E Air Quality Supporting Materials

GENERAL CONFORMITY - RECORD OF NON-APPLICABILITY (RONA)

for

Disposal and Reuse of NAS Brunswick
NAS Brunswick, Brunswick, ME

The 1990 Amendments to Section 176 of the Clean Air Act require the EPA to promulgate rules to ensure that federal actions conform to the appropriate State Implementation Plan (SIP). These rules, known as the General Conformity Rule (40 CFR §§ 51.850-.860 and 40 CFR §§ 93.150-.160), require any federal agency responsible for an action in a nonattainment area to determine that the action conforms to the applicable SIP or that the action is exempt from the General Conformity Rule requirements.

In accordance with revisions to 40 CFR 93.153 published July 6, 2010, General Conformity requirements shall not apply to federal actions that involve the transfer of ownership, interests, and titles in land, facilities, and real and personal properties, regardless of the form or method of transfer (40 CFR 93.153(c)(2)(xiv).

Under either Alternative 1 or Alternative 2, the disposal and transfer of NAS Brunswick land and improvements would be carried out by the Navy and is exempt from the General Conformity Rule requirements under (40 CFR 93.153(c)(2)(xiv).

SIGNED:

Wm. A. FITZGERALD
Captain, U.S. Navy
Commanding Officer

10 OCT 10
Date

Build-Out Plan Summary

Alt 1 SUMMARY

	5 Years			10 Years			15 Years			20 Years (Full Build-out)		
	Existing	New	Total	Existing	New	Total	Existing	New	Total	Existing	New	Total
Non-Residential (Square Feet)	700,539	383,513	1,084,052	1,119,460	1,606,524	2,725,984	1,119,460	4,037,312	5,156,772	1,119,460	8,074,625	**9,194,085**
Civic and Cultural	9,293	21,986	31,278	18,585	80,846	99,431	18,585	161,692	180,277	18,585	323,385	341,970
Education Facility	45,353	14,657	60,010	90,706	36,643	127,349	90,706	73,286	163,992	90,706	146,572	237,278
Industry, Warehouse, and Storage	91,649	169,315	260,964	158,775	538,699	697,474	158,775	1,423,627	1,582,402	158,775	2,847,255	3,006,030
Office	80,683	116,727	197,410	161,365	622,188	783,553	161,365	1,289,621	1,450,986	161,365	2,579,243	2,740,608
Retail and Commercial	87,920	60,827	148,747	175,840	183,886	359,726	175,840	367,773	543,613	175,840	735,545	911,385
Transportation Facility	385,642	0	385,642	514,189	144,263	658,452	514,189	721,313	1,235,502	514,189	1,442,626	1,956,815
Hotel or Motel (Rooms)	125	0	125	250	0	250	250	0	250	250	0	250
Residential (Units)	248	216	464	496	541	1,037	639	1,082	1,721	782	2,164	**2,947**
Single Family - 2 Bedroom	31	0	31	62	0	62	92	0	92	123	0	123
Single Family - 3 Bedroom	39	0	39	79	0	79	118	0	118	157	0	157
Single Family - 4 Bedroom	17	0	17	33	0	33	50	0	50	66	0	66
Single Family - 5 Bedroom	1	0	1	2	0	2	2	0	2	3	0	3
Townhome/Condo - 2 Bedroom	10	0	10	20	0	20	30	0	30	40	0	40
Townhome/Condo - 3 Bedroom	39	0	39	78	0	78	116	0	116	155	0	155
Townhome/Condo - 4 Bedroom	7	0	7	15	0	15	22	0	22	29	0	29
Townhome/Condo - 5 Bedroom	0	0	0	0	0	0	0	0	0	0	0	0
Apartment - 1 Bedroom	0	65	65	0	162	162	0	325	325	0	649	649
Apartment - 2 Bedroom	40	54	94	80	135	215	80	271	351	80	541	621
Apartment - 3 Bedroom	0	54	54	0	135	135	0	271	271	0	541	541
Apartment - 4 Bedroom	0	0	0	0	0	0	0	0	0	0	0	0
Senior Housing - 1 Bedroom	0	43	43	0	108	108	0	216	216	0	433	433
Student Housing	65	0	65	129	0	129	129	0	129	129	0	129

Build-Out Plan Summary

Alt 2 SUMMARY

	5 Years			10 Years			15 Years			20 Years (Full Build-out)		
	Existing	New	Total	Existing	New	Total	Existing	New	Total	Existing	New	Total
Non-Residential (Square Feet)	559,730	989,417	1,549,147	1,119,460	2,473,542	3,593,002	1,119,460	4,947,084	6,066,544	1,119,460	9,894,168	**11,013,628**
Civic and Cultural	9,293	66,013	75,305	18,585	165,032	183,617	18,585	330,063	348,648	18,585	660,127	678,712
Education Facility	45,353	76,941	122,294	90,706	192,352	283,058	90,706	384,704	475,410	90,706	769,408	860,114
Industry, Warehouse, and Storage	96,968	346,433	443,401	193,935	866,083	1,060,018	193,935	1,732,166	1,926,101	193,935	3,464,332	3,658,267
Office	311,697	326,507	638,204	623,394	816,268	1,439,662	623,394	1,632,536	2,255,930	623,394	3,265,071	3,888,465
Retail and Commercial	96,420	173,523	269,943	192,840	433,808	626,648	192,840	867,615	1,060,455	192,840	1,735,230	1,928,070
Transportation Facility	0	0	0	0	0	0	0	0	0	0	0	0
Hotel or Motel (Rooms)	125	0	125	250	0	250	250	0	250	250	0	250
Residential (Units)	248	744	992	496	1,859	2,355	639	3,718	4,357	782	7,436	**8,219**
Single Family - 2 Bedroom	31	0	31	62	0	62	92	0	92	123	0	123
Single Family - 3 Bedroom	39	52	91	79	130	208	118	259	377	157	519	676
Single Family - 4 Bedroom	17	17	34	33	43	76	50	86	136	66	173	239
Single Family - 5 Bedroom	1	0	1	2	0	2	2	0	2	3	0	3
Townhome/Condo - 2 Bedroom	10	9	19	20	22	42	30	43	73	40	86	126
Townhome/Condo - 3 Bedroom	39	9	47	78	22	99	116	43	159	155	86	241
Townhome/Condo - 4 Bedroom	7	0	7	15	0	15	22	0	22	29	0	29
Townhome/Condo - 5 Bedroom	0	0	0	0	0	0	0	0	0	0	0	0
Apartment - 1 Bedroom	0	195	195	0	487	487	0	975	975	0	1,949	1,949
Apartment - 2 Bedroom	40	162	202	80	406	486	80	812	892	80	1,625	1,705
Apartment - 3 Bedroom	0	162	162	0	406	406	0	812	812	0	1,625	1,625
Apartment - 4 Bedroom	0	0	0	0	0	0	0	0	0	0	0	0
Senior Housing - 1 Bedroom	0	130	130	0	325	325	0	650	650	0	1,300	1,300
Student Housing	65	7	72	129	18	148	129	37	166	129	73	203

Energy Intensity Factors

Energy Intensity by Building Use: Commercial

Building Use	Existing Averages[1]		
	Electricity intensity (kWh/sq ft)	**Natural Gas Energy Intensity** (cubic feet/	**Fuel Oil Energy Intensity** (gallons/
Education	11.039	36.9	0.18
Food Sales	48.606	50.2	Q
Food Service	38.089	141.2	Q
Health Care	23.079	92.5	0.04
Inpatient	27.297	109.8	0.04
Outpatient	15.898	50.2	Q
Lodging	13.540	48.9	0.12
Mercantile	0.000	32.5	Q
Enclosed and Strip Malls	0.000	30.9	Q
Retail (Other Than Mall)	14.362	33.4	Q
Office	17.284	31.8	0.03
Public Assembly	12.440	36.4	0.22
Public Order and Safety	15.596	43.7	Q
Religious Worship	4.795	30.3	0.29
Service	10.864	54.1	Q
Warehouse and Storage	7.144	23.4	0.05
Other	22.440	67.6	Q
Vacant	1.558	23.0	Q

[1]Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

http://www.eia.doe.gov/emeu/cbecs/cbecs2003/detailed_tables_2003/detailed_tables_2003.html#enduse03

Energy Intensity by Use: Residential

		Annual Fuels Used (physical units of consumption per household using the fuel)		
	U.S. Households (Millions)	**Electricity** (kWh)	**Natural Gas** (thousand cf)	**Fuel Oil** (gallons)
Existing Homes[1]				
Single-Family Detached	72.1	13,159	73	770
Single-Family Attached	7.6	9,240	68	649
Apartments in 2-4 Unit Buildings	7.8	7,460	66	687
Apartments in 5 or More Unit Buildings	16.7	7,001	41	721
New Homes (25% more efficient than U.S. Average)				
Single-Family Detached		9,869	55	578
Single-Family Attached		6,930	51	487
Apartments in 2-4 Unit Buildings		5,595	50	515
Apartments in 5 or More Unit Buildings		5,251	31	541

