Air Toxics Guidelines Implementation

Allegheny County Health Department
Air Quality Program
2/4/2013

Revised Air Toxics Guidelines

Policy for Air Toxics Review of Installation Permit Applications

Allegheny County Health Department
Air Quality Program
February 4th, 2013

Gregson Vaux (gvaux@achd.net)

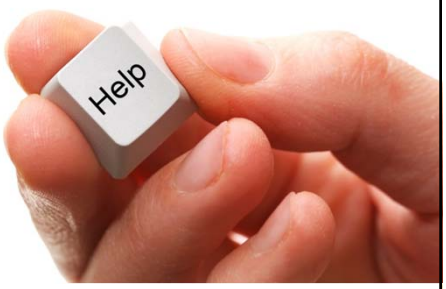
POLICY FOR AIR TOXICS REVIEW OF INSTALLATION PERMIT APPLICATIONS

The Purpose of Today's Meeting

We will be covering the steps required to successfully apply for an installation permit given the new air toxics guidelines.

If you are confused

We are here to help you



Sandra Etzel
Chief Engineer Permitting
SEtzel@achd.net

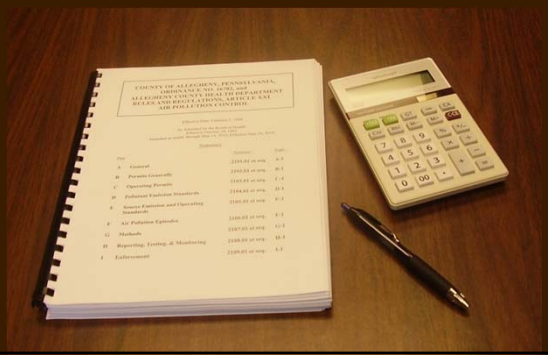
(The three presenters are also available to answer questions)

Agenda

- Overview – Gregson Vaux (air quality engineer)
- Modeling – Tony Sadar (air pollution meteorologist)
- Examples – David Good (air quality engineer)
- General Questions

Policy Established

- The new air toxics document represents an establishment of policy for installation permits.
- It replaces the 1988 policy.
- It does not represent a new regulation or law.



Authority

Article XXI of Allegheny County's Rules and Regulations states:

§2102.04.b.7 – *"The Department shall not issue any Installation Permit unless it has . . . received a complete application meeting the requirements of this Part, which application includes or demonstrates that: . . . Emissions from the proposed source will not endanger the public health, safety, or welfare. . ."*

- The policy covers installation permits
  - New Facilities
  - Modifications
  - New Equipment

- The policy does not cover
  - In-kind replacement of pollution control devices
  - *De minimis* increases (as defined by the Air Toxics Guideline)
  - Activities on Allegheny County's exemption list
  - Projects with EPA-published risk assessment guidance (Requires a different review)

How is the toxicity of a chemical determined?

- IRIS and Cal EPA data comes from the latest health studies.
- The process to determine carcinogenic and non-carcinogenic health risks involves input from the public and multiple reviews.
- The published results are worst case scenarios that assume a person is exposed to a particular concentration of a substance for 70 years.

Hierarchy for Toxicity Information

1. IRIS (Integrated Risk Information System)
   http://www.epa.gov/IRIS/
   The IRIS database contains more than 550 substances but only 124 are known to have useful quantitative values.
2. EPA's Provisional Peer Reviewed Toxicity Values
   http://hhpprtv.ornl.gov/quickview/pprtv.php
3. Other Sources (e.g. Cal EPA)
   http://www.oehha.org/air/allrels.html

All Chemicals currently in the IRIS database (557)

