
B

Air Quality Calculations Tables

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TABLE B.1 EMISSION FACTORS FOR OPERATIONS OF F/A-18G AIRCRAFT

| Flight Operation and Flight Mode | | Engine Power Setting ¹ | No. of Engines in Use | Time-in-Mode per Engine (min) | Fuel Flow Rate per Engine (lb/hr) | Fuel Used (lbs) | Engine(s): F414-GE500 (2) | | | | | APU Type: GTC 36-200 | | | | | | |
|--|--------|-----------------------------------|-----------------------|-------------------------------|-----------------------------------|-----------------|---|--------------------|-------|--------------------|---------------------|--|-----------------|-------------|-----------------|------------------|--|--|
| | | | | | | | Emission Indexes (pounds per 1,000 pounds fuel) | | | | | Emissions from Single Landing and Take Off (lb/operations) | | | | | | |
| | | | | | | | EI CO | EI NO _x | EI HC | EI SO ₂ | EI PM ₁₀ | CO | NO _x | HC | SO ₂ | PM ₁₀ | | |
| Departure | | | | | | | | | | | | | | | | | | |
| APU Use | ON | 1 | 5.0 | 197 | 16.42 | 2.00 | 6.25 | 0.25 | 0.40 | 0.22 | 0.033 | 0.103 | 0.004 | 0.007 | 0.004 | | | |
| Start/Warm-up | G Idle | 2 | 15.0 | 723 | 361.50 | 93.26 | 3.23 | 59.39 | 0.40 | 13.39 | 33.713 | 1.168 | 21.469 | 0.145 | 4.840 | | | |
| Unstick | 75% N2 | 2 | 0.3 | 1,421 | 14.21 | 26.09 | 4.85 | 5.37 | 0.40 | 10.49 | 0.371 | 0.069 | 0.076 | 0.006 | 0.149 | | | |
| Taxi Out | G Idle | 2 | 5.0 | 723 | 120.50 | 93.26 | 3.23 | 59.39 | 0.40 | 13.39 | 11.238 | 0.389 | 7.156 | 0.048 | 1.613 | | | |
| Engine Run-up | 80% N2 | 2 | 0.5 | 2,337 | 38.95 | 5.34 | 7.08 | 0.34 | 0.40 | 8.47 | 0.208 | 0.276 | 0.013 | 0.016 | 0.330 | | | |
| Takeoff | Max AB | 2 | 0.5 | 35,763 | 596.05 | 274.97 | 9.67 | 4.87 | 0.40 | No Data | 163.896 | 5.764 | 2.903 | 0.238 | 0.000 | | | |
| Takeoff - No A/B | 95% N2 | 2 | 0.5 | 9,225 | 153.75 | 0.69 | 28.11 | 0.12 | 0.40 | 3.14 | 0.106 | 4.322 | 0.018 | 0.062 | 0.483 | | | |
| Climbout | 95% N2 | 2 | 1.0 | 9,225 | 307.50 | 0.69 | 28.11 | 0.12 | 0.40 | 3.14 | 0.212 | 8.644 | 0.037 | 0.123 | 0.966 | | | |
| Single Departure Totals | | | | | | 1455.1 | | | | | 209.67 | 16.41 | 31.66 | 0.58 | 7.90 | | | |
| Single Departure Totals, no AB | | | | | | 1012.8 | | | | | 45.88 | 14.97 | 28.77 | 0.41 | 8.38 | | | |
| Arrival straight in | | | | | | | | | | | | | | | | | | |
| Approach | 85% N2 | 2 | 3.0 | 4,049 | 404.90 | 0.89 | 11.58 | 0.12 | 0.4 | 6.31 | 0.360 | 4.689 | 0.049 | 0.162 | 2.555 | | | |
| On Runway(WOW) | G Idle | 2 | 1.0 | 723 | 24.10 | 93.26 | 3.23 | 59.39 | 0.4 | 13.39 | 2.248 | 0.078 | 1.431 | 0.010 | 0.323 | | | |
| Unstick | 75% N2 | 2 | 0.3 | 1,421 | 14.21 | 26.09 | 4.85 | 5.37 | 0.4 | 10.49 | 0.371 | 0.069 | 0.076 | 0.006 | 0.149 | | | |
| Taxi In/ shut down | G Idle | 2 | 8.0 | 723 | 192.80 | 93.26 | 3.23 | 59.39 | 0.4 | 13.39 | 17.981 | 0.623 | 11.450 | 0.077 | 2.582 | | | |
| Hot Refuel | G Idle | 2 | 15.0 | 723 | 361.50 | 93.26 | 3.23 | 59.39 | 0.4 | 13.39 | 33.713 | 1.168 | 21.469 | 0.145 | 4.840 | | | |
| Single Straight in Arrival Totals | | | | | | 997.5 | | | | | 54.67 | 6.63 | 34.48 | 0.40 | 10.45 | | | |
| Single Straight in Arrival Totals, no hotfuel | | | | | | 636.0 | | | | | 20.96 | 5.46 | 13.01 | 0.25 | 5.61 | | | |
| Arrival w/ break | | | | | | | | | | | | | | | | | | |
| Approach to break | 90% N2 | 2 | 1.0 | 6,505 | 216.8 | 0.70 | 18.82 | 0.12 | 0.40 | 4.48 | 0.152 | 4.081 | 0.026 | 0.087 | 0.971 | | | |
| Break | F Idle | 2 | 0.5 | 880 | 14.7 | 69.91 | 3.59 | 34.50 | 0.40 | 12.52 | 1.025 | 0.053 | 0.506 | 0.006 | 0.184 | | | |
| Circle | 80% N2 | 2 | 1.0 | 2,337 | 77.9 | 5.34 | 7.08 | 0.34 | 0.40 | 8.47 | 0.416 | 0.552 | 0.026 | 0.031 | 0.660 | | | |
| Approach | 80% N2 | 2 | 0.5 | 2,337 | 39.0 | 5.34 | 7.08 | 0.34 | 0.40 | 8.47 | 0.208 | 0.276 | 0.013 | 0.016 | 0.330 | | | |
| On Runway(WOW) | G Idle | 2 | 1.0 | 723 | 24.1 | 93.26 | 3.23 | 59.39 | 0.40 | 13.39 | 2.248 | 0.078 | 1.431 | 0.010 | 0.323 | | | |
| Unstick | 75% N2 | 2 | 0.3 | 1,421 | 14.2 | 26.09 | 4.85 | 5.37 | 0.40 | 10.49 | 0.371 | 0.069 | 0.076 | 0.006 | 0.149 | | | |
| Taxi In | G Idle | 2 | 8.0 | 723 | 192.8 | 93.26 | 3.23 | 59.39 | 0.40 | 13.39 | 17.981 | 0.623 | 11.450 | 0.077 | 2.582 | | | |
| Hot Refuel | G Idle | 2 | 15.0 | 723 | 361.5 | 93.26 | 3.23 | 59.39 | 0.40 | 13.39 | 33.713 | 1.168 | 21.469 | 0.145 | 4.840 | | | |
| Single Arrival with Break w/ hot refuel | | | | | | 941.0 | | | | | 56.11 | 6.90 | 35.00 | 0.38 | 10.04 | | | |
| Single Arrival with Break w/o hot refuel | | | | | | 579.5 | | | | | 22.40 | 5.73 | 13.53 | 0.23 | 5.20 | | | |
| Single F/A-18E/F LTO with Straight In Arrival, w/ hot refuel, w/AB | | | | | | 2,453 | | | | | 264.34 | 23.04 | 66.14 | 0.98 | 18.35 | | | |
| Single F/A-18E/F LTO with Straight In Arrival, w/o hot refuel, w/ AB | | | | | | 2,091 | | | | | 230.63 | 21.87 | 44.67 | 0.84 | 13.51 | | | |
| Single F/A-18E/F LTO with Straight In Arrival, w/ hot refuel, w/o AB | | | | | | 2,010 | | | | | 100.55 | 21.60 | 63.25 | 0.80 | 18.83 | | | |
| Single F/A-18E/F LTO with Straight In Arrival, w/o hot refuel, w/o AB | | | | | | 1,649 | | | | | 66.84 | 20.43 | 41.78 | 0.66 | 13.99 | | | |
| Single F/A-18E/F LTO with Break Arrival, w/ hot refuel, w/AB | | | | | | 2,396 | | | | | 265.78 | 23.31 | 66.66 | 0.96 | 17.94 | | | |
| Single F/A-18E/F LTO with Break Arrival, w/o hot refuel, w/ AB | | | | | | 2,035 | | | | | 232.07 | 22.14 | 45.19 | 0.81 | 13.10 | | | |
| Single F/A-18E/F LTO with Break Arrival, w/ hot refuel, w/o AB | | | | | | 1,954 | | | | | 101.99 | 21.87 | 63.77 | 0.78 | 18.42 | | | |
| Single F/A-18E/F LTO with Break Arrival, w/o hot refuel, w/o AB | | | | | | 1,592 | | | | | 68.28 | 20.70 | 42.30 | 0.64 | 13.58 | | | |
| Data source: AESO Memorandum Report No. 9815, Revision E, Nov 2002 | | | | | | | | | | | | | | | | | | |
| Touch-and Go (T&G) and Field Carrier Landing Practice (FCLP) | | | | | | | | | | | | | | | | | | |
| Approach | 85% N2 | 2 | 1.0 | 4,049 | 134.97 | 0.89 | 11.58 | 0.12 | 0.40 | 6.31 | 0.120 | 1.563 | 0.016 | 0.054 | 0.852 | | | |
| Climbout | 95% N2 | 2 | 0.5 | 9,225 | 153.75 | 0.69 | 28.11 | 0.12 | 0.40 | 3.14 | 0.106 | 4.322 | 0.018 | 0.062 | 0.483 | | | |
| Circle | 85% N2 | 2 | 2.0 | 4,049 | 269.93 | 0.89 | 11.58 | 0.12 | 0.40 | 6.31 | 0.240 | 3.126 | 0.032 | 0.108 | 1.703 | | | |
| Single Touch-and Go or Field Carrier Landing Practice Total | | | | | | 558.65 | | | | | 0.47 | 9.01 | 0.07 | 0.22 | 3.04 | | | |
| Ground Control Approach (GCA) Box | | | | | | | | | | | | | | | | | | |
| Approach | 85% N2 | 2 | 1.0 | 4,049 | 134.97 | 0.89 | 11.58 | 0.12 | 0.40 | 6.31 | 0.120 | 1.563 | 0.016 | 0.054 | 0.852 | | | |
| Climbout | 95% N2 | 2 | 1.0 | 9,225 | 307.50 | 0.69 | 28.11 | 0.12 | 0.40 | 3.14 | 0.212 | 8.644 | 0.037 | 0.123 | 0.966 | | | |
| Circle | 85% N2 | 2 | 5.0 | 4,049 | 674.83 | 0.89 | 11.58 | 0.12 | 0.40 | 6.31 | 0.601 | 7.815 | 0.081 | 0.270 | 4.258 | | | |
| Single Ground Control Approach Total | | | | | | 1,117.30 | | | | | 0.93 | 18.02 | 0.13 | 0.45 | 6.08 | | | |