[1]Energy Information Administration, 2005 Residential Energy Consumption Survey

http://www.eia.doe.gov/emeu/recs/recs2005/c&e/detailed_tables2005c&e.html

(Table US8)

Existing Energy Use, NAS Brunswick Facilities

Existing Commercial/Industrial

	Sq ft	Electricity (kwh) Use per sq ft[1]	Estimated Annual Electricity (kwh)
Civic and Cultural	18,585	15.596	289,858
Education/Medical Facility	83,206	15.898	1,322,830
Hotel or Motel	136,770	13.540	1,851,870
Industry, Warehouse, and Storage	158,775	7.144	1,134,332
Office	136,365	17.284	2,356,898
Retail and Commercial	178,880	14.362	2,569,043
Student/Bachelor Housing	196,522	13.540	2,660,914
Transportation Facility	514,189	22.440	11,538,188
Total	**1,423,292**		**23,723,934**

[1]Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

Reported Annual Direct Emissions, NAS Brunswick, 2001-2008

Year	Emissions of Pollutants (tons)							
	SO2	NOx	CO	PM10	VOC	TSP/PM	HAPs	Lead
1995	69.81	48.85	6.32	13.97	16.38	14.11	2.73	1.09E-02
1996	70.6	49.92	6.41	13.93	18.87	14.08	1.27	1.45E-02
1997	68.02	49.27	6.4	13.77	20.68	13.93	3	3.65E-03
1998	60.89	45.16	6.33	12.05	21.93	12.22	2.74	3.00E-03
1999	56.95	42.79	5.63	11.19	18.94	11.34	2.28	2.23E-02
2000	47.62	33.76	6.37	8.35	21.13	8.55	1.35	8.47E-04
2001	38.69	28.84	6.49	6.67	22.16	6.79	1.50	4.40E-04
2002	2.99	16.92	11.06	1.38	19.38	0.79	0.78	8.58E-05
2003	6.77	19.57	14.37	2.43	17.91	1.74	0.76	1.60E-04
2004	3.33	19.80	14.40	3.33	19.23	3.33	1.13	9.25E-05
2005	4.53	16.88	11.99	3.08	11.73	3.08	1.85	1.06E-04
2006	1.74	11.75	6.47	2.05	11.57	2.05	2.05	5.19E-05
2007	1.76	12.37	7.41	2.48	12.70	2.48	2.06	5.90E-05
2008	1.85	14.22	8.80	2.44	11.82	2.44	2.58	5.53E-05
Licensed Thresholds**	***88.2***	***74.6***	***23.5***	***21.5***	***48.0***	***21.5***	***9.9***	***9.9***

U.S. Department of the Navy. 2009. NAS Brunswick 2008 Air Emission Inventory Report.

Alternative 1: Building Energy Use, 2016

New Residential		Annual Fuel Use By Unit[1]			Total Annual Fuel Use		
Type	Units	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)
Single Family - 2 Bedroom	31	9,869	55	578	303,479	1,684	17,758
Single Family - 3 Bedroom	39	9,869	55	578	387,368	2,149	22,667
Single Family - 4 Bedroom	17	9,869	55	578	162,843	903	9,529
Single Family - 5 Bedroom	1	9,869	55	578	7,402	41	433
Townhome/Condo - 2 Bedroom	10	6,930	51	487	69,300	510	4,868
Townhome/Condo - 3 Bedroom	39	6,930	51	487	268,538	1,976	18,862
Townhome/Condo - 4 Bedroom	7	6,930	51	487	50,243	370	3,529
Townhome/Condo - 5 Bedroom	0	6,930	51	487	0	0	0
Apartment - 1 Bedroom	65	5,595	50	515	363,270	3,214	33,454
Apartment - 2 Bedroom	94	5,595	50	515	526,525	4,658	48,488
Apartment - 3 Bedroom	54	5,595	50	515	302,725	2,678	27,878
Apartment - 4 Bedroom	0	5,595	50	515	0	0	0
Senior Housing - 1 Bedroom	43	5,251	31	541	227,279	1,331	23,406
Student Housing	65	5,251	31	541	339,549	1,989	34,969
Total Housing, 2016	**464**				**3,008,520**	**21,503**	**245,840**
				Total Fuel Use, Housing	**3,008,520**	**21,503**	**245,840**

[1]25 % more efficent than Average household energy use, Energy Information Administration, 2005 Residential Energy Consumption Survey

Commercial and Industrial Building Energy Intensity: Alternative 1

		Annual Fuel Use per Sq Ft			Total Annual Fuel Use		
	Sq ft	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)
Civic and Cultural	31,278	15.596	43.700	0.22	487,826	1,366,860	6,881
Education/Medical Facility	60,010	15.898	50.2	0.18	954,057	3,012,510	10,802
Industry, Warehouse, and Storage	260,964	7.144	23.400	0.050	1,864,400	6,106,562	13,048
Office	197,410	17.284	31.800	0.030	3,411,982	6,277,634	5,922
Retail and Commercial	148,747	14.362	33.400	0	2,136,283	4,968,160	0
Transportation Facility	385,642	22.440	67.600	0	8,653,641	26,069,382	0
Hotel or Motel (not included in sq ft total)	125,000	13.540	48.900	0.120	1,692,504	6,112,500	15,000
	1,084,052				19,200,693	53,913,608	51,654
				Total, Residential and Commercial	**22,209,213**	**53,935,111**	**297,494**

[1]Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

Alternative 1: Building Energy Use, 2031

New Residential		Annual Fuel Use By Unit			Total Annual Fuel Use		
Residential (Units)	Units	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)
Single Family - 2 Bedroom	123	9,869	55	578	1,213,918	6,734	71,033
Single Family - 3 Bedroom	157	9,869	55	578	1,549,472	8,596	90,668
Single Family - 4 Bedroom	66	9,869	55	578	651,371	3,614	38,115
Single Family - 5 Bedroom	3	9,869	55	578	29,608	164	1,733
Townhome/Condo - 2 Bedroom	40	6,930	51	487	277,200	2,040	19,470
Townhome/Condo - 3 Bedroom	155	6,930	51	487	1,074,150	7,905	75,446
Townhome/Condo - 4 Bedroom	29	6,930	51	487	200,970	1,479	14,116
Townhome/Condo - 5 Bedroom	0	6,930	51	487	0	0	0
Apartment - 1 Bedroom	649	5,595	50	515	3,632,701	32,139	334,540
Apartment - 2 Bedroom	621	5,595	50	515	3,474,850	30,743	320,003
Apartment - 3 Bedroom	541	5,595	50	515	3,027,250	26,783	278,783
Apartment - 4 Bedroom	0	5,595	50	515	0	0	0
Senior Housing - 1 Bedroom	433	5,251	31	541	2,272,791	13,310	234,064
Student Housing	129	5,251	31	541	679,097	3,977	69,937
Total, New Housing	**2947**				**18,083,378**	**137,483**	**1,547,906**
				Total Fuel Use, Housing	**18,083,378**	**137,483**	**1,547,906**

[1]25 % more efficent than Average household energy use, Energy Information Administration, 2005 Residential Energy Consumption Survey.

Commercial and Industrial Building Energy Intensity: Alternative 1

		Annual Fuel Use per Sq Ft			Total Annual Fuel Use		
	Sq ft	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)
Civic and Cultural	341,970	15.596	43.700	0.22	5,333,472	14,944,076	75,233
Education/Medical Facility	237,278	15.898	50.2	0.18	3,772,300	11,911,340	42,710
Industry, Warehouse, and Storage	3,006,030	7.144	23.400	0.050	21,475,903	70,341,098	150,301
Office	2,740,608	17.284	31.800	0.030	47,367,973	87,151,324	82,218
Retail and Commercial	911,385	14.362	33.400	0	13,089,154	30,440,263	0
Transportation Facility	1,956,815	22.440	67.600	0	43,910,109	132,280,668	0
Hotel or Motel	250,000	13.540	48.900	0.120	3,385,008	12,225,000	30,000
Total	9,194,085				138,333,920	359,293,768	380,463
				Total, Residential and Commercial	**156,417,298**	**359,431,252**	**1,928,369**

[1]Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey.

