would not overlap.

Table 2
South Berth of the Mole Pier
Estimated Net Emissions of Dredging and Sediment Disposal

<i>Construction Year</i>	<i>Emissions (tons/year)</i>	
	<i>VOC</i>	<i>NO_x</i>
Nearshore Replenishment Option		
<i>Naval Base Coronado Silver Strand Boat Lanes Replenishment Site</i>		
2020	1.56	16.54
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No
<i>Naval Air Station North Island Replenishment Site</i>		
2020	1.26	13.81
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No
Ocean Disposal		
2020	1.26	13.81
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No
Upland Disposal		
2020	1.52	17.75
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No

Table 3
South Berth of the Mole Pier
Estimated Net Emissions of Demolition and Construction

<i>Construction Year</i>	<i>Emissions (tons/year)</i>	
	<i>VOC</i>	<i>NO_x</i>
Partial Wharf Demolition		
2020	0.13	0.86
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No
Mooring Dolphins and Fender Pile Construction		
2020	0.16	2.06
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No

Table 4
MGBW Maintenance Piers Location
Estimated Net Emissions of Dredging and Sediment Disposal

<i>Construction Year</i>	<i>Emissions (tons/year)</i>	
	<i>VOC</i>	<i>NO_x</i>
Nearshore Replenishment Option		
<i>Naval Base Coronado Silver Strand Boat Lanes Replenishment Site</i>		
2020	3.00	31.90
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No
<i>Naval Air Station North Island Replenishment Site</i>		
2020	2.43	26.64
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No
Ocean Disposal Option		
2020	2.60	28.20
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No
Upland Disposal Option		
2020	2.93	34.16
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No

Table 5
MGBW Maintenance Piers Location
Estimated Net Emissions of Construction

<i>Construction Year</i>	<i>Emissions (tons/year)</i>	
	<i>VOC</i>	<i>NO_x</i>
Access Structures, Mooring Dolphins, and Fender Pile Construction		
2021	0.17	2.21
<i>de minimis</i> Threshold/Major Source Threshold	50	50
Exceeds Threshold?	No	No

Based on the air quality analysis summarized in Tables 2 through 5, the maximum estimated emissions would be below the conformity *de minimis* levels.

Date RONA Prepared: 9 October 2019.

EMISSIONS EVALUATION AND CONCLUSION

The Proposed Action would involve minor construction and operational emissions; all emissions are *de minimis*.

The Navy concludes that *de minimis* thresholds for applicable criteria pollutants would not be exceeded as a result of implementation of any of the three action alternatives. The emissions modeling data supporting the conclusion shown in Tables 2 through 5 above, is included in the attachment to the RONA. Therefore, the Navy concludes that further formal Conformity Determination procedures are not required, resulting in this RONA.

RONA APPROVAL

To the best of my knowledge, the information presented in this RONA is correct and accurate and I concur with the finding that the Proposed Action is not subject to the General Conformity Rule.

Date

HABECK.JACKSON.RUSSELL.1243214021
ELL.1243214021

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HABECK.JACKSON.RUSSELL.1243214021
Date: 2020.04.24 11:43:07 -07'00'

Signature

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Mole Pier Dredge and Disposal

Nearshore Replenishment Option

EQUIPMENT

Engine	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Main genset	2000	2935	12	70
Aux genset	2000	550	12	70
Spud winch	2000	250	12	70
Tugboat with Barge (Replenishment Site 1) (Two units operating at opposite ends of route) (1)	NA	800	48	70
Tugboat with Barge (Replenishment Site 2) (Two units operating at opposite ends of route) (2)	NA	800	24	70
Tugboat with Barge (Replenishment Site 3) (Two units operating at opposite ends of route) (3)	NA	800	12	70

Assume 12 hours per day at 1,231 cy per day over 70 working days to dredge 86,121 cy.