Acenaphthene
Acenaphthylene
Acephate
Acetaldehyde
Acetochlor
Acetone
Acetonitrile
Acetophenone
Acifluorfen, sodium
Acrolein
Acrylamide
Acrylic acid
Acrylonitrile
Adiponitrile
Alachlor
Alar
Aldicarb
Aldicarb sulfone
Aldrin
Ally
Allyl alcohol
Allyl chloride
Aluminum phosphide
Amdro
Ametryn
4-Aminopyridine
Amitraz
Ammonia
Ammonium acetate
Ammonium methacrylate
Ammonium sulfamate
Aniline
ortho-Anisidine
Anthracene
Antimony
Antimony trioxide
Apollo
Aramite
Aroclor 1016
Aroclor 1248
Aroclor 1254
Arsenic, inorganic
Arsine
Asbestos
Assure
Asulam
Atrazine
Avermectin B1
Azobenzene
Barium and Compounds
Barium cyanide
Baygon
Bayleton
Baythroid
Benefin
Benomyl
Bentazon (Basagran)
Benz[a]anthracene
Benzaldehyde
Benzene
Benzidine
Benzo[a]pyrene (BaP)
Benzo[b]fluoranthene
Benzo[g,h,i]perylene
Benzo[k]fluoranthene
Benzoic acid
Benzotrichloride
Benzyl chloride
Beryllium and compounds
Bidrin
Biphenthrin
1,1-Biphenyl
Bis(2-chloro-1-methylethyl) ether
Bis(2-chloroethoxy)methane
Bis(chloroethyl)ether (BCEE)
Bis(chloromethyl)ether (BCME)
Bisphenol A.
Boron and Compounds
Bromacil
Brominated dibenzofurans
Bromobenzene
Bromochloromethane
Bromodichloromethane
Bromodiphenyl ether
Bromoform
Bromomethane
Bromotrichloromethane
Bromoxynil
Bromoxynil octanoate
1,3-Butadiene
n-Butanol
Butyl benzyl phthalate
Butylate
t-Butylchloride
Butylphthalyl butylglycolate (BPBG)
Cacodylic acid
Cadmium
Calcium cyanide
Caprolactam
Captafol
Captan
Carbaryl
Carbofuran
Carbon disulfide
Carbon tetrachloride
Carbonyl sulfide
Carbosulfan
Carboxin
Cerium Oxide and Cerium Compounds
Chloral hydrate
Chloramben
Chlordane (Technical)
Chlordecone (Kepone)
Chlorimuron-ethyl
Chlorine
Chlorine cyanide
Chlorine dioxide
Chlorite (sodium salt)
1-Chloro-1,1-difluoroethane
2-Chloroacetophenone
p-Chloroaniline
Chlorobenzene
Chlorobenzilate
1-Chlorobutane
p-Chlorobutane
Chlorocyclopentadien e
Chlorodifluoromethan e
Chloroform
Chloromethyl methyl ether (CMME)
beta-Chloronaphthalene
2-Chlorophenol
p-Chlorophenyl methyl sulfide
p-Chlorophenyl methyl sulfone
p-Chlorophenyl methyl sulfoxide
Chloroprene
Chlorothalonil
o-Chlorotoluene
Chlorpropham
Chlorpyrifos
Chlorsulfuron
Chromium(III), insoluble salts
Chromium(VI)
Chrysene
Coke oven emissions
Copper
Copper cyanide
Creosote
Crotonaldehyde
Cumene
Cyanazine
Cyanide, free
Cyanogen
Cyanogen bromide
Cyclohexane
Cyclohexanone
Cyclohexylamine
Cyhalothrin/Karate
Cypermethrin
Cyromazine
Dacthal
Dalapon, sodium salt
Daxtol
2,2',3,3',4,4',5,5',6,6' -Decabromodiphenyl ether (BDE-209)
Demeton
Di (2-ethylhexyl)phthalate (DEHP)
Di(2-ethylhexyl)adipate
2,4-Diaminotoluene
Diazomethane
Dibenz[a,h]anthracen e
Dibenzofuran
1,2-Dibromo-3-chloropropane (DBCP)
1,4-Dibromobenzene
Dibromochloromeetha ne
Dibromodichloromeeth ane
Dibromomethane
1,2-Dibromoethane
Dibutyl phthalate
Dicamba
Dichloroacetic acid
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
3,3'-Dichlorobenzidine
Dichlorodifluoromeeth ane
p,p'-Dichlorodiphenyl dichloroethane (DDD)
p,p'-Dichlorodiphenyldichl oroethylene (DDE)
p,p'-Dichlorodiphenyltrich loroethane (DDT)
1,1-Dichloroethane
1,2-Dichloroethane
cis-1,2-Dichloroethylene
trans-1,2-Dichloroethylene
1,1-Dichloroethylene (1,1-DCE)
Dichloromethane
2,4-Dichlorophenol
4-(2,4-dichlorophenoxy)but yric acid (2,4-DB)
2,4-Dichlorophenoxyaceti c acid (2,4-D)
1,2-Dichloropropane
2,3-Dichloropropanol
1,3-Dichloropropene
Dichlorvos
Dicofol
Dieldrin
Diesel engine exhaust
Diethyl phthalate
Diethyl sulfate
Diethyl-p-nitrophenylphosphate
Diethylene glycol dinitrate (DEGDN)
Difenzoquat
Diflubenzuron
1,1-Difluoroethane
Diisopropyl methylphosphonate (DIMP)
Dimethipin
Dimethoate
Dimethyl phthalate
Dimethyl sulfate
Dimethyl terephthalate (DMT)
Dimethylamine
N-N-Dimethylaniline
3,3-Dimethylbenzidine
N,N-Dimethylformamide
2,4-Dimethylphenol
2,6-Dimethylphenol
3,4-Dimethylphenol
4,6-Dinitro-o-cyclohexyl phenol
m-Dinitrobenzene
o-Dinitrobenzene
2,4-Dinitrophenol
2,4-Dinitrotoluene
2,4-/2,6-Dinitrotoluene mixture (DNTP)
Dinoseb
1,4-Dioxane
Diphenamid
Diphenylamine
1,2-Diphenylhydrazine
Diquat
Disulfoton
1,4-Dithiane
Diuron
Dodine
Endosulfan
Endothall
Endrin
Epichlorohydrin
Ethyl 2-cyanoacrylate (EBU)
Ethephon
Ethion
2-Ethoxyethanol
Ethyl acetate
Ethyl carbamate
Ethyl chloride
S-Ethyl dipropylthiocarbamat e (EPTC)
Ethyl ether
Ethyl p-nitrophenyl phenylphosphonothio ate (EPN)
Ethylbenzene
Ethylene diamine
Ethylene glycol
Ethylene glycol monobutyl ether (EGBE) (2-Butoxyethanol)
Ethylene thiourea (ETU)
Ethylenimine
Ethylphthalyl ethylglycolate (EPEG)
Express
Fenamiphos
Fluometuron
Fluoranthene
Fluorene
Fluoride (soluble fluoride)
Floridone
Flurprimidol
Flutolanil
Fluvalinate
Folpet
Fomesafen
Fonofos
Formaldehyde
Formic acid
Fosetyl-al
Furan
Furfural
Furmecyclox
Glufosinate-ammonium
Glutaraldehyde
Glyphosate
Haloxyfop-methyl
Harmony
Heptachlor
Heptachlor epoxide
n-Heptane
Hexabromobenzene
Hexabromodiphenyl ether
2,2',4,4',5,5'-Hexabromodiphenyl ether (BDE-153)
Hexachlorobenzene
Hexachlorobutadiene
alpha-Hexachlorocyclohexa ne (alpha-HCH)
beta-Hexachlorocyclohexa ne (beta-HCH)
delta-Hexachlorocyclohexa ne (delta-HCH)
epsilon-Hexachlorocyclohexa ne (epsilon-HC)
gamma-Hexachlorocyclohexa ne (gamma-HCH) technical
Hexachlorocyclohexa ne (t-HCH)
Hexachlorocyclopent adiene (HCCPD)
Hexachlorodibenzo-p-dioxin (HxCDD), mixture of
1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDD
Hexachloroethane
Hexachlorophene
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
Hexamethylene diisocyanate
n-Hexane
2-Hexanone
Hexazinone
Hydrazine/Hydrazine sulfate
Hydrogen Cyanide and Cyanide Salts
Hydrogen chloride
Hydrogen sulfide
Hydroquinone
Imazalil
Imazaquin
Indeno[1,2,3-cd]pyrene
Iprodione
Isobutyl alcohol
Isophorone
Isopropalin
Isopropyl methyl phosphonic acid (IMPA)
Isoxaben
Lactofen
Lead and compounds (inorganic)
d-Limonene
Linuron
Londax
Malathion
Maleic anhydride
Maleic hydrazide
Manab
Manganese
Mepiquat chloride
Mercuric chloride (HgCl2)
Mercury, elemental
Merphos
Merphos oxide
Metalaxyl
Methacrylonitrile
Methamidophos
Methanol
Methidathion
Methomyl
Methoxychlor
2-Methoxyethanol
Methyl acrylate
Methyl azide
Methyl bromide
Methyl carbonate
Methyl ethyl ketone (MEK)
Methyl iodide
Methyl isobutyl ketone (MIBK)
Methyl isocyanate
Methyl methacrylate
Methyl parathion
Methyl tert-butyl ether (MTBE)
4-(2-Methyl-4-chlorophenoxy) butyric acid (MCPB)
2-(2-Methyl-4-chlorophenoxy)propi onic acid (MCPP)
2-Methyl-4-chlorophenoxyacetic acid (MCPA)
Methylene Diphenyl Diisocyanate (monomeric MDI) and polymeric MDI (PMDI)
4,4'-Methylene bis(N,N'-dimethyl)aniline
Methylmercury (MeHg)
2-Methylnaphthalene
2-Methylphenol
3-Methylphenol
4-Methylphenol
Metolachlor
Metribuzin
Mirex
Molinate
Molybdenum
Monochloramine
Naled
Naphthalene
Napropamide
Nickel carbonyl
Nickel refinery dust
Nickel subsulfide
Nickel, soluble salts
Nitrapyrin
Nitrate
Nitric oxide
Nitrite
Nitrobenzene
Nitrogen dioxide
Nitroguanidine
p-Nitrophenol
2-Nitropropane
N-Nitroso-N-methylethylamine
N-Nitroso-di-n-butylamine
N-Nitroso-di-n-propylamine
N-Nitrosodiethanolamin e
N-Nitrosodiethylamine
N-Nitrosodimethylamin e
N-Nitrosodiphenylamine
N-Nitrosopyrrolidine
Nonabromodiphenyl ether
Norflurazon
Nudtar
Octabromodiphenyl ether
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
Oryzalin
Oxadiazon
Oxamyl
Oxyfluorfen
Paclobutrazol
Paraquat
Parathion
Pendimethalin
Pentabromodiphenyl ether (BDE-99)
Pentachlorobenzene
Pentachlorocyclopent adiene
Pentachloronitrobenz ene (PCNB)
Pentachlorophenol
Pentafluorobenzene
Perchlorate (CD04) and Perchlorate Salts
Permethrin
Phenanthrene
Phenmedipham
Phenol
Phenylenediamine
Phenylmercuric acetate
Phosalone
Phosgene
Phosmet
Phosphine
Phosphoric acid
Phthalic anhydride
Picloram
Pirimiphos-methyl
Polychlorinated biphenyls (PCBs)
Potassium cyanide
Potassium silver cyanide
Prochloraz
Prometon
Prometryn
Pronamide
Propachlor
Propanil
Propargite
Propargyl alcohol
Propazine
Propham
Propiconazole
beta-Propiolactone
Propionaldehyde
Propylene glycol
Propylene glycol monoethyl ether
Propylene glycol monomethyl ether (PGME)
Propylene oxide
Propyleneimine
Pursuit
Pydrin
Pyrene
Pyridine
Quinalphos
Quinoline
Quinomes
Radium 226, 228
Radon 222
Refractory ceramic fibers
Resmethrin
Rotenone
Savey
Selenious acid
Selenium and Compounds
Selenium sulfide
Selenourea
Sethoxydim
Silver
Silver cyanide
Simazine
Sodium azide
Sodium cyanide
Sodium fluoride
Sodium pentachlorophenate
Sodium fluoroacetate
Strontium
Strychnine
Styrene
Sulfolane
Tebuthiuron
Terbacil
Terbutryn
Tetrabromodiphenyl ether
2,2',4,4'-Tetrabromodiphenyl ether (BDE-47)
1,2,4,5-Tetrachlorobenzene
Tetrachlorocyclopent adiene
2,3,7,8-Tetrachlorodibenzo-p-dioxin
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethylene
2,3,4,6-Tetrachlorophenol
Tetrachlorovinphos
Tetraethyl lead
Tetraethyldithiopyrop hosphate (TEDP)
Tetrafluoroethane
Tetrahydrofuran
Thallium (I), soluble salts
Thallium acetate
Thallium carbonate
Thallium chloride
Thallium nitrate
Thallium oxide
Thallium selenite
Thallium(I) sulfate
Thiobencarb
Thiodicarb/Larvin
Thiram
Toluene
2,4-/2,6-Toluene diisocyanate mixture (TDI)
Toxaphene
Trialomethrin
Triallate
Triasulfuron
1,2,4-Tribromobenzene
Tribromochloromeeth ane
Tribromodiphenyl ether
Tributyltin oxide (TBTO)
1,1,1-Trichloro-1,2,2-trifluoroethane (CFC-113)
Trichloroacetic acid
1,2,4-Trichlorobenzene
Trichlorocyclopentadi ene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethylene
Trichlorofluorometha ne
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
2,4,5-Trichlorophenoxy propionic acid (2,4,5-TP)
2,4,5-Trichlorophenoxyacet ic acid (2,4,5-T)
1,1,2-Trichloropropane
1,2,3-Trichloropropane
Triclopyr
Tridiphane
Triethylamine
Triethylene glycol monobutyl ether
Triethylene glycol monoethyl ether
Trifluralin
2,2,4-Trimethylpentane
1,3,5-Trinitrobenzene
2,4,6-Trinitrotoluene (TNT)
Uranium, natural
Uranium, soluble salts
Urea
Vanadium pentoxide
Vernam
Vinclozolin
Vinyl acetate
Vinyl bromide
Vinyl chloride
Warfarin
White phosphorus
Xylenes
Zinc and Compounds
Zinc cyanide
Zinc phosphide
Zineb