Data source: AESO Memorandum Report No. 9933B, Nov 2002

TABLE B.2 EMISSIONS FACTORS FOR OPERATIONS OF EA-6B AIRCRAFT

| | | | | | | | Engine(s): J52-P-408A (2) | | | | | APU Type: None | | | | |
|---|-------------------------|-----------------------------------|------------------------------------|--|--|--|---|--------------------|-------|--------------------|---------------------|---|-----------------|-------|-----------------|------------------|
| | | | | | | | Emission Indexes ² (pounds per 1,000 pounds fuel) | | | | | Emissions from Single Landing and Take Off ⁴ (lb/Operation) | | | | |
| Flight Operation and Flight Mode | | Engine Power Setting ¹ | No. of Engines in Use ¹ | Time-in-Mode per Engine ¹ (min) | Fuel Flow Rate per Engine ² (lb/hr) | Fuel Used ³ (lbs) | EI CO | EI NO _x | EI HC | EI SO ₂ | EI PM ₁₀ | CO | NO _x | HC | SO ₂ | PM ₁₀ |
| Landing and Take Off (LTO) Operations with Straight-in Arrival | | | | | | | | | | | | | | | | |
| Departure | | | | | | | | | | | | | | | | |
| | Start/Warm-up | Idle | 2 | 15.0 | 779 | 389.50 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 21.80 | 0.93 | 11.03 | 0.16 | 7.77 |
| | Unstick | 70% N2 | 2 | 0.3 | 1,825 | 18.25 | 18.09 | 4.30 | 2.40 | 0.40 | 15.41 | 0.33 | 0.08 | 0.04 | 0.01 | 0.28 |
| | Taxi Out | Idle | 2 | 5.0 | 779 | 129.83 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 7.27 | 0.31 | 3.68 | 0.05 | 2.59 |
| | Engine Run-up | 85% N2 | 2 | 0.5 | 4,227 | 70.45 | 5.19 | 6.77 | 0.84 | 0.40 | 10.48 | 0.37 | 0.48 | 0.06 | 0.03 | 0.74 |
| | Takeoff | 95% N2 | 2 | 0.5 | 7,401 | 123.35 | 2.10 | 10.05 | 0.60 | 0.40 | 7.18 | 0.26 | 1.24 | 0.07 | 0.05 | 0.89 |
| | Climbout | 95% N2 | 2 | 1.0 | 7,401 | 246.70 | 2.10 | 10.05 | 0.60 | 0.40 | 7.18 | 0.52 | 2.48 | 0.15 | 0.10 | 1.77 |
| | | | | | | Single Departure Totals | 978.08 | | | | | 30.53 | 5.51 | 15.04 | 0.39 | 14.03 |
| Arrival straight in | | | | | | | | | | | | | | | | |
| | Approach | 85% N2 | 2 | 5.0 | 4,227 | 704.50 | 5.19 | 6.77 | 0.84 | 0.40 | 10.48 | 3.66 | 4.77 | 0.59 | 0.28 | 7.38 |
| | On runway (WoW) | Idle | 2 | 1.0 | 779 | 25.97 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 1.45 | 0.06 | 0.74 | 0.01 | 0.52 |
| | Unstick | 70% N2 | 2 | 0.3 | 1,825 | 18.25 | 18.09 | 4.30 | 2.40 | 0.40 | 15.41 | 0.33 | 0.08 | 0.04 | 0.01 | 0.28 |
| | Taxi In/Shut down | Idle | 2 | 10.0 | 779 | 259.67 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 14.53 | 0.62 | 7.36 | 0.10 | 5.18 |
| | Hot Refuel ¹ | Idle | 1 | 20.0 | 779 | 259.67 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 14.53 | 0.62 | 7.36 | 0.10 | 5.18 |
| | | | | | | Single Straight In Arrival Totals | 1268.05 | | | | | 34.50 | 6.15 | 16.08 | 0.51 | 18.54 |
| | | | | | | Single Straight In Arrival Totals, no hot refuel | 1008.38 | | | | | 19.97 | 5.53 | 8.73 | 0.40 | 13.36 |
| | | | | | | Single EA-6B LTO with Straight in Arrival | 2246.13 | | | | | 65.04 | 11.66 | 31.12 | 0.90 | 32.57 |
| | | | | | | Single EA-6B LTO with Straight in Arrival, no hot refuel | 1986.47 | | | | | 50.51 | 11.04 | 23.77 | 0.79 | 27.39 |
| Landing and Take Off (LTO) Operations with Break Arrival | | | | | | | | | | | | | | | | |
| Departure | | | | | | | | | | | | | | | | |
| | Start/Warm-up | Idle | 2 | 15.0 | 779 | 389.50 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 21.80 | 0.93 | 11.03 | 0.16 | 7.77 |
| | Unstick | 70% N2 | 2 | 0.3 | 1,825 | 18.25 | 18.09 | 4.30 | 2.40 | 0.40 | 15.41 | 0.33 | 0.08 | 0.04 | 0.01 | 0.28 |
| | Taxi Out | Idle | 2 | 5.0 | 779 | 129.83 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 7.27 | 0.31 | 3.68 | 0.05 | 2.59 |
| | Engine Run-up | 85% N2 | 2 | 0.5 | 4,227 | 70.45 | 5.19 | 6.77 | 0.84 | 0.40 | 10.48 | 0.37 | 0.48 | 0.06 | 0.03 | 0.74 |
| | Takeoff | 95% N2 | 2 | 0.5 | 7,401 | 123.35 | 2.10 | 10.05 | 0.60 | 0.40 | 7.18 | 0.26 | 1.24 | 0.07 | 0.05 | 0.89 |
| | Climbout | 95% N2 | 2 | 1.0 | 7,401 | 246.70 | 2.10 | 10.05 | 0.60 | 0.40 | 7.18 | 0.52 | 2.48 | 0.15 | 0.10 | 1.77 |
| | | | | | | Single Departure Totals | 978.08 | | | | | 30.53 | 5.51 | 15.04 | 0.39 | 14.03 |
| Arrival w/ break | | | | | | | | | | | | | | | | |
| | Approach to break | 90% N2 | 2 | 2.0 | 5,594 | 372.93 | 3.33 | 8.18 | 0.70 | 0.40 | 8.83 | 1.24 | 3.05 | 0.26 | 0.15 | 3.29 |
| | Break | 60% N2 | 2 | 0.5 | 1,042 | 17.37 | 38.61 | 3.49 | 9.54 | 0.40 | 18.70 | 0.67 | 0.06 | 0.17 | 0.01 | 0.32 |
| | Circle | 80% N2 | 2 | 1.0 | 3,195 | 106.50 | 7.99 | 5.71 | 1.09 | 0.40 | 12.12 | 0.85 | 0.61 | 0.12 | 0.04 | 1.29 |
| | Approach | 85% N2 | 2 | 1.0 | 4,227 | 140.90 | 5.19 | 6.77 | 0.84 | 0.40 | 10.48 | 0.73 | 0.95 | 0.12 | 0.06 | 1.48 |
| | On runway (WoW) | Idle | 2 | 1.0 | 779 | 25.97 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 1.45 | 0.06 | 0.74 | 0.01 | 0.52 |
| | Unstick | 70% N2 | 2 | 0.3 | 1,825 | 18.25 | 18.09 | 4.30 | 2.40 | 0.40 | 15.41 | 0.33 | 0.08 | 0.04 | 0.01 | 0.28 |
| | Taxi In/Shut down | Idle | 2 | 10.0 | 779 | 259.67 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 14.53 | 0.62 | 7.36 | 0.10 | 5.18 |
| | Hot Refuel ¹ | Idle | 1 | 20.0 | 779 | 259.67 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 14.53 | 0.62 | 7.36 | 0.10 | 5.18 |
| | | | | | | Single Arrival w/ Break Totals | 1201.25 | | | | | 34.34 | 6.05 | 16.15 | 0.48 | 17.54 |
| | | | | | | Single Arrival w/ Break, no hot refuel Totals | 941.58 | | | | | 19.81 | 5.43 | 8.80 | 0.38 | 12.36 |
| | | | | | | Single EA-6B LTO with Break at Arrival | 2179.33 | | | | | 64.87 | 11.56 | 31.19 | 0.87 | 31.57 |
| | | | | | | Single EA-6B LTO with Break Arrival, no hot refuel | 1919.67 | | | | | 50.34 | 10.94 | 23.83 | 0.77 | 26.39 |
| Touch-and Go (T&G) and Field Carrier Landing Practice (FCLP) | | | | | | | | | | | | | | | | |
| | Approach | 85% N2 | 2 | 1 | 4,227 | 140.90 | 5.19 | 6.77 | 0.84 | 0.4 | 10.48 | 0.73 | 0.95 | 0.12 | 0.06 | 1.48 |
| | Climbout | 95% N2 | 2 | 1 | 7,401 | 246.70 | 2.1 | 10.05 | 0.6 | 0.4 | 7.18 | 0.52 | 2.48 | 0.15 | 0.10 | 1.77 |
| | Circle | 80% N2 | 2 | 2 | 3,195 | 213.00 | 7.99 | 5.71 | 1.09 | 0.4 | 12.12 | 1.70 | 1.22 | 0.23 | 0.09 | 2.58 |
| | | | | | | Single Touch-and Go or Field Carrier Landing Practice Total | 600.60 | | | | | 2.95 | 4.65 | 0.50 | 0.24 | 5.83 |
| Ground Control Approach (GCA) Box | | | | | | | | | | | | | | | | |
| | Approach | 85% N2 | 2 | 2 | 4,227 | 281.80 | 5.19 | 6.77 | 0.84 | 0.4 | 10.48 | 1.46 | 1.91 | 0.24 | 0.11 | 2.95 |
| | Climbout | 95% N2 | 2 | 1 | 7,401 | 246.70 | 2.1 | 10.05 | 0.6 | 0.4 | 7.18 | 0.52 | 2.48 | 0.15 | 0.10 | 1.77 |
| | Circle | 80% N2 | 2 | 5 | 3,195 | 532.50 | 7.99 | 5.71 | 1.09 | 0.4 | 12.12 | 4.25 | 3.04 | 0.58 | 0.21 | 6.45 |
| | | | | | | Single Ground Control Approach Total | 1061.00 | | | | | 6.24 | 7.43 | 0.97 | 0.42 | 11.18 |