Alternative 2: Building Energy Use, 2016

Type		Annual Fuel Use By Unit			Total Annual Fuel Use		
Residential (Units)	Units	Electricity (kwh)	Natural Gas (1000 +cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)
Single Family - 2 Bedroom	31	9,869	55	578	303,479	1,684	17,758
Single Family - 3 Bedroom	91	9,869	55	578	899,473	4,990	52,633
Single Family - 4 Bedroom	34	9,869	55	578	333,544	1,850	19,517
Single Family - 5 Bedroom	1	9,869	55	578	7,402	41	433
Townhome/Condo - 2 Bedroom	19	6,930	51	487	129,232	951	9,077
Townhome/Condo - 3 Bedroom	47	6,930	51	487	328,469	2,417	23,071
Townhome/Condo - 4 Bedroom	7	6,930	51	487	50,243	370	3,529
Townhome/Condo - 5 Bedroom	0	6,930	51	487	0	0	0
Apartment - 1 Bedroom	195	5,595	50	515	1,090,726	9,650	100,446
Apartment - 2 Bedroom	202	5,595	50	515	1,132,738	10,022	104,315
Apartment - 3 Bedroom	162	5,595	50	515	908,938	8,042	83,705
Apartment - 4 Bedroom	0	5,595	50	515	0	0	0
Senior Housing - 1 Bedroom	130	5,251	31	541	682,410	3,996	70,278
Student Housing	72	5,251	31	541	377,975	2,214	38,926
Total Housing	**992**				6,244,629	46,226	523,689
				Total Fuel Use, Housing	**6,244,629**	**46,226**	**523,689**

[1]25 % more efficent than Average household energy use, Energy Information Administration, 2005 Residential Energy Consumption Survey

		Annual Fuel Use per Sq Ft			Total Annual Fuel Use		
	Sq ft	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)
Civic and Cultural	75,305	15.596	43.700	0.22	1,174,484	3,290,836	16,567
Education/Medical Facility	122,294	15.898	50.2	0.18	1,944,257	6,139,147	22,013
Industry, Warehouse, and Storage	443,401	7.144	23.400	0.050	3,167,776	10,375,576	22,170
Office	638,204	17.284	31.800	0.030	11,030,559	20,294,891	19,146
Retail and Commercial	269,943	14.362	33.400	0	3,876,875	9,016,098	0
Transportation Facility	0	22.440	67.600	0	0	0	0
Hotel	125,000	48.606	50.200	Q	6,075,697	6,275,000	0
Total	**1,549,147**				**27,269,649**	**55,391,548**	**79,896**
				Total, Residential and Commercial	**33,514,279**	**55,437,774**	**603,585**

[1]Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

Alternative 2: Building Energy Use, 2031

New Residential		Annual Fuel Use By Unit			Total Annual Fuel Use		
Residential (Units)	Units	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (1000 cf)	Fuel Oil (gallons)
Single Family - 2 Bedroom	123	9,869	55	578	1,213,918	6,734	71,033
Single Family - 3 Bedroom	676	9,869	55	578	6,670,523	37,005	390,326
Single Family - 4 Bedroom	239	9,869	55	578	2,358,388	13,083	138,001
Single Family - 5 Bedroom	3	9,869	55	578	29,608	164	1,733
Townhome/Condo - 2 Bedroom	126	6,930	51	487	876,517	6,451	61,565
Townhome/Condo - 3 Bedroom	241	6,930	51	487	1,673,467	12,316	117,541
Townhome/Condo - 4 Bedroom	29	6,930	51	487	200,970	1,479	14,116
Townhome/Condo - 5 Bedroom	0	6,930	51	487	0	0	0
Apartment - 1 Bedroom	1949	5,595	50	515	10,907,257	96,499	1,004,462
Apartment - 2 Bedroom	1705	5,595	50	515	9,536,981	84,375	878,272
Apartment - 3 Bedroom	1625	5,595	50	515	9,089,381	80,415	837,052
Apartment - 4 Bedroom	0	5,595	50	515	0	0	0
Senior Housing - 1 Bedroom	1300	5,251	31	541	6,824,102	39,964	702,782
Student Housing	203	5,251	31	541	1,063,362	6,227	109,511
Total Housing	**8219**				50,444,474	384,713	4,326,392
				Total Fuel Use, Housing	**50,444,474**	**384,713**	**4,326,392**

[1]25 % more efficent than Average household energy use, Energy Information Administration, 2005 Residential Energy Consumption Survey

		Annual Fuel Use per Sq Ft			Total Annual Fuel Use		
	Sq ft	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)	Electricity (kwh)	Natural Gas (cf)	Fuel Oil (gallons)
Civic and Cultural	678,712	15.596	43.700	0.22	10,585,411	29,659,700	149,317
Education/Medical Facility	860,114	15.898	50.2	0.18	13,674,304	43,177,710	154,820
Industry, Warehouse, and Storage	3,658,267	7.144	23.400	0.050	26,135,664	85,603,447	182,913
Office	3,888,465	17.284	31.800	0.030	67,207,254	123,653,193	116,654
Retail and Commercial	1,928,070	14.362	33.400	0	27,690,611	64,397,553	0
Transportation Facility	0	22.440	67.600	0	0	0	0
Hotel	250,000	48.606	50.200	Q	12,151,394	12,550,000	0
Total	**11,013,628**				**157,444,639**	**359,041,604**	**603,704**
				Total, Residential and Commercial	**207,889,113**	**359,426,316**	**4,930,096**

[1]Energy Information Administration, 2003 Commercial Buildings Energy Consumption Survey

Criteria Pollutants from Building Energy Use, 2016, All Alternatives

					Emissions factors (lbs per unit of fuel)[1,2]						Emissions per year (tons)					
Buildings	**Square feet**	**Energy Supply**	**Unit**	**Total**	**CO**	**NOX**	**VOCs**	**SO2**	**PM10**	**PM2.5**	**CO**	**NOX**	**HC**	**SO2**	**PM10**	**PM2.5**
Existing																
All Buildings[3]	1,423,292															
Fuel Oil and Natural Gas Use included in Total Reported Emissions																
		Electricity	KWH	23,723,934	NA	0.0014	NA	0.0029	NA	NA	NA	16.61	NA	34.40	NA	NA
										Total Reported Operational Emissions[3]	8.80	14.22	11.82	1.85	2.44	NA
										Total Annual Existing Building Emissions	**8.80**	**30.83**	**11.82**	**36.25**	**2.44**	**0.00**
Alternative 1																
Residential		Fuel Oil	1000 gallons	246	5	18	0.7	42.6	1.08	0.83	0.61	2.21	0.09	5.24	0.13	0.10
		Natural Gas	10E6 cf	22	40	94	5.5	0.6	1.9	1.9	0.43	1.01	0.06	0.01	0.02	0.02
		Electricity	KWH	3,008,520	NA	0.0014	NA	0.0029	NA	NA	NA	2.11	NA	4.36	NA	NA
										Total Annual Residential Emissions	**1.04**	**5.33**	**0.15**	**9.61**	**0.15**	**0.12**
Commercial	1,084,052	Fuel Oil	1000 gallons	52	5	18	0.7	42.6	1.08	0.83	0.13	0.46	0.02	1.10	0.03	0.02
		Natural Gas	10E6 cf	54	40	94	5.5	0.6	1.9	1.9	1.08	2.53	0.15	0.02	0.05	0.05
		Electricity	KWH	19,200,693	NA	0.0014	NA	0.0029	NA	NA	NA	13.44	NA	27.84	NA	NA
										Total Annual Commercial Emissions	**1.21**	**16.44**	**0.17**	**28.96**	**0.08**	**0.07**
										Total Annual Building Emissions	**2.25**	**21.77**	**0.31**	**38.56**	**0.23**	**0.20**
										Total Change in Annual Building Emissions	**-6.55**	**-9.06**	**-11.51**	**2.31**	**-2.20**	**0.20**
Alternative 2																
Residential		Fuel Oil	1000 gallons	524	5	18	0.7	42.6	1.08	0.83	1.31	4.71	0.18	11.15	0.28	0.22
		Natural Gas	10E6 ft3	46	40	94	5.5	0.6	1.9	1.9	0.92	2.17	0.13	0.01	0.04	0.04
		Electricity	KWH	6,244,629	NA	0.0014	NA	0.0029	NA	NA	NA	4.37	NA	9.05	NA	NA
										Total Annual Residential Emissions	**2.23**	**11.26**	**0.31**	**20.22**	**0.33**	**0.26**
Commercial	1,549,147	Fuel Oil	1000 gallons	80	5	18	0.7	42.6	1.08	0.83	0.20	0.72	0.03	1.70	0.04	0.03
		Natural Gas	10E6 ft3	55	40	94	5.5	0.6	1.9	1.9	1.11	2.60	0.15	0.02	0.05	0.05
		Electricity	KWH	27,269,649	NA	0.0014	NA	0.0029	NA	NA	NA	19.09	NA	39.54	NA	NA
										Total Annual Commercial Emissions	**1.31**	**22.41**	**0.18**	**41.26**	**0.10**	**0.09**
										Total Annual Building Emissions	**3.54**	**33.67**	**0.49**	**61.48**	**0.42**	**0.35**
										Total Change in Annual Building Emissions	**-5.26**	**2.84**	**-11.33**	**25.23**	**-2.01**	**0.35**