There are 358 air toxics in IRIS and Cal EPA Databases

This list is subject to change (although infrequently)

1,1,1,2-Tetrachloroethane
1,1,1,2-Tetrafluoroethane
1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethylene
1,1-Difluoroethane
Octachlorodibenzofuran
Octachlorodibenzo-p-dioxin
Heptachlorodibenzofuran
Heptachlorodibenzo-p-dioxin
Heptachlorodibenzofuran
Hexachlorodibenzofuran
Hexachlorodibenzo-p-dioxin
Hexachlorodibenzofuran
Hexachlorodibenzo-p-dioxin
Pentachlorodibenzofuran
Pentachlorodibenzo-p-dioxin
1,2,3-Trichloropropane
1,2-Dibromo-3-chloropropane
1,2-Dibromoethane
1,2-Dichloroethane
1,2-Dichloropropane
1,2-Dimethylhydrazine
1,2-Epoxybutane
1,3-Butadiene
1,3-Dichloropropene
1,3-Propane sultone
1,4-Dichlorobenzene
1,4-Dioxane
1,6-Dinitropyrene
1,6-Hexamethylene diisocyanate
1,8-Dinitropyrene
1-[(5-Nitrofurfurylidene)-amino]-2-imidazolidinone
1-Amino-2-methylanthraquinone
1-Chloro-1,1-difluoroethane
1-Nitropyrene
2-(2-Formylhydrazino)-4-(5-nitro-2-furyl)thiazole
2,3,3',4,4',5,5'-HpCB
2,3,3',4,4',5'-HxCB
2,3,3',4,4',5-HxCB
2,3,3',4,4'-PeCB
2,3',4,4',5,5'-HxCB
2,3,4,4',5-PeCB
2',3,4,4',5-PeCB
2,3,4,6,7,8-hexachlorodibenzofuran
2,3,4,7,8-Pentachlorodibenzofuran
2,3,7,8-Hexachlorodibenzo-p-dioxin
2,3,7,8-Tetrachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,4,6-Trichlorophenol
2,4-Diaminoanisole sulfate
2,4-Diaminotoluene
2,4-Dinitrotoluene
2-4-Diaminoanisole
2-Acetylaminofluorene
2-Amino-5-(5-nitro-2-furyl)-1-3-4-thiadiazol
2-Aminoanthraquinone
2-Chloroacetophenone
2-Hexanone
2-Methyl-1-nitroanthraquinone
2-Nitrofluorene
2-Nitropropane
3,3',4,4',5,5'-HxCB
3,3',4,4',5-PeCB
3,3',4,4'-TCB
3,3-Dichlorobenzidine
3,4,4'5-TCB
3-Amino-9-ethylcarbazolehydrochloride
3-Chloro-2-methylpropene
3-Methylcholanthrene
4,4-Diaminodiphenyl ether
4,4-Methylene bis(2-chloroaniline)
4,4-Methylene bis(2-methylaniline)
4,4-Methylene bis(N-N'-dimethyl)aniline
4,4-Methylenedianiline
4,4-Methylenedianiline dihydrochloride
4,4-Thiodianiline
4-Aminobiphenyl
4-Chloro-ortho-phenylenediamine
4-Dimethylaminoazobenzene
4-Nitropyrene
5-Methylchrysene
5-Nitroacenaphthene
6-Nitrochrysene
7,12-Dimethylbenz(a)anthracene
7H-dibenzo(c,g)carbazole
A-alpha-C(2-Amino-9H-pyrido[2-3-b]indole)
Acetaldehyde
Acetamide
Acetonitrile
Acrolein
Acrylamide
Acrylic Acid
Acrylonitrile
Actinomycin D
AF-2(2-(2-furyl)-3(5-nitro-2-furyl)acrylamide
Aldrin
Allyl chloride
Amitrole
Ammonia
Aniline
Antimony trioxide
Aramite
Arsenic
Arsine
Asbestos [1/100 PCM fibers/m3)]-1
Auramine
Azaserine
Azathioprine
Azobenzene
Benz(a)anthracene
Benzene
Benzidine
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(j)fluoranthene
Benzo(k)fluoranthene
Benzyl Chloride
Benzyl Violet 4B
Beryllium
Beryllium Oxide
Beryllium Sulfate
beta-Butyrolactone
beta-Propiolactone
Bis(2-chloroethyl) Ether
Bis(2-chloromethyl) Ether
Bromobenzene
Bromodichloromethane
Bromoform
Bromomethane (Methyl Bromide)
Butylated Hydroxyanisole
C.I. Basic Red 9 Monohydrochloride
Cadmium
Captafol
Captan
Carbon Disulfide
Carbon Tetrachloride
Cerium Oxide and Cerium Compounds
Chlorambucil
Chlordane
Chlordane (Technical)
Chlordecone
Chlorendic Acid
Chlorinated paraffins
Chlorine
Chlorine Dioxide
Chlorobenzene
Chlorodibromomethane
Chlorodifluoromethane
Chloroform
Chloromethyl Methyl Ether
Chloroprene
Chloroprene
Chlorothalonil
Chlorozotocin
Chromic Trioxide
Chromium(VI) -acid mists and dissolved aerosols
Chromium(VI) -hexavalent
Chrysene
Cinnamyl Anthranilate
Coke oven emissions
Cresol Mixtures
Cumene
Cupferron
Cyclohexane
Cyclophosphamide (Anhydrous)
Cyclophosphamide (Hydrated)
D & C Red No. 9
Dacarbazine
Daminozide
Dantron
Di(2-ethylhexyl)phthalate
Dibenz(a-h)acridine
Dibenz(a-h)anthracene
Dibenz(a-j)acridine
Dibenzo(a-e)pyrene
Dibenzo(a-h)pyrene
Dibenzo(a-i)pyrene
Dibenzo(a-l)pyrene
Dichlorodiphenyldichloroethane
Dichlorodiphenyldichloroethylene
Dichloromethane (Methylene Chloride)
Dichlorvos
Diesel engine exhaust
Diesel Exhaust Particulate
Diethanolamine
Diethylstilbestrol
Diglycidyl Resorcinol Ether
Dihydrosafrole
Dimethylcarbamyl Chloride
Dimethylvinylchloride
Direct Black 38 (Technical Grade)
Direct Blue 6 (Technical Grade)
Direct Brown 95 (Technical Grade)
Disperse Blue 1 (Technical Grade)
Epichlorohydrin
Estradiol 17B
Ethyl Chloride
Ethyl-4-4'-dichlorobenzilate
Ethylbenzene
Ethylene Glycol
Ethylene Glycol Monobutyl Ether
Ethylene Glycol Monoethyl Ether (2-Ethoxyethanol)
Ethylene Glycol Monoethyl Ether Acetate
Ethylene Glycol Monomethyl Ether (2-Methoxyethanol)
Ethylene Glycol Monomethyl Ether acetate
Ethylene oxide
Ethylene Thiourea
Ethylenimine
Formaldehyde
Furmecyclox
Glu-P-1 (2-Amino-6-methyldipyrido[1-2-a:3'-2'-d]imidazole)
Glu-P-2 (2-Aminodipyrido[1-2-a:3'-2'-d]indole)
Glutaraldehyde
Gyromitrin
HC Blue 1
Heptachlor
Heptachlor Epoxide
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclohexane- Alpha Isomer
Hexachlorocyclohexane- Beta Isomer
Hexachlorocyclohexane- Gamma Isomer
Hexachlorocyclopentadiene
Hexachlorodibenzo-p-dioxin
Hexachlorodibenzo-p-dioxin (HxCDD)
Hexachloroethane
Hydrazine sulfate
Hydrazine/Hydrazine sulfate
Hydrazobenzene (1,2-Diphenylhydrazine)
Hydrogen Chloride
Hydrogen Cyanide
Hydrogen Cyanide and Cyanide Salts
Hydrogen Fluoride (Fluorides)
Hydrogen Sulfide
Indeno(1-2-3-c-d)pyrene
IQ (2-Amino-3-methylimidazo-[4-5-f]quinoline)
Isophorone
Lasiocarpine
Lead Acetate
Lead and Lead Compounds
Lead Subacetate
Maleic Anhydride
Manganese & Manganese Compounds
Me-A-alpha-C (2-Amino-3-methyl-9H-pyrido[2-3-b]indole)
Melphalan
Mercury (Inorganic)
Methanol
Methyl chloride
Methyl Ethyl Ketone
Methyl Isobutyl ketone (MIBK)
Methyl isocyanate
Methyl methacrylate
Methyl Methanesulfonate
Methyl Tertiary Butyl Ether
Methylene Diphenyl Diisocyanate
Methylthiouracil
Mirex
Mitomycin C
Monocrotaline
N,N-Dimethylformamide
n-[4-(5-Nitro-2-furyl)-2-thiazolyl]-acetamide
Naphthalene
n-Hexane
Nickel and Nickel Compounds
Nickel Oxide
Nickel Refinery Dust
Nickel Subsulfide
Nitrilotriacetic Acid
Nitrilotriacetic acid- Trisodium Salt monohydrate
Nitrobenzene
Nitrofen (technical grade)
Nitrofurazone
n-Methyl-n-Nitro-n-Nitrosoguanidine
n-Nitrosodiethanolamine
n-Nitrosodiethylamine
n-Nitrosodimethylamine
n-Nitrosodi-n-Butylamine
n-Nitrosodi-n-Propylamine
n-Nitrosodiphenylamine
n-Nitrosomorpholine
n-Nitroso-n-Ethylurea
n-Nitroso-n-methylethylamine
n-Nitroso-n-Methylurea
n-Nitroso-n-Methylurethane
n-Nitrosonornicotine
n-Nitrosopiperidine
n-Nitrosopyrrolidine
o-Aminoazotoluene
o-Anisidine
o-Anisidine Hydrochloride
o-Phenylphenate, sodium
o-Toluidine
o-Toluidine Hydrochloride
DDT
para-Cresidine
p-Chloro-o-toluidine
Pentachlorophenol
Phenacetin
Phenazopyridine
Phenazopyridine hydrochloride
Phenesterin
Phenobarbital
Phenol
Phenoxybenzamine
Phenoxybenzamine
Hydrochloride
Phosgene
Phosphine
Phosphoric Acid
Phthalic Anhydride
p-Nitrosodiphenylamine
Polybrominated Biphenyls
Polychlorinated Biphenyls
Ponceau 3R
Ponceau MX
Potassium Bromate
Procarbazine
Procarbazine Hydrochloride
Propionaldehyde
Propyl Thiouracil
Propylene
Propylene Glycol Monomethyl Ether
Propylene oxide
Reserpine
Safrole
Silica (crystalline, respirable)
Sterigmatocystin
Streptozotocin
Styrene
Styrene oxide
Sulfallate
Sulfuric acid
technical Hexachlorocyclohexane (t-HCH)
Tetrachloroethylene
Tetrahydrofuran
Thioacetamide
Thiourea
Toluene
Toluene diisocyanate
Toxaphene
trans-2[(Dimethylamino)-methylimino]
Trichloroethylene
Triethylamine
Tris(1-aziridinyl)phosphine sulfide
Tris(2-3-dibromopropyl)phosphate
Trp-P-1 (Tryptophan-P-1)
Trp-P-2 (Tryptophan-P-2)
Urethane
Vinyl acetate
Vinyl bromide
Vinyl chloride
Xylenes