Equipment	Load Factor	Emission Factors (g/HP-hr)						
		CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Main Genset	0.51	1.83	6.25	0.184	0.184	0.006	0.53	568.3
Aux Genset	0.74	1.49	4.8	0.164	0.164	0.003	0.46	568.3
Spud Winch	0.51	1.39	5.23	0.172	0.172	0.006	0.48	568.3
Tugboat with Barge (Replenishment Site 1)	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Tugboat with Barge (Replenishment Site 2)	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Tugboat with Barge (Replenishment Site 3)	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2

Equipment	Load Factor	Emissions (lbs/yr)						
		CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Main Genset		5073	17325	510	510	17	1469	1575306
Aux Genset		1123	3618	124	124	2	347	428333
Spud Winch		328	1235	41	41	1	113	134183
Tugboat with Barge (Replenishment Site 1)		10074	10904	640	640	7	1185	623649
Tugboat with Barge (Replenishment Site 2)		5037	5452	320	320	3	593	311824
Tugboat with Barge (Replenishment Site 3)		2519	2726	160	160	2	296	155912

Replenishment Site 1 Total (lbs/yr)	16598	33081	1314	1314	27	3114	2761470
Replenishment Site 2 Total (lbs/yr)	11561	27629	994	994	24	2522	2449646
Replenishment Site 3 Total (lbs/yr)	9042	24903	834	834	22	2225	2293734

Replenishment Site 1 Total (tons/yr)	8.30	16.54	0.66	0.66	0.01	1.56
Replenishment Site 2 Total (tons/yr)	5.78	13.81	0.50	0.50	0.01	1.26
Replenishment Site 3 Total (tons/yr)	4.52	12.45	0.42	0.42	0.01	1.11

Green House Gas Potential*	1	
Replenishment Site 1 Total CO ₂ e (metric tons/yr)	1252.60	1252.60
Replenishment Site 2 Total CO ₂ e (metric tons/yr)	1111.16	1111.16
Replenishment Site 3 Total CO ₂ e (metric tons/yr)	1040.44	1040.44

NOTES:

- (1) Assumed 24 hours for roundtrip barge trip
- (2) Assumed 12 hours for roundtrip barge trip
- (3) Assumed 6 hours for roundtrip barge trip
- (4) Tier 1 Nonroad diesel engine standards. Taken from <http://www.dieselnet.com/standards/us/nonroad.ph>
- (5) AP-42 Section 3.4, sulfur content of fuel assumed to be 0.0015%

Ocean Disposal Option

EQUIPMENT

Engine	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Main genset	2000	2935	12	70
Aux genset	2000	550	12	70
Spud winch	2000	250	12	70
Tugboat with Barge (Two units operating at opposite ends of route) (1)	NA	800	24	70

Equipment	Load Factor	Emission Factors (g/HP-hr)						
		CO (2)	NOx (2)	PM ₁₀ (2)	PM _{2.5} (2)	SO ₂ (3)	VOC (2)	CO ₂ (3)
Main Genset	0.51	1.83	6.25	0.184	0.184	0.006	0.53	568.3
Aux Genset	0.74	1.49	4.8	0.164	0.164	0.003	0.46	568.3
Spud Winch	0.51	1.39	5.23	0.172	0.172	0.006	0.48	568.3
Tugboat with Barge	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2

Equipment	Emissions (lbs/yr)						
	CO (2)	NOx (2)	PM ₁₀ (2)	PM _{2.5} (2)	SO ₂ (3)	VOC (2)	CO ₂ (3)
Main Genset	5073	17325	510	510	17	1469	1575306
Aux Genset	1123	3618	124	124	2	347	428333
Spud Winch	328	1235	41	41	1	113	134183
Tugboat with Barge	5037	5452	320	320	3	593	311824
Total (lbs/yr)	11561	27629	994	994	24	2522	2449646
Total (tons/yr)	5.78	13.81	0.497	0.497	0.0118	1.26	

Green House Gas Potential* 1
Total CO₂e (metric tons/yr) 1111.16 1111.16

NOTES:

- (1) Assumes 12 hours roundtrip barge trip
- (2) Tier 1 Nonroad diesel engine standards. Taken from <http://www.dieselnet.com/standards/us/nonroad.php>
- (3) AP-42 Section 3.4, sulfur content of fuel assumed to be 0.0015%

* IPCC Second Assessment Report (1996)

Upland Disposal Option

EQUIPMENT

Engine	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Main genset	2000	2935	12	70
Aux genset	2000	550	12	70
Spud winch	2000	250	12	70
Shore-Based Crane	NA	240	12	70
Loader	NA	900	12	70
Tugboat with Barge	NA	800	12	70
Dump Truck - 12 CY HP-hrs (1) (2)	NA	6240	24	70

