Appendix J

Air Quality Calculations

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Table 1
Summary of Constructions Emissions by Alternative
Proposed Modernization and Expansion of Townsend Bombing Range

Alternative	Emissions (tons)						Emissions (metric tons)
	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
1	4.5	1.6	8.4	0.010	10	1.4	820
2	3.9	1.4	7.3	0.009	8.4	1.2	716
3	8.3	3.0	16	0.018	17	2.6	1,532
4	5.3	1.9	10	0.012	11	1.7	965

Table 2
Construction Emissions - Alternative 1
Proposed Modernization and Expansion of Townsend Bombing Range

Non-Road Combustion Emissions[1]

Construction Activity	Equipment Type	Fuel Type	No of Units	Daily Oper. Per Unit (hrs/day)	Working Days per Unit (days)	Equip. Engine Size (hp)	Load Factor	Emission Factor[2] (g/hp-hr)							Emissions (tons)						GHG Emissions (metric tons)
								NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Clearing[3]	Chain Saw	Gasoline	8	6	82	6.6	0.70	1.353	59.788	289.454	0.008	9.748	9.748	685.997	0.027	1.2	5.8	0.0002	0.20	0.20	12
	Backhoe/Loader	Diesel	2	8	82	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.15	0.031	0.18	0.0002	0.027	0.027	19
	Skid steer Loader	Diesel	2	8	21	168	0.59	5.510	0.978	3.883	0.007	0.667	0.667	623.483	0.20	0.036	0.14	0.0003	0.024	0.024	21
	Dozer	Diesel	4	6	33	299	0.58	2.184	0.184	0.742	0.006	0.148	0.148	536.249	0.33	0.028	0.11	0.0009	0.022	0.022	74
	Dump Truck (12 CY)	Diesel	6	8	82	275	0.21	1.535	0.152	0.444	0.005	0.084	0.084	536.351	0.38	0.038	0.11	0.0013	0.021	0.021	122
	Subtotal							-	-	-	-	-	-	-	**1.1**	**1.3**	**6.4**	**0.0028**	**0.29**	**0.29**	**248**
Cut, Fill, Excavate, Borrow[4]	Skid steer Loader	Diesel	3	8	46	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.11	0.024	0.12	0.0002	0.018	0.018	12
	Dump Truck (12 CY)	Diesel	6	8	46	710	0.59	2.807	0.169	1.581	0.006	0.169	0.169	536.047	2.9	0.17	1.6	0.0061	0.17	0.17	496
	Backhoe/Loader	Diesel	2	8	46	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.084	0.017	0.10	0.0001	0.015	0.015	10
	Excavator	Diesel	2	8	8	513	0.59	2.565	0.166	1.010	0.006	0.154	0.154	536.307	0.11	0.0071	0.043	0.0003	0.0066	0.0066	21
	Dozer	Diesel	2	8	8	620	0.59	2.855	0.171	1.599	0.006	0.171	0.171	536.294	0.15	0.0088	0.083	0.0003	0.0088	0.0088	25
	Small Generator	Diesel	10	8	4	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.0087	0.0012	0.007	0.0000	0.0009	0.0009	1
	Subtotal							-	-	-	-	-	-	-	**3.3**	**0.23**	**2.0**	**0.0070**	**0.22**	**0.22**	**565**
Grading/Site Prep (grading, drainage, utilities, etc.)[4]	Dozer	Diesel	2	6	6	90	0.59	2.907	0.245	2.709	0.007	0.359	0.359	595.388	0.012	0.0010	0.011	0.00003	0.0015	0.0015	2
	Skid steer Loader	Diesel	4	4	17	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.026	0.0059	0.029	0.00004	0.0045	0.0045	3
	Backhoe/Loader	Diesel	2	6	12	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.016	0.0034	0.020	0.00003	0.0030	0.0030	2
	Small Generator	Diesel	2	4	17	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.004	0.0005	0.0030	0.000005	0.0004	0.0004	0.3
	Subtotal							-	-	-	-	-	-	-	**0.059**	**0.011**	**0.064**	**0.00010**	**0.0093**	**0.0093**	**8**
TOTAL								-	-	-	-	-	-	-	**4.5**	**1.6**	**8.4**	**0.010**	**0.52**	**0.52**	**820**

Notes:

1. Estimates of the type of equipment, number of units, daily operation, working days per unit, equipment engine size, and load factor are based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

2. Emission factors from USEPA's NONROAD emission model for CY 2014.

3. For Alternative 1, the total disturbed area for the construction period is estimated at 200 acres. It is estimated that 80% (i.e., 160 acres) would be cleared. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 176 acres.