The Big Picture

How will this affect Pittsburgh businesses?

- ACHD retroactively reviewed 121 installation permits from the last three years
- 13 required an air toxic analysis
- 9 demonstrated attainment with simple models
- 2 demonstrated attainment with more complex models
- 2 used in-plant offsets

Step 1

Which pollutants in your installation permit application are air toxics?

This can be determined by checking the IRIS and Cal EPA databases – The Health Department expects to develop a list for convenience

An air toxic has a URF number or an RfC number

IRIS DATABASE

Cal-EPA
California Environmental Protection Agency

Step 2

Determine the potential emissions of each air toxic in lbs/yr or tons/yr

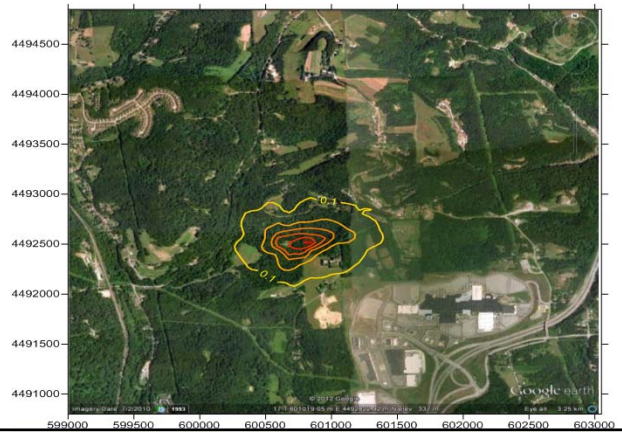
Step 3

Compare the potential emissions with Table 1 (air toxic *de minimis* levels)

Pollutant	De minimis level
Polychlorobiphenols	20 lbs. per year
Polycyclic Organic Matter	20 lbs. per year
Mercury	20 lbs. per year
Dioxins	0.020 lbs. per year
Furans	0.020 lbs. per year
Hazardous Air Pollutant Metals	20 lbs. per year (combined)
All Other Air Toxics	0.25 tons per year (combined)