Equipment	Load Factor	Emission Factors (g/HP-hr)						
		CO (3)	NOx (3)	PM ₁₀ (3)	PM _{2.5} (3)	SO ₂ (4)	VOC (3)	CO ₂ (4)
Main Genset	0.51	1.83	6.25	0.184	0.184	0.006	0.53	568.3
Aux Genset	0.74	1.49	4.8	0.164	0.164	0.003	0.46	568.3
Spud Winch	0.51	1.39	5.23	0.172	0.172	0.006	0.48	568.3
Shore-Based Crane	0.6	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Loader	0.5	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Tugboat with Barge	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Dump Truck - 12 CY	NA	8.5	9.2	0.54	0.54	0.0055	1.0	526.2

Equipment	Emissions (lbs/yr)						
	CO (3)	NOx (3)	PM ₁₀ (3)	PM _{2.5} (3)	SO ₂ (4)	VOC (3)	CO ₂ (4)
Main Genset	5073	17325	510	510	17	1469	1575306
Aux Genset	1123	3618	124	124	2	347	428333
Spud Winch	328	1235	41	41	1	113	134183
Shore-Based Crane	2267	2453	144	144	1	267	140321
Loader	7083	7667	450	450	5	833	438503
Tug with Barge	2833	3067	180	180	2	0	0
Dump Truck - 12 CY	117	127	7	7	0	14	7239
Total (lbs/yr)	18824	35491	1456	1456	28	3043	2723884
Total (tons/yr)	9.41	17.75	0.728	0.728	0.0141	1.52	

Green House Gas Potential* 1
Total CO₂e (metric tons/yr) 1235.55 1235.55

NOTES:

- (1) One-way distance from NBSD to Otay Landfill = 12.2 miles
- (2) Assumed 120 roundtrip truck trips per day
- (3) Tier 1 Nonroad diesel engine standards. Taken from <http://www.dieselnet.com/standards/us/nonroad.php>
- (4) AP-42 Section 3.4, sulfur content of fuel assumed to be 0.0015%

* IPCC Second Assessment Report (1996)

Mole Pier Wharf Demolition

EQUIPMENT

Engine (1)	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Excavator	2000	58	8	28
Vibratory Extractor	2000	300	8	28
225-ton Crane	2000	300	8	28
Tugboat	NA	800	8	28
Loader	2000	150	2	28
Dump Truck	2000	490	12	28
Vibratory Hammer	2000	300	0	0
Forklift	2000	85	4	28
Generator Set	2000	30	4	28
Concrete/Industrial Saw	2000	85	4	28

Equipment	Load Factor	Emission Factors (lb/1000 HP-hr)						
		CO (4)	NO _x (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Excavator	59	3.75	10.03	0.71	0.68	0.84	0.75	1192.91
Vibratory Extractor	59	6.46	13.01	0.95	0.93	0.82	0.99	1184.09
225-ton Crane	43	3.02	12.06	0.64	0.62	0.82	0.84	1175.27
Tugboat	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Loader	59	4.87	11.75	0.82	0.79	0.84	0.86	1177.5
Dump Truck	21	18.74	16.43	3.11	3	1.04	5.01	1499.4
Vibratory Hammer	59	6.46	13.01	0.95	0.93	0.82	0.99	1184.09
Forklift	59	6.5	9.97	0.9	0.88	0.88	0.9	1250.24
Generator Set	43	6.95	13.98	1.35	1.3	0.88	1.85	1250.24
Concrete/Industrial Saw	43	7.17	15.79	1.35	1.3	0.86	1.81	1124.42

Equipment	Emissions (lbs/yr)						
	CO (4)	NO _x (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Excavator	29	77	5	5	6	6	9144
Vibratory Extractor	256	516	38	37	33	39	46947
225-ton Crane	87	348	18	18	24	24	33961
Tugboat	3	3	0	0	0	0	189
Loader	24	58	4	4	4	4	5836
Dump Truck	648	568	108	104	36	173	51841
Forklift	37	56	5	5	5	5	7022
Generator Set	10	20	2	2	1	3	1806
Concrete/Industrial Saw	29	65	6	5	4	7	4603

Wharf Demolition Total (lbs/yr)	1123	1712	186	180	113	262	161348
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Wharf Demolition Total (tons/yr)	0.56	0.86	0.09	0.09	0.06	0.13
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Green House Gas Potential* 1
 Renepishment Site 1 Total CO₂e (metric tons/yr) 73.19