¹Time in Mode Source: CDR Miller, NAS Oceana, 1997

Data source: AESO Memorandum Report No. 9917, Revision B, Aug 2002

Data source: AESO Memorandum Report No. 9941A, August 2002

TABLE B.3 MODAL EMISSION RATES FOR OTHER AIRCRAFT AT NAS WHIDBEY ISLAND

| Aircraft (Engine Model) | Engine Power Setting | Time in Mode (minutes) | Fuel Flow ((lb/hr)/eng) | Fuel Flow ((lb/min)/eng) | Engines | VOC | Emission Index (lb /1000 lb fuel) | | | | | Modal Emission Rates (lb/mode) | | | | |
|---|--------------------------|------------------------|-------------------------|--------------------------|---------|-----|-----------------------------------|--------|--------|------|-------------|--------------------------------|--------------|--------------|-------------|--------------|
| | | | | | | | NOx | CO | SO2 | PM10 | VOC (1) | NOx | CO | SO2 | PM10 (2) | |
| P-3 (T56-A-14) APU type: GTCP 95-2/3 | APU | 100% | 120.0 | 293 | 4.88 | 1 | 0.42 | 5.65 | 3.20 | 0.40 | 0.22 | 0.25 | 3.31 | 1.88 | 0.23 | 0.13 |
| | Start/Warm up | L/S Idle | 9.0 | 599 | 9.98 | 3 | 22.32 | 3.53 | 30.11 | 0.40 | 3.97 | 6.02 | 0.95 | 8.12 | 0.11 | 1.07 |
| | Start/Warm up | H/S Idle | 13.0 | 756 | 12.60 | 1 | 1.42 | 6.35 | 5.65 | 0.40 | 3.97 | 0.23 | 1.04 | 0.93 | 0.07 | 0.65 |
| | Unstick | 24% shp | 0.2 | 1000 | 16.67 | 4 | 0.61 | 7.61 | 2.65 | 0.40 | 3.97 | 0.01 | 0.10 | 0.04 | 0.01 | 0.05 |
| | Taxi Out/Idle | L/S Idle | 10.0 | 599 | 9.98 | 3 | 22.32 | 3.53 | 30.11 | 0.40 | 3.97 | 6.68 | 1.06 | 9.02 | 0.12 | 1.19 |
| | Taxi Out/Idle | H/S Idle | 10.0 | 756 | 12.60 | 1 | 1.42 | 6.35 | 5.65 | 0.40 | 3.97 | 0.18 | 0.80 | 0.71 | 0.05 | 0.50 |
| | Run up | Military | 0.3 | 2219.0 | 36.98 | 4 | 0.16 | 10.45 | 0.65 | 0.40 | 3.97 | 0.01 | 0.46 | 0.03 | 0.02 | 0.18 |
| | Take Off | Military | 0.5 | 2219.0 | 36.98 | 4 | 0.16 | 10.45 | 0.65 | 0.40 | 3.97 | 0.01 | 0.77 | 0.05 | 0.03 | 0.29 |
| | Climbout | 74% shp | 3.0 | 1800.0 | 30.00 | 4 | 0.21 | 9.83 | 0.94 | 0.40 | 3.97 | 0.08 | 3.54 | 0.34 | 0.14 | 1.43 |
| | Approach | 37% shp | 10.0 | 1200.0 | 20.00 | 4 | 0.41 | 8.43 | 1.82 | 0.40 | 3.97 | 0.33 | 6.74 | 1.46 | 0.32 | 3.18 |
| | On Runway | H/S Idle | 1.0 | 756 | 12.60 | 4 | 1.42 | 6.35 | 5.65 | 0.40 | 3.97 | 0.07 | 0.32 | 0.28 | 0.02 | 0.20 |
| | Taxi In/Idle | L/S Idle | 12.0 | 599 | 9.98 | 4 | 22.32 | 3.53 | 30.11 | 0.40 | 3.97 | 10.70 | 1.69 | 14.43 | 0.19 | 1.90 |
| | APU | 100% | 15.0 | 293 | 4.88 | 1 | 0.42 | 5.65 | 3.20 | 0.40 | 0.22 | 0.03 | 0.41 | 0.23 | 0.03 | 0.02 |
| | T&G Level ^{1,2} | 37% shp | 2.0 | 1200.0 | 20.00 | 4 | 0.41 | 8.43 | 1.82 | 0.40 | 3.97 | 0.07 | 1.35 | 0.29 | 0.06 | 0.64 |
| | GCA Box ¹ | 37% shp | 5.0 | 1200.0 | 20.00 | 4 | 0.41 | 8.43 | 1.82 | 0.40 | 3.97 | 0.16 | 3.37 | 0.73 | 0.16 | 1.59 |
| | Full LTO | | | | | | | | | | | 24.59 | 21.21 | 37.50 | 1.34 | 10.79 |
| Touch and Go ³ | | | | | | | | | | | 0.47 | 1.75 | 0.69 | 0.47 | 1.04 | |
| GCA Box ³ | | | | | | | | | | | 0.57 | 3.78 | 1.13 | 0.56 | 1.99 | |
| Data source: AESO Memorandum Report 9911B April 2000 | | | | | | | | | | | | | | | | |
| C-12/TC-4 (PT6A-41) | Start/Warm up | G Idle | 10.00 | 138.0 | 2.30 | 2 | 8.98 | 3.05 | 29.78 | 0.40 | 4.20 | 0.41 | 0.14 | 1.37 | 0.02 | 0.19 |
| | Unstick | 71.2% | 0.25 | 161.0 | 2.68 | 2 | 3.92 | 3.26 | 23.12 | 0.40 | 4.20 | 0.01 | 0.00 | 0.03 | 0.00 | 0.01 |
| | Taxi Out/Idle | 63.2% | 5.00 | 148.0 | 2.47 | 2 | 6.21 | 3.13 | 28.36 | 0.40 | 4.20 | 0.15 | 0.08 | 0.70 | 0.01 | 0.10 |
| | Run up | 93.8% | 0.50 | 401.0 | 6.68 | 2 | 0.11 | 6.53 | 0.76 | 0.40 | 4.20 | 0.00 | 0.04 | 0.01 | 0.00 | 0.03 |
| | Take Off | 100.0% | 0.50 | 540.0 | 9.00 | 2 | 0.11 | 8.32 | 0.75 | 0.40 | 4.20 | 0.00 | 0.07 | 0.01 | 0.00 | 0.04 |
| | Climbout | 100.0% | 2.00 | 540.0 | 9.00 | 2 | 0.11 | 8.32 | 0.75 | 0.40 | 4.20 | 0.00 | 0.30 | 0.03 | 0.01 | 0.15 |
| | Approach | 86.7% | 5.00 | 249.0 | 4.15 | 2 | 0.23 | 4.42 | 4.93 | 0.40 | 4.20 | 0.01 | 0.18 | 0.20 | 0.02 | 0.17 |
| | On Runway | 63.2% | 1.00 | 148.0 | 2.47 | 2 | 6.21 | 3.13 | 28.36 | 0.40 | 4.20 | 0.03 | 0.02 | 0.14 | 0.00 | 0.02 |
| | Unstick | 71.2% | 0.25 | 161.0 | 2.68 | 2 | 3.92 | 3.26 | 23.12 | 0.40 | 4.20 | 0.01 | 0.00 | 0.03 | 0.00 | 0.01 |
| | Taxi In/Idle | 63.2% | 5.00 | 148.0 | 2.47 | 2 | 6.21 | 3.13 | 28.36 | 0.40 | 4.20 | 0.15 | 0.08 | 0.70 | 0.01 | 0.10 |
| | Shut down | G Idle | 1.00 | 138.0 | 2.30 | 2 | 8.98 | 3.05 | 29.78 | 0.40 | 4.20 | 0.04 | 0.01 | 0.14 | 0.00 | 0.02 |
| | T&G Level | varies | 4.00 | varies | varies | 2 | varies | varies | varies | 0.40 | 4.20 | 0.01 | 0.39 | 0.09 | 0.04 | 0.39 |
| | GCA Box | varies | 8.00 | varies | varies | 2 | varies | varies | varies | 0.40 | 4.20 | 0.01 | 0.56 | 0.15 | 0.04 | 0.39 |
| | Touch and Go | | | | | | | | | | | 0.02 | 0.87 | 0.32 | 0.07 | 0.72 |
| Full LTO | | | | | | | | | | | 0.82 | 0.93 | 3.35 | 0.08 | 0.84 | |
| GCA Box | | | | | | | | | | | 0.01 | 0.56 | 0.15 | 0.04 | 0.39 | |
| Data source: AESO Memorandum Report 9910 Revision B April 2000 and 9935 Revision A March 2000 | | | | | | | | | | | | | | | | |
| C-9 (JT8D-9) APU: GTCP-85 | APU Use | On | 1 | 75 | 293 | 366 | 0.42 | 5.65 | 3.20 | 0.40 | 0.22 | 0.154 | 2.069 | 1.172 | 0.147 | 0.081 |
| | Start/Warm | Idle | 2 | 5 | 1,049 | 175 | 10.00 | 2.90 | 34.50 | 0.40 | 19.59 | 1.748 | 6.029 | 0.070 | 3.424 | |
| | Unstick | 70% rpm | 2 | 0.25 | 2,368 | 20 | 1.72 | 5.46 | 9.36 | 0.40 | 16.25 | 0.034 | 0.108 | 0.185 | 0.008 | 0.321 |
| | Taxi Out | Idle | 2 | 7 | 1,049 | 245 | 10.00 | 2.90 | 34.50 | 0.40 | 19.59 | 2.447 | 0.710 | 8.441 | 0.098 | 4.793 |
| | Run-up | 80% rpm | 2 | 0.5 | 3,547 | 59 | 0.67 | 7.79 | 4.90 | 0.40 | 14.59 | 0.040 | 0.461 | 0.290 | 0.024 | 0.863 |
| | Takeoff | Military | 2 | 1 | 8,254 | 275 | 0.47 | 17.92 | 1.24 | 0.40 | 11.12 | 0.129 | 4.931 | 0.341 | 0.110 | 3.060 |
| | Climbout | 90% rpm | 2 | 1.5 | 5,387 | 269 | 0.48 | 11.59 | 2.51 | 0.40 | 12.87 | 0.129 | 3.122 | 0.676 | 0.108 | 3.466 |
| | Approach | 80% rpm | 2 | 5 | 3,547 | 591 | 0.67 | 7.79 | 4.90 | 0.40 | 14.59 | 0.396 | 4.606 | 2.897 | 0.236 | 8.626 |
| | On runway | 70% rpm | 2 | 1 | 2,368 | 79 | 1.72 | 5.46 | 9.36 | 0.40 | 16.25 | 0.136 | 0.431 | 0.739 | 0.032 | 1.283 |
| | Unstick | 70% rpm | 2 | 0.25 | 2,368 | 20 | 1.72 | 5.46 | 9.36 | 0.40 | 16.25 | 0.034 | 0.108 | 0.185 | 0.008 | 0.321 |
| | Taxi in | Idle | 2 | 10 | 1,049 | 350 | 10.00 | 2.90 | 34.50 | 0.40 | 19.59 | 3.495 | 1.014 | 12.059 | 0.140 | 6.847 |
| | APU Use | On | 1 | 20 | 293 | 98 | 0.42 | 5.65 | 3.20 | 0.40 | 0.22 | 0.041 | 0.552 | 0.313 | 0.039 | 0.021 |
| | Full LTO | | | | | | | | | | | 8.78 | 18.62 | 33.33 | 1.02 | 33.10 |
| Data source: AESO Memorandum Report 9926 C-9 LTO and Maintenance Emissions Estimates | | | | | | | | | | | | | | | | |

¹ Time in mode (TIM) for level modes were estimated from flight track profiles for EA-6B aircraft, assuming a power setting of 37% shp.

² FCLP Emission Factors are the same as T&G

³ Emission rates for T&G and GCA Box operations include approach, climbout, and level modes only.