[1]Natural Gas and Fuel Oil Factors from "A National Methodology and Emission Inventory for Residential Fuel Combustion"

Bernd H. Haneke, May 1 2003

PES, Inc. (A MACTEC Company)

retrieved from www.epa.gov/ttn/chief/conference/ei12/area/haneke.pdf

12th International Emission Inventory Conference - " ***Emission Inventories - Applying New Technologies*** "

[2]Electricity Emission Factors based on Maine Electricity Data, 2007, EIA

http://www.eia.doe.gov/cneaf/electricity/st_profiles/maine.html

3Direct emissions from heating units at NAS Brunswick facilities are assumed to be included in reported emissions

Criteria Pollutants from Building Energy Use, Final Build-out, 2031, All Alternatives

						Emissions factors (lbs per unit of fuel)						Emissions per year (tons)					
Buildings	**Square feet**	**Units**	**Energy Supply**	**Unit**	**Total**	**CO**	**NOX**	**VOCs**	**SO2**	**PM10**	**PM2.5**	**CO**	**NOX**	**HC**	**SO2**	**PM10**	**PM2.5**
Existing																	
All Buildings[3]	1,423,292																
			Electricity	KWH	23,723,934	NA	0.0014	NA	0.0029	NA	NA	NA	16.61	NA	34.40	NA	NA
											Total Reported Operational Emissions[3]	8.80	14.22	11.82	1.85	2.44	NA
											Total Annual Existing Building Emissions	**8.80**	**30.83**	**11.82**	**36.25**	**2.44**	**0.00**
Alternative 1																	
Residential		2947	Fuel Oil	1000 gallons	1,548	5	18	0.7	42.6	1.08	0.83	3.87	13.93	0.54	32.97	0.84	0.64
			Natural Gas	10E6 cf	137	40	94	5.5	0.6	1.9	1.9	2.75	6.46	0.38	0.04	0.13	0.13
			Electricity	KWH	18,083,378	NA	0.0014	NA	0.0029	NA	NA	NA	12.66	NA	26.22	NA	NA
											Total Annual Residential Emissions	**6.62**	**33.05**	**0.92**	**59.23**	**0.97**	**0.77**
Commercial	9,194,085		Fuel Oil	1000 gallons	380	5	18	0.7	42.6	1.08	0.83	0.95	3.42	0.13	8.10	0.21	0.16
			Natural Gas	10E6 cf	359	40	94	5.5	0.6	1.9	1.9	7.19	16.89	0.99	0.11	0.34	0.34
			Electricity	KWH	138,333,920	NA	0.0014	NA	0.0029	NA	NA	NA	96.83	NA	200.58	NA	NA
											Total Annual Commercial Emissions	**8.14**	**117.14**	**1.12**	**208.80**	**0.55**	**0.50**
											Total Annual Building Emissions	**14.76**	**150.20**	**2.04**	**268.03**	**1.51**	**1.27**
											Total Change in Annual Building Emissions	**5.96**	**119.36**	**-9.78**	**231.78**	**-0.92**	**1.27**
Alternative 2																	
Residential		8219	Fuel Oil	1000 gallons	4,326	5	18	0.7	42.6	1.08	0.83	10.82	38.94	1.51	92.15	2.34	1.80
			Natural Gas	10E6 ft3	385	40	94	5.5	0.6	1.9	1.9	7.69	18.08	1.06	0.12	0.37	0.37
			Electricity	KWH	50,444,474	NA	0.0014	NA	0.0029	NA	NA	NA	35.31	NA	73.14	NA	NA
											Total Annual Residential Emissions	**18.51**	**92.33**	**2.57**	**165.41**	**2.70**	**2.16**
Commercial	11,013,628		Fuel Oil	1000 gallons	604	5	18	0.7	42.6	1.08	0.83	1.51	5.43	0.21	12.86	0.33	0.25
			Natural Gas	10E6 ft3	359	40	94	5.5	0.6	1.9	1.9	7.18	16.87	0.99	0.11	0.34	0.34
			Electricity	KWH	157,444,639	NA	0.0014	NA	0.0029	NA	NA	NA	110.21	NA	228.29	NA	NA
											Total Annual Commercial Emissions	**8.69**	**132.52**	**1.20**	**241.26**	**0.67**	**0.59**
											Total Annual Building Emissions	**27.20**	**224.85**	**3.77**	**406.67**	**3.37**	**2.75**
											Total Change in Annual Building Emissions	**18.40**	**194.02**	**-8.05**	**370.42**	**0.93**	**2.75**

[1]Natural Gas and Fuel Oil Factors from "A National Methodology and Emission Inventory for Residential Fuel Combustion"

Bernd H. Haneke, May 1 2003

PES, Inc. (A MACTEC Company)

retrieved from www.epa.gov/ttn/chief/conference/ei12/area/haneke.pdf

12th International Emission Inventory Conference - ***Emission Inventories - Applying New Technologies "***

[2]Electricity Emission Factors based on Maine Electricity Data, 2007, EIA

http://www.eia.doe.gov/cneaf/electricity/st_profiles/maine.html

3Direct emissions from heating units at NAS Brunswick facilities are assumed to be included in reported emissions

GHG Emissions from Building Energy Use, Phase 1, 2031, All Alternatives

Existing GHG Emissions, NAS Brunswick

Reported Emissions per year (tons)[1]				CO2-e, Global Warming Potential (tons)				Total	Total
CO2	N2O	CH4	HFC-134a	CO2	N2O	CH4	HFC-134a	CO2-e	MTCO2-e
7424.54	0.169339	0.01543	0.0015	7424.54	4.233475	4.59814	2.145	7435.517	6,744.01

[1]Reported Emissions from NAS Brunswick Permitted Sources, 2008 Facility Emission Report Summary

						Emissions factors (lbs per unit of fuel)[1,2]			Emissions per year (tons)			CO2-e, Global Warming Potential (tons)			Total	Total
Buildings	Square feet	Units	Energy Supply	Unit	Total	CO2	N2O	CH4	CO2	N2O	CH4	CO2	N2O	CH4	CO2-e	MTCO2-e
Existing GHG Emissions, NAS Brunswick: Electricity																
Building sq ft	1,423,292		Electricity	KWH	23,723,934	0.85	0.000027	0.0000565	10,082.67	0.32	0.67	10,082.67	95.44	16.76	10,194.87	9,246.75
											Reported Emissions	0.00	0.00	0.00	7,435.52	6,744.01
								Total Annual Existing Building Emissions	**10,082.67**	**0.32**	**0.67**	**10,082.67**	**95.44**	**16.76**	**17,630.38**	15,990.76
Alternative 1																
Residential		2947	Fuel Oil	MMBTU	198,132	161	0.001	0.02	15,949.62	0.10	1.98	15,949.62	29.52	49.53	16,028.68	14,538.01
			Natural Gas	MMBTU	141,195	117	0	0.01	8,259.93	0.00	0.71	8,259.93	0.00	17.65	8,277.58	7,507.77
			Electricity	KWH	18,083,378	0.85	0.000027	0.0000565	7,685.44	0.24	0.51	7,685.44	72.75	12.77	7,770.96	7,048.26
								Total Annual Residential Emissions	**31,894.99**	**0.34**	**3.20**	**31,894.99**	**102.27**	**79.95**	**32,077.22**	29,094.04
Commercial	9,194,085		Fuel Oil	MMBTU	48,699	161	0.001	0.02	3,920.29	0.02	0.49	3,920.29	7.26	12.17	3,939.72	3,573.33
			Natural Gas	MMBTU	368,995	117	0	0.01	21,586.19	0.00	1.84	21,586.19	0.00	46.12	21,632.31	19,620.51
			Electricity	KWH	138,333,920	0.85	0.000027	0.0000565	58,791.92	1.87	3.91	58,791.92	556.52	97.70	59,446.13	53,917.64
								Total Annual Commercial Emissions	**84,298.40**	**1.89**	**6.24**	**84,298.40**	**563.77**	**156.00**	**85,018.17**	77,111.48
								Total Annual Building Emissions	**116,193.39**	**2.24**	**9.44**	**116,193.39**	**666.04**	**235.95**	**117,095.39**	106,205.51
								Total Change in Annual Building Emissions	**106,110.72**	**1.91**	**8.77**	**106,110.72**	**570.60**	**219.20**	**99,465.00**	90,214.76
														% of Maine's Electric generation	1.62%	0.01
Alternative 2																
Residential		8219	Fuel Oil	MMBTU	553,778	161	0.001	0.02	44,579.14	0.28	5.54	44,579.14	82.51	138.44	44,800.10	40,633.69
			Natural Gas	MMBTU	395,100	117	0	0.01	23,113.34	0.00	1.98	23,113.34	0.00	49.39	23,162.73	21,008.59
			Electricity	KWH	50,444,474	0.85	0.000027	0.0000565	21,438.90	0.68	1.43	21,438.90	202.94	35.63	21,677.47	19,661.46
								Total Annual Residential Emissions	**89,131.39**	**0.96**	**8.94**	**89,131.39**	**285.45**	**223.46**	**89,640.30**	81,303.75
Commercial	11,013,628		Fuel Oil	MMBTU	77,274	161	0.001	0.02	6,220.57	0.04	0.77	6,220.57	11.51	19.32	6,251.40	5,670.02
			Natural Gas	MMBTU	368,736	117	0	0.01	21,571.04	0.00	1.84	21,571.04	0.00	46.09	21,617.13	19,606.74
			Electricity	KWH	157,444,639	0.85	0.000027	0.0000565	66,913.97	2.13	4.45	66,913.97	633.40	111.20	67,658.57	61,366.32
								Total Annual Commercial Emissions	**94,705.58**	**2.16**	**7.06**	**94,705.58**	**644.91**	**176.61**	**95,527.10**	86,643.08
								Total Annual Building Emissions	**183,836.97**	**3.12**	**16.00**	**183,836.97**	**930.36**	**400.06**	**185,167.40**	167,946.83
								Total Change in Annual Building Emissions	**173,754.30**	**2.80**	**15.33**	**173,754.30**	**834.92**	**383.31**	**167,537.01**	151,956.07

