

APPENDIX D

HEALTH RISK ASSESSMENT

TBAc Acute Noncarcinogenic Health Risk Analysis for PAR 1113

Tank Diameter and Approximate Footprint Area:

Tank Diameter, m	Tank Footprint Area, m ²	Effective Length, m	Height, m	Release Height, m
22.00	380	19.50	9.75	4.88

- Tank diameter and height from John Wallace, MWD for a one million gallon Tank

- Effective length, m = (tank footprint area, m²)^{1/2}

Determination of the Highest TBAc Mass Emission Rate:

Description	Usage, gal/hr	Specific Gravity	Density, lb/gal	Mix Ratio	TBAc Weight Fraction	Coating Emission Rate, lb/hr	TBAc Emission Rate, lb/hr	Adjusted TBAc Weight Fraction	TBAc Emission Rate, g/s
Primer resin	4		9.96	0.1808	0.2620	7.2021	1.89		0.24
Primer cure	4		7.62	0.0599	0.3800	1.8251	0.69		0.09
Primer powder	4		58.80	0.7593	0.0000	178.5874	0.00		0.00
Primer total						187.61	2.58	0.01	0.33
Intermediate resin	4		12.78	0.5000	0.0000	25.5538	0.00		0.00
Intermediate cure	4		11.75	0.5000	0.1090	23.5000	2.56		0.32
Intermediate total						49.05	2.56	0.05	0.32
Topcoat resin	4	1.37	11.43	0.7500	0.2121	34.2980	7.27		0.92
Topcoat cure	4	1.13	9.43	0.2500	0.0000	9.4299	0.00		0.00
Topcoat total						43.7278	7.27	0.17	0.92
Max TBAc emissions							7.27		0.92

Notes:

- Max.usage of four gal/hr provided by John Wallace DWP based two guns delivering two gallons per hour per gun
- Coating emissions , lb/hr = usage, gal/hr x density, lb/gal x mix ratio
- TBAc emissions , lb/hr = usage, gal/hr x density, lb/gal x mix ratio x TBAc weight fraction
- Adjusted TBAc weight fraction =(TBAc emission rate, lb/hr)/(Coating emission rate, lb/hr)
- TBAc Emissions, g/s = (TBAc emissions, lb/hr x 454 g/lb)/(3,600 sec/hr)

Mass Emission Rate Coating:

Description	Usage, gal/hr	Specific Gravity	Density, lb/gal	Mix Ratio	Emission Rate, lb/hr	Emission Rate, g/s
Topcoat resin	4	1.37	11.43	0.7500	34.30	4.32
Topcoat cure	4	1.13	9.43	0.2500	9.43	1.19
Topcoat total					43.73	5.51

- Coating emissions , lb/hr = usage, gal/hr x density, lb/gal x mix ratio

- Coating Emissions, g/s = (coating emissions, lb/hr x 454 g/lb)/(3,600 sec/hr)

Acute HI for TBAC

Component	Maximum Unit Emission Rate Conc. (ug/m3)	Mass Rate, g/s	TBAC Weight Fraction	Acute REL, ug/m3	Acute HI
TBAC	4,277	5.51	0.17	1.00E+04	0.4

- Maximum unit emission rate conc., ug/m3 estimated using ISCST3
- Weight fraction TBAC - highest concentration reported by Ameron
- Acute REL - Budroe, et. al, Acute Toxicity and Cancer Risk Assessment Values for Tert-Butyl Acetate, 2004.
- HI = (maximum unit emission rate conc., (ug/m3)/(g/s) x coating mass rate, g/s x TBAC weight fraction)/(REL, ug/m3)

Acute HI for Conventional Solvents

Component	Maximum Unit Emission Rate Conc. (ug/m3)	Mass Rate, g/s	Wt fraction Component	Acute REL	Acute HI
Xylene	4,277	5.51	0.01	2.20E+04	0.01

- Maximum unit emission rate conc., ug/m3 estimated using ISCST3
- Weight fraction conventional - highest concentration from review of MSDSs of I&M coatingss
- Acute REL - Budroe, et. al, Acute Toxicity and Cancer Risk Assessment Values for Tert-Butyl Acetate, 2004.
- HI = (max. unit emission rate conc., (ug/m3)/(g/s) x coating mass rate, g/s x component weight fraction)/(REL, ug/m3)

Target Organs

Component	Dev	Eye	Hem	Imm	NS	Rep	Resp
TBAC							X
Xylene		X					X

Assumptions

- One million gallon tank per conversation with Mark Staple of DWP
- 25 meters from tank to property boundry per Rules 1401/212 HRA Guidance shortest distance to receptor
- Tank dimensions from John Wallace at MWD
- Tank modeled as a volume source with an volume equivalent to the volume of the cylindrical tank
- Initial release height is half the height of the tank
- West LA metrological data
- 10 meter receptor grid beginning 25 meters from tank
- Max.usage of four gal/hr provided by John Wallace DWP based two guns delivering two gallons per hour per gun
- Coating parameters (mix ratios, TBAC weight fraction and density) from three part Ameron coating system
- Since only one coating can be sprayed at a time, the coating with the highest amount of TBAC emissions was used.
- TBAC acute REL - Budroe, et. al, Acute Toxicity and Cancer Risk Assessment Values for Tert-Butyl Acetate, 2004
- Weight fraction conventional - highest concentration from review of MSDSs of I&M coatingss
- Xylene acute REL - Budroe, et. al, Acute Toxicity and Cancer Risk Assessment Values for Tert-Butyl Acetate, 2004

