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PROJECT CORRESPONDENCE

TO:	Charley Baummer, PMC	**DATE:**	January 15, 2004
FROM:	Daniel Raley	**CC:**	Mike Callahan, PMC

SUBJECT: **Future North-South Runway 1L-19R Construction Air Emission Estimates**

REF: Washington Dulles International Airport (IAD)

TASK: E002

EA Engineering, Science, and Technology has estimated air emissions from construction equipment associated with the Subject Runway at IAD.

Background–Estimates of air emissions from construction equipment for a future runway at IAD originally were developed as one of many planned construction projects at IAD. These data were based on estimated construction quantities detailed in the "Gray Book."[1] The Gray Book data envisioned the first of two future runways to be an east-west runway in the southern section of the airport. The resulting calculations were included in a database with analogous data for other IAD capital construction projects in the context of the area's State Implementation Plan (SIP).[2]

New Runway Data–More recent and detailed data on the first of two future runways have been developed. Data for this north-south runway to be located on the west side of the airport were provided in a Conceptual Engineering Report. Specifically, construction quantities delineated in Table 2.8A[3] were used to estimate emissions for the first of the projected two new runways at IAD.

Results–Results of the new analysis are provided in the attached Table 1 and associated assumptions in Table 2. In addition, a comparison of the original estimates for an east-west runway and estimates for the north-south runway is provided in Table 3. It should be noted that two activities noted in Table 1, demolition and saw-cut grooving, were not included in the estimates for the original east-west runway since construction quantities for these activities were not included in the Gray Book data.

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[1] "Dulles Development, New Project Starts, Gray Book," Metropolitan Washington Airports Authority, October 16, 2000.

[2] "Air Emissions from Construction Projects, Washington Dulles International Airport," EA Engineering, Science, and Technology, September 2003.

[3] "Conceptual Level Cost Estimate, Opening Day, Future Runway 1L-19R," December 15, 2003.

As noted in Table 3, the new emission estimates for all pollutants are approximately four times lower than those for the original estimates. Also as noted in Table 3, there is a direct correlation between emission reductions and reductions in construction quantity parameters between the two scenarios.

Paving Emissions–Although estimates of emissions associated with paving equipment are included in this analysis, VOC emissions resulting from the application of bituminous concrete or asphalt material for shoulders and service roads have not been included. For the original east-west runway calculations, these VOC emissions constituted approximately one-third of total VOC runway construction emissions. The difference between emissions from the application of different asphalt products can be very large and is a function of the nominal VOC content of the asphalt material, which was not specified in the December 2003 Conceptual Engineering Report. These emission data will be generated when the general asphalt specifications are obtained.

Attachments

Table 1 - Future Runway 1L-19R Construction Emissions

Table 2 - Future Runway 1L-19R Construction Emission Assumptions

Table 3 - Comparison of Runway Construction Air Emission Estimates

Table 1
Future Runway 1L-19R Construction Emissions
Washington Dulles International Airport

Activity	Construction Equipment	Usage (hrs)	Emissions (lbs)				
			CO	NO_X	VOC	PM_{10}	Aldehydes
Clearing	Excavators	3,560	4,272	8,793	570	1,175	178
	Dump Trucks	7,120	8,758	30,046	2,706	2,492	712
Demolition	Crushing Equipment	1,352	2,718	3,246	433	419	68
	Dump Trucks	1,352	1,663	5,707	514	473	135
	Loaders	1,352	1,217	2,624	216	325	54
Excavation	Excavators	16,780	20,136	41,447	2,685	5,537	839
	Dump Trucks	16,780	20,639	70,812	6,376	5,873	1,678
Paving	Concrete Pavers	2,020	1,798	3,939	444	364	81
	Paving Equipment	2,020	1,071	2,565	242	202	40
	Graders	2,020	1,778	4,484	727	465	61
Saw-Cut Grooving	Concrete Saw	2,500	2,075	2,475	325	325	50
Total:		**lbs**	66,125	176,138	15,238	17,650	3,896
		tons	33.06	88.07	7.62	8.82	1.95

Notes:

- Estimates based on assumptions derived from engineering estimates contained in: "Table 2.8A Conceptual Level Cost Estimate, Opening Day, Future Runway 1L-19R" dated December 15, 2003