[1]Natural Gas and Fuel Oil Factors from "A National Methodology and Emission Inventory for Residential Fuel Combustion," Bernd H. Haneke, May 1, 2003

[2]Electricity Factors from Energy Information Administration, Updated State-and Regional-level Greenhouse Gas Emission Factors for Electricity (March 2002), http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/e-supdoc.pdf.

Total CO2 from Electricity in 2007 in Maine	6,135,465
Total GHG Emissions in US, 2007	7150100000

	CO_2 Emission Factors			CH_4	N_2O
Region/State	lbs/kWh	short tons/MWh	metric tons/MWh	lbs/MWh	lbs/MWh
Maine	0.85	0.426	0.386	0.0565	0.027

Source: Energy Information Administration, Updated State-and Regional-level Greenhouse Gas Emission Factors for Electricity (March 2002), http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/e-supdoc.pdf.

GHG Emissions from Building Energy Use, Phase 1, 2016, All Alternatives

Existing GHG Emissions, NAS Brunswick

Reported Emissions per year (tons)[1]				CO2-e, Global Warming Potential (tons)				Total	Total
CO2	N2O	CH4	HFC-134a	CO2	N2O	CH4	HFC-134a	CO2-e	MTCO2-e
7424.54	0.169339	0.01543	0.0015	7424.54	4.233475	4.59814	2.145	7435.517	6,744.01

[1]Reported Emissions from NAS Brunswick Permitted Sources, 2008 Facility Emission Report Summary

						Emissions factors (lbs per unit of fuel)[1,2]			Emissions per year (tons)			CO2-e, Global Warming Potential (tons)			Total	Total
Buildings	Square feet	Units	Energy Supply	Unit	Total	CO2	N2O	CH4	CO2	N2O	CH4	CO2	N2O	CH4	CO2-e	MTCO2-e
Existing GHG Emissions, NAS Brunswick: Electricity																
Building sq ft	1,423,292		Electricity	KWH	23,723,934	0.85	0.000027	0.0000565	10,082.67	0.32	0.67	10,082.67	95.44	16.76	10,194.87	9,246.75
							Reported Emissions					0.00	0.00	0.00	7,435.52	6,744.01
								Total Annual Existing Building Emissions	**10,082.67**	**0.32**	**0.67**	**10,082.67**	**95.44**	**16.76**	**17,630.38**	15,990.76
Alternative 1																
Residential		464	Fuel Oil	MMBTU	31,468	161	0.001	0.02	2,533.14	0.02	0.31	2,533.14	4.69	7.87	2,545.69	2,308.94
			Natural Gas	MMBTU	22,083	117	0	0.01	1,291.88	0.00	0.11	1,291.88	0.00	2.76	1,294.64	1,174.24
			Electricity	KWH	3,008,520	0.85	0.000027	0.0000565	1,278.62	0.04	0.08	1,278.62	12.10	2.12	1,292.85	1,172.61
								Total Annual Residential Emissions	**5,103.64**	**0.06**	**0.51**	**5,103.64**	**16.79**	**12.75**	**5,133.19**	4,655.80
Commercial	1,084,052		Fuel Oil	MMBTU	6,612	161	0.001	0.02	532.24	0.00	0.07	532.24	0.99	1.65	534.88	485.13
			Natural Gas	MMBTU	55,369	117	0	0.01	3,239.10	0.00	0.28	3,239.10	0.00	6.92	3,246.02	2,944.14
			Electricity	KWH	19,200,693	0.85	0.000027	0.0000565	8,160.29	0.26	0.54	8,160.29	77.24	13.56	8,251.10	7,483.75
								Total Annual Commercial Emissions	**11,931.64**	**0.26**	**0.89**	**11,931.64**	**78.23**	**22.13**	**12,032.00**	10,913.02
								Total Annual Building Emissions	**17,035.28**	**0.32**	**1.40**	**17,035.28**	**95.02**	**34.89**	**17,165.19**	15,568.82
								Total Change in Annual Building Emissions	**6,952.61**	**0.00**	**0.73**	**6,952.61**	**-0.42**	**18.13**	**-465.20**	-421.93
												% of Maine's Electric generation			0.28%	0.00
Alternative 2																
Residential		992	Fuel Oil	MMBTU	67,032	161	0.001	0.02	5,396.09	0.03	0.67	5,396.09	9.99	16.76	5,422.84	4,918.51
			Natural Gas	MMBTU	47,474	117	0	0.01	2,777.22	0.00	0.24	2,777.22	0.00	5.93	2,783.16	2,524.32
			Electricity	KWH	6,244,629	0.85	0.000027	0.0000565	2,653.97	0.08	0.18	2,653.97	25.12	4.41	2,683.50	2,433.93
								Total Annual Residential Emissions	**10,827.28**	**0.12**	**1.08**	**10,827.28**	**35.11**	**27.10**	**10,889.50**	9,876.77
Commercial	1,549,147		Fuel Oil	MMBTU	10,227	161	0.001	0.02	823.25	0.01	0.10	823.25	1.52	2.56	827.33	750.39
			Natural Gas	MMBTU	56,887	117	0	0.01	3,327.90	0.00	0.28	3,327.90	0.00	7.11	3,335.01	3,024.85
			Electricity	KWH	27,269,649	0.85	0.000027	0.0000565	11,589.60	0.37	0.77	11,589.60	109.71	19.26	11,718.57	10,628.74
								Total Annual Commercial Emissions	**15,740.75**	**0.37**	**1.16**	**15,740.75**	**111.23**	**28.93**	**15,880.90**	14,403.98
								Total Annual Building Emissions	**26,568.03**	**0.49**	**2.24**	**26,568.03**	**146.34**	**56.03**	**26,770.40**	24,280.75
								Total Change in Annual Building Emissions	**16,485.36**	**0.17**	**1.57**	**16,485.36**	**50.90**	**39.27**	**9,140.01**	8,289.99
														% of Maine's Electric generation	**0.44%**	0.00

[1]Natural Gas and Fuel Oil Factors from "A National Methodology and Emission Inventory for Residential Fuel Combustion," Bernd H. Haneke, May 1, 2003

[2]Electricity Factors from Energy Information Administration, Updated State-and Regional-level Greenhouse Gas Emission Factors for Electricity (March 2002), http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/e-supdoc.pdf.

Total CO2 from Electricity in 2007 in Maine	6,135,465
Total GHG Emissions in US, 2007	7,150,100,000

	CO_2 Emission Factors			CH_4	N_2O
Region/State	lbs/kWh	short tons/MWh	metric tons/MWh	lbs/MWh	lbs/MWh
Maine	0.85	0.426	0.386	0.0565	0.027

Source: Energy Information Administration, Updated State-and Regional-level Greenhouse Gas Emission Factors for Electricity (March 2002), http://www.eia.doe.gov/pub/oiaf/1605/cdrom/pdf/e-supdoc.pdf.

