

Supplemental Table 1. Non-Task Benzene Air Concentrations by Job Title, Operational Status, and Area

Job Title ^a	Status	Area(s)	n	Detection Frequency (%)	Benzene Concentration (ppm)							
					Mean	Std. Dev.	Geometric Mean	Geometric Std. Dev	75th percentile	95th percentile	Maximum Detected	Minimum Detected
Process Technician	Routine	Lube Blending and Storage	135	6%	0.015	0.041	0.0049	4.2	0.011	0.055	0.39	0.034
		Hydrofiner	299	44%	1.1	7.0	0.030	11	0.18	1.0	91	0.010
		Hydrocracker	138	62%	0.074	0.11	0.023	7.5	0.093	0.26	0.95	0.010
		Reformer	908	47%	0.084	0.15	0.022	6.8	0.11	0.24	2.0	0.009
		Waste Treatment	697	58%	0.13	0.19	0.037	7.1	0.20	0.45	1.6	0.008
		Tank Farm	224	54%	0.090	0.30	0.014	7.0	0.060	0.34	3.6	0.010
		Pipestills	357	43%	0.074	0.33	0.012	6.2	0.040	0.19	5.1	0.010
	Analyzer	18	100%	0.12	0.19	0.069	2.8	0.090	0.44	0.80	0.010	
	All other areas	2540	29%	0.068	1.0	0.0085	5.8	0.028	0.16	49	0.006	
	Start-up	All areas	57	39%	0.041	0.062	0.012	6.3	0.040	0.16	0.29	0.015
	Turnaround	Hydrocracker	39	95%	0.17	0.28	0.077	3.3	0.12	0.93	1.3	0.030
		Reformer	133	77%	0.28	0.88	0.055	7.2	0.21	1.2	9.2	0.0070
		All other areas	381	43%	0.049	0.093	0.011	6.8	0.048	0.24	0.52	0.010
Machinist	Routine	Waste Treatment	309	74%	0.34	0.74	0.087	7.7	0.34	0.91	6.2	0.010
		Reformer	68	57%	0.51	1.6	0.045	12	0.19	2.1	11	0.040
		All other areas	958	31%	0.074	0.39	0.011	6.6	0.038	0.26	7.7	0.0050
	Turnaround	Lube Extraction Unit	49	33%	0.021	0.025	0.0085	5.3	0.035	0.055	0.06	0.024
		Reformer	39	90%	0.28	1.1	0.082	3.4	0.12	0.32	7.0	0.030
		All other areas	97	52%	0.065	0.11	0.020	6.5	0.060	0.29	0.76	0.020
Pipefitter/Welder	Routine	Reformer	77	74%	0.69	1.8	0.093	8.1	0.49	3.1	12	0.010
		Waste Treatment	71	69%	0.12	0.19	0.034	6.7	0.13	0.53	0.92	0.0050
		All other areas	777	37%	0.12	0.88	0.012	6.6	0.036	0.31	16	0.0010
	Turnaround	Reformer	135	75%	0.44	1.6	0.061	8.4	0.20	1.9	15	0.013
		Lube Extraction Unit	46	26%	0.029	0.061	0.0084	5.7	0.023	0.13	0.32	0.013
		All other areas	168	61%	0.11	0.27	0.026	6.2	0.11	0.41	1.9	0.010
Laboratory Technician	Routine	All areas	1187	58%	0.17	0.71	0.024	8.1	0.11	0.60	14	0.0035
Instrument Technician	Routine	All areas	294	26%	0.17	2.3	0.0081	6.1	0.025	0.14	39	0.010
	Turnaround	All areas	7	43%	0.016	0.020	0.0055	6.4	ND	ND	0.05	0.012
Contractor - Pipefitter	Routine	All areas	53	34%	0.14	0.29	0.018	8.6	0.053	0.69	1.6	0.017
	Turnaround	All areas	211	20%	0.12	0.46	0.014	6.3	0.038	0.26	3.3	0.0080
Contractor - Laborer	Routine	Waste Treatment	104	47%	0.11	0.27	0.025	6.6	0.14	0.32	2.1	0.020
		Tank Farm	65	80%	1.3	4.0	0.13	14	0.99	2.8	24	0.0030
		All other areas	30	70%	0.28	0.38	0.054	13	0.39	1.0	1.6	0.0073
	Turnaround	All areas	21	43%	0.41	0.89	0.035	12	0.19	2.7	3.2	0.0040
Process Supervisor	Routine	All areas	197	27%	0.044	0.11	0.011	5.8	0.033	0.20	1.2	0.010
	Turnaround	All areas	19	47%	0.14	0.26	0.019	10	0.083	0.71	0.88	0.020
Electrician	Routine	All areas	179	18%	0.019	0.046	0.0057	5.1	0.017	0.074	0.45	0.010
	Turnaround	All areas	1	0%	<0.02	ND	ND	ND	ND	ND	ND	ND
Mobile Equipment Operator	Routine	Waste Treatment	75	60%	0.20	0.31	0.046	9.6	0.29	0.67	1.7	0.019
		Coker	13	0%	<0.02	ND	ND	ND	ND	ND	ND	ND