4. For Alternative 1, the total disturbed area for the construction period is estimated at 200 acres. It is estimated that 8% (i.e., 16 acres) would be graded. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 17.6 acres.

Fugitive Dust Emissions[4]

Area of Disturbance (acres)	Duration of Disturbance (months)	$PM_{2.5}$ to PM_{10} Ratio[5]	Emission Factor[6] (tons per acre-month)		Emissions (tons)	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
15	5.5	0.1	0.11	0.011	9.1	0.91

Notes:

4. Estimates of the area and duration of disturbance based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

5. Ratio from Executive Summary of "Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust - Final Report" (Western Governors' Association Western Regional Air Partnership (WRAP), October 2005).

6. PM_{10} emission factor from Table 3.2 of "WRAP Fugitive Dust Handbook" (Western Governer's Association, September 2006). $PM_{2.5}$ emission factor calculated using $PM_{2.5}$ to PM_{10} ratio and PM_{10} emission factor.

TOTAL EMISSIONS:

Emissions (tons)						Emissions (metric tons)
NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
4.5	1.6	8.4	0.010	10	1.4	820

Table 3
Construction Emissions - Alternative 2
Proposed Modernization and Expansion of Townsend Bombing Range

Non-Road Combustion Emissions[1]

Construction Activity	Equipment Type	Fuel Type	No of Units	Daily Oper. Per Unit (hrs/day)	Working Days per Unit (days)	Equip. Engine Size (hp)	Load Factor	Emission Factor[2] (g/hp-hr)							Emissions (tons)						GHG Emissions (metric tons)
								NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Clearing[3]	Chain Saw	Gasoline	8	6	72	6.6	0.70	1.353	59.788	289.454	0.008	9.748	9.748	685.997	0.024	1.1	5.1	0.0001	0.17	0.17	11
	Backhoe/Loader	Diesel	2	8	72	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.13	0.027	0.16	0.0002	0.024	0.024	16
	Skid steer Loader	Diesel	2	8	19	168	0.59	5.510	0.978	3.883	0.007	0.667	0.667	623.483	0.18	0.032	0.13	0.0002	0.022	0.022	19
	Dozer	Diesel	4	6	29	299	0.58	2.184	0.184	0.742	0.006	0.148	0.148	536.249	0.29	0.024	0.10	0.0008	0.020	0.020	65
	Dump Truck (12 CY)	Diesel	6	8	72	275	0.21	1.535	0.152	0.444	0.005	0.084	0.084	536.351	0.34	0.033	0.10	0.0011	0.018	0.018	107
	Subtotal							-	-	-	-	-	-	-	**1.0**	**1.2**	**5.6**	**0.0025**	**0.26**	**0.26**	**218**
Cut, Fill, Excavate, Borrow[4]	Skid steer Loader	Diesel	3	8	40	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.09	0.021	0.10	0.0001	0.016	0.016	10
	Dump Truck (12 CY)	Diesel	6	8	40	710	0.59	2.807	0.169	1.581	0.006	0.169	0.169	536.047	2.5	0.15	1.4	0.0053	0.15	0.15	431
	Backhoe/Loader	Diesel	2	8	40	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.073	0.015	0.09	0.0001	0.013	0.013	9
	Excavator	Diesel	2	8	7	513	0.59	2.565	0.166	1.010	0.006	0.154	0.154	536.307	0.10	0.0062	0.038	0.0002	0.0058	0.0058	18
	Dozer	Diesel	2	8	7	620	0.59	2.855	0.171	1.599	0.006	0.171	0.171	536.294	0.13	0.0077	0.072	0.0003	0.0077	0.0077	22
	Small Generator	Diesel	10	8	4	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.0087	0.0012	0.007	0.0000	0.0009	0.0009	1
	Subtotal							-	-	-	-	-	-	-	**2.9**	**0.20**	**1.7**	**0.0061**	**0.19**	**0.19**	**491**
Grading/Site Prep (grading, drainage, utilities, etc.)[4]	Dozer	Diesel	2	6	5	90	0.59	2.907	0.245	2.709	0.007	0.359	0.359	595.388	0.010	0.0009	0.010	0.00002	0.0013	0.0013	2
	Skid steer Loader	Diesel	4	4	15	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.023	0.0052	0.026	0.00003	0.0039	0.0039	3
	Backhoe/Loader	Diesel	2	6	11	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.015	0.0031	0.018	0.00002	0.0027	0.0027	2
	Small Generator	Diesel	2	4	15	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.003	0.0005	0.0026	0.000004	0.0003	0.0003	0.3
	Subtotal							-	-	-	-	-	-	-	**0.052**	**0.010**	**0.056**	**0.00009**	**0.0083**	**0.0083**	**7**
TOTAL								-	-	-	-	-	-	-	**3.9**	**1.4**	**7.3**	**0.009**	**0.46**	**0.46**	**716**