TBAc Cancer Risk Analysis for PAR 1113 - Sewage Treatment Facility

TBAc Emissions Inventory:

Coating	Usage, gal/yr	Specific Gravity	Density, lb/gal	Mix Ratio	TBAc Weight Fraction	Coating Emission Rate, lb/yr	TBAc Emission Rate (Q), lb/yr
Topcoat resin	889	1.37	11.43	0.75	0.2121	7,623	1,617
Topcoat cure	889	1.13	9.43	0.25	0.0000	2,096	0
Topcoat total						9,719	1,617

Equation:

TBAc Emission Rate, lb/yr = Usage, gal/yr x Density, lb/gal x Mix Ratio x TBAc Weight Fraction

Rule 1401 and 212 Tier II Cancer Risk Analysis:

Impact to Residential or Sensitive Receptor

Parameter	Value	Units	Note
X/Q	6.7	{(ug/m ³)/(ton/yr)}	75 meters downwind distance, for an area <3,000 sq ft
AFann	1.00E+00		Residential/sensitive receptor 24 hour/day exposure
MET	0.58		Long Beach
CP	2.00E-03	(mg/kg-day) ⁻¹	OEHHA CP for TBA
DBR	302	(L/kg-day)	Sensitive/Residential
EVF	0.96		Sensitive/Residential
MP	1		Not assigned, assumed worst-case
Cair	3.14E+00	(ug/m ³)	
DI	9.11E-04	mg/kg-day	
MICR	1.82E-06		

Impact to Off-Site Worker

Parameter	Value	Units	Note
X/Q	6.7	{(ug/m ³)/(ton/yr)}	75 meters downwind distance, for an area <3,000 sq ft
AFann	4.20E+00		Off-site worker 8 hour/day exposure
MET	0.58		Long Beach
CP	2.00E-03	(mg/kg-day) ⁻¹	OEHHA CP for TBA
DBR	149	(L/kg-day)	Off-site worker
EVF	0.38		Off-site worker
MP	1		Not assigned, assumed worst-case
Cair	1.32E+01	(ug/m ³)	
DI	7.47E-04	mg/kg-day	
MICR	1.49E-06		

Equations:

Cair = Qtons x X/Q x AFann x MET

DI = Cair x DBR x EVF x 10⁻⁶

MICR = CP x DI x MP

Distance Range to Nearest Receptor (varies depending on location of coating operation)

Downwind Distances ft	Downwind Distances meter
300 - 5280	91 - 1609

Obtained from SCAQMD Inspector; verified with Thomas Guide

Assumptions

- IM coating usage based on actual facility data and actual location meteorological data
- Weight fraction TBAC - highest concentration reported by Ameron
- TBAC Cancer Potency - Budroe, et. al, Acute Toxicity and Cancer Risk Assessment Values for Tert-Butyl Acetate, 2004.
- Coating parameters (mix ratios, TBAC weight fraction and density) from three part Ameron coating system

Key

Dispersion factor	X/Q
Annual concentration adjustment factor	AFann
Meteorological correction factor	MET
Cancer potency	CP
Daily Breathing Rate	DBR
Exposure Value Factor	EVF
Multi-pathway factor	MP
Concentration in air	Cair
Dose through inhalation	DI
Maximum Individual Cancer Risk	MICR

TBAc Cancer Risk Analysis for PAR 1113 - Refinery

TBAc Emissions Inventory:

Coating	Usage, gal/yr	Specific Gravity	Density, lb/gal	Mix Ratio	TBAc Weight Fraction	Coating Emission Rate, lb/yr	TBAc Emission Rate (Q), lb/yr
Topcoat resin	269	1.37	11.43	0.75	0.2121	2,307	489
Topcoat cure	269	1.13	9.43	0.25	0.0000	634	0
Topcoat total						2,941	489

Equation:

TBAc Emission Rate, lb/yr = Usage, gal/yr x Density, lb/gal x Mix Ratio x TBAc Weight Fraction

Rule 1401 and 212 Tier II Cancer Risk Analysis:

Impact to Residential or Sensitive Receptor

Parameter	Value	Units	Note
X/Q	6.7	{(ug/m ³)/(ton/yr)}	75 meters downwind distance, for an area <3,000 sq ft
AFann	1.00E+00		Residential/sensitive receptor 24 hour/day exposure
MET	1		West Los Angeles
CP	2.00E-03	(mg/kg-day) ⁻¹	OEHHA CP for TBA
DBR	302	(L/kg-day)	Sensitive/Residential
EVF	0.96		Sensitive/Residential
MP	1		Not assigned, assumed worst-case
Cair	1.64E+00	(ug/m ³)	
DI	4.75E-04	mg/kg-day	
MICR	9.50E-07		