Mobile Equipment Operator		All other areas	56	55%	0.12	0.44	0.019	6.3	0.050	0.29	3.21	0.0030
	Turnaround	All areas	10	70%	0.30	0.49	0.058	10	0.31	1.1	1.6	0.017
Building Trades	Routine	All areas	58	50%	0.038	0.059	0.012	6.1	0.062	0.10	0.39	0.0040
	Turnaround	All areas	15	47%	0.042	0.055	0.020	4.0	0.047	0.12	0.22	0.030
Contractor - Catalyst	Routine	All areas	5	40%	0.045	0.044	0.030	2.8	ND	ND	0.11	0.062
	Turnaround	All other areas	55	47%	0.027	0.074	0.0077	5.6	0.023	0.067	0.54	0.0070
		Hydrofiner	9	78%	19	37	1.1	31	ND	ND	103	1.1
Industrial Hygienist	Routine	All areas	58	76%	0.43	0.98	0.055	15	0.33	2.9	5.0	0.010
	Turnaround	All areas	5	40%	0.030	0.044	0.0051	14	ND	ND	0.10	0.047
Contractor - Coker Cutter / Deheader / Transfer	Routine	All areas	59	0%	<0.05	ND	ND	ND	ND	ND	ND	ND
Environmental/Safety Inspector	Routine	All areas	45	29%	0.022	0.031	0.0093	4.0	0.038	0.058	0.17	0.024
	Turnaround	All areas	13	15%	0.035	0.039	0.016	4.5	0.045	0.10	0.13	0.048
Field Supervisor	Routine	All areas	51	29%	0.028	0.093	0.0065	5.1	0.020	0.10	0.65	0.010
	Turnaround	All areas	4	100%	0.34	0.41	0.14	5.6	ND	ND	0.90	0.020
Contractor - Machinist	Routine	All areas	25	12%	0.016	0.028	0.0079	2.9	0.012	0.054	0.14	0.050
	Turnaround	All areas	26	23%	0.022	0.034	0.010	3.9	0.017	0.10	0.14	0.016
Fuel Truck Driver / Refueler	Routine	All areas	49	84%	0.29	0.42	0.086	6.2	0.28	1.1	1.9	0.010
Contractor - Laboratory technician	Routine	All areas	35	49%	0.56	1.2	0.055	11	0.35	2.2	6.1	0.042
Laborer	Routine	All areas	35	57%	2.2	7.1	0.037	15	0.10	15	35	0.0030
Garage Mechanic	Routine	All areas	27	52%	0.090	0.14	0.024	6.3	0.10	0.38	0.55	0.021
Contractor - Mobile Equipment Operator	Routine	All areas	23	43%	0.072	0.12	0.012	9.8	0.053	0.31	0.45	0.023
Engineer	Routine	All areas	10	60%	0.12	0.14	0.039	5.8	0.19	0.34	0.36	0.020
	Turnaround	All areas	11	9%	0.010	0.011	0.0044	4.7	0.011	0.029	0.014	0.014
Welder	Routine	All areas	19	11%	0.026	0.065	0.0035	7.7	0.0089	0.18	0.24	0.18
Contractor - Fireguard/Watch	Routine	All areas	6	67%	0.019	0.018	0.010	4.6	ND	ND	0.050	0.010
Contractor - Groundskeeper	Routine	All areas	18	0%	<0.02	ND	ND	ND	ND	ND	ND	ND
Contractor - Fireguard/Watch	Turnaround	All areas	12	0%	<0.37	ND	ND	ND	ND	ND	ND	ND