Notes:

1. Estimates of the type of equipment, number of units, daily operation, working days per unit, equipment engine size, and load factor are based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

2. Emission factors from USEPA's NONROAD emission model for CY 2014.

3. For Alternative 2, the total disturbed area for the construction period is estimated at 174 acres. It is estimated that 80% (i.e., 139 acres) would be cleared. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 176 acres.

4. For Alternative 2, the total disturbed area for the construction period is estimated at 174 acres. It is estimated that 8% (i.e., 14 acres) would be graded. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 17.6 acres.

Fugitive Dust Emissions[4]

Area of Disturbance (acres)	Duration of Disturbance (months)	$PM_{2.5}$ to PM_{10} Ratio[5]	Emission Factor[6] (tons per acre-month)		Emissions (tons)	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
15	4.8	0.1	0.11	0.011	7.9	0.79

Notes:

4. Estimates of the area and duration of disturbance based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

5. Ratio from Executive Summary of "Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust - Final Report" (Western Governors' Association Western Regional Air Partnership (WRAP), October 2005).

6. PM_{10} emission factor from Table 3.2 of "WRAP Fugitive Dust Handbook" (Western Governer's Association, September 2006). $PM_{2.5}$ emission factor calculated using $PM_{2.5}$ to PM_{10} ratio and PM_{10} emission factor.

TOTAL EMISSIONS:

Emissions (tons)						Emissions (metric tons)
NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
3.9	1.4	7.3	0.009	8.4	1.2	716

Table 4
Construction Emissions - Alternative 3
Proposed Modernization and Expansion of Townsend Bombing Range

Non-Road Combustion Emissions[1]