73.19

NOTES:

(1) Air Emissions Guide for Air Force Mobile Sources (USAF 2013)

Mole Pier Mooring Dolphin and Fender Pile Construction

EQUIPMENT

Engine (1)	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Excavator	2000	58	0	0
Diesel Hammer	2000	300	8	70
225-ton Crane	2000	300	8	70
Loader	2000	150	4	70
Dump Truck	2000	490	0	0
Vibratory Hammer	2000	300	8	70
Forklift	2000	85	8	70
Generator Set	2000	30	8	70
Concrete/Industrial Saw	2000	85	0	0

Equipment	Load Factor	Emission Factors (lb/1000 HP-hr)						
		CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Excavator	59	3.75	10.03	0.71	0.68	0.84	0.75	1192.91
Diesel Hammer	59	6.46	13.01	0.95	0.93	0.82	0.99	1184.09
225-ton Crane	43	3.02	12.06	0.64	0.62	0.82	0.84	1175.27
Loader	59	4.87	11.75	0.82	0.79	0.84	0.86	1177.5
Dump Truck	21	18.74	16.43	3.11	3	1.04	5.01	1499.4
Vibratory Hammer	59	6.46	13.01	0.95	0.93	0.82	0.99	1184.09
Forklift	59	6.5	9.97	0.9	0.88	0.88	0.9	1250.24
Generator Set	43	6.95	13.98	1.35	1.3	0.88	1.85	1250.24
Concrete/Industrial Saw	43	7.17	15.79	1.35	1.3	0.86	1.81	1124.42

Equipment		Emissions (lbs/yr)						
		CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Excavator		0	0	0	0	0	0	0
Diesel Hammer		640	1290	94	92	81	98	117367
225-ton Crane		218	871	46	45	59	61	84902
Loader		121	291	20	20	21	21	29178
Dump Truck		0	0	0	0	0	0	0
		640	1290	94	92	81	98	117367
Forklift		183	280	25	25	25	25	35112
Generator Set		50	101	10	9	6	13	9032
Concrete/Industrial Saw		0	0	0	0	0	0	0

Replenishment Site 1 Total (lbs/yr)	1852	4122	290	283	274	317	392957
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Replenishment Site 1 Total (tons/yr)	0.93	2.06	0.14	0.14	0.14	0.16
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Green House Gas Potential* 1

Replenishment Site 1 Total CO₂e (metric tons/yr) 178.25 **178.25**

NOTES:

(1) Air Emissions Guide for Air Force Mobile Sources (USAF 2013)

MGBW Alternative Dredge and Disposal

Nearshore Replenishment Option

EQUIPMENT

Engine	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Main genset	2000	2935	12	135
Aux genset	2000	550	12	135
Spud winch	2000	250	12	135
Tugboat with Barge (Replenishment Site 1) (Two units operating at opposite ends of route) (1)	NA	800	48	135
Tugboat with Barge (Replenishment Site 2) (Two units operating at opposite ends of route) (2)	NA	800	24	135
Tugboat with Barge (Replenishment Site 3) (Two units operating at opposite ends of route) (3)	NA	800	12	135

Assume 12 hours per day at 1,223 cy per day over 135 working days to dredge 165,000 cy.

Equipment	Load Factor	Emission Factors (g/HP-hr)						
		CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Main Genset	0.51	1.83	6.25	0.184	0.184	0.006	0.53	568.3
Aux Genset	0.74	1.49	4.8	0.164	0.164	0.003	0.46	568.3
Spud Winch	0.51	1.39	5.23	0.172	0.172	0.006	0.48	568.3
Tugboat with Barge (Replenishment Site 1)	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Tugboat with Barge (Replenishment Site 2)	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Tugboat with Barge (Replenishment Site 3)	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2

Equipment	Emissions (lbs/yr)						
	CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Main Genset	9783	33412	984	984	32	2833	3038091
Aux Genset	2166	6977	238	238	4	669	826070
Spud Winch	633	2382	78	78	3	219	258781
Tugboat with Barge (Replenishment Site 1)	19429	21029	1234	1234	13	2286	1202751
Tugboat with Barge (Replenishment Site 2)	9714	10514	617	617	6	1143	601375
Tugboat with Barge (Replenishment Site 3)	4857	5257	309	309	3	571	300688