Key: VOC = volatile organic compounds
 NOx = oxides of nitrogen
 CO = carbon monoxide
 SO2 = sulfur dioxide
 PM10 = particulate matter
 LTO = Landing and Take Off Cycle
 T&G = touch and go

TABLE B.4 PROJECTED EMISSIONS FROM IN-FRAME MAINTENANCE RUN UP OPERATIONS OF EA-18G AIRCRAFT

| Maintenance Operation and Engine Mode | Engine Power Setting ¹ | Maint. Test per yr ¹ | No. of Engines in Use ¹ | Time-in-Mode per Engine ¹ (min) | Fuel Flow Rate per Engine ^{2,3} (lb/hr) | Fuel Used ⁴ (lbs/AC/yr) | Engine(s): F414-GE-400 (2) | | | | | APU Type: GTC 36-200 | | | | |
|---|-----------------------------------|---------------------------------|------------------------------------|--|--|------------------------------------|--|--------------------|-------|--------------------|---------------------|---|-----------------|--------------|-----------------|------------------|
| | | | | | | | Emission Indexes ^{2,3} (pounds per 1,000 pounds fuel) | | | | | Emissions from Maint. Test per Year ² (lb /yr) | | | | |
| | | | | | | | EI CO | EI NO _x | EI HC | EI SO ₂ | EI PM ₁₀ | CO | NO _x | HC | SO ₂ | PM ₁₀ |
| APU Check | | | | | | | | | | | | | | | | |
| APU Use | On | 52 | 1 | 10 | 197 | 1,707 | 2.00 | 6.25 | 0.25 | 0.40 | 0.22 | 3.4 | 10.7 | 0.4 | 0.7 | 0.4 |
| APU Check Totals | | | | | | 1,707 | | | | | | 3.4 | 10.7 | 0.4 | 0.7 | 0.4 |
| Water Wash | | | | | | | | | | | | | | | | |
| APU Use | On | 57 | 1 | 5 | 197 | 936 | 2.00 | 6.25 | 0.25 | 0.40 | 0.22 | 1.9 | 5.8 | 0.2 | 0.4 | 0.2 |
| Main eng run | Gr Idle | 57 | 1 | 10 | 723 | 6,869 | 93.26 | 3.29 | 54.20 | 0.40 | 12.75 | 640.6 | 22.6 | 372.3 | 2.7 | 87.6 |
| Water Wash Totals | | | | | | 7,804 | | | | | | 642.4 | 28.4 | 372.5 | 3.1 | 87.8 |
| Low Power- 2 Engines | | | | | | | | | | | | | | | | |
| APU Use | On | 701 | 1 | 5 | 197 | 11,508 | 2.00 | 6.25 | 0.25 | 0.40 | 0.22 | 23.0 | 71.9 | 2.9 | 4.6 | 2.5 |
| Main eng run | Gr Idle (56%) | 701 | 2 | 15 | 723 | 253,412 | 93.26 | 3.29 | 54.20 | 0.40 | 12.75 | 23,633.2 | 833.7 | 13,734.9 | 101.4 | 3,231.0 |
| | 80% | 701 | 2 | 15 | 2,337 | 819,287 | 5.34 | 7.08 | 0.34 | 0.40 | 8.47 | 4,375.0 | 5,800.6 | 278.6 | 327.7 | 6,939.4 |
| Low Power- Two Engine Totals | | | | | | 1,084,206 | | | | | | 28,031.2 | 6,706.2 | 14,016.3 | 433.7 | 10,172.9 |
| High Power | | | | | | | | | | | | | | | | |
| APU Use | On | 34 | 1 | 5 | 197 | 558 | 2.00 | 6.25 | 0.25 | 0.40 | 0.22 | 1.1 | 3.5 | 0.1 | 0.2 | 0.1 |
| Main eng run | Gr. Idle | 34 | 2 | 10 | 723 | 8,194 | 93.26 | 3.29 | 54.20 | 0.40 | 12.75 | 764.2 | 27.0 | 444.1 | 3.3 | 104.5 |
| Main eng run | 80% | 34 | 2 | 10 | 2,337 | 26,491 | 5.34 | 7.08 | 0.34 | 0.40 | 8.47 | 141.5 | 187.6 | 9.0 | 10.6 | 224.4 |
| Main eng run | 90% | 34 | 2 | 10 | 6,505 | 73,724 | 0.70 | 18.82 | 0.12 | 0.40 | 4.48 | 51.6 | 1,387.5 | 8.8 | 29.5 | 330.3 |
| Main eng run | MIL 96% | 34 | 2 | 10 | 9,941 | 112,666 | 0.69 | 30.81 | 0.12 | 0.40 | 2.86 | 77.7 | 3,471.2 | 13.5 | 45.1 | 322.2 |
| Main eng run | AB 97% | 34 | 2 | 3 | 35,763 | 121,594 | 274.97 | 9.67 | 4.87 | 0.40 | 0.00 | 33,434.8 | 1,175.8 | 592.2 | 48.6 | - |
| High Power Totals | | | | | | 343,228 | | | | | | 34,470.9 | 6,252.6 | 1,067.8 | 137.3 | 981.5 |
| Total Annual Maintenance Test Emissions From F/A-18G Aircraft (pounds) | | | | | | | | | | | 63,147.9 | 12,997.9 | 15,457.1 | 574.8 | 11,242.5 | |
| Total Annual Maintenance Test Emissions From F/A-18G Aircraft (Tons) | | | | | | | | | | | 31.57 | 6.50 | 7.73 | 0.29 | 5.62 | |

Notes:

¹ Total maintenance tests from Wyle Laboratories, 2004 (see table A.3).

² Fuel flow and emission indexes from AESO memorandum report 9725B (Nov 2002).

³ Fuel used = fuel flow x time-in-mode / 60/ x no. of engines in use x maintenance tests per aircraft year.

⁴ Emissions = fuel used / 1000 x emission index

TABLE B.5 EXISTING EMISSIONS FROM IN-FRAME MAINTENANCE RUN UP OPERATIONS OF EA-6B AIRCRAFT

| Maintenance Operation and Engine Mode | Engine Power Setting ¹ | Maint. Test per yr ¹ | No. of Engines in Use ¹ | Time-in-Mode per Engine ¹ (min) | Fuel Flow Rate per Engine ² (lb/hr) | Fuel Used ³ (lbs/yr) | Engine(s): J52-P- 408A (2) | | | | | APU Type: None | | | | |
|--|-----------------------------------|---------------------------------|------------------------------------|--|--|---------------------------------|--|--------|-------|--------|---------|--|------------------|------------------|-----------------|------------------|
| | | | | | | | Emission Indexes ² (pounds per 1,000 pounds fuel) | | | | | Emissions from Maint. Test per Year ⁴ (lb/yr) | | | | |
| | | | | | | | EI CO | EI NOx | EI HC | EI SO2 | EI PM10 | CO | NOx | HC | SO2 | PM10 |
| Water Wash- see Low Power- 2 Engines | | | | | | | | | | | | | | | | |
| Low Power- 1 Engine | | | | | | | | | | | | | | | | |
| Main eng run | Idle | 2592 | 1 | 15 | 779.0 | 504,792 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 28248.16 | 1201.40 | 14300.76 | 201.92 | 10065.55 |
| Main eng run | 75% N2 | 2592 | 1 | 5 | 2,415.0 | 521,640 | 12.11 | 4.91 | 1.53 | 0.40 | 13.77 | 6317.06 | 2561.25 | 798.11 | 208.66 | 7182.98 |
| Low Power- One Engine Totals | | | | | | 1,026,432 | | | | | | 34,565.22 | 3,762.66 | 15,098.87 | 410.57 | 17,248.54 |
| Low Power- 2 Engines | | | | | | | | | | | | | | | | |
| Main eng run | Idle | 1080 | 2 | 25 | 779.0 | 701,100 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 39233.56 | 1668.62 | 19862.16 | 280.44 | 13979.93 |
| Main eng run | 75% N2 | 1080 | 2 | 8 | 2,415.0 | 695,520 | 12.11 | 4.91 | 1.53 | 0.40 | 13.77 | 8422.75 | 3415.00 | 1064.15 | 278.21 | 9577.31 |
| Low Power- Two Engine Totals | | | | | | 1,396,620 | | | | | | 47,656.30 | 5,083.62 | 20,926.31 | 558.65 | 23,557.24 |
| High Power | | | | | | | | | | | | | | | | |
| engine start/taxi | Idle | 360 | 2 | 16 | 779.0 | 149,568 | 55.96 | 2.38 | 28.33 | 0.40 | 19.94 | 8369.83 | 355.97 | 4237.26 | 59.83 | 2982.39 |
| Intermed power | 70% N2 | 360 | 2 | 15 | 1,825.0 | 328,500 | 18.09 | 4.30 | 2.40 | 0.40 | 15.41 | 5942.57 | 1412.55 | 788.40 | 131.40 | 5062.19 |
| High power | 98% N2 | 360 | 2 | 10 | 8,755.0 | 1,050,600 | 1.58 | 11.44 | 0.56 | 0.40 | 6.20 | 1659.95 | 12018.86 | 588.34 | 420.24 | 6513.72 |
| High Power Totals | | | | | | 1,528,668 | | | | | | 15,972.34 | 13,787.39 | 5,614.00 | 611.47 | 14,558.29 |
| Total Annual Emissions from EA-6B In Frame Maintenance Testing (lbs) | | | | | | 3,951,720 | | | | | | 98,193.86 | 22,633.66 | 41,639.17 | 1,580.69 | 55,364.07 |
| Total Annual Emissions from EA-6B In Frame Maintenance Testing (tons) | | | | | | 1,976 | | | | | | 49.10 | 11.32 | 20.82 | 0.79 | 27.68 |

EA-6B Notes:

¹ Total maintenance tests from Wyle Laboratories, 2004 (see table A.3).

² No data available for the J52-P-408A engine. Fuel flow and emission indexes are for the J52-P-408 from: *J52-P-408 Engine Fuel Flow and Emission Indexes by Percentage of Core RPM (%N2)* –DRAFT–; Aircraft Environmental Support Office; San Diego, CA., January 1999; AESO Memorandum Report

³ Fuel used = fuel flow x time-in-mode / 60 x no. of engines in use x maint. test per AC per yr.