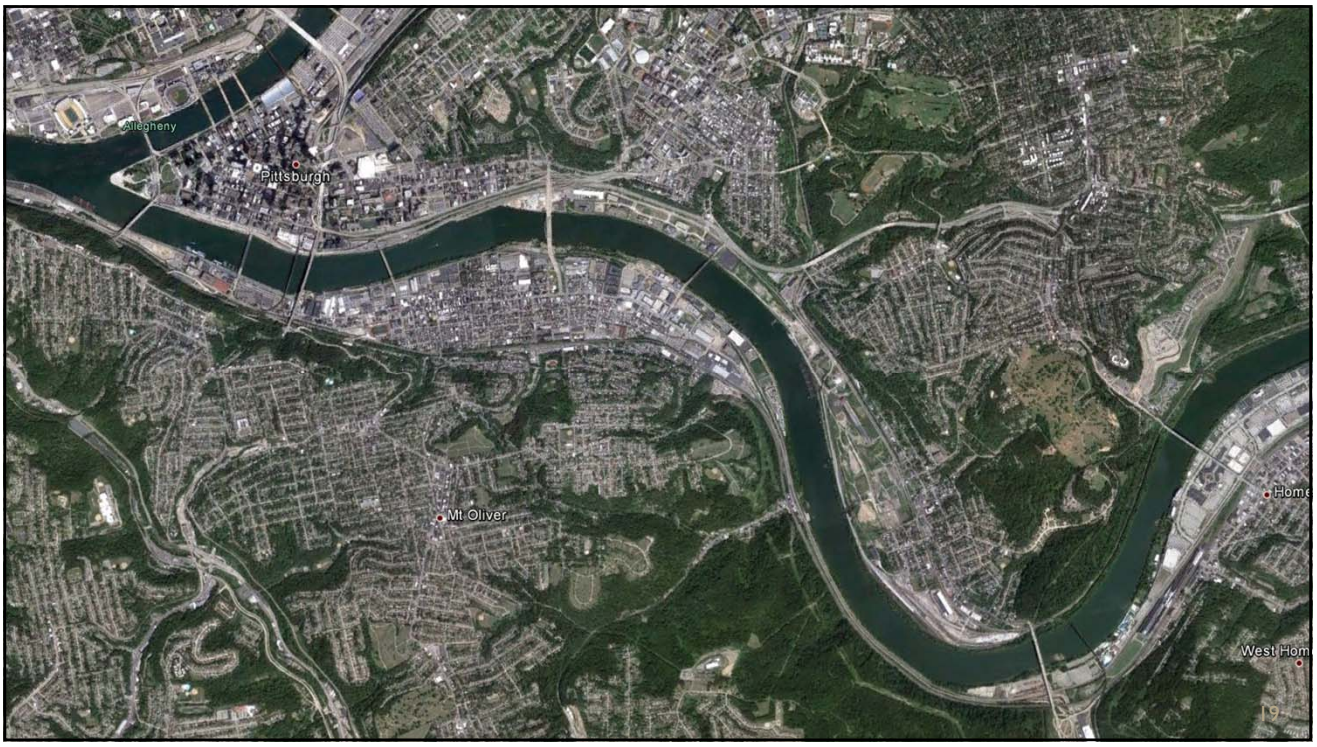
Step 4

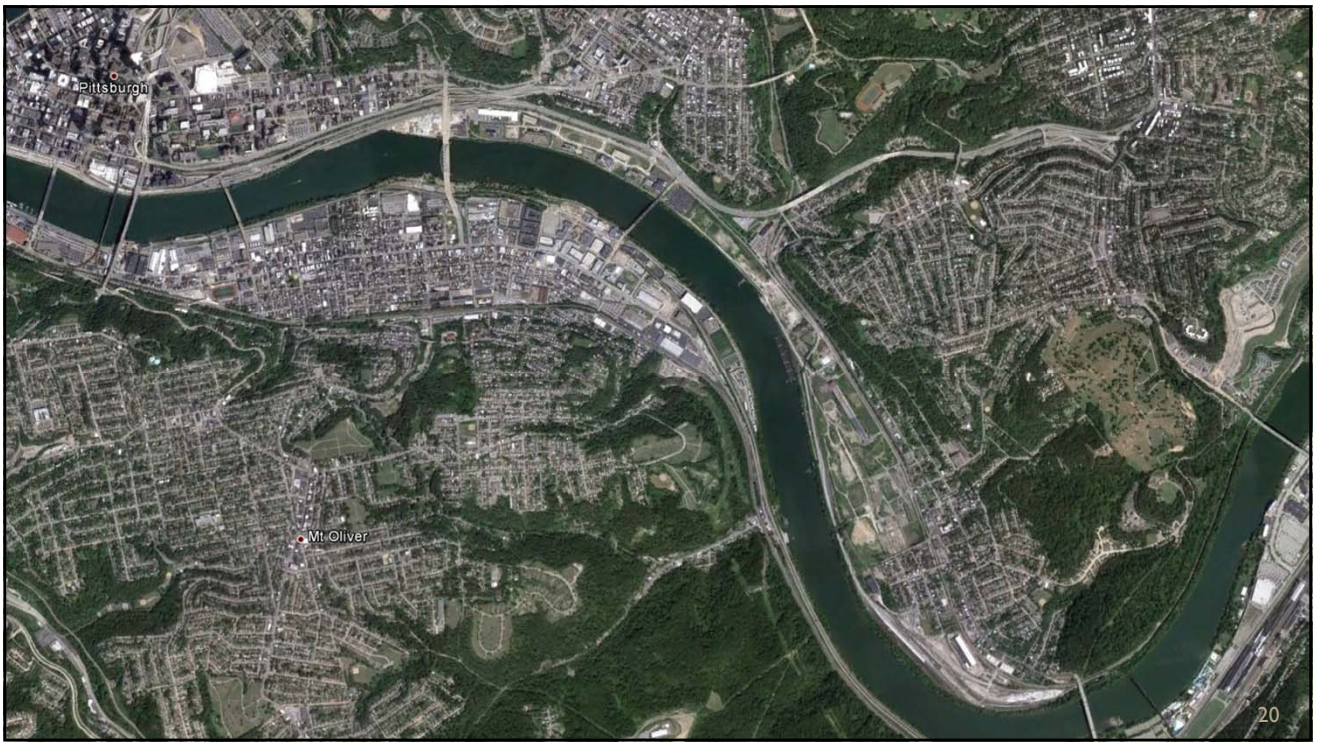
Use an air model to find the maximum ambient concentration at or beyond the "Public Exposure Boundary". Make sure to use the annual concentration

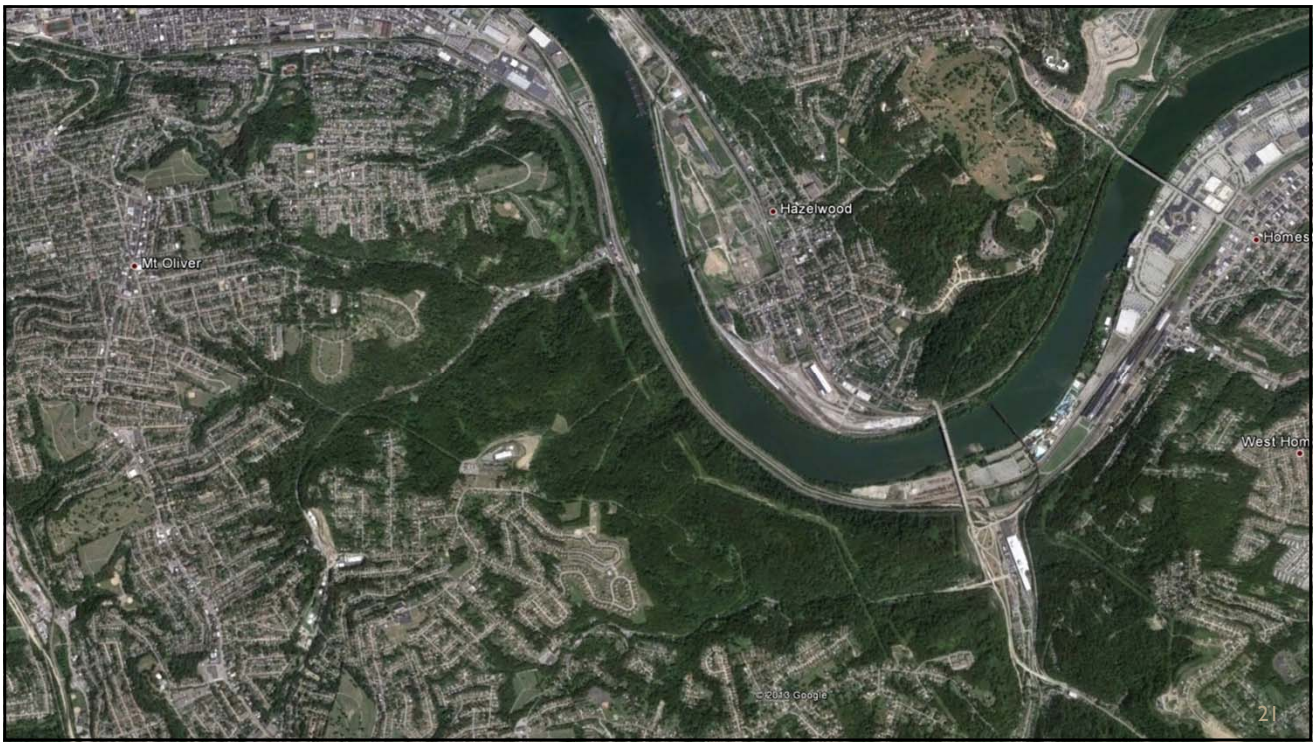


What is the Public Exposure Boundary?

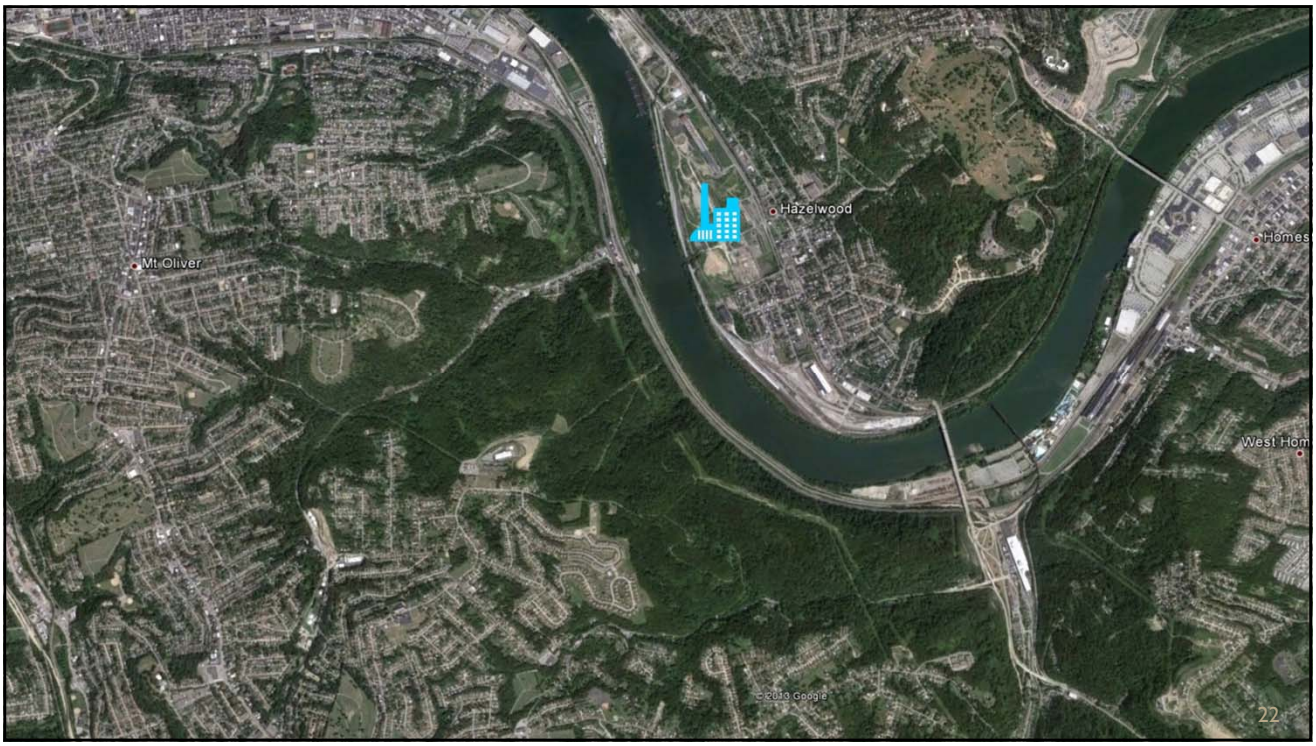
Nearest structure outside the applicant's property line occupied at least six hours per day for a minimum of 30 days per calendar year.