Existing Aircraft Operations, NAS Brunswick

Squadrons	Aircraft	Annual Aircraft Operations at NAS Brunswick		
		Take offs	Arrivals	T&G Patterns
Patrol & Reconnaissance Wing FIVE (CPRW-5)	P-3C	1534	1534	24544
Patrol Squadron NINETY-TWO (VP-92)	P-3C	437	437	3933
Fleet Logistics Support Squadron SIXTY-TWO (VR-62)	C-130	858	858	1320
Special Projects Patrol Squadron ONE (VPU-1)	P-3C	246	246	2100
Total P-3		2217	2217	30577

Visiting aircraft	Type	Take offs	Arrivals
	F/A-18	70	70
	AV-8	32	32
	C-130	19	19
	Other	3	3

Source: NAS Brunswick Airfield and Airspace Baseline Development Study, April 13 2004

Projected Aircraft Emissions, Alternative 1

Aircraft Type	2016		2021		2026		2031	
	LTOs	Touch and Go	LTOs	Touch and Go	LTOs	Touch and Go	LTOs	Touch and Go
Cessna 150/152/172/177 (CNA172)	1,800	3,600	2,416	4,832	3024	6048	3,640	7,280
Piper PA-18 Super Club; Piper PA-28 140/180 (GASEPF)	1,800	3,600	2,416	4,832	3024	6048	3,640	7,280
Beech Bonanza, Cessna 180, Money M20, Piper PA-24 Comanche (GASEPV)	900	1,800	1,208	2,416	1512	3024	1,820	3,640
Beech Baron, Beech Queen Air, Cessna 414 Chancellor, Grumman Cougar, Piper PA-23 Aztec, Piper PA31 Navajo (BEC58P)	293	313	393	423	491	529	592	637
Piper PA-44 Seminole, Piper PA-30 Twin Comanche (PA30)	73	78	98	106	123	132	148	159
Aero Commander 695, Beech King Air 90, Beech King Air 100, Cessna Conquest II, Cessna 425, Piper PA-31T, Swearingen Merlin II/III (NA441)	428	43	574	60	718	76	865	91
Beech King Air 300, Beech King Air 350, de Havilland DHC-8-300, Saab 2000, Saab 340 (DHC830)	107	11	143	15	180	19	216	23
Canadiair Challenger 610/RJ (CL601)	56	0	76	0	95	0	114	0
Cessna Mustang (CNA510)	113	0	151	0	189	0	228	0
Cessna Citation II/V (MU3001)	84	0	113	0	142	0	171	0
Cessna Citation X (CNA750)	84	0	113	0	142	0	171	0
Lear 31/36/45/55/60, Falcon 10/200 (Lear35)	113	0	151	0	189	0	228	0
Gulfstream IIB/III (GIIB)	28	0	38	0	47	0	57	0
Gulfstream IV (GIV)	28	0	38	0	47	0	57	0
Gulfstream V (GV)	28	0	38	0	47	0	57	0
Airbus 319 (A319-313)	6	0	8	0	9	0	11	0
Airbus 3121 (A321-232)	6	0	8	0	9	0	11	0
B737 (737800)	6	0	8	0	9	0	11	0
B757 (757PW)	6	0	8	0	9	0	11	0
B767 (767CF6)	6	0	8	0	9	0	11	0
Eurocopter AS 350 B#3 (SA350D)	28	56	38	76	47	95	57	114
Bell 206B (206L)	28	56	38	76	47	95	57	114
Robinson R22 (R22)	225	450	302	604	378	756	455	910
Total Operations	**6,246**	**10,008**	**8,381**	**13,439**	**10,490**	**16,821**	**12,626**	**20,248**

Source: Brunswick - Future Aircraft Ops Data (April 2009).xls

 # EDMS 5.1.2 Emissions Inventory Report
 # Emissions Inventory Summary
 # Study: Brunswick 2010
 # Scenario - Airport: Baseline - Brunswick Nas
 # Year: 2004
 # Units: Short Tons per Year
 # Generated: 03/10/10 13:04:10

# Category	CO2	CO	THC	NMHC	VOC	TOG	NOx	SOx	PM-10	PM-2.5	Fuel Consumption
Aircraft	26498.915	69.433	31.182	36.053	35.865	36.053	68.173	10.852	N/A	N/A	8399.022
GSE	N/A	1.983	N/A	0.531	0.569	0.578	6.98	0.695	0.443	0.429	N/A
APUs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Parking Facilities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roadways	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stationary Sources	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Training Fires	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grand Total	26498.915	71.416	31.182	36.585	36.434	36.631	75.153	11.547	0.443	0.429	8399.022

EDMS 5.1.2 does not provide emission factors for PM emissions from Military Aircraft, therefore PM emissions are calculated with AESO's PM Emissions Index (EI) for P-3 and C-130 aircraft, which is 3.97 lbs/1000 lbs of fuel at all power settings. [1,2]

PM 10 EI for P-3 and C-130 aircraft	3.97
Total Tons Fuel used, all aircraft	8399.022
Tons PM 10 emissions	33.34

[1] AESO Memorandum Report N. 9911B, April 2000 "Aircraft Emission Estimates: P-3 Landing and Takeoff Cycle and In Frame Engine Maintenance Testing Using JP-5"

[2] AESO Memorandum Report N. 2000-09B January 2001 "Aircraft Emission Estimates: C-130 Landing and Takeoff Cycle and In Frame Engine Maintenance Testing Using JP-5"

 # EDMS 5.1.2 Emissions Inventory Report
 # Emissions Inventory Summary
 # Study: Brunswick 2010
 # Scenario - Airport: Baseline - Brunswick Nas
 # Year: 2016
 # Units: Short Tons per Year
 # Generated: 03/10/10 13:19:07

# Category	CO2	CO	THC	NMHC	VOC	TOG	NOx	SOx	PM-10	PM-2.5	Fuel Consumption
Aircraft	1316.086	187.68	5.15	5.132	5.009	5.443	2.251	0.539	0.054	0.054	417.143
GSE	N/A	1.423	N/A	0.054	0.057	0.062	0.182	0.006	0.008	0.007	N/A
APUs	N/A	0.119	0.003	0.003	0.003	0.003	0.047	0.006	0.005	0.005	N/A
Parking Facilities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roadways	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stationary Sources	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Training Fires	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grand Total	1316.086	189.22	5.153	5.189	5.069	5.508	2.479	0.551	0.067	0.067	417.143

 # EDMS 5.1.2 Emissions Inventory Report
 # Emissions Inventory Summary
 # Study: Brunswick fix
 # Scenario - Airport: Baseline - Brunswick Nas
 # Year: 2031
 # Units: Short Tons per Year
 # Generated: 03/10/10 13:19:07

# Category	CO2	CO	THC	NMHC	VOC	TOG	NOx	SOx	PM-10	PM-2.5	Fuel Consumption
Aircraft	2622.942	373.31	10.264	10.244	10.001	10.858	4.432	1.074	0.109	0.109	831.36
GSE	N/A	1.081	N/A	0.05	0.053	0.056	0.107	0.011	0.007	0.007	N/A
APUs	N/A	0.24	0.005	0.006	0.006	0.006	0.093	0.013	0.011	0.011	N/A
Parking Facilities	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Roadways	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stationary Sources	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Training Fires	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grand Total	2622.942	374.63	10.27	10.301	10.06	10.92	4.632	1.098	0.127	0.127	831.36

EDMS 5.1.2 Emissions Inventory Report
Emissions Inventory Summary
HAPs Emissions, Tons per year, Aircraft and GSE