⁴ Emissions = fuel used / 1,000 x emission index

TABLE B.6 ESTIMATED EMISSIONS FROM IN-FRAME MAINTENANCE RUN UP OPERATIONS OF P-3 AIRCRAFT

| Maintenance Operation and Engine Mode | Engine Power Setting ¹ | Maint. Test per yr ¹ | No. of Engines in Use ¹ | Mode per Time-in-Engine ¹ (min) | Fuel Flow Rate per Engine ^{2,3} (lb/hr) | Fuel Used ⁴ (lbs/yr) | Engine(s): T56-A-14 (4) | | | | | APU Type: GTCP 95-2/3 | | | | |
|---|-----------------------------------|---------------------------------|------------------------------------|--|--|---------------------------------|--|--------------------|-------|--------------------|---------------------|---|-----------------|--------------|-----------------|------------------|
| | | | | | | | Emission Indexes ^{2,3} (pounds per 1,000 pounds fuel) | | | | | Emissions from Maint. Test per Year ⁵ (lb /yr) | | | | |
| | | | | | | | EI CO | EI NO _x | EI HC | EI SO ₂ | EI PM ₁₀ | CO | NO _x | HC | SO ₂ | PM ₁₀ |
| APU Check | | | | | | | | | | | | | | | | |
| APU Use | On | 210 | 1 | 30 | 293 | 30,765 | 3.2 | 5.65 | 0.42 | 0.40 | 0.22 | 98.45 | 173.82 | 12.92 | 12.31 | 6.77 |
| APU Check Totals | | | | | | 30,765 | | | | | | 98.45 | 173.82 | 12.92 | 12.31 | 6.77 |
| Low Power | | | | | | | | | | | | | | | | |
| APU Use | On | 520 | 1 | 40 | 293 | 101,573 | 3.2 | 5.65 | 0.42 | 0.40 | 0.22 | 325.03 | 573.89 | 42.66 | 40.63 | 22.35 |
| Main eng run | 1000 | 520 | 1 | 15 | 1000 | 130,000 | 2.65 | 7.61 | 0.61 | 0.40 | 3.97 | 344.50 | 989.30 | 79.30 | 52.00 | 516.10 |
| Low Power Totals | | | | | | 231,573 | | | | | | 669.53 | 1,563.19 | 121.96 | 92.63 | 538.45 |
| Prop Dynamic Balancing | | | | | | | | | | | | | | | | |
| APU Use | On | 80 | 1 | 40 | 293 | 15,627 | 3.2 | 5.65 | 0.42 | 0.40 | 0.22 | 50.01 | 88.29 | 6.56 | 6.25 | 3.44 |
| Main eng run | 1500 | 80 | 1 | 15 | 458 | 9,160 | 17.40 | 1.69 | 90.98 | 0.40 | 3.26 | 159.38 | 15.48 | 833.38 | 3.66 | 29.86 |
| Prop Dynamic Totals | | | | | | 24,787 | | | | | | 209.39 | 103.77 | 839.94 | 9.91 | 33.30 |
| Out of Phase Turn | | | | | | | | | | | | | | | | |
| APU Use | On | 42 | 1 | 40 | 293 | 8,204 | 3.2 | 5.65 | 0.42 | 0.40 | 0.22 | 26.25 | 46.35 | 3.45 | 3.28 | 1.80 |
| Main eng run | 250 (Low Idle) | 42 | 4 | 30 | 599 | 50,316 | 30.11 | 3.53 | 22.32 | 0.40 | 3.97 | 1,515.01 | 177.62 | 1,123.05 | 20.13 | 199.75 |
| Main eng run | 450 (Normal Idle) | 42 | 4 | 10 | 756 | 21,168 | 5.65 | 6.35 | 1.42 | 0.40 | 3.97 | 119.60 | 134.42 | 30.06 | 8.47 | 84.04 |
| Main eng run | 1000 | 42 | 4 | 10 | 1000 | 28,000 | 2.65 | 7.61 | 0.61 | 0.40 | 3.97 | 74.20 | 213.08 | 17.08 | 11.20 | 111.16 |
| Low Power- Two Engine Totals | | | | | | 107,688 | | | | | | 1,735.07 | 571.46 | 1,173.64 | 43.08 | 396.76 |
| High Power | | | | | | | | | | | | | | | | |
| APU Use | On | 100 | 1 | 40 | 293 | 19,533 | 2 | 6.25 | 0.42 | 0.40 | 0.22 | 39.07 | 122.08 | 8.20 | 7.81 | 4.30 |
| Main eng run | 1500 | 100 | 2 | 10 | 1200 | 40,000 | 1.82 | 8.43 | 0.41 | 0.40 | 3.97 | 72.80 | 337.20 | 16.40 | 16.00 | 158.80 |
| Main eng run | 2750 | 100 | 2 | 10 | 1800.0 | 60,000 | 0.94 | 9.83 | 0.21 | 0.40 | 3.97 | 56.40 | 589.80 | 12.60 | 24.00 | 238.20 |
| Main eng run | 4300 | 100 | 2 | 10 | 2219.0 | 73,967 | 0.65 | 10.45 | 0.16 | 0.40 | 3.97 | 48.08 | 772.95 | 11.83 | 29.59 | 293.65 |
| Idling engines | 250 (Low Idle) | 100 | 2 | 30 | 599 | 59,900 | 30.11 | 3.53 | 22.32 | 0.40 | 3.97 | 1,803.59 | 211.45 | 1,336.97 | 23.96 | 237.80 |
| High Power Totals | | | | | | 253,400 | | | | | | 2,019.93 | 2,033.48 | 1,386.01 | 101.36 | 694.95 |
| Total Annual Maintenance Test Emissions From P-3 Aircraft | | | | | | | | | | | | 4,732 | 4,446 | 3,534 | 259 | 1,670 |
| Total Annual Maintenance Test Emissions From P-3 Aircraft (Tons) | | | | | | | | | | | | 2.37 | 2.22 | 1.77 | 0.13 | 0.84 |

Notes:

¹ Total maintenance tests from Wyle Laboratories, 2004 (see table A.3).

² Main engine fuel flow and emission indexes from AESO memo reports 9911 Rev B (Apr 2000) and 9908 Rev B (Mar 2000). APU fuel flow and emission indexes from AESO memo report 9911 Rev B (Apr 2000).

³ Fuel used = fuel flow x time-in-mode / 60 / x no. of engines in use x maintenance tests per aircraft year.

⁴ Emissions = fuel used / 1000 x emission index.

TABLE B.7 SUMMARY OF EXISTING MOBILE AIR EMISSIONS

| | # Aircraft | Operation | # Operations (from Table A.1) | LBS Emissions per operation | | | | | (TPY) | | | | | |
|---|------------|---------------------------------------|----------------------------------|-----------------------------|-------|-------|------|-------|---------------|---------------|---------------|--------------|---------------|--|
| | | | | CO | NOx | VOC | SO2 | PM10 | CO | NOx | VOCs | SO2 | PM10 | |
| EA-6B | 72 | LTOs, w/ Straight In Arrival | 2,820 | | | | | | | | | | | |
| See table B.5 for emission factors | | LTOs, w/Break at Arrival | 1,996 | | | | | | | | | | | |
| | | EA-6B LTO, straight in, w/ hot refuel | 1,128 | 65.04 | 11.66 | 31.12 | 0.90 | 32.57 | 36.68 | 6.57 | 17.55 | 0.51 | 18.37 | |
| | | EA-6B LTO, straight in, no hot refuel | 1,692 | 50.51 | 11.04 | 23.77 | 0.79 | 27.39 | 42.73 | 9.34 | 20.11 | 0.67 | 23.17 | |
| | | EA-6B LTO, break, w/hot refuel | 798 | 64.87 | 11.56 | 31.19 | 0.87 | 31.57 | 25.90 | 4.61 | 12.45 | 0.35 | 12.60 | |
| | | EA-6B LTO, break, no hot refuel | 1,198 | 50.34 | 10.94 | 23.83 | 0.77 | 26.39 | 30.15 | 6.55 | 14.27 | 0.46 | 15.80 | |
| | | Total FCLPs | 15,316 | 2.95 | 4.65 | 0.50 | 0.24 | 5.83 | 22.60 | 35.61 | 3.82 | 1.84 | 44.64 | |
| | | GCA Box | 4,119 | 6.24 | 7.43 | 0.97 | 0.42 | 11.18 | 12.84 | 15.30 | 1.99 | 0.87 | 23.02 | |
| | | T&G | 4,797 | 2.95 | 4.65 | 0.50 | 0.24 | 5.83 | 7.08 | 11.15 | 1.20 | 0.58 | 13.98 | |
| See table B.8 for Maint. Testing emission factors | | | | | | | | | | | | | | |
| See table B.8 for Maint. Testing emission factors | 72 | Maintenance Testing | | | | | | | 49.10 | 11.32 | 20.82 | 0.79 | 27.68 | |
| LTO emission factors from AESO Memorandum Report No. 9917, Revision B, May 2000 FCLP, T&G and GCA Box emission factors from AESO Memorandum Report No. 9941A, August 2002 FCLP totals include Whidbey and Couplville totals. For FCLP and T&G operations, each cycle (departure and arrival) is counted as one operation. Therefore, totals will be one half totals from table A.1 Assumptions: Hot refuel occurs for 40% of LTOs (LCDR Gamburg, NAS Whidbey, Feb 2004) Depart-Re-enter operations are counted as GCA Box Operations for air emission estimating purposes | | | | | | | | | | | | | | |
| TOTAL EA-6B EMISSIONS | | | | | | | | | 227.07 | 100.45 | 92.20 | 6.07 | 179.28 | |
| | # Aircraft | Operation | # Operations (from Table A.1) | LBS Emissions per operation | | | | | (TPY) | | | | | |
| | | | | CO | NOx | VOC | SO2 | PM10 | CO | NOx | VOCs | SO2 | PM10 | |
| P-3 | | Average LTO | 8,183 | 37.50 | 21.21 | 24.59 | 1.34 | 10.79 | 153.44 | 86.77 | 100.60 | 5.47 | 44.13 | |
| | | FCLPs | 0 | 0.69 | 1.75 | 0.47 | 0.47 | 1.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| See Table for LTO emission factors | | GCA Box | 4,836 | 1.13 | 3.78 | 0.57 | 0.56 | 1.99 | 2.74 | 9.13 | 1.37 | 1.36 | 4.82 | |
| | | T&G | 6,556 | 0.69 | 1.75 | 0.47 | 0.47 | 1.04 | 2.28 | 5.74 | 1.54 | 1.53 | 3.40 | |
| See Table for maintenance testing emission factors | | LBS Emission per aircraft, per year | | | | | TPY | | | | | | | |
| | | Maintenance Testing | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.37 | 2.22 | 1.77 | 0.13 | 0.84 | |
| data source: LTO emission factors from AESO Memorandum Report FCLP, T&G and GCA Box emission factors from AESO Memorandum Report Assumptions: Hot refuel occurs for 0% of LTOs This A/C does not do Break arrivals. | | | | | | | | | | | | | | |
| TOTAL P-3 EMISSIONS | | | | | | | | | 160.82 | 103.86 | 105.28 | 8.49 | 53.18 | |
| | # Aircraft | Operation | # Operations (from Table A.1) | LBS Emissions per operation | | | | | (TPY) | | | | | |
| | | | | CO | NOx | VOC | SO2 | PM10 | CO | NOx | VOCs | SO2 | PM10 | |
| C-9 | | Average LTO | 325 | 33.33 | 18.62 | 8.78 | 1.02 | 33.10 | 5.41 | 3.02 | 1.42 | 0.17 | 5.37 | |
| See Table B.6 for LTO emission factors | | | | | | | | | | | | | | |
| TOTAL C-9 EMISSIONS | | | | | | | | | 5.41 | 3.02 | 1.42 | 0.17 | 5.37 | |
| C-12 | | Average LTO | 100 | 3.35 | 0.93 | 0.82 | 0.08 | 0.84 | 0.17 | 0.05 | 0.04 | 0.00 | 0.04 | |
| See Table B.6 for LTO emission factors | | | | | | | | | | | | | | |
| TOTAL C-12 EMISSIONS | | | | | | | | | 0.17 | 0.05 | 0.04 | 0.00 | 0.04 | |
| Transient (P-3) | | Average LTO | 252 | 37.50 | 21.21 | 24.59 | 1.34 | 10.79 | 4.73 | 2.67 | 3.10 | 0.17 | 1.36 | |
| See Table B.6 for LTO emission factors | | | | | | | | | | | | | | |
| TOTAL C-12 EMISSIONS | | | | | | | | | 4.73 | 2.67 | 3.10 | 0.17 | 1.36 | |
| TOTAL EXISTING AIRCRAFT MOBILE EMISSIONS | | | | | | | | | 398.18 | 210.05 | 202.04 | 14.89 | 239.23 | |