Construction Activity	Equipment Type	Fuel Type	No of Units	Daily Oper. Per Unit (hrs/day)	Working Days per Unit (days)	Equip. Engine Size (hp)	Load Factor	Emission Factor[2] (g/hp-hr)							Emissions (tons)						GHG Emissions (metric tons)
								NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Clearing[3]	Chain Saw	Gasoline	8	6	155	6.6	0.70	1.353	59.788	289.454	0.008	9.748	9.748	685.997	0.051	2.3	11	0.0003	0.37	0.37	24
	Backhoe/Loader	Diesel	2	8	155	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.28	0.058	0.34	0.0005	0.051	0.051	35
	Skid steer Loader	Diesel	2	8	40	168	0.59	5.510	0.978	3.883	0.007	0.667	0.667	623.483	0.39	0.068	0.27	0.0005	0.047	0.047	40
	Dozer	Diesel	4	6	62	299	0.58	2.184	0.184	0.742	0.006	0.148	0.148	536.249	0.62	0.052	0.21	0.0017	0.042	0.042	138
	Dump Truck (12 CY)	Diesel	6	8	155	275	0.21	1.535	0.152	0.444	0.005	0.084	0.084	536.351	0.73	0.072	0.21	0.0024	0.040	0.040	230
	Subtotal							-	-	-	-	-	-	-	**2.1**	**2.5**	**12**	**0.0053**	**0.55**	**0.55**	**467**
Cut, Fill, Excavate, Borrow[4]	Skid steer Loader	Diesel	3	8	86	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.20	0.045	0.22	0.0003	0.034	0.034	22
	Dump Truck (12 CY)	Diesel	6	8	86	710	0.59	2.807	0.169	1.581	0.006	0.169	0.169	536.047	5.4	0.32	3.0	0.011	0.32	0.32	927
	Backhoe/Loader	Diesel	2	8	86	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.16	0.032	0.19	0.0002	0.028	0.028	20
	Excavator	Diesel	2	8	14	513	0.59	2.565	0.166	1.010	0.006	0.154	0.154	536.307	0.19	0.012	0.075	0.0004	0.012	0.012	36
	Dozer	Diesel	2	8	14	620	0.59	2.855	0.171	1.599	0.006	0.171	0.171	536.294	0.26	0.015	0.14	0.0005	0.015	0.015	44
	Small Generator	Diesel	10	8	7	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.015	0.0022	0.012	0.0000	0.0016	0.0016	1
	Subtotal							-	-	-	-	-	-	-	**6.2**	**0.43**	**3.7**	**0.0130**	**0.41**	**0.41**	**1,050**
Grading/Site Prep (grading, drainage, utilities, etc.)[4]	Dozer	Diesel	2	6	11	90	0.59	2.907	0.245	2.709	0.007	0.359	0.359	595.388	0.022	0.0019	0.021	0.00005	0.0028	0.0028	4
	Skid steer Loader	Diesel	4	4	31	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.048	0.011	0.053	0.00007	0.0081	0.0081	5
	Backhoe/Loader	Diesel	2	6	23	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.031	0.0065	0.038	0.00005	0.0057	0.0057	4
	Small Generator	Diesel	2	4	31	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.007	0.0010	0.0055	0.000008	0.0007	0.0007	0.6
	Subtotal							-	-	-	-	-	-	-	**0.109**	**0.020**	**0.118**	**0.00018**	**0.017**	**0.017**	**14**
TOTAL								-	-	-	-	-	-	-	**8.3**	**3.0**	**16**	**0.018**	**0.98**	**0.98**	**1,532**

Notes:

1. Estimates of the type of equipment, number of units, daily operation, working days per unit, equipment engine size, and load factor are based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

2. Emission factors from USEPA's NONROAD emission model for CY 2014.

3. For Alternative 3, the total disturbed area for the construction period is estimated at 379 acres. It is estimated that 80% (i.e., 303 acres) would be cleared. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 176 acres.

4. For Alternative 3, the total disturbed area for the construction period is estimated at 379 acres. It is estimated that 8% (i.e., 30 acres) would be graded. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 17.6 acres.

Fugitive Dust Emissions[4]

Area of Disturbance (acres)	Duration of Disturbance (months)	$PM_{2.5}$ to PM_{10} Ratio[5]	Emission Factor[6] (tons per acre-month)		Emissions (tons)	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
15	10	0.1	0.11	0.011	17	1.7

Notes:

4. Estimates of the area and duration of disturbance based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

5. Ratio from Executive Summary of "Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust - Final Report" (Western Governors' Association Western Regional Air Partnership (WRAP), October 2005).

6. PM_{10} emission factor from Table 3.2 of "WRAP Fugitive Dust Handbook" (Western Governer's Association, September 2006). $PM_{2.5}$ emission factor calculated using $PM_{2.5}$ to PM_{10} ratio and PM_{10} emission factor.

TOTAL EMISSIONS:

Emissions (tons)						Emissions (metric tons)
NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
8.3	3.0	16	0.018	17	2.6	1,532

Table 5
Construction Emissions - Alternative 4
Proposed Modernization and Expansion of Townsend Bombing Range

Non-Road Combustion Emissions[1]