Allegheny
Pittsburgh
Mt Oliver
Home
West Hom
19

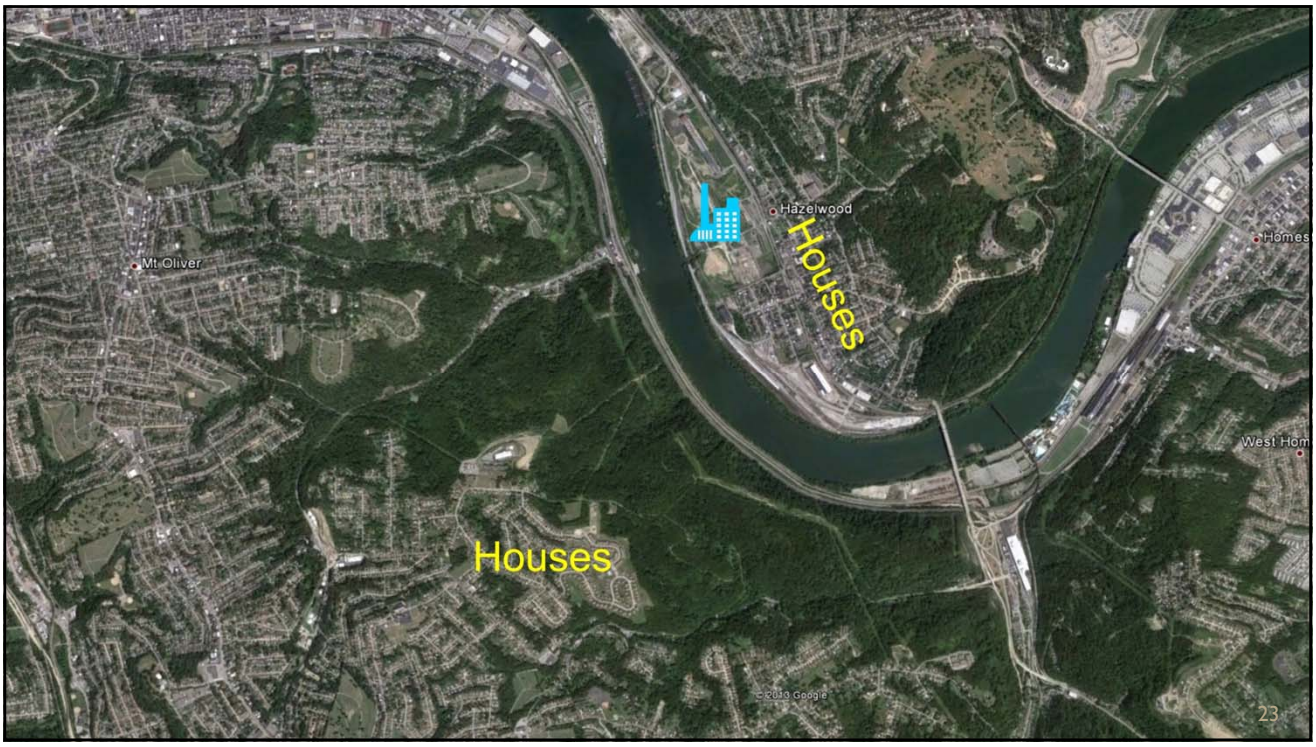

Pittsburgh
Mt Oliver
20

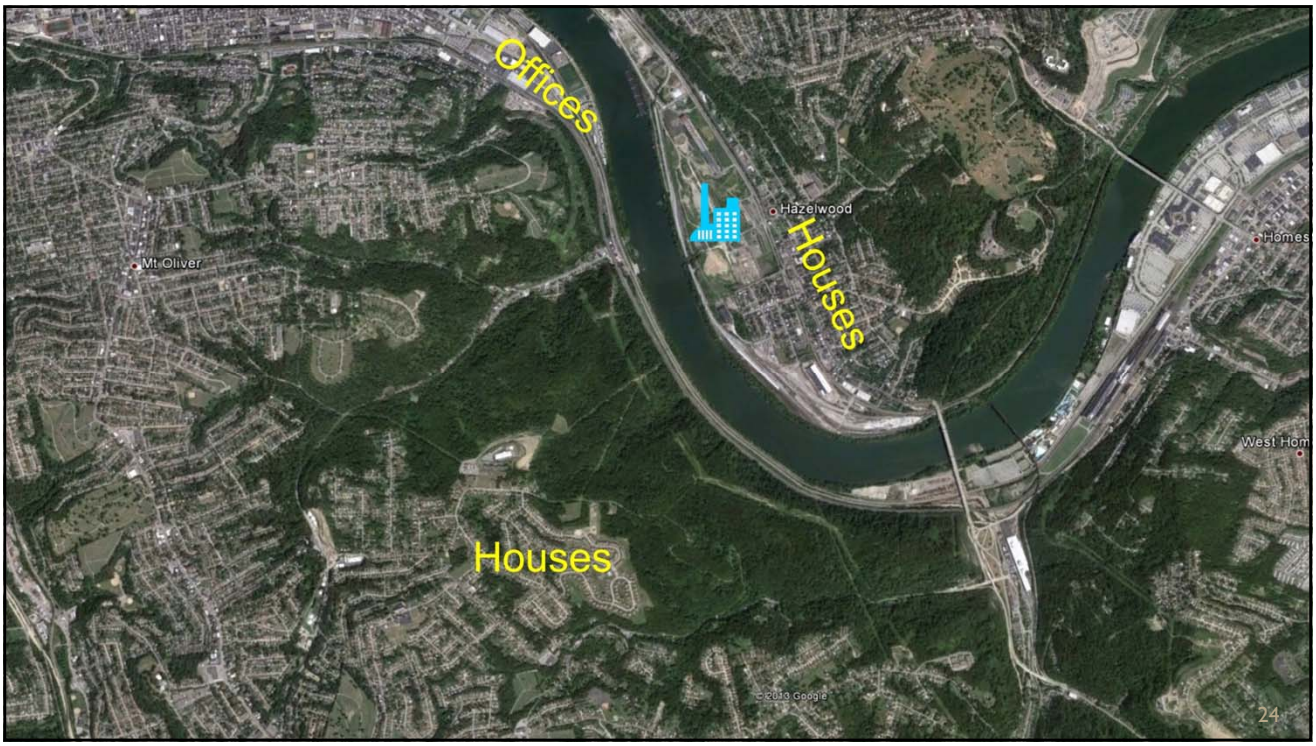

Hazelwood
Mt Oliver
Homes
West Hom
© 2013 Google

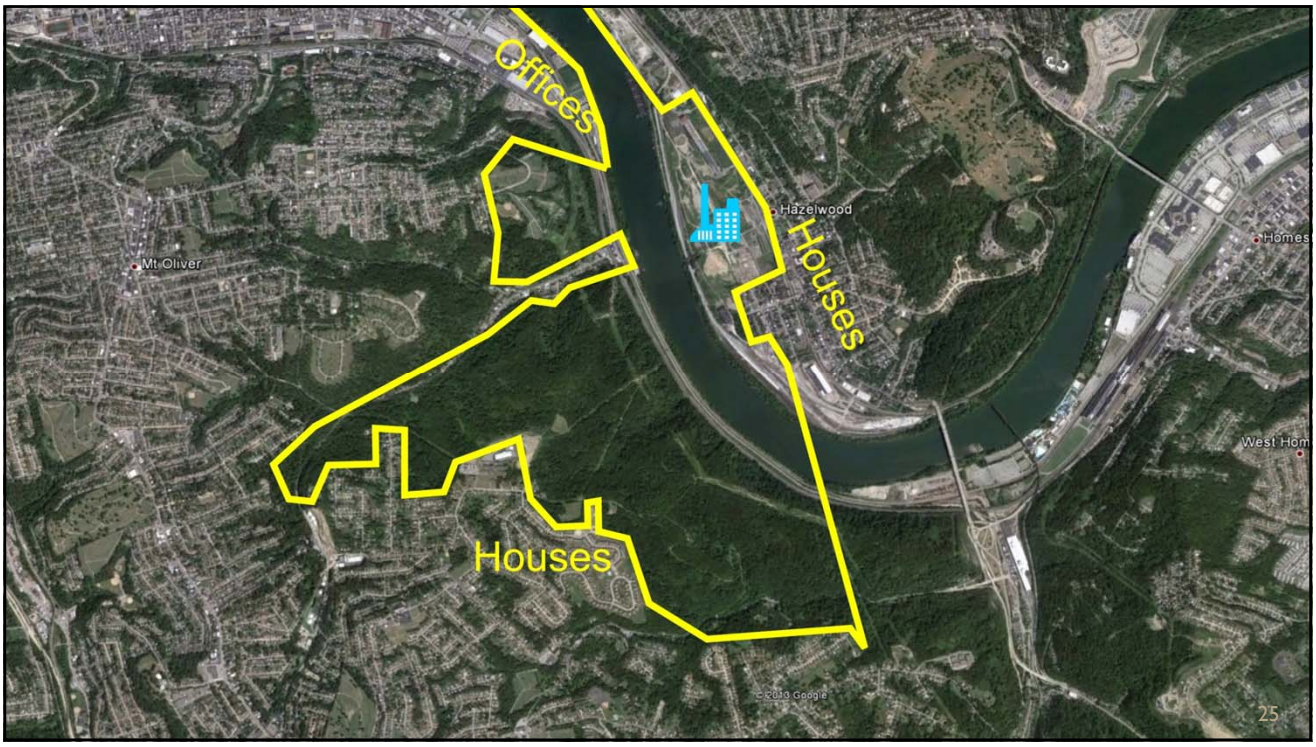
21


Hazelwood
Mt Oliver
Homes
West Hom
© 2013 Google

22


Mt Oliver
Hazelwood
Houses
Houses
© 2013 Google
23


Offices
Mt Oliver
Hazelwood
Houses
Houses
© 2013 Google
24



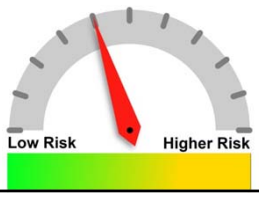
Step 5 (carcinogenic)