Replenishment Site 1 Total (lbs/yr)	32011	63799	2535	2535	52	6006	5325693
Replenishment Site 2 Total (lbs/yr)	22296	53285	1918	1918	45	4863	4724317
Replenishment Site 3 Total (lbs/yr)	17439	48028	1609	1609	42	4292	4423630

Replenishment Site 1 Total (tons/yr)	16.01	31.90	1.27	1.27	0.03	3.00
Replenishment Site 2 Total (tons/yr)	11.15	26.64	0.96	0.96	0.02	2.43
Replenishment Site 3 Total (tons/yr)	8.72	24.01	0.80	0.80	0.02	2.15

Green House Gas Potential* 1

Replenishment Site 1 Total CO ₂ e (metric tons/yr)	2415.73	2415.73
Replenishment Site 2 Total CO ₂ e (metric tons/yr)	2142.95	2142.95
Replenishment Site 3 Total CO ₂ e (metric tons/yr)	2006.56	2006.56

NOTES:

- (1) Assumed 24 hours for roundtrip barge trip
- (2) Assumed 12 hours for roundtrip barge trip
- (3) Assumed 6 hours for roundtrip barge trip
- (4) Tier 1 Nonroad diesel engine standards. Taken from <http://www.dieselnet.com/standards/us/nonroad.php>
- (5) AP-42 Section 3.4, sulfur content of fuel assumed to be 0.0015%

Ocean Disposal Option

EQUIPMENT

Engine	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Main genset	2000	2935	12	135
Aux genset	2000	550	12	135
Spud winch	2000	250	12	135
Tugboat with Barge (Two units operating at opposite ends of route) (1)	NA	800	24	175

Assume 12 hours per day at 1,223 cy per day over 135 working days to dredge 165,000

Equipment	Load Factor	Emission Factors (g/HP-hr)						
		CO (2)	NOx (2)	PM ₁₀ (2)	PM _{2.5} (2)	SO ₂ (3)	VOC (2)	CO ₂ (3)
Main Genset	0.51	1.83	6.25	0.184	0.184	0.006	0.53	568.3
Aux Genset	0.74	1.49	4.8	0.164	0.164	0.003	0.46	568.3
Spud Winch	0.51	1.39	5.23	0.172	0.172	0.006	0.48	568.3
Tugboat with Barge	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2

Equipment		Emissions (lbs/yr)						
		CO (2)	NOx (2)	PM ₁₀ (2)	PM _{2.5} (2)	SO ₂ (3)	VOC (2)	CO ₂ (3)
Main Genset		9783	33412	984	984	32	2833	3038091
Aux Genset		2166	6977	238	238	4	669	826070
Spud Winch		633	2382	78	78	3	219	258781
Tugboat with Barge		12593	13630	800	800	8	1481	779561
Total (lbs/yr)		25175	56400	2100	2100	47	5202	4902503

Total (tons/yr)	12.59	28.20	1.050	1.050	0.0237	2.60
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Green House Gas Potential* 1
 Total CO₂e (metric tons/yr) 2223.78 **2223.78**

NOTES:

- (1) Assumes 12 hours roundtrip barge trip
- (2) Tier 1 Nonroad diesel engine standards. Taken from <http://www.dieselnet.com/standards/us/nonroad.php>
- (3) AP-42 Section 3.4, sulfur content of fuel assumed to be 0.0015%

* IPCC Second Assessment Report (1996)

Upland Disposal Option

EQUIPMENT

Engine	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Main genset	2000	2935	12	135
Aux genset	2000	550	12	135
Spud winch	2000	250	12	135
Shore-Based Crane	NA	240	12	135
Loader	NA	900	12	135
Tugboat with Barge	NA	800	6	135
Dump Truck - 12 CY HP-hrs (1) (2)	NA	6240	16	135

Assume 12 hours per day at 1,223 cy per day over 135 working days to dredge 165,000

Equipment	Load Factor	Emission Factors (g/HP-hr)						
		CO (3)	NOx (3)	PM ₁₀ (3)	PM _{2.5} (3)	SO ₂ (4)	VOC (3)	CO ₂ (4)
Main Genset	0.51	1.83	6.25	0.184	0.184	0.006	0.53	568.3
Aux Genset	0.74	1.49	4.8	0.164	0.164	0.003	0.46	568.3
Spud Winch	0.51	1.39	5.23	0.172	0.172	0.006	0.48	568.3
Shore-Based Crane	0.6	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Loader	0.5	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Tugboat with Barge	0.2	8.5	9.2	0.54	0.54	0.0055	1.0	526.2
Dump Truck - 12 CY	NA	8.5	9.2	0.54	0.54	0.0055	1.0	526.2