TABLE B.8 SUMMARY OF PROJECTED MOBILE AIR EMISSIONS

| EA -18G Operations: Projected Emissions | | | | | | | | | | | | | |
|--|------------|---|----------------------------------|-----------------------------|-------|-------|------|-------|---------------|---------------|---------------|--------------|----------------|
| | # Aircraft | Operation | # Operations (from Table A.2) | LBS Emissions per operation | | | | | (TPY) | | | | |
| | | | | CO | NOx | VOC | SO2 | PM10 | CO | NOx | VOCs | SO2 | PM10 |
| EA-18G | 57 | LTOs, w/ Straight In Arrival | 2,687 | | | | | | | | | | |
| | | LTOs, w/Break at Arrival | 1,901 | | | | | | | | | | |
| | | LTO w/Straight In, w/ hot refuel, w/AB | 860 | 264.34 | 23.04 | 66.14 | 0.98 | 18.35 | 113.65 | 9.90 | 28.43 | 0.42 | 7.89 |
| | | LTO w/Straight In, w/o hot refuel, w/ AB | 1290 | 230.63 | 21.87 | 44.67 | 0.84 | 13.51 | 148.73 | 14.10 | 28.80 | 0.54 | 8.71 |
| | | LTO w/Straight In, w/ hot refuel, w/o AB | 215 | 100.55 | 21.60 | 63.25 | 0.80 | 18.83 | 10.81 | 2.32 | 6.80 | 0.09 | 2.02 |
| See table 4 for LTO emission factors | | LTO w/Straight In, w/o hot refuel, w/o AB | 322 | 66.84 | 20.43 | 41.78 | 0.66 | 13.99 | 10.78 | 3.29 | 6.74 | 0.11 | 2.26 |
| | | LTO w/Break, w/ hot refuel, w/AB | 608 | 265.78 | 23.31 | 66.66 | 0.96 | 17.94 | 80.84 | 7.09 | 20.27 | 0.29 | 5.46 |
| | | LTO w/Break, w/o hot refuel, w/ AB | 912 | 232.07 | 22.14 | 45.19 | 0.81 | 13.10 | 105.88 | 10.10 | 20.62 | 0.37 | 5.98 |
| | | LTO w/Break, w/ hot refuel, w/o AB | 152 | 101.99 | 21.87 | 63.77 | 0.78 | 18.42 | 7.76 | 1.66 | 4.85 | 0.06 | 1.40 |
| | | LTO w/Break, w/o hot refuel, w/o AB | 228 | 68.28 | 20.70 | 42.30 | 0.64 | 13.58 | 7.79 | 2.36 | 4.83 | 0.07 | 1.55 |
| | | FCLPs | 12,201 | 0.47 | 9.01 | 0.07 | 0.22 | 3.04 | 2.85 | 54.97 | 0.41 | 1.36 | 18.53 |
| | | GCA Box | 3,924 | 0.93 | 18.02 | 0.13 | 0.45 | 6.08 | 1.83 | 35.36 | 0.26 | 0.88 | 11.92 |
| See table 6 for Maint. Testing emission factors | | T&G | 4,570 | 0.47 | 9.01 | 0.07 | 0.22 | 3.04 | 1.07 | 20.59 | 0.15 | 0.51 | 6.94 |
| | | Maintenance Testing | | | | | | | | | | | |
| TOTAL MOBILE EMISSIONS | | | | | | | | | 31.57 | 6.50 | 7.73 | 0.29 | 5.62 |
| TOTAL PROJECTED EA-18G EMISSIONS | | | | | | | | | 523.54 | 168.25 | 129.89 | 4.99 | 78.28 |
| data source: LTO emission factors from AESO Memorandum Report No. 9815, Revision E, Nov 2002 (see table B.1) FCLP, T&G and GCA Box emissions factors from AESO Memorandum Report No. 9933B, Dec 2001 FCLP totals include Whidbey and Couplville totals. For FCLP and T&G operations, each cycle (departure and arrival) is counted as one operation. Therefore, totals will be one half totals from table A.2 Assumptions: 41% Percentage of Break arrivals (Wyle, Oct 2004 see table A-2) 40% Percentage of LTOs with Hot Refuel (LCDR Gamburg, NAS Whidbey, Feb 2004) 80% Percentage of A/B usage for Takeoffs (Wyle, Oct 2004, Table 4-2) | | | | | | | | | | | | | |
| TOTAL MOBILE P-3 EMISSIONS | | | | | | | | | 160.82 | 103.86 | 105.28 | 8.49 | 53.18 |
| data source: LTO emission factors from AESO Memorandum Report FCLP, T&G and GCA Box emission factors from AESO Memorandum Report Assumptions: Hot refuel occurs for 40% LTOs | | | | | | | | | | | | | |
| P-3 | 42 | Average LTO | 8,183 | 37.50 | 21.21 | 24.59 | 1.34 | 10.79 | 153.44 | 86.77 | 100.60 | 5.47 | 44.13 |
| | | FCLPs | 0 | 0.69 | 1.75 | 0.47 | 0.47 | 1.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| See Table for LTO emission factors | | GCA Box | 4,836 | 1.13 | 3.78 | 0.57 | 0.56 | 1.99 | 2.74 | 9.13 | 1.37 | 1.36 | 4.82 |
| | | T&G | 6,556 | 0.69 | 1.75 | 0.47 | 0.47 | 1.04 | 2.28 | 5.74 | 1.54 | 1.53 | 3.40 |
| See Table for maintenance testing emission factors | | Maintenance Testing | | | | | | | 2.37 | 2.22 | 1.77 | 0.13 | 0.84 |
| TOTAL MOBILE P-3 EMISSIONS | | | | | | | | | 160.82 | 103.86 | 105.28 | 8.49 | 53.18 |
| data source: LTO emission factors from AESO Memorandum Report FCLP, T&G and GCA Box emission factors from AESO Memorandum Report Assumptions: Hot refuel occurs for 40% LTOs | | | | | | | | | | | | | |
| C-9 | 4 | Average LTO | 325 | 33.33 | 18.62 | 8.78 | 1.02 | 33.10 | 5.41 | 3.02 | 1.42 | 0.17 | 5.37 |
| See Table for LTO emission factors data source: LTO emission factors from AESO Memorandum Report | | | | | | | | | | | | | |
| TOTAL C-9 EMISSIONS | | | | | | | | | 5.41 | 3.02 | 1.42 | 0.17 | 5.37 |
| C-12 | 2 | Average LTO | 0 | 3.35 | 0.93 | 0.82 | 0.08 | 0.84 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| See Table for LTO emission factors data source: LTO emission factors from AESO Memorandum Report | | | | | | | | | | | | | |
| TOTAL C-12 EMISSIONS | | | | | | | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Transient (P-3) | | Average LTO | 252 | 37.50 | 21.21 | 24.59 | 1.34 | 10.79 | 4.73 | 2.67 | 3.10 | 0.17 | 1.36 |
| See Table for LTO emission factors data source: LTO emission factors from AESO Memorandum Report | | | | | | | | | | | | | |
| TOTAL TRANSIENT EMISSIONS | | | | | | | | | 4.73 | 2.67 | 3.10 | 0.17 | 1.36 |
| TOTAL PROJECTED AIRCRAFT MOBILE EMISSIONS | | | | | | | | | 694.49 | 277.81 | 239.69 | 13.81 | 138.19 |
| PROJECTED CHANGE TO AIRCRAFT MOBILE EMISSIONS | | | | | | | | | 296.30 | 67.76 | 37.65 | -1.08 | -101.04 |

Table B.9 EMISSION FACTORS FOR PRIVATELY OWNED VEHICLES, NAS WHIDBEY ISLAND

| Fleet Year | Type of Vehicle | EPA Category | Emission Factor (g/mile) | | | | |
|------------|--------------------------------------|--------------|--------------------------|--------|--------|--------|-------|
| | | | NOx | CO | PM | SO2 | VOC |
| 2004 | Cars | LDGV | 1.051 | 18.998 | 0.0263 | 0.0275 | 1.277 |
| | Pickups under 6000 lbs | LDGT1,2 | 1.409 | 23.777 | 0.0275 | 0.0351 | 1.524 |
| | Trucks under 8500 lbs, over 6000 lbs | LDGT3,4 | 2.02 | 31.75 | 0.0291 | 0.0459 | 2.505 |

Source: Mobile 6.2, Using default parameters for Whidbey Island, WA

Table B.10 Residential Distribution of NAS Whidbey Island Personnel

| CITY | ZIP | Distance from base (miles) | % of base population | Distance x Percentage |
|--------------------|---------|----------------------------|----------------------|-----------------------|
| ANACORTES | 98221 | 15.66 | 4.80% | 0.75 |
| BURLINGTON | 98233 | 27.87 | 1.60% | 0.45 |
| CLINTON | 98236 | 40.37 | 0.40% | 0.16 |
| COUPEVILLE | 98239 | 15.25 | 3.70% | 0.56 |
| FREELAND | 98249 | 30.52 | 0.30% | 0.09 |
| GREENBANK | 98253 | 24.98 | 0.30% | 0.07 |
| LA CONNER | 98257 | 19.25 | 0.20% | 0.04 |
| LANGLEY | 98260 | 37.11 | 0.20% | 0.07 |
| MOUNT VERNON | 98273 | 23.7 | 0.00% | 0.00 |
| MOUNT VERNON | 98274 | 32.41 | 3.20% | 1.04 |
| OAK HARBOR | 98277 | 3.73 | 81.60% | 3.04 |
| OAK HARBOR | 98278 | 0 | 0.00% | 0.00 |
| CAMANO IS | 98282 | 48.3 | 2.30% | 1.11 |
| SEDRO-WOLLEY | 98284 | 32.21 | 1.40% | 0.45 |
| CAMANO IS/STANWOOD | 98292 | 45.4 | 0.00% | 0.00 |
| | Average | 26.45 | Weighted Ave | 7.85 |

Table B.11 PROJECTED CRITERIA AIR POLLUTANT EMISSIONS FROM PRIVATELY OWNED VEHICLES, NAS WHIDBEY ISLAND

| Group | Vehicle Type | EPA Category | Daily Vehicles (/day) | Daily Travel - Per Vehicle | | | Travel Days (days/yr) | Annual Travel (VMT/yr) | Annual Emissions (lb/yr) | | | | |
|---------------------------------|--------------------------------------|--------------|-----------------------|----------------------------|----------------|-------------|-----------------------|------------------------|--------------------------|----------------|------------------|---------------|---------------|
| | | | | On-Base (VMT) | Off-Base (VMT) | Total (VMT) | | | NOx | VOC | CO | SO2 | PM |
| Existing POV Commute Emissions | Cars (60%) | LDGV | 6,627 | 3 | 7.85 | 10.84519 | 247 | 17752155.3 | 41132.1 | 49976.9 | 743508.5 | 1076.2 | 1029.3 |
| | Pickups under 6000 lbs (30%) | LDGT1,2 | 3314 | 3 | 7.85 | 10.84519 | 247 | 8876077.7 | 20566.0 | 24988.4 | 371754.2 | 538.1 | 514.6 |
| | Trucks under 8500 lbs, over 6000 lbs | LDGT3,4 | 1104.5 | 3 | 7.85 | 10.84519 | 247 | 2958692.6 | 6855.3 | 8329.5 | 123918.1 | 179.4 | 171.5 |
| | Total | - | 11,045 | - | - | - | - | - | 68553.5 | 83294.8 | 1239180.8 | 1793.7 | 1715.5 |
| total tons emissions | | | | | | | | | 34.3 | 41.6 | 619.6 | 0.9 | 0.9 |
| Projected POV Commute Emissions | Cars | LDGV | 5,963 | 3 | 7.85 | 10.84519 | 247 | 15974528.9 | 37013.3 | 44972.4 | 669056.7 | 968.5 | 926.2 |
| | Pickups/Light Trucks | LDGT | 2982 | 3 | 7.85 | 10.84519 | 247 | 7987264.4 | 18506.6 | 22486.2 | 334528.3 | 484.2 | 463.1 |
| | Pickups/Light Trucks | LDDT | 993.9 | 3 | 7.85 | 10.84519 | 247 | 2662421.5 | 6168.9 | 7495.4 | 111509.4 | 161.4 | 154.4 |
| | Total | - | 9,939 | - | - | - | - | - | 61688.8 | 74954.0 | 1115094.4 | 1614.1 | 1543.7 |
| total tons emissions | | | | | | | | | 30.8 | 37.5 | 557.5 | 0.8 | 0.8 |
| Change in emissions | | | | | | | | | -3.4 | -4.2 | -62.0 | -0.1 | -0.1 |

Refer to section 3.3.1 for description and explanation of population data.