Use the maximum ambient concentration to calculate the Maximum Individual Carcinogenic Risk (MICR)

MICR = [URF (Risk/(μg/m^3)] x [maximum ambient impact concentration (μg/m^3)]

MICR – The probability of an individual developing cancer

URF - Unit Risk Factor – the lifetime cancer risk for exposure to a unit concentration of a chemical. This is a value determined for each chemical and can be found in the IRIS database. The value is a worst case and assumes a person is exposed to a particular concentration for 70 years



Step 6

- Add all of the MICRs together to calculate the Aggregated MICR ($MICR_A$)

$$MICR_A = MICR_1 + MICR_2 + MICR_3 + \ldots + MICR_n$$

Step 7

Determine further requirements based on the $MICR_A$

- No further assessment required ($MICR_A < 1 \times 10^{-5}$)
- Further emissions modeling, offsets, process changes, etc. ($MICR_A > 1 \times 10^{-5}$)
- Section VIII implemented, policy deviations may be approved by the director ($MICR_A > 1 \times 10^{-4}$)

Offsets

- Offsets are reductions in emissions that compensate for new emissions
- Offsets (reductions) must be maintained throughout the operating life of the IP sources
- Offsets are based on toxicity and location
  - Sources within the facility
  - Other sources in Allegheny County
  - Mobile Sources

Step 8 (non-carcinogenic)

- Calculate the Hazard Quotient for each air toxic

HQ = [maximum ambient impact concentration (µg/m^3)] / [RfC (µg/m^3)]

RfC = Reference Concentration – level of continuous inhalation exposure that is not likely to increase the risk of deleterious effects (µg/m^3). The value is a worst case and assumes a person is exposed to a particular concentration for 70 years.

Step 9

Calculate the sum of the HQs

$HI = HQ_1 + HQ_2 + HQ_3 + \ldots\ldots + HQ_n$ (for each organ system)

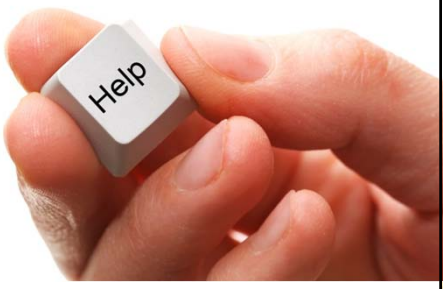
Organ systems include: Respiratory, Nervous, Development, etc.

Step 10

Determine further requirements based on the HQ and HI

(HQ≤1 and HI<2)	No further assessment required
Or	
(HQ>1 or HI>2)	Further emissions modeling, offsets available, the department may require additional actions

If you are confused



We are here to help you

Sandra Etzel
Chief Engineer Permitting
SEtzel@achd.net

The three presenters are also available to answer questions. During the application process, your permitting engineer can help you with air toxics questions.

Questions?

Anthony J. Sadar (asadar@achd.net)

EXAMPLE ATG MODELING

Modeling Options

V. EMISSIONS MODELING ANALYSIS

a. Selection of Models

At the applicant's discretion, any appropriate model, including but not limited to those listed in 40 CFR 51 Appendix W, may be used in the emissions modeling analysis required by this policy. At the applicant's discretion, it may use an appropriate screening or refined model. These models include but are not limited to:

SCREEN3	TSCREEN	RTDM3.2
AERSCREEN	COMPLEX1	CALPUFF
CTSCREEN	VALLEY	AERMOD

The Department will review the choice of model and model inputs to determine appropriateness and accuracy. The applicant will correct any deficiencies. Any appropriate and properly implemented model which produces results meeting the guidelines of Section IV will satisfy the requirements of this policy, the results of any other model notwithstanding.

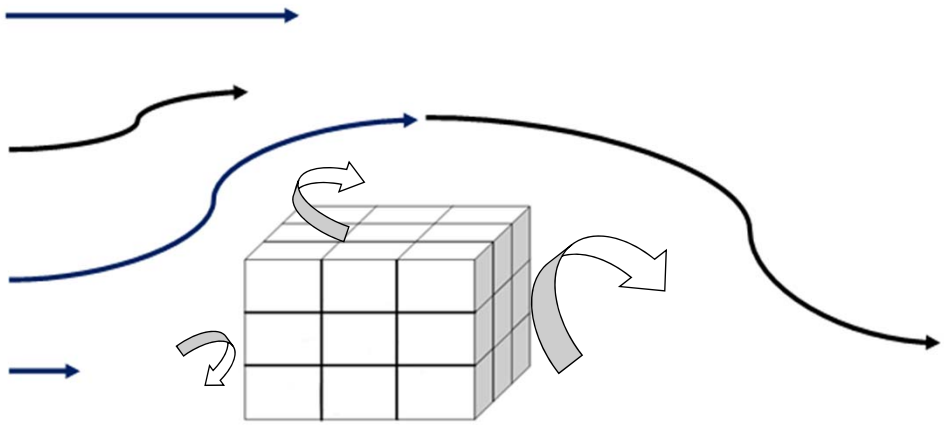
Modeling Options (Continued)

- AERSCREEN (Screening Version of AERMOD)
- AERMOD (American Meteorological Society / Environmental Protection Agency Regulatory Model)

AERSCREEN for Example No. 1

- **New Chemical Line** in Rural Area
  - Benzene emission rate of 0.09 tpy (0.0026 g/s)
  - Stack height of 30 ft (10.67 m)
  - Stack diameter of 20 in (0. 51 m)
  - Exit gas temperature equal to ambient conditions
  - Exit gas flow rate of 15 fps (4.57 m/s)
  - Stack distance to property line is 20 ft (6.10 m)
  - Stack located at northeast side and 70 ft (21.33 m) from center of building
  - Building dimensions of 26 ft high, 100 ft long, and 60 ft wide (7.92 m x 30.48 m x 18.29 m)
  - Building oriented 90° to north

Potential Downwash from Building



Potential Building Downwash (Continued)

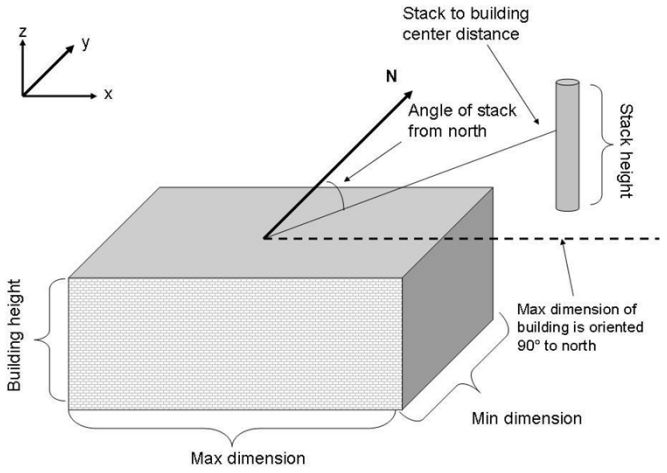


Figure 11. Stack and building orientation for a building oriented 90 degrees to north and stack oriented 45 degrees to north. (Source: *AERSCREEN User's Guide*, U.S.EPA, 3/2011, p. 20) www.epa.gov/scram001/models/screen/aerscreen_userguide.pdf

AERSCREEN Example (Continued)

```
AERSCREEN 11126 / AERMOD  1110                                  01/24/13
                                                                13:02:53

TITLE: NEWCHEMICALLINE


------------------------------------------------------------------------------
*****************************  STACK PARAMETERS  ****************************
------------------------------------------------------------------------------

SOURCE EMISSION RATE:          0.269E-02 g/s            0.214E-01 lb/hr
STACK HEIGHT:                       9.16 meters              30.05 feet
STACK INNER DIAMETER:              0.508 meters              20.00 inches
PLUME EXIT TEMPERATURE:           Ambient
PLUME EXIT VELOCITY:               4.572 m/s                15.00 ft/s
STACK AIR FLOW RATE:                1964 ACFM
STACK BASE LONGITUDE:            -80.1200 deg              574638. Easting
STACK BASE LATITUDE:              40.4350 deg             4476412. Northing
STACK BASE UTM ZONE:                                            17
REFERENCE DATUM (NADA):                                          4
STACK BASE ELEVATION:              348.90 meters            1144.69 feet
RURAL OR URBAN:                     RURAL

DIGITAL ELEVATION MAP(S)            NED_05150359.tif

INITIAL PROBE DISTANCE =           2000. meters              6562. feet


------------------------------------------------------------------------------
***********************  BUILDING DOWNWASH PARAMETERS  ***********************
------------------------------------------------------------------------------

BUILDING HEIGHT:                    7.9 meters               26.0 feet
MAX BUILDING DIMENSION:            30.5 meters              100.0 feet
MIN BUILDING DIMENSION:            18.3 meters               60.0 feet
BUILDING ORIENTATION TO NORTH:       90. degrees
STACK DIRECTION FROM CENTER:         45. degrees
STACK DISTANCE FROM CENTER:        21.3 meters               70.0 feet
```