Contractor - Building Trades	Routine	All areas	15	13%	0.0089	0.0061	0.0059	3.2	0.012	0.018	0.020	0.012
Motorized/rigger Mechanic	Routine	All areas	17	24%	0.042	0.10	0.0068	7.3	0.010	0.26	0.34	0.010
Contractor - Building Trades	Turnaround	All areas	2	50%	0.27	0.37	0.062	20.6	ND	ND	0.53	0.53
Office Administration	Routine	All areas	15	7%	0.0069	0.0063	0.0042	3.3	0.0089	0.019	0.010	0.010
Laboratory Supervisor	Routine	All areas	13	38%	0.031	0.036	0.010	5.6	0.057	0.090	0.090	0.054
Contractor - Warehouse/storage	Routine	All areas	11	0%	<0.31	ND	ND	ND	ND	ND	ND	ND
Equipment Cleaner	Routine	All areas	10	100%	4.7	4.2	2.6	4.0	7.5	11	12	0.15
Contractor - Welding Specialist	Turnaround	All areas	10	0%	<0.37	ND	ND	ND	ND	ND	ND	ND
Contractor - Process Operations	Routine	All areas	8	100%	0.48	0.37	0.38	2.0	ND	ND	1.3	0.15
Maintenance Supervisor	Routine	All areas	3	0%	<0.06	ND	ND	ND	ND	ND	ND	ND
Material Specialist	Routine	All areas	7	0%	<0.31	ND	ND	ND	ND	ND	ND	ND
Maintenance Supervisor	Turnaround	All areas	4	75%	0.44	0.45	0.15	11	ND	ND	1.0	0.17
Contractor - Field supervisor	Routine	All areas	6	83%	0.43	0.56	0.088	16	ND	ND	1.4	0.020
Contractor - Meter Proving	Routine	All areas	5	60%	0.044	0.053	0.022	4.1	ND	ND	0.13	0.030
Truck Driver	Routine	All areas	5	80%	0.26	0.25	0.13	5.6	ND	ND	0.69	0.18
Facilities Maintenance	Routine	All areas	2	100%	0.11	0.077	0.090	2.2	ND	ND	0.16	0.051
Inspector	Routine	All areas	2	0%	<0.07	ND	ND	ND	ND	ND	ND	ND
Contractor - Foreman	Turnaround	All areas	2	0%	<0.30	ND	ND	ND	ND	ND	ND	ND

Crane Operator	Routine	All areas	1	0%	<0.06	ND	ND	ND	ND	ND	ND	ND
Garage Attendant	Routine	All areas	1	100%	0.050	--	0.050	--	ND	ND	0.050	0.050
Security Officer	Routine	All areas	1	0%	<0.02	ND	ND	ND	ND	ND	ND	ND
Contractor - Engineer	Turnaround	All areas	1	0%	<0.30	ND	ND	ND	ND	ND	ND	ND
Contractor - Industrial Hygienist	Turnaround	All areas	1	0%	<0.01	ND	ND	ND	ND	ND	ND	ND
Maintenance-Superintendent	Turnaround	All areas	1	0%	<0.06	ND	ND	ND	ND	ND	ND	ND

^a Definitions of cross-refinery job titles and areas have previously been reported

ND: Geometric mean and geometric standard deviation not calculated because more than 50% of the samples were below the limit of detection. Percentile not calculated because the proportion of results below the detection limit exceeds the selected percentile.