Table B.12 Annual Emissions from Ground Support Equipment Operations, 2003-2013

| | Operation (hours/yr) 2003 Baseline | Emission Rate | | | | | Total Emissions: (TPY) | | | | | |
|---|--|---------------|--------------|-------------|--------------|----------------|----------------------------|--------------|--------------|--------------|--------------|--------------|
| | | VOC lb/hr | NOX lb/hr | CO lb/hr | SO2 lb/hr | PM-10 lb/hr | VOC TPY | NOX TPY | CO TPY | SO2 TPY | PM-10 TPY | |
| 2003 Landing/TakeOff Flight Operations: | 13675 | | | | | | | | | | | |
| <i>Tow Tractors: (a)</i> | | | | | | | | | | | | |
| A/S32A-30A (Small tow) | 31092 | 0.03 | 0.26 | 0.10 | | 0.04 | 0.39 | 4.04 | 1.55 | 0.00 | 0.68 | |
| <i>Flight Line Electric Power Units (a)</i> | | | | | | | | | | | | |
| NC8A | 2240 | 0.75 | 3.83 | 0.46 | | 0.39 | 0.84 | 4.29 | 0.52 | 0.00 | 0.44 | |
| NC10C | 6606 | 0.38 | 3.22 | 0.34 | | 0.16 | 1.26 | 10.64 | 1.12 | 0.00 | 0.53 | |
| <i>Jet Engine Start Units (a)</i> | | | | | | | | | | | | |
| A/M47A-4/NCPP-105 (b) | 7005 | 5.13 | 1.14 | 10.80 | | 1.51 | 17.97 | 3.99 | 37.83 | 0.00 | 5.29 | |
| GTC-85 | 1704 | 0.09 | 0.70 | 3.20 | | 0.22 | 0.08 | 0.60 | 2.73 | 0.00 | 0.19 | |
| <i>Miscellaneous: (a), (c)</i> | | | | | | | | | | | | |
| A/S48M-2 Manlift | 4208 | 0.53 | 0.64 | 0.86 | | 0.03 | 1.12 | 1.35 | 1.81 | 0.00 | 0.06 | |
| A/M32C-17 (mobile ac) | 6268 | 0.29 | 5.02 | 0.33 | | 0.09 | 0.91 | 15.73 | 1.03 | 0.00 | 0.29 | |
| A/M27T-5 (hydraulic unit) | 6774 | 0.31 | 1.95 | 0.25 | | 0.06 | 1.05 | 6.60 | 0.85 | 0.00 | 0.19 | |
| A/M42M-2 (floodlight cart) | 3955 | 0.11 | 0.23 | 0.19 | | 0.01 | 0.22 | 0.45 | 0.38 | 0.00 | 0.01 | |
| HLU-196 (bomb lift) | 2690 | 0.11 | 0.23 | 0.19 | | 0.01 | 0.15 | 0.31 | 0.26 | 0.00 | 0.01 | |
| Misc Carts (water, lav, B%B) | 2308 | 0.38 | 3.22 | 0.34 | | 0.16 | 0.44 | 3.72 | 0.39 | 0.00 | 0.18 | |
| (using small power plant EFs) | | | | | | | | | | | | |
| Total | 74850.00 | | | | | | 24.41 | 51.72 | 48.46 | 0.00 | 7.87 | |
| 2013 Landing/Take Off Flight Operations: | 13348 | | | | | | | | | | | |
| <i>Tow Tractors: (a)</i> | | | | | | | | | | | | |
| A/S32A-30A (Small tow) | 30347 | 0.03 | 0.26 | 0.10 | | 0.04 | 0.38 | 3.95 | 1.52 | 0.00 | 0.67 | |
| <i>Flight Line Electric Power Units (a)</i> | | | | | | | | | | | | |
| NC8A | 2186 | 0.75 | 3.83 | 0.46 | | 0.39 | 0.82 | 4.19 | 0.50 | 0.00 | 0.43 | |
| NC10C | 6448 | 0.38 | 3.22 | 0.34 | | 0.16 | 1.23 | 10.38 | 1.10 | 0.00 | 0.52 | |
| <i>Jet Engine Start Units (a)</i> | | | | | | | | | | | | |
| A/M47A-4/NCPP-105 (b) | 6837 | 5.13 | 1.14 | 10.80 | | 1.51 | 17.54 | 3.90 | 36.92 | 0.00 | 5.16 | |
| GTC-85 | 1663 | 0.09 | 0.70 | 3.20 | | 0.22 | 0.07 | 0.58 | 2.66 | 0.00 | 0.18 | |
| <i>Miscellaneous: (a), (c)</i> | | | | | | | | | | | | |
| A/M32C-17 (mobile ac) | 6118 | 0.29 | 5.02 | 0.33 | | 0.09 | 0.89 | 15.36 | 1.01 | 0.00 | 0.28 | |
| A/M27T-5 (hydraulic unit) | 6612 | 0.31 | 1.95 | 0.25 | | 0.06 | 1.02 | 6.45 | 0.83 | 0.00 | 0.18 | |
| A/M42M-2 (floodlight cart) | 3860 | 0.11 | 0.23 | 0.19 | | 0.01 | 0.21 | 0.44 | 0.37 | 0.00 | 0.01 | |
| HLU-196 (bomb lift) | 2626 | 0.11 | 0.23 | 0.19 | | 0.01 | 0.14 | 0.30 | 0.25 | 0.00 | 0.01 | |
| Misc Carts (water, lav, B%B) | 2253 | 0.11 | 0.23 | 0.19 | | 0.01 | 0.12 | 0.26 | 0.21 | 0.00 | 0.01 | |
| (using small power plant EFs) | | | | | | | | | | | | |
| Total | | | | | | | 22.43 | 45.80 | 45.36 | 0.00 | 7.46 | |
| | | | | | | | Change in emissions | -1.98 | -5.92 | -3.10 | 0.00 | -0.41 |

Notes:

(a) Emission Factors from Final Report for Emission Testing on Ground Support Equipment at Naval Air Stations, February 2000, Navy, Atlantic Division.

(b) Emission factor for GTC100 used.

(c) A/M32C-17 assumed equivalent to "mobile AC"; A/M27T-5 assumed equivalent to "hydraulic test unit"; A/M42M-2 assumed equivalent to "floodlight"; HLU-196 assumed equivalent to size of floodlight cart.

SO2 emission factors are not available

TABLE B.13: PROJECTED EMISSIONS RATES FROM AIRCRAFT ENGINE TEST CELL OPERATIONS (EA-18G), (SINGLE ENGINE IN TEST CELLS)

| Engine (Aircraft) F414-GE-400 | Power Setting(1),(2) | Time in Power Setting (2) (minutes) | Fuel Flow (lb/hr/eng) | Fuel Flow (lb/min/eng) | Fuel Usage (3) (lbs/test/eng) | Emission Index (3) lb /1000 lb fuel | | | | | Engine Test Emissions (pounds) | | | | |
|-------------------------------------|-------------------------|---|--------------------------|---------------------------|-------------------------------------|--|-------|--------|-----|---------|---|---------------|---------------|--------------|-------------|
| | | | | | | VOC (4) | NOx | CO | SO2 | PM10 | VOC (5) | NOx | CO | SO2 | PM10 |
| Warm Up | Flt idle | 25 | 862.00 | 14.37 | 359.17 | 36.63 | 3.55 | 72.17 | 0.4 | 12.17 | 13.16 | 1.28 | 25.92 | 0.14 | 4.37 |
| Step 1 | 81.3 | 5 | 3603.00 | 60.05 | 300.25 | 0.12 | 10.53 | 1.09 | 0.4 | 6.19 | 0.04 | 3.16 | 0.33 | 0.12 | 1.86 |
| Step 2 | 88.4 | 5 | 6809.00 | 113.48 | 567.42 | 0.12 | 20.62 | 0.69 | 0.4 | 3.48 | 0.07 | 11.70 | 0.39 | 0.23 | 1.97 |
| Step 3 | 91.3 | 5 | 8468.00 | 141.13 | 705.67 | 0.12 | 24.52 | 0.69 | 0.4 | 2.85 | 0.08 | 17.30 | 0.49 | 0.28 | 2.01 |
| Step 4 | 93.2 | 5 | 9351.00 | 155.85 | 779.25 | 0.12 | 29.23 | 0.69 | 0.4 | 2.25 | 0.09 | 22.78 | 0.54 | 0.31 | 1.75 |
| Step 5 | 96.5 | 10.00 | 11893.00 | 198.22 | 1982.17 | 0.12 | 34.94 | 0.69 | 0.4 | 1.66 | 0.24 | 69.26 | 1.37 | 0.79 | 3.29 |
| Step 6 | 1.0 | 7.00 | 11893.00 | 198.22 | 1387.52 | 0.12 | 34.94 | 0.69 | 0.4 | 1.66 | 0.17 | 48.48 | 0.96 | 0.56 | 2.30 |
| IRP | IRP | 10.00 | 11893.00 | 198.22 | 1982.17 | 0.12 | 34.94 | 0.69 | 0.4 | 1.66 | 0.24 | 69.26 | 1.37 | 0.79 | 3.29 |
| A/B | Max A/B | 3.00 | 39678.00 | 661.30 | 1983.90 | 4.72 | 9.47 | 262.12 | 0.4 | No Data | 9.36 | 18.79 | 520.02 | 0.79 | 0.00 |
| Stud Down | Flt idle | 10.00 | 862.00 | 14.37 | 143.67 | 36.63 | 3.55 | 72.17 | 0.4 | 12.17 | 5.26 | 0.51 | 10.37 | 0.06 | 1.75 |
| | Total | 85.00 | | | 10191.17 | | | | | | 28.71 | 205.78 | 523.71 | 2.93 | 8.88 |
| | | | | | | | | | | | Tons Emissions Per Test | 0.01 | 0.10 | 0.26 | 0.00 |
| | | | | | | | | | | | Projected Annual Emissions from 71 tests of EA-18G (tpy) | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | | | | | | | 6B Emissions | 4.84 | 14.65 | 12.24 | 0.64 |

Total EA-18 G tests: 71

Notes:

1. Performance Test Time in Mode, Fuel Flow, and Emissions Indexes Draft AESO Memorandum Report 2000-21 July 2000.
2. Total number of tests from Wyle Laboratories, 2004 (see table A.3)

Key:

| | |
|--------|----------------------------|
| A/B = | maximum afterburner |
| VOC = | volatile organic compounds |
| NOx = | oxides of nitrogen |
| CO = | carbon monoxide |
| SO2 = | sulfur dioxide |
| PM10 = | particulate matter |

