

Screening level modeling report which was superceded by ISC modeling report
Data and Modeling Procedures

Dispersion modeling was performed using the U.S. EPA's Screen3 model. This model is a screening tool which gives predictions of ambient ground level concentrations for a single stack. Due to the assumptions made in the model, particularly those regarding meteorological conditions, these predictions will always be more conservative than predictions made by the ISC3 model.

Although there are several different sources of C8 emissions in the Telomers area at the Washington Works site, these emission points are all headered together into a common stack. The following parameters for this stack were used in the model:

Stack Height: 85 feet
Diameter: 1.5 feet
Temperature: 68°F
Velocity: 47 ft/s
C8 Emission Rate: 0.16 lb/yr (1.83×10^{-5} lb/hr)

The C8 emission rate is based on the maximum production rate for the Telomers area. The basis for the emission calculations is shown in the attached document titled "Calculation of Emissions from the Telomers Process."

To determine the impacts of building downwash on dispersion from the stack, the Screen3 model uses only the dominant downwash structure as an input to the model. The dominant downwash structure can be found by first locating all buildings which have an area of influence encompassing the stack. The area of influence is defined by EPA as a distance of five times the lesser of the height or the maximum projected width of the building. Once all of the potential downwash structures are located, the dominant downwash structure is determined by calculating the GEP (Good Engineering Practice) stack height for each building. The building with the greatest GEP stack height is the building that should be included in the Screen3 model. The GEP stack height is calculated according to the following formula:

$$H = h + 1.5L$$

where H = GEP stack height

h = building height

L = lesser of the building height or maximum projected width

The following table shows the buildings that were included in the downwash analysis and their respective GEP's:

Building	Height (ft)	Length (ft)	Width (ft)	Max Projected Width (ft)	GEP (ft)
164	44	90	90	125	110
180	64	70	.25	75	160
184*	96	195	120	230	240

*This building has the highest GEP and was used in the model.

Modeling Results

Using the above data the Screen3 model predicted a maximum off-site ground level concentration of $0.0023 \mu\text{g}/\text{m}^3$ at a distance of 289 feet from the source. This concentration is based on a 1-hour averaging time. To convert a Screen3 model result to an annual average, EPA guidance directs the user to multiply

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the predicted Screen3 concentration by a value of 0.05. This gives an annual average concentration of $1.15 \times 10^{-4} \mu\text{g}/\text{m}^3$. This concentration is four orders of magnitude below the recommended ambient air concentration level in the community.

A copy of the Screen3 model output is attached.

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*** SCREEN3r MODEL RUN ***
 *** VERSION DATED 96043 ***

WASHINGTON WORKS TELOMERS EMISSIONS ** 0

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
 EMISSION RATE (G/S) = .230576E-05
 STACK HEIGHT (M) = 25.9080
 STK INSIDE DIAM (M) = .4572
 STK EXIT VELOCITY (M/S) = 14.3256
 STK GAS EXIT TEMP (K) = 293.1500
 AMBIENT AIR TEMP (K) = 293.0000
 RECEPTOR HEIGHT (M) = .0000
 URBAN/RURAL OPTION = RURAL
 BUILDING HEIGHT (M) = 29.2608
 MIN HORIZ BLDG DIM (M) = 36.5760
 MAX HORIZ BLDG DIM (M) = 59.4360

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.

THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = .004 M**4/S**3; MOM. FLUX = 10.719 M**4/S**2.

*** FULL METEOROLOGY ***

 *** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
10.	.0000	0	.0	.0	.0	.00	.00	.00	NA
100.	.2091E-02	6	1.0	1.7	10000.0	26.21	4.07	18.28	SS
200.	.1291E-02	6	1.0	1.7	10000.0	26.21	7.73	24.04	SS
300.	.8797E-03	6	1.0	1.7	10000.0	26.21	11.23	30.17	SS
400.	.6730E-03	6	1.0	1.7	10000.0	26.21	14.64	30.53	SS
500.	.5466E-03	6	1.0	1.7	10000.0	26.21	17.97	30.89	SS
600.	.4609E-03	6	1.0	1.7	10000.0	26.21	21.24	31.25	SS
700.	.3988E-03	6	1.0	1.7	10000.0	26.21	24.46	31.60	SS
800.	.3517E-03	6	1.0	1.7	10000.0	26.21	27.63	31.95	SS
900.	.3147E-03	6	1.0	1.7	10000.0	26.21	30.78	32.29	SS
1000.	.2848E-03	6	1.0	1.7	10000.0	26.21	33.88	32.63	SS
1100.	.2601E-03	6	1.0	1.7	10000.0	26.21	36.96	32.96	SS
1200.	.2394E-03	6	1.0	1.7	10000.0	26.21	40.01	33.29	SS
1300.	.2217E-03	6	1.0	1.7	10000.0	26.21	43.04	33.62	SS
1400.	.2065E-03	6	1.0	1.7	10000.0	26.21	46.05	33.94	SS
1500.	.1932E-03	6	1.0	1.7	10000.0	26.21	49.03	34.26	SS
1600.	.1815E-03	6	1.0	1.7	10000.0	26.21	51.99	34.57	SS
1700.	.1711E-03	6	1.0	1.7	10000.0	26.21	54.94	34.89	SS

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1800.	.1618E-03	6	1.0	1.7	10000.0	26.21	57.87	35.20	SS
1900.	.1534E-03	6	1.0	1.7	10000.0	26.21	60.78	35.50	SS
2000.	.1459E-03	6	1.0	1.7	10000.0	26.21	63.68	35.80	SS

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 10. M:

88.	.2254E-02	6	1.0	1.7	10000.0	26.21	3.65	17.65	SS
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DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED
DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
DWASH=NA MEANS DOWNWASH NOT APPLICABLE, $X < 3 * LB$

*** REGULATORY (Default) ***

PERFORMING CAVITY CALCULATIONS
WITH ORIGINAL SCREEN CAVITY MODEL
(BRODE, 1988)

*** CAVITY CALCULATION - 1 ***

CONC (UG/M**3)	=	.8839E-03
CRIT WS @10M (M/S)	=	1.27
CRIT WS @ HS (M/S)	=	1.54
DILUTION WS (M/S)	=	1.00
CAVITY HT (M)	=	38.48
CAVITY LENGTH (M)	=	67.12
ALONGWIND DIM (M)	=	36.58

*** CAVITY CALCULATION - 2 ***

CONC (UG/M**3)	=	.1001E-02
CRIT WS @10M (M/S)	=	2.37
CRIT WS @ HS (M/S)	=	2.87
DILUTION WS (M/S)	=	1.44
CAVITY HT (M)	=	32.60
CAVITY LENGTH (M)	=	48.77
ALONGWIND DIM (M)	=	59.44

END OF CAVITY CALCULATIONS

*** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	.2254E-02	88.	0.
BLDG. CAVITY-1	.8839E-03	67.	-- (DIST = CAVITY LENGTH)
BLDG. CAVITY-2	.1001E-02	49.	-- (DIST = CAVITY LENGTH)

** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **

Note: The off-site concentration referenced in the report is the concentration shown for simple terrain. This concentration is valid for receptor locations near the fence line since this area is relatively flat. Although the model predicted a building cavity concentration which is higher than the predicted value for simple terrain, this concentration will occur on site and is not applicable for this analysis.