Construction Activity	Equipment Type	Fuel Type	No of Units	Daily Oper. Per Unit (hrs/day)	Working Days per Unit (days)	Equip. Engine Size (hp)	Load Factor	Emission Factor[2] (g/hp-hr)							Emissions (tons)						GHG Emissions (metric tons)
								NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2	NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
Clearing[3]	Chain Saw	Gasoline	8	6	98	6.6	0.70	1.353	59.788	289.454	0.008	9.748	9.748	685.997	0.032	1.4	6.9	0.0002	0.23	0.23	15
	Backhoe/Loader	Diesel	2	8	98	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.18	0.037	0.22	0.0003	0.032	0.032	22
	Skid steer Loader	Diesel	2	8	25	168	0.59	5.510	0.978	3.883	0.007	0.667	0.667	623.483	0.24	0.043	0.17	0.0003	0.029	0.029	25
	Dozer	Diesel	4	6	39	299	0.58	2.184	0.184	0.742	0.006	0.148	0.148	536.249	0.39	0.033	0.13	0.0011	0.026	0.026	87
	Dump Truck (12 CY)	Diesel	6	8	98	275	0.21	1.535	0.152	0.444	0.005	0.084	0.084	536.351	0.46	0.046	0.13	0.0015	0.025	0.025	146
	Subtotal							-	-	-	-	-	-	-	**1.3**	**1.6**	**7.6**	**0.0034**	**0.35**	**0.35**	**295**
Cut, Fill, Excavate, Borrow[4]	Skid steer Loader	Diesel	3	8	54	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.13	0.028	0.14	0.0002	0.021	0.021	14
	Dump Truck (12 CY)	Diesel	6	8	54	710	0.59	2.807	0.169	1.581	0.006	0.169	0.169	536.047	3.4	0.20	1.9	0.0072	0.20	0.20	582
	Backhoe/Loader	Diesel	2	8	54	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.098	0.020	0.12	0.0002	0.018	0.018	12
	Excavator	Diesel	2	8	9	513	0.59	2.565	0.166	1.010	0.006	0.154	0.154	536.307	0.12	0.0080	0.049	0.0003	0.0074	0.0074	23
	Dozer	Diesel	2	8	9	620	0.59	2.855	0.171	1.599	0.006	0.171	0.171	536.294	0.17	0.0099	0.093	0.0003	0.0099	0.0099	28
	Small Generator	Diesel	10	8	5	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.0109	0.0016	0.009	0.0000	0.0012	0.0012	1
	Subtotal							-	-	-	-	-	-	-	**3.9**	**0.27**	**2.3**	**0.0082**	**0.26**	**0.26**	**661**
Grading/Site Prep (grading, drainage, utilities, etc.)[4]	Dozer	Diesel	2	6	7	90	0.59	2.907	0.245	2.709	0.007	0.359	0.359	595.388	0.014	0.0012	0.013	0.00003	0.0018	0.0018	3
	Skid steer Loader	Diesel	4	4	20	67	0.23	5.709	1.272	6.308	0.008	0.965	0.965	692.019	0.031	0.0069	0.034	0.00004	0.0052	0.0052	3
	Backhoe/Loader	Diesel	2	6	15	98	0.21	5.021	1.033	6.128	0.008	0.912	0.912	692.767	0.021	0.0042	0.025	0.00003	0.0037	0.0037	3
	Small Generator	Diesel	2	4	20	10	0.43	5.754	0.823	4.637	0.007	0.609	0.609	587.780	0.004	0.0006	0.0035	0.000005	0.0005	0.0005	0.4
	Subtotal							-	-	-	-	-	-	-	**0.070**	**0.013**	**0.076**	**0.00012**	**0.0112**	**0.0112**	**9**
TOTAL								-	-	-	-	-	-	-	**5.3**	**1.9**	**10**	**0.012**	**0.62**	**0.62**	**965**

Notes:

1. Estimates of the type of equipment, number of units, daily operation, working days per unit, equipment engine size, and load factor are based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

2. Emission factors from USEPA's NONROAD emission model for CY 2014.

3. For Alternative 4, the total disturbed area for the construction period is estimated at 237 acres. It is estimated that 80% (i.e., 190 acres) would be cleared. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 176 acres.

4. For Alternative 4, the total disturbed area for the construction period is estimated at 237 acres. It is estimated that 8% (i.e., 19 acres) would be graded. The working days for each unit were adjusted to account for the difference in acreage listed in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008), which was 17.6 acres.