TABLE B.14: EXISTING EMISSIONS FOR AIRCRAFT ENGINE TEST CELL OPERATIONS (EA-6B), (SINGLE ENGINE IN TEST CELLS)

| Engine (Aircraft) | Power Setting | Time in Power Setting ¹ (minutes) | Fuel Flow (lb/hr/eng) | Fuel Flow (lb/min/eng) | Fuel Usage ² (lbs/test/eng) | % Fuel use in Power Setting ¹ | Emission Index ³ lb /1000 lb fuel | | | | | Single Engine Test Emissions (lbs emissions per 1000 lbs, based on % fuel use per mode) ¹ | | | | |
|-------------------|---------------|---|--------------------------|---------------------------|---|---|---|---------------|-------|--------|--|---|-------------|-------------|-------------|-------------|
| | | | | | | | VOC ⁴ | NOx | CO | SO2 | PM10 | VOC ⁴ | NOx | CO | SO2 | PM10 |
| | | | | | | | J52-P-408A (EA-6B) | Gr Idle (56%) | 25.00 | 779.00 | 12.98 | 324.58 | 0.08 | 28.33 | 2.38 | 55.96 |
| | 76% | 10.00 | 2554.00 | 42.57 | 425.67 | 0.11 | 1.42 | 5.05 | 11.16 | 0.4 | 13.44 | 0.16 | 0.56 | 1.23 | 0.04 | 1.49 |
| | 90% | 10.00 | 5594.00 | 93.23 | 932.33 | 0.24 | 0.7 | 8.18 | 3.33 | 0.4 | 8.83 | 0.17 | 1.98 | 0.81 | 0.10 | 2.14 |
| | 97% | 10.00 | 8278.00 | 137.97 | 1379.67 | 0.36 | 0.57 | 10.95 | 1.74 | 0.4 | 6.53 | 0.20 | 3.92 | 0.62 | 0.14 | 2.34 |
| | 100% | 5.00 | 9479.00 | 157.98 | 789.92 | 0.21 | 0.57 | 12.32 | 1.47 | 0.4 | 5.73 | 0.12 | 2.53 | 0.30 | 0.08 | 1.17 |
| | Total | 60.00 | | | 3852.17 | | | | | | Pounds Emissions Per 1000 lbs fuel: | 3.03 | 9.19 | 7.68 | 0.40 | 8.82 |

| | Reported Emissions (TPY) | | | | |
|---------------------------------------|--------------------------|--------------|--------------|-------------|--------------|
| | VOC ⁴ | NOx | CO | SO2 | PM10 |
| 2002 Annual Reported Emissions | 5.32 | 16.12 | 13.47 | 0.70 | 15.47 |
| 2003 Annual Reported Emissions | 4.35 | 13.18 | 11.02 | 0.57 | 12.65 |
| Average 2002/2003 emissions | 4.84 | 14.65 | 12.24 | 0.64 | 14.06 |

| Fuel burned at test cell (lbs) ⁵ | |
|---|-----------|
| 2002 | 516000.00 |
| 2003 | 422000.00 |
| lbs fuel per gallon | 6.80 |

Notes:

¹Power setting, time in power setting, and calculation of emissions per mode using % of fuel use is described in Whidbey Island Air Operating Permit Number 008, issued July 27, 2004.

²Assumes a product density of 6.8 lb/gallon for JP-5.

³Fuel Flow and Emissions Indexes from AESO memo. 9725A and 2002-05..

⁴Aircraft VOC reported as HC in the form CHy/x

⁵As reported to NWAPA, 2004 Title V emission inventory submission (information from Keith Kuenzi, NAS Whidbey 2004)

Key:

- VOC = volatile organic compounds
- NOx = oxides of nitrogen
- CO = carbon monoxide
- SO2 = sulfur dioxide
- PM10 = particulate matter
- A/B = maximum afterburner
- 75% = 75% throttle setting

B2

Construction Emissions

Vehicle Engine Exhaust from Grading and Material Hauling Activities

Emission Factors for Vehicle Engine Exhaust from Construction Activities

Total Daily Vehicle Engine Exhaust Emissions from Construction Activities

Total Vehicle Engine Exhaust Emissions from Construction Activities

Fugitive Emissions from Construction Activities

Equation Used to Calculate Operation Parameters

Equations Used to Calculate Mass/Unit Emission Factors (Corrected for PM₁₀)

Emission Factors for Fugitive Emissions from Construction Activities

Calculation of Annual Fugitive Emissions from Construction Activities

Demolition Particulate Emissions

CALCULATION OF CONSTRUCTION EMISSIONS
NAS Whidbey Island

Construction Emissions: Vehicle Engine Exhaust from Grading and Material Hauling Activities

| Input Parameters/Assumptions: | |
|-------------------------------|------------------------|
| Total Building Area: | 20,000 ft ² |
| Total Paved Area: | 10,000 ft ² |
| Total Disturbed Area: | 3.00 acres |
| Construction Duration: | 0.25 years |
| Annual Construction Activity: | 250 days/yr |
| Total Demolition: | 10,000 ft ² |

Emission Factors for Vehicle Engine Exhaust from Construction Activities

| Activity | SMAQMD Emission Factor | | | | | | | | | |
|--------------------------------|------------------------|--------------|-----------------|--------------|------------------------------|--------------|-----------------|--------------|------------------|--------------|
| | ROG ¹ | | NO _x | | SO ₂ ² | | CO ² | | PM ₁₀ | |
| Grading Equipment ³ | 2.91E-01 | lbs/acre/day | 2.75E+00 | lbs/acre/day | 0.18 | lbs/acre/day | 0.60 | lbs/acre/day | 2.32E-01 | lbs/acre/day |
| Material Hauling ⁴ | 4.20E-01 | lbs/acre/day | 6.07E+00 | lbs/acre/day | 0.40 | lbs/acre/day | 1.31 | lbs/acre/day | 4.30E-01 | lbs/acre/day |

Reference: *Air Quality Thresholds of Significance*, Sacramento Metropolitan Air Quality Management District (SMAQMD), 1994 and *Compilation of Air Pollutant Emission Factors* (USEPA AP-42).

¹ ROG = VOC.

² Factors for grading equipment are calculated from AP-42 for diesel engines using ratios with the NO_x factors.

³ Grading Activities assumes the use of one tracked loader, one wheeled loader, and one motor grader for each 10 acres of disturbed area, used 8 hours per day.

⁴ Material Hauling Activities assumes the use of one loader and one haul truck for each 10 acres of disturbed area, used 8 hours per day.

Total Daily Vehicle Engine Exhaust Emissions from Construction Activities¹

| Activity | ROG | NO _x | SO ₂ | CO | PM ₁₀ |
|-----------------------------------|------------|-----------------|-----------------|------------|------------------|
| Grading Equipment | 0.9 | 8.3 | 0.5 | 1.8 | 0.7 |
| Material Hauling | 1.3 | 18.2 | 1.2 | 3.9 | 1.3 |
| Total Emissions (lbs/day): | 2.1 | 26.5 | 1.8 | 5.7 | 2.0 |

¹ Total Emissions (lbs/day) = Emission Factor * Affected Acres

Total Vehicle Engine Exhaust Emissions from Construction Activities¹

| Activity | ROG | NO _x | SO ₂ | CO | PM ₁₀ |
|----------------------------------|-------------|-----------------|-----------------|-------------|------------------|
| Grading Equipment | 0.03 | 0.26 | 0.02 | 0.06 | 0.02 |
| Material Hauling | 0.04 | 0.57 | 0.04 | 0.12 | 0.04 |
| Demolition | | | | | 0.6 |
| Fugitive Emissions (from page 2) | | | | | 5.57 |
| Total Emissions(tons/yr) | 0.07 | 0.83 | 0.06 | 0.18 | 5.63 |

¹ Total emissions (TPY) = Total emissions (lbs/day) * days of construction / 2000 lbs per ton

Construction Emissions: Fugitive Emissions from Construction Activities

Input Parameters / Assumptions

| | | |
|----------------------------|-----|---|
| Acres affected: | 3.0 | acres/yr |
| Grading days/yr: | 30 | days/yr |
| Exposed days/yr: | 90 | days/yr graded area is exposed |
| Grading Hours/day: | 8 | hr/day |
| Soil percent silt, s: | 15 | % |
| Soil percent moisture, M: | 2 | % |
| Fraction of TSP, J: | 0.5 | (SCAQMD recommendation) |
| Mean vehicle speed, S: | 5 | mi/hr (On-site) |
| Dozer path width: | 5 | ft |
| Qty construction vehicles: | 3 | vehicles |
| On-site VMT/vehicle/day: | 5 | mi/veh/day (Excluding bulldozer VMT during grading) |

Reference: CEQA Air Quality Handbook, SCAQMD, April 1993.

Equation Used to Calculate Operation Parameters

| Operation Parameter | Emission Factor | Equation |
|----------------------------|-----------------|--|
| Grading duration per acre | 80 hr/acre | Grading days * hours per day / acres affected |
| Bulldozer mileage per acre | 1.7 VMT/acre | Miles traveled by bulldozer, based on dozer path width |
| Construction VMT per day | 15 VMT/day | Number of vehicle * VMT per vehicle per day |
| Construction VMT per acre | 150 VMT/acre | Construction VMT * days of construction / acres affected (Travel on unpaved surfaces within site) |

Equations Used to Calculate Mass/Unit Emission Factors (Corrected for PM₁₀)

| Operation | Empirical Equation | Units | AP-42 Section (4th Edition) |
|-----------------|---------------------------|---------|--------------------------------|
| Bulldozing | $0.75(s^{1.5})/(M^{1.4})$ | lbs/hr | 8.24, Overburden |
| Grading | $(0.60)(0.051)S^{2.0}$ | lbs/VMT | 8.24, Overburden |
| Vehicle Traffic | $(3.72/(M^{4.3})) * 0.6$ | lbs/VMT | 8.24, Overburden |

Reference: *Compilation of Air Pollutant Emission Factors*, USEPA AP-42;
Section 8.24, Western Surface Coal Mining (4th Edition)

Emission Factors for Fugitive Emissions from Construction Activities¹

| Operation | Emission Factor (mass/ unit) | Operation Parameter | Emission Factor (lbs/acre) |
|-----------------|---------------------------------|---------------------|-------------------------------|
| Bulldozing | 16.51 lbs/hr | 80 hr/acre | 1320.8 lbs/acre |
| Grading | 0.77 lbs/VMT | 1.7 VMT/acre | 1.3 lbs/acre |
| Vehicle Traffic | 0.11 lbs/VMT | 150 VMT/acre | 16.5 lbs/acre |

¹ Emission Factor (lbs/acre) = Emission Factor (lbs per hour or VMT) * Operation Parameter (hours of VMT per acre)

Calculation of Annual Fugitive Emissions from Construction Activities

| Source | Emission Factor | Graded Acres/yr | Exposed days/yr | Emissions lbs/yr | Emissions tons/yr |
|--|--------------------------------|-----------------|-----------------|------------------|-------------------|
| Bulldozing ¹ | 1320.8 lbs/acre | 3.00 | NA | 3,962 | 1.98 |
| Grading ¹ | 1.3 lbs/acre | 3.00 | NA | 4 | 0.00 |
| Vehicle Traffic ¹ | 16.5 lbs/acre | 3.00 | NA | 50 | 0.02 |
| Erosion of Graded Surface ² | 26.4 lbs/acre/day ³ | 3.00 | 90 | 7,128 | 3.56 |
| TOTAL | | | | 11,144 | 5.57 |

¹ Total annual emissions (TPY) = Emission Factor (lbs/acre) * affected acres * 2000 lbs per ton

² Total annual emissions (TPY) from erosion = Emission Factor (lbs/acre) * days of construction * 2000 lbs per ton

³ Reference: CEQA Air Quality Handbook, SCAQMD, April 1993.

Demolition Particulate Emissions

| Calculation of PM Emissions | | |
|--|------------|-------------|
| Space to be demolished | (SQ FT) | 10,000.00 |
| Emission from Structure removal | (LBS) | 5.1 |
| Emissions from debris removal | (LBS) | 94.0 |
| Emissions from vehicle activity | (LBS) | 1064.5 |
| Total PM ₁₀ emissions | LBS/YR | 1163.60 |
| Total PM₁₀ emissions | TPY | 0.58 |

Notes:

- (2) PM emission from structure takedown based on sq ft *EF
- (3) PM emission from debris removal based on sq ft *EF
- (4) PM emission from on-site vehicle activity based on sq ft *EF
- (5) Pushing (bulldozing) PM emission put under site prep spreadsheet
- (6) Reference EPA-450/2-92-004 (Fugitive Dust document)
(all EF's in EPA document converted to english units)