- Assumptions noted in Table 2

Table 2
Future Runway 1L-19R Construction Emission Assumptions
Washington Dulles International Airport

Bituminous Concrete

	Tons	Lbs	Cu Yds	Sq Yds	Days	Hours
Shoulders	75,250	150,500,000	39,878	287,122		
Service Roads	24,000	48,000,000	12,719	91,574		
Total	**99,250**	198,500,000	52,597	378,696	252	2,020

Surface Course Bituminous Concrete

Density: 3,774 lbs/cu yd

Output: 1,500 sq yds/day

Thickness (5 in): 0.14 yd

Clearing

Acres	Acres/Day	Days	Hours
890	2	445	3,560

7,120

Demolition

Sq Yd	Sq Yd/Day	Days	Hours
71,000	420	169	1,352

Excavation

Cu Yd	Cu Yd/Day	Days	Hours
1,258,400	600	2,097	16,779

Saw-Cut Grooving

Sq Yd	Cost	Cost/Hr	Hours
136,370	**$306,000**	125	2,448

Note: **Bold** data entries obtained from engineering estimates contained in:
"Table 2.8A Conceptual Level Cost Estimate, Opening Day, Future Runway 1L-19R"
dated December 15, 2002

Table 3
Comparison of Runway Construction Air Emission Estimates
Washington Dulles International Airport

Proposed Runways	Parameters			Emissions (tons)				
	Acres	Cu Yd	Sq Yd	CO	NO_X	VOC[1]	PM_{10}	Aldehydes
2000 Gray Book Runway[2]	1,300	5,412,470	1,621,670	114.9	385.78	33.36	37.24	8.28
Future 1L-19R Runway[3]	890	1,258,400	378,696	33.06	88.07	7.62	8.82	1.95
Ratio:	1.46	4.30	4.28	3.48	4.38	4.38	4.22	4.25

[1] Does not include paving material emissions

[2] Estimates originally developed based on data in "Dulles Development, New Project Starts, Gray Book," Metropolitan Washington Airports Authority, October 16, 2000

[3] Table 1 - Future Runway 1L-19R Construction Emissions, January 14, 2004

Construction for IAD 2006 - 2010

Alternative 3 - Direct and Connected Actions	**Notes:**	**CO**	**NOx**	**VOC**	**PM10**	**Years**
Runway 1W/19W (1L/19R) Alt 3 & Taxiways	- Estimates based on assumptions derived from engineering estimates contained in: "Table 2.8A Conceptual Level Cost Estimate, Opening Day, Future Runway 1L-19R" dated December 15, 2003 - From Table 1 in EA memo dated 1/15/04.	11	29	3	3	2006, 2007, 2008
Runway 12R/30L & Taxiways	Estimate based on Table 3, Comparison of Runway Construction Air Emission Estimates, by EA Engineering	23	77	7	7	2006 - 2010
Installation of NAVAIDS	used analysis for Norfolk (~2 years) using 2004 Efs	5	11	1	1	2008, 2010
Installation of PRM - Precision Runway Monitor	insignificant emissions, assumed included Navaids					
Tier 3 Concourse improvements	assume same as Tier 2, concouse C/D demo was 2,326,760 CF = 86,176	3	6	1	1	2006-2010
Tier 3 Building	Building from DFW Terminal F - 22 Gates	3	2	0	0	2006-2010
APM to Tier 3	assumed 15% of Tier 2 APM	5	13	1	1	2006-2010
VOC Paving emissions for 1/19 Runway	Based on Runway 12/30 paving of 17.7 tons * 90%			8		2007 - 2008
VOC Paving emissions for 12/30 Runway				18		2010
	Maximum Annual Average over 5 yrs project - ALT 3	49	138	38	13	
	Total Over 5 Years - Alt 3	209	599	88	57	2006 - 2010