	2004	2016	2021	2026	2031
Fuel Consumption	8399.022	417.143	504.127	625.21	831.36
HAP	**2004**	**2016**	**2021**	**2026**	**2031**
Formaldehyde (IRIS,CAA)	4.488	0.707	0.849	1.061	1.409
Methyl alcohol (IRIS,CAA)	0.651	0.045	0.054	0.068	0.09
Benzene (IRIS,CAA)	0.606	0.093	0.111	0.139	0.185
Acetaldehyde (IRIS,CAA)	1.557	0.229	0.275	0.343	0.456
Naphthalene (IRIS,CAA)	0.195	0.028	0.033	0.042	0.056
O-xylene (IRIS,CAA)	0.06	0.01	0.011	0.014	0.019
Isopropylbenzene (cumene) (IRIS,CAA)	0.001	0	0	0	0
Ethylbenzene (IRIS,CAA)	0.063	0.009	0.01	0.013	0.017
Styrene (IRIS,CAA)	0.111	0.018	0.022	0.027	0.036
1,3-butadiene (IRIS,CAA)	0.608	0.086	0.104	0.13	0.172
Acrolein (IRIS,CAA)	0.883	0.119	0.143	0.179	0.238
M-xylene (IRIS,CAA)	N/A	0.001	0.001	0	0.001
Toluene (IRIS,CAA)	0.231	0.031	0.037	0.046	0.06
Phenol (carbolic acid) (IRIS,CAA)	0.262	0.024	0.029	0.037	0.049
N-hexane (IRIS,CAA)	N/A	0.001	0	0	0
2,2,4-trimethylpentane (IRIS,CAA)	N/A	0.001	0	0	0
M & P-xylene (IRIS,CAA)	0.102	0.014	0.017	0.022	0.029
Propionaldehyde (CAA)	0.272	0.044	0.053	0.066	0.087
Acetone (IRIS)	0.133	0.092	0.11	0.138	0.183
2-methylnaphthalene (IRIS)	0.074	0.005	0.006	0.008	0.01
Benzaldehyde (IRIS)	0.173	0.027	0.032	0.04	0.053
N-heptane (IRIS)	0.023	0.004	0.004	0.005	0.007
Hexaldehyde	0	0.006	0.007	0.008	0.011
Methane	N/A	0.312	0.37	0.463	0.614
Ethane	0.188	0.039	0.047	0.059	0.078
Ethylene	5.574	0.824	0.989	1.236	1.641
Acetylene	1.42	0.203	0.244	0.304	0.404
Propane	0.028	0.008	0.009	0.011	0.015
1-propyne	N/A	0	0	0	0
Isobutane	N/A	0.002	0.001	0.001	0.001
2,2-dimethylbutane	N/A	0	0	0	0
Isopentane	N/A	0.005	0.003	0.003	0.003
Isoprene	N/A	0	0	0	0
2-methyl-2-propenal (methacrolein)	0.155	0.011	0.013	0.016	0.021
Methylglyoxal	0.542	0.037	0.045	0.056	0.075
2,3-dimethylbutane	N/A	0	0	0	0
1-Methylnaphthalene	0.089	0.006	0.007	0.009	0.012
(1,3,4-trimethylbenzene)	0.126	0.009	0.011	0.013	0.018
3-methylpentane	N/A	0.001	0	0	0
Methylcyclopentane	N/A	0.001	0	0	0
Furfuryl alcohol	N/A	0.051	0.061	0.076	0.101

EDMS 5.1.2 Emissions Inventory Report
Emissions Inventory Summary
HAPs Emissions, Tons per year, Aircraft and GSE

	2004	2016	2021	2026	2031
N-propylbenzene	N/A	0.001	0.002	0.002	0.003
N-butylbenzene	0.019	0.006	0.007	0.009	0.012
p-Tolualdehyde	0.017	0.001	0.001	0.002	0.002
N-butane	N/A	0.01	0.006	0.006	0.007
1-butene	0.632	0.095	0.113	0.142	0.188
Glyoxal	0.655	0.117	0.14	0.175	0.232
2,4,4-trimethyl-1-pentene	N/A	0.001	0	0	0.001
2-methylpentane	0.147	0.021	0.025	0.031	0.041
2,4-dimethylpentane	N/A	0	0	0	0
1,3,5-trimethylbenzene	0.019	0.002	0.002	0.002	0.003
Methylcyclohexane	N/A	0	0	0	0
N-pentane	0.071	0.013	0.014	0.017	0.022
1-pentene	0.28	0.041	0.049	0.061	0.081
Valeraldehyde	0.088	0.006	0.007	0.009	0.012
Cyclohexene	N/A	0.001	0	0	0
N-octane	0.022	0.003	0.003	0.004	0.005
1-octene	0.1	0.014	0.017	0.021	0.028
N-nonane	0.022	0.006	0.007	0.009	0.012
N-dodecane	0.167	0.046	0.055	0.068	0.091
Propylene	1.635	0.243	0.292	0.364	0.484
Butyraldehyde	0.043	0.037	0.044	0.055	0.073
1-nonene	0.089	0.012	0.015	0.019	0.025
N-decane	0.115	0.02	0.024	0.03	0.04
1,2-diethylbenzene (ortho)	N/A	0	0	0	0
(1-Methylpropyl)benzene	N/A	0	0	0	0
1,3-diethylbenzene (meta)	N/A	0	0	0	0
Cyclopentene	N/A	0	0	0	0
Cyclopentane	N/A	0	0	0	0
1,2-propadiene	N/A	0	0	0	0
Indan	N/A	0	0	0	0
2-methyl-2-butene	0.067	0.01	0.012	0.015	0.019
1,2,3-trimethylbenzene	0.038	0.003	0.003	0.004	0.005
o-Tolualdehyde	0.083	0.006	0.007	0.009	0.011
N-pentylbenzene	N/A	0.005	0.006	0.007	0.01
N-Hexadecane	0.018	0.005	0.006	0.008	0.01
2,3,3-trimethylpentane	N/A	0	0	0	0
3-methyl-1-butene	0.04	0.003	0.003	0.004	0.006
2-methyl-1-butene	0.05	0.003	0.004	0.005	0.007
2,3,4-trimethylpentane	N/A	0	0	0	0
2,4-dimethylhexane	N/A	0	0	0	0
4-methylheptane	N/A	0	0	0	0
3-methylheptane	N/A	0	0	0	0
Cis-2-butene	0.076	0.018	0.022	0.027	0.036

EDMS 5.1.2 Emissions Inventory Report
Emissions Inventory Summary
HAPs Emissions, Tons per year, Aircraft and GSE

	2004	2016	2021	2026	2031
Isovaleraldehyde	0.012	0.001	0.001	0.001	0.002
2-methylheptane	N/A	0	0	0	0
1-hexene	0.265	0.04	0.048	0.06	0.079
1-Methyl-2-ethylbenzene (o-ethyltoluene)	0.023	0.002	0.002	0.002	0.003
1-Methyl-3-ethylbenzene (m-ethyltoluene)	0.056	0.004	0.005	0.006	0.008
Tolualdehyde	0.1	0.007	0.008	0.01	0.014
1-Methyl-4-ethylbenzene (p-ethyltoluene)	0.023	0.002	0.002	0.002	0.003
Cis-1,4-dimethylcyclohexane	N/A	0	0	0	0
Trans-2-butene	N/A	0	0	0	0
2-methyl-2-pentene	N/A	0	0	0	0
Cis-2-pentene	0.1	0.007	0.009	0.011	0.014
N-tridecane	0.193	0.032	0.038	0.048	0.064
N-Tetradecane	0.15	0.027	0.032	0.041	0.054
N-Pentadecane	0.062	0.012	0.014	0.018	0.024
N-heptadecane	0.003	0.001	0.001	0.001	0.001
Trans-2-pentene	0.129	0.009	0.011	0.014	0.018
4-methyl-1-pentene	0.025	0.002	0.002	0.003	0.003
1-Methylcyclopentene	N/A	0	0	0	0
2-methyl-1-pentene	0.012	0.001	0.001	0.001	0.002
4-Phenyl-1-butene	N/A	0	0	0	0
1-undecene	N/A	0	0	0	0
1-decene	0.067	0.009	0.011	0.013	0.018
2,3,5-trimethylhexane	N/A	0	0	0	0
1-Methyl-3-propylbenzene	N/A	0	0	0	0
N-undecane	0.16	0.026	0.031	0.039	0.051
2,6-dimethyloctane	N/A	0	0	0	0
2,4-dimethylheptane	N/A	0	0	0	0
2,5-dimethylheptane	N/A	0	0	0	0
3-methyloctane	N/A	0	0	0	0
4-methyloctane	N/A	0	0	0	0
2-methyloctane	N/A	0	0	0	0
2,2,5-trimethylhexane	N/A	0	0	0	0
Trans-2-hexene	0.011	0.001	0.001	0.001	0.001
Crotonaldehyde	0.378	0.026	0.031	0.039	0.052
T-2-Nonene	N/A	0	0	0	0
2-methyldecane	N/A	0	0	0	0
2,3-dimethyloctane	N/A	0	0	0	0
Cis-2-hexene	N/A	0	0	0	0
Heptene	0.158	0.026	0.031	0.038	0.051
Dimethyl napthalene	0.032	0.002	0.003	0.003	0.004
C-1 Compounds	0.034	0.001	0.001	0.001	0.001
C-10 Compounds	0.02	0.001	0.001	0.001	0.001
C-10 Olefins	2.107	0.144	0.176	0.219	0.291

EDMS 5.1.2 Emissions Inventory Report
Emissions Inventory Summary
HAPs Emissions, Tons per year, Aircraft and GSE