Impact to Off-Site Worker

Parameter	Value	Units	Note
X/Q	6.7	{(ug/m ³)/(ton/yr)}	75 meters downwind distance, for an area <3,000 sq ft
AFann	4.20E+00		Off-site worker 8 hour/day exposure
MET	1		West Los Angeles
CP	2.00E-03	(mg/kg-day) ⁻¹	OEHHA CP for TBA
DBR	149	(L/kg-day)	Off-site worker
EVF	0.38		Off-site worker
MP	1		Not assigned, assumed worst-case
Cair	6.88E+00	(ug/m ³)	
DI	3.90E-04	mg/kg-day	
MICR	7.79E-07		

Equations:

Cair = Qtons x X/Q x AFann x MET

DI = Cair x DBR x EVF x 10⁻⁶

MICR = CP x DI x MP

Distance Range to Nearest Receptor (varies depending on location of coating operation)

Downwind Distances ft	Downwind Distances meter	
300 - 3960	91-1207	Obtained from SCAQMD Inspector; verified with Thomas Guide

Assumptions

- IM coating usage based on actual facility data and actual location meteorological data
- Weight fraction TBAC - highest concentration reported by Ameron
- TBAC Cancer Potency - Budroe, et. al, Acute Toxicity and Cancer Risk Assessment Values for Tert-Butyl Acetate, 2004.
- Coating parameters (mix ratios, TBAC weight fraction and density) from three part Ameron coating system

Key

Dispersion factor	X/Q
Annual concentration adjustment factor	AFann
Meteorological correction factor	MET
Cancer potency	CP
Daily Breathing Rate	DBR
Exposure Value Factor	EVF
Multi-pathway factor	MP
Concentration in air	Cair
Dose through inhalation	DI
Maximum Individual Cancer Risk	MICR

TBAc Cancer Risk Analysis for PAR 1113 - Water/Power Facility

TBAc Emissions Inventory:

Coating	Usage, gal/yr	Specific Gravity	Density, lb/gal	Mix Ratio	TBAc Weight Fraction	Coating Emission Rate, lb/yr	TBAc Emission Rate (Q), lb/yr
Topcoat resin	600	1.37	11.43	0.75	0.2121	5,145	1,091
Topcoat cure	600	1.13	9.43	0.25	0.0000	1,414	0
Topcoat total						6,559	1,091

Equation:

TBAC Emission Rate, lb/yr = Usage, gal/yr x Density, lb/gal x Mix Ratio x TBAc Weight Fraction

Rule 1401 and 212 Tier II Cancer Risk Analysis:

Impact to Residential or Sensitive Receptor

Parameter	Value	Units	Note
X/Q	0.17	{{(ug/m ³)/(ton/yr)}}	500 meters downwind distance, for an area <3,000 sq ft
AFann	1.00E+00		Residential/sensitive receptor 24 hour/day exposure
MET	0.71		Upland
CP	2.00E-03	(mg/kg-day) ⁻¹	OEHHA CP for TBA
DBR	302	(L/kg-day)	Sensitive/Residential
EVF	0.96		Sensitive/Residential
MP	1		Not assigned, assumed worst-case
Cair	6.59E-02	(ug/m ³)	
DI	1.91E-05	mg/kg-day	
MICR	3.82E-08		

Impact to Off-Site Worker

Parameter	Value	Units	Note
X/Q	0.17	{{(ug/m ³)/(ton/yr)}}	500 meters downwind distance, for an area <3,000 sq ft
AFann	4.20E+00		Off-site worker 8 hour/day exposure
MET	0.71		Upland
CP	2.00E-03	(mg/kg-day) ⁻¹	OEHHA CP for TBA
DBR	149	(L/kg-day)	Off-site worker
EVF	0.38		Off-site worker
MP	1		Not assigned, assumed worst-case
Cair	2.77E-01	(ug/m ³)	
DI	1.57E-05	mg/kg-day	
MICR	3.13E-08		

Equations:

$C_{air} = Q_{tons} \times X/Q \times AFann \times MET$

$DI = C_{air} \times DBR \times EVF \times 10^{-6}$

$MICR = CP \times DI \times MP$

Distance Range to Nearest Receptor (varies depending on location of coating operation)

Downwind Distances ft	Downwind Distances meter
2000 - 3000	610 - 914

Obtained from SCAQMD Inspector; verified with Thomas Guide

Assumptions

- IM coating usage based on actual facility data and actual location meteorological data
- Weight fraction TBAC - highest concentration reported by Ameron
- TBAC Cancer Potency - Budroe, et. al, Acute Toxicity and Cancer Risk Assessment Values for Tert-Butyl Acetate, 2004.
- Coating parameters (mix ratios, TBAC weight fraction and density) from three part Ameron coating system

Key

Dispersion factor	X/Q
Annual concentration adjustment factor	AFann
Meteorological correction factor	MET
Cancer potency	CP
Daily Breathing Rate	DBR
Exposure Value Factor	EVF
Multi-pathway factor	MP
Concentration in air	Cair
Dose through inhalation	DI
Maximum Individual Cancer Risk	MICR