Alternative 4 - Direct and Connected Actions						
Runway 1W/19W (1L/19R) Alt 4 & Taxiways	Estimate for Alt 4 based on an average 8.7% increase due to size, location and area of comparing runways.	13	34	3	3	2006, 2007, 2008
Runway 12R/30L	Same as Alt. 3	23	77	7	7	2006 - 2010
Installation of NAVAIDS	Same as Alt. 3	5	11	1	1	2008, 2010
Installation of PRM - Precision Runway Monitor	Same as Alt. 3					
Tier 3 Concourse improvements	Same as Alt. 3	3	6	1	1	2006-2010
Tier 3 Building	Same as Alt. 3	3	2	0	0	2006-2010
APM to Tier 3	Same as Alt. 3	5	13	1	1	2006-2010
VOC Paving emissions for 1/19 Runway	Same as Alt. 3			8		2007 - 2008
VOC Paving emissions for 12/30 Runway	Same as Alt. 3			18		2010
	Maximum Annual Average over 5 yrs project - ALT 4	51	143	39	14	
	Total Over 5 Years - Alt 4	214	613	89	59	2006 - 2010

De Minimus Levels in SIP (tpd)	0.572	0.096	Based on email from
De Minimus Levels in SIP (tpy)	209	35	J. Ponticello, 7/15/04

Alternative 3	**CO**	**NOx**	**VOC**	**PM10**		
2006	44	127	11	12	Runway EIS with Tier 3	
2007	44	127	19	12	Runway EIS with Tier 3	includes paving
2008	49	138	21	13	Runway EIS with Tier 3	includes Navaids, paving
2009	33	98	9	9	Runway EIS with Tier 3	
2010	38	109	28	10	Runway EIS with Tier 3	includes Navaids, paving
	209	599	88	57		

Alternative 4						
2006	46	132	12	13	Runway EIS with Tier 3	
2007	46	132	20	13	Runway EIS with Tier 3	includes paving
2008	51	143	21	14	Runway EIS with Tier 3	includes Navaids, paving
2009	33	98	9	9	Runway EIS with Tier 3	
2010	38	109	28	10	Runway EIS with Tier 3	includes Navaids, paving
	214	613	89	59		

Notes:
Maximum CO and NOx emissions occur in 2008, while max. VOC emissions are estimated to be in 2010

Cumulative Construction for IAD 2006 - 2010

Direct and Connected Actions - Alternative 3	Total Emissions by Project **CO**	**NOx**	**VOC**	**PM**	**Year(s)**	**CO**	**NOx**	**VOC**	**PM**	Years
Runway 1W/19W (1L/19R) Alt 3 - taxiways, etc.	33.1	88.1	7.6	8.8	2006-2008	11.02	29.36	2.54	2.94	2006, 2007, 2008
Paving of Runway 1W/19W			15.9		2009			8.0		2007 - 2008
Runway 12R/30L - taxiways, etc.	114.9	385.8	33.4	37.2	2006-2010	22.98	77.16	6.68	7.448	2006 - 2010
Paving of Runway 12R/30L			17.7		2010			17.7		2010
Installation of NAVAIDS	5.3	11.4	1.3	1.0	2008, 2010	5.3	11.4	1.3	1.0	2008, 2010
Installation of PRM - Precision Runway Monitor	Included with Navaids									
Tier 3 Concourse improvements	13.08	31.24	3.42	3.09	2006-2010	2.6	6.2	0.7	0.6	2006-2010
Tier 3 Building	14.1	7.6	1.3	0.6	2006-2010	2.8	1.5	0.3	0.1	2006-2010
APM to Tier 3	23.4	63.0	6.0	5.7	2006-2010	4.7	12.6	1.2	1.1	2006-2010

Cumulative Actions

Tier 2 Concourse Improvements

- Tunneling (APM), S employee lot demo, land clearing, paving, C/D concourse demo, more paving

Tunneling: removed: Bag Tunnels, Int'l APM, Walkback Tunnel 7-15-04	129.6	350.0	33.3	31.6	2002-0009	16.19	43.75	4.16	3.95	2002-2009
S Employee Parking Lot Demo	5.0	10.5	1.1	1.1	2002-2007	0.8	1.8	0.2	0.2	2002-2007
Clearing of Land	0.9	2.7	0.2	0.3	2002-2007	0.2	0.4	0.0	0.0	2002-2007
Paving of Land - south of Tier 2	4.8	11.2	1.5	1.1	2002-2007	0.8	1.9	0.2	0.2	2002-2007

62.10	174.72	15.98	16.61	2006
62.10	174.72	23.95	16.61	2007
65.62	182.04	24.79	17.21	2008
49.30	141.28	12.98	13.27	2009
38.4	108.9	27.8	10.3	2010
277.5	781.7	105.5	74.0	2006 -2010

SIP	**209.0**	**35.0**