Fugitive Dust Emissions[4]

Area of Disturbance (acres)	Duration of Disturbance (months)	$PM_{2.5}$ to PM_{10} Ratio[5]	Emission Factor[6] (tons per acre-month)		Emissions (tons)	
			PM_{10}	$PM_{2.5}$	PM_{10}	$PM_{2.5}$
15	6.5	0.1	0.11	0.011	10.7	1.1

Notes:

4. Estimates of the area and duration of disturbance based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).

5. Ratio from Executive Summary of "Analysis of the Fine Fraction of Particulate Matter in Fugitive Dust - Final Report" (Western Governors' Association Western Regional Air Partnership (WRAP), October 2005).

6. PM_{10} emission factor from Table 3.2 of "WRAP Fugitive Dust Handbook" (Western Governer's Association, September 2006). $PM_{2.5}$ emission factor calculated using $PM_{2.5}$ to PM_{10} ratio and PM_{10} emission factor.

TOTAL EMISSIONS:

Emissions (tons)						Emissions (metric tons)
NO_x	VOC	CO	SO_2	PM_{10}	$PM_{2.5}$	CO_2
5.3	1.9	10	0.012	11	1.7	965

Table 6
Prescribed Fires - Operational Emissions
Proposed Modernization and Expansion of Townsend Bombing Range

Alternative	Acquisition Areas	Area Affected by Each Alternative: Area of Classified Softwood Forest Product (acres)	Area Affected by Each Alternative: Fraction of Area with Prescribed Burning Each Year	Area Affected by Each Alternative: Annual Area of Prescribed Burns (acres)	Current Annual Baseline Area of Prescribed Burns (acres)	New Total Annual Area of Prescribed Burns[1] (acres)	Vegetation Fraction[2]: Long Needle (Pine)	Vegetation Fraction[2]: Palmetto /Gallberry	Area of Prescrived Burn by Vegetation Type (acre/yr): Long Needle (Pine)	Area of Prescrived Burn by Vegetation Type (acre/yr): Palmetto /Gallberry	Fuel Loading[3] (ton/acre): Long Needle (Pine)	Fuel Loading[3] (ton/acre): Palmetto /Gallberry	Fuel Amount (ton/yr): Long Needle (Pine)	Fuel Amount (ton/yr): Palmetto /Gallberry
1	1A+1B	8,881	33.3%	2,957	1,310	4,267	0.83	0.17	3,542	725	3.48	4.87	12,326	3,533
2	3	18,092	33.3%	6,025	1,310	7,335	0.83	0.17	6,088	1,247	3.48	4.87	21,185	6,072
3	1A+1B+3	26,973	33.3%	8,982	1,310	10,292	0.83	0.17	8,542	1,750	3.48	4.87	29,727	8,521
4	1B+3	22,044	33.3%	7,341	1,310	8,651	0.83	0.17	7,180	1,471	3.48	4.87	24,987	7,162
No Action	-	0	33.3%	0	1,310	1,310	0.83	0.17	1,087	223	3.48	4.87	3,784	1,085

Notes:

1. Total area includes areas from each alternative added to the baseline area.
2. Estimates of vegetation fraction based on listing in Appendix C of the "Environmental Assessment U.S Marine Corps and U.S. Navy Operations at for the Townsend Bombing Range, GA" (October 2008).
3. Fuel loading based on Table 1 in "NWCG Fireline Handbook Fireline Handbook - Appendix B: Fire Behavior" (National Wildfire Coordinating Group, April 2006).

Emission Factors for Prescribed Burning of Long Needle Conifer (Pine)[4] (g/kg): VOC	CO	PM_{10}	$PM_{2.5}$	Emission Factors for Prescribed Burning of Palmetto/Gallberry[4] (g/kg): VOC	CO	PM_{10}	$PM_{2.5}$
3.5	200.00	40.0	40.00	0.0	150.00	15.0	15.00

Notes:

4. Emission factors from USEPA's AP-42, Section 13.2: "Wildfires And Prescribed Burning".

Alternative	Emissions (tons): VOC	CO	PM_{10}	$PM_{2.5}$
1	43	2,995	546	546
2	74	5,148	938	938
3	104	7,224	1,317	1,317
4	87	6,072	1,107	1,107
No Action	13	919	168	168