	2004	2016	2021	2026	2031
C-10 Paraffins	5.266	0.361	0.439	0.548	0.728
C-11 Compounds	0.021	0.001	0.001	0.001	0.001
C-12 Compounds	0.013	0	0	0	0.001
C-13 Compounds	0.02	0.001	0.001	0.001	0.001
C-14 Alkane	0.067	0.005	0.006	0.007	0.009
C-14 Compounds	0.026	0.001	0.001	0.001	0.001
C-15 Alkane	0.064	0.004	0.005	0.007	0.009
C-15 Compounds	0.025	0.001	0.001	0.001	0.001
C-16 Alkane	0.053	0.007	0.009	0.011	0.015
C-16 Compounds	0.02	0.001	0.001	0.001	0.001
C-17 Compounds	0.018	0	0	0.001	0.001
C-18 Alkane	0.001	0	0	0	0
C-18 Compounds	0.012	0	0	0	0.001
C-19 Compounds	0.009	0	0	0	0
C-2 Compounds	0.115	0.003	0.003	0.004	0.005
C-20 Compounds	0.005	0	0	0	0
C-21 Compounds	0.004	0	0	0	0
C-22 Compounds	0.003	0	0	0	0
C-23 Compounds	0.003	0	0	0	0
C-24 Compounds	0.003	0	0	0	0
C-25 Compounds	0.003	0	0	0	0
C-26 Compounds	0.003	0	0	0	0
C-27 Compounds	0.001	0	0	0	0
C-28 Compounds	0.002	0	0	0	0
C-29 Compounds	0.001	0	0	0	0
C-3 Compounds	0.03	0.001	0.001	0.001	0.001
C-30 Compounds	0.002	0	0	0	0
C-31 Compounds	0.002	0	0	0	0
C-32 Compounds	0.002	0	0	0	0
C-33 Compounds	0.001	0	0	0	0
C-34 Compounds	0.001	0	0	0	0
C-35 Compounds	0.001	0	0	0	0
C-36 Compounds	0.001	0	0	0	0
C-37 Compounds	0	0	0	0	0
C-38 Compounds	0	0	0	0	0
C-39 Compounds	0.001	0	0	0	0
C-4 Compounds	0.024	0.001	0.001	0.001	0.001
C-40 Compounds	0	0	0	0	0
C-41 Compounds	0	0	0	0	0
C-42 Compounds	0	0	0	0	0
C-43 compounds	0	0	0	0	0
C-4 Benzene + C-3 Aroald	0.237	0.016	0.02	0.025	0.033
C-5 Compounds	0.014	0	0	0	0.001

EDMS 5.1.2 Emissions Inventory Report
Emissions Inventory Summary
HAPs Emissions, Tons per year, Aircraft and GSE

	2004	2016	2021	2026	2031
C-5 Benzene + C-4 Aroald	0.117	0.008	0.01	0.012	0.016
C-6 Compounds	0.025	0.001	0.001	0.001	0.001
C6H18O3SI3	N/A	0.334	0.397	0.497	0.66
C-7 Compounds	0.017	0	0	0.001	0.001
C7-C16 Paraffins	N/A	0.008	0.009	0.011	0.015
C-8 Compounds	0.007	0	0	0	0
C8H24O4SI4	N/A	0.119	0.142	0.177	0.235
C-9 Compounds	0.004	0	0	0	0
Cyclopentylcyclopentane	N/A	0	0	0	0
Hexyne	N/A	0	0	0	0
Isomers of dodecane	N/A	0.005	0.005	0.007	0.009
Isomers of pentadecane	N/A	0.004	0.005	0.006	0.008
Isomers of pentene	N/A	0.018	0.022	0.027	0.036
Isomers of tetradecane	N/A	0.005	0.006	0.007	0.01
Methyl naphthalenes	N/A	0.012	0.015	0.019	0.025
Methylcyclooctane	N/A	0	0	0	0
Pentyne	N/A	0	0	0	0
T-1-Phenylbutene	N/A	0	0	0	0
Decanol	2.107	0.144	0.176	0.219	0.291
Dodecanol	1.053	0.072	0.088	0.11	0.146
Unidentified	N/A	0.002	0.001	0.001	0.002
Total HAPs	**36.632**	**5.37**	**6.42**	**8.015**	**10.641**

MOBILE6 Vehicle Emission Factors - 2016-2031

Year	Abbreviation	Description	Emission Factors (g/mi)					
			VOC	CO	NOx	CO_2	PM	SO_2
2016	All Vehicles	Composite of All Vehicles	0.387	5.001	0.523	552.4	0.016	0.009
2021	All Vehicles	Composite of All Vehicles	0.301	4.505	0.281	552.5	0.014	0.009
2026	All Vehicles	Composite of All Vehicles	0.281	4.366	0.192	552.6	0.013	0.009
2031	All Vehicles	Composite of All Vehicles	0.253	4.42	0.087	368.0	0.011	0.007

Peak Hourly Traffic Counts for Existing, Alternative 1, and Alternative 2

2008 Raw Data		Reuse		High Density	
Enter	Exit	Enter	Exit	Enter	Exit
139	643	347	536	626	877
Source: Figure 2, Main and Dyers Gates		Source: Figure 9		Source: Figure 10A+10B+10C	

Reduction: Base closure		2021: Alt 1 - Reuse		2021: Alt 2 – High Density	
Enter	Exit	Enter	Exit	Enter	Exit
114	589	810	1310	1448	2019
Source: Figure 4		Source: Figure 11		Source: Figure 12A+12B+12C	

2026: Alt 1 -		2026: Alt 2 –	
Enter	Exit	Enter	Exit
1417	2516	2886	3630
Source: Figure 13		Source: Figure 14	

2031: Alt 1 -		2031: Alt 2 –	
Enter	Exit	Enter	Exit
2221	4252	4451	6138
Source: Figure 15		Source: Figure 16	

Reference: Gorrill-Palmer Consulting Engineers, Traffic Impact Study Closure and Reuse of Property at NAS Brunswick, August 2010

Vehicle Emissions Estimates based on Peak Hourly Traffic Data(tons)

Vehicle Class	Base Case (Existing) Emissions					
	VOC	CO	NOx	CO_2	PM	SO2
All Vehicles	0.01	0.11	0.011	11.904	0.0003	0.0002
Daily Emissions[1]	0.01	0.11	0.01	11.90	0.0003	0.0002
Annual Emissions[2]	3.04	39.34	4.11	4344.92	0.13	0.07

[1]Total peak entering and exiting vehicles x 25 miles (assumed daily commute total) x emission factor,

[2]Daily Emissions x 365 days

Vehicle Class	Emissions Reduction from Base Closure					
	VOC	CO	NOx	CO_2	PM	SO2
All Vehicles	0.01	0.10	0.01	10.70	0.00	0.00
Daily Emissions[1]	0.01	0.10	0.01	10.70	0.0003	0.0002
Annual Emissions[2]	2.74	35.36	3.70	3905.98	0.11	0.06

[1]Total entering and exiting vehicles x 25 miles (assumed daily commute total) x emission factor, converted from grams to tons

[2]Daily Emissions x 365 days

Estimated Vehicle Emissions for Alt 1 (tons)

	2016						2021						2026						2031					
Vehicle Class	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**
All Vehicles	0.01	0.12	0.013	13.441	0.0004	0.0002	0.02	0.26	0.02	32.28	0.001	0.0005	0.03	0.47	0.02	59.89	0.001	0.001	0.05	0.79	0.02	65.64	0.002	0.001
Daily Emissions	0.01	0.12	0.01	13.44	0.0004	0.0002	0.02	0.26	0.02	32.28	0.001	0.001	0.03	0.47	0.02	59.9	0.001	0.001	0.05	0.79	0.02	65.6	0.002	0.001
Annual Emissions	3.4372	44.4176	4.6451	4906.0931	0.1412	0.0808	6.4186	96.0656	5.9921	11782.4803	0.2985	0.1941	11.1165	172.7209	7.5956	21859.5152	0.5064	0.3600	16.4726	287.7829	5.6645	23960.2068	0.7292	0.4427

Estimated Vehicle Emissions for Alt 2 (tons)

	2016						2021						2026						2031					
Vehicle Class	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**	**VOC**	**CO**	**NOx**	**CO2**	**PM**	**SO2**
All Vehicles	0.02	0.21	0.022	22.879	0.0007	0.0004	0.03	0.43	0.03	52.79	0.001	0.0009	0.05	0.78	0.03	99.22	0.002	0.002	0.08	1.27	0.05	161.24	0.004	0.003
Daily Emissions	0.02	0.21	0.02	22.88	0.0007	0.0004	0.03	0.43	0.03	52.79	0.001	0.001	0.05	0.78	0.03	99.2	0.002	0.002	0.08	1.27	0.05	161.2	0.004	0.003
Annual Emissions	5.8507	75.6054	7.9067	8350.9150	0.2404	0.1376	10.4968	157.1035	9.7994	19268.8014	0.4882	0.3173	18.4172	286.1554	12.5840	36215.7643	0.8389	0.5964	29.6099	463.1073	17.7872	58853.3960	1.3420	0.9692