Equipment		Emissions (lbs/yr)						
		CO (3)	NOx (3)	PM ₁₀ (3)	PM _{2.5} (3)	SO ₂ (4)	VOC (3)	CO ₂ (4)
Main Genset		9783	33412	984	984	32	2833	3038091
Aux Genset		2166	6977	238	238	4	669	826070
Spud Winch		633	2382	78	78	3	219	258781
Shore-Based Crane		4371	4731	278	278	3	514	270619
Loader		13661	14786	868	868	9	1607	845684
Tug with Barge		5464	5914	347	347	4	0	0
Dump Truck - 12 CY		117	127	7	7	0	14	7239

Total (lbs/yr)		36195	68329	2801	2801	54	5856	5246484
Total (tons/yr)	18.10	34.16	1.400	1.400	0.0272	2.93		

Green House Gas Potential* 1
 Total CO₂e (metric tons/yr) 2379.81 **2379.81**

NOTES:

- (1) One-way distance from NBSD to Otay Landfill = 12.2 miles
- (2) Assumed 120 roundtrip truck trips per day
- (3) Tier 1 Nonroad diesel engine standards. Taken from <http://www.dieselnet.com/standards/us/nonroad.php>
- (4) AP-42 Section 3.4, sulfur content of fuel assumed to be 0.0015%

MGBW Alternative Mooring Dolphin and Fender Pile Construction

EQUIPMENT

Engine (1)	Model Year	Maximum HP	Assumed Hours of Operation per Day	Assumed Days of Operation per Year
Excavator	2000	58	0	0
Diesel Hammer	2000	300	8	70
225-ton Crane	2000	300	8	70
Loader	2000	150	8	70
Dump Truck	2000	490	0	0
Vibratory Hammer	2000	300	8	70
Forklift	2000	85	8	70
Generator Set	2000	30	8	70
Concrete/Industrial Saw	2000	85	0	0

Equipment	Load Factor	Emission Factors (lb/1000 HP-hr)						
		CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Excavator	59	3.75	10.03	0.71	0.68	0.84	0.75	1192.91
Diesel Hammer	59	6.46	13.01	0.95	0.93	0.82	0.99	1184.09
225-ton Crane	43	3.02	12.06	0.64	0.62	0.82	0.84	1175.27
Loader	59	4.87	11.75	0.82	0.79	0.84	0.86	1177.5
Dump Truck	21	18.74	16.43	3.11	3	1.04	5.01	1499.4
Vibratory Hammer	59	6.46	13.01	0.95	0.93	0.82	0.99	1184.09
Forklift	59	6.5	9.97	0.9	0.88	0.88	0.9	1250.24
Generator Set	43	6.95	13.98	1.35	1.3	0.88	1.85	1250.24
Concrete/Industrial Saw	43	7.17	15.79	1.35	1.3	0.86	1.81	1124.42

Equipment	Emissions (lbs/yr)						
	CO (4)	NOx (4)	PM ₁₀ (4)	PM _{2.5} (4)	SO ₂ (5)	VOC (4)	CO ₂ (5)
Excavator	0	0	0	0	0	0	0
Diesel Hammer	640	1290	94	92	81	98	117367
225-ton Crane	218	871	46	45	59	61	84902
Loader	241	582	41	39	42	43	58357
Dump Truck	0	0	0	0	0	0	0
Vibratory Hammer	640	1290	94	92	81	98	117367
Forklift	183	280	25	25	25	25	35112
Generator Set	50	101	10	9	6	13	9032
Concrete/Industrial Saw	0	0	0	0	0	0	0

Pier 14 Mooring Dolphin and Fender Pile Construction Total (lbs/yr)	1973	4414	310	302	294	338	422136
Pier 14 Mooring Dolphin and Fender Pile 1 Total (tons/yr)	0.99	2.21	0.16	0.15	0.15	0.17	

Green House Gas Potential* 1
 Replenishment Site 1 Total CO₂e (metric tons/yr) 191.48 **191.48**

NOTES:

(1) Air Emissions Guide for Air Force Mobile Sources (USAF 2013)