AERSCREEN Example (Continued)

```
------------------------------------------------------------------------------
************************  AERSCREEN MAXIMUM IMPACT SUMMARY  ********************
------------------------------------------------------------------------------

                    MAXIMUM       SCALED       SCALED       SCALED       SCALED
                     1-HOUR       3-HOUR       8-HOUR      24-HOUR       ANNUAL
  CALCULATION          CONC         CONC         CONC         CONC         CONC
   PROCEDURE       (ug/m3)      (ug/m3)      (ug/m3)      (ug/m3)      (ug/m3)
---------------   ----------   ----------   ----------   ----------   ----------
ELEVATED TERRAIN    10.10        10.10        9.089        6.059        1.010

DISTANCE FROM SOURCE         120.00 meters directed toward 120 degrees
RECEPTOR HEIGHT       9.09 meters


IMPACT AT THE
AMBIENT BOUNDARY    3.670        3.670        3.303        2.202        0.3670

DISTANCE FROM SOURCE           6.10 meters directed toward 320 degrees
RECEPTOR HEIGHT       1.68 meters
```

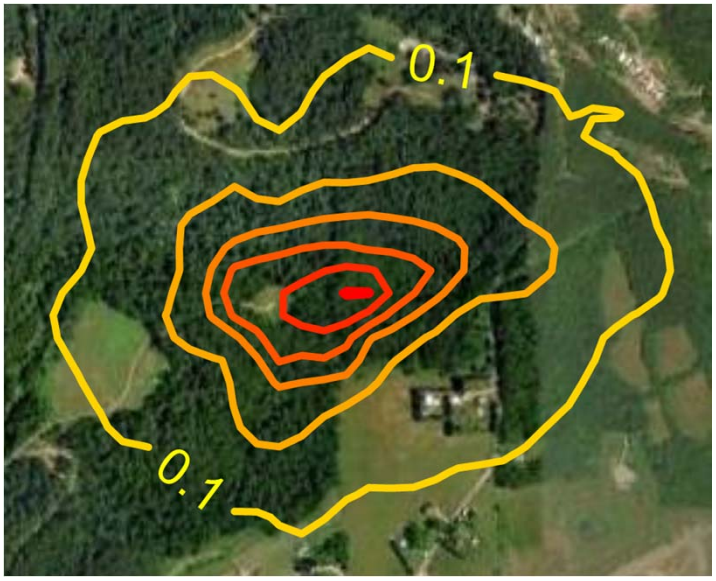
AERMOD for Example No. 3

- **Compressor Station (4 Engines)** in Rural Area
  - Formaldehyde emission rate per engine of 1.908 tpy (0.0549 g/s)
  - Stack height per engine of 20 ft (6.10 m)
  - Stack diameter per engine of 12 in (0. 305 m)
  - Exit gas temperature per engine of 1200 °F (922 K)
  - Exit gas flow rate per engine of 162.62 fps (49.56 m/s)
  - Stack distances to property line vary
  - Stack locations from center of building vary
  - Building dimensions of 33 ft high, 72 ft long, and 72 ft wide (10.06 m x 22.07 m x 22.07 m)
  - Building oriented 90° to north

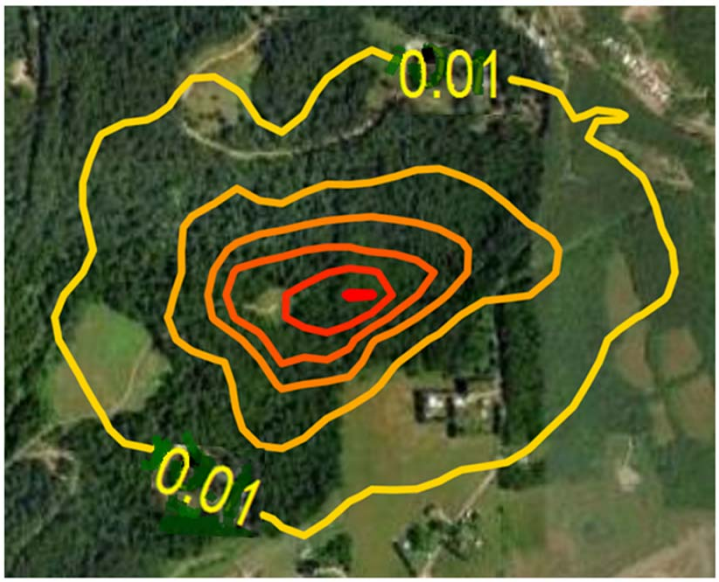
AERMOD Example (Continued)

- Why use AERMOD?
  - More detailed building simulation
  - Better building-induced downwash estimates
  - More-realistic meteorological data set
  - Multiple sources
  - Isopleth outputs for better analysis of impacts

AERMOD Example (Continued)



AERMOD Example (Continued)



QUESTIONS?

David D. Good (dgood@achd.net)

EXAMPLE AIR TOXICS REVIEWS

Use the 10-Step Guide to Quantify Desired Output

1. **Emission Rate >>>**
   1. Calculate emission for ALL air toxics.
   2. Compare to the *de minimis* table.

Calculate ALL Air Toxics:

Table 3.4-3. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (lb/MMBtu) (fuel input)
Benzene[b]	7.76 E-04
Toluene[b]	2.81 E-04
Xylenes[b]	1.93 E-04
Propylene	2.79 E-03
Formaldehyde[b]	7.89 E-05
Acetaldehyde[b]	2.52 E-05
Acrolein[b]	7.88 E-06

Table 3.4-4. PAH EMISSION FACTORS FOR LARGE UNCONTROLLED STATIONARY DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

PAH	Emission Factor (lb/MMBtu) (fuel input)
Naphthalene[b]	1.30 E-04
Acenaphthylene	9.23 E-06
Acenaphthene	4.68 E-06
Fluorene	1.28 E-05
Phenanthrene	4.08 E-05
Anthracene	1.23 E-06
Fluoranthene	4.03 E-06
Pyrene	3.71 E-06
Benz(a)anthracene	6.22 E-07
Chrysene	1.53 E-06
Benzo(b)fluoranthene	1.11 E-06
Benzo(k)fluoranthene	<2.18 E-07
Benzo(a)pyrene	<2.57 E-07
Indeno(1,2,3-cd)pyrene	<4.14 E-07
Dibenz(a,h)anthracene	<3.46 E-07
Benzo(g,h,I)perylene	<5.56 E-07
TOTAL PAH	<2.12 E-04

If De Minimis Thresholds Are Exceeded…

1. Quantify cancer risk >>> **$MICR_A$**
2. Quantify non-cancer hazard >>> **HQ/HI**

Example No. 1

Installation = New chemical line

Size = 1 ton/hour of product

Operating hours = 8,760 hours/year

Example No. 1 - Steps 1 & 2

Steps 1 & 2 - Determine which pollutants emitted from the proposed Installation Permit (IP) are classified as air toxics and determine the annual potential emissions of each individual air toxic:

	Toluene	Benzene	Xylene	Ethylbenzene	Total
Emission Rate (tpy)	9.15	0.09	4.58	0.05	**13.86**

Example No. 1 – Step 3

Pollutant	*De minimis* level	IP Emissions Increase
Polychlorobiphenols	20 lbs. per year	N/A
Polycyclic Organic Matter	20 lbs. per year	N/A
Mercury	20 lbs. per year	N/A
Dioxins	0.020 lbs. per year	N/A
Furans	0.020 lbs. per year	N/A
Hazardous Air Pollutant Metals	20 lbs. per year (combined)	N/A
All Other Air Toxics	0.25 tons per year (combined)	**13.86 tons per year**

Result – Air toxics emissions are above *de minimis* level thresholds. Proceed to Step No. 4.

Example No. 1 – Step 4

Step 4 - Determine the annual average of the maximum ambient impact concentration for each air toxic at or beyond the "public exposure boundary" in terms of micrograms per cubic meter ($\mu g/m^3$):

	Toluene	Benzene	Xylene	Ethylbenzene
Emission Rate (tpy)	9.15	0.09	4.58	0.05
Model Result ($\mu g/m^3$)	**101**	**1.01**	**50.5**	**0.51**

Example No. 1 – Step 4 (Continued)

```
---------------------------------------------------------------------------
********************  AERSCREEN MAXIMUM IMPACT SUMMARY  ********************
---------------------------------------------------------------------------

                    MAXIMUM       SCALED       SCALED       SCALED       SCALED
                     1-HOUR       3-HOUR       8-HOUR      24-HOUR       ANNUAL
  CALCULATION          CONC         CONC         CONC         CONC         CONC
   PROCEDURE         (ug/m3)      (ug/m3)      (ug/m3)      (ug/m3)      (ug/m3)
---------------    ----------   ----------   ----------   ----------   ----------
ELEVATED TERRAIN    10.10        10.10        9.089        6.059        1.010

DISTANCE FROM SOURCE        120.00 meters directed toward 120 degrees
RECEPTOR HEIGHT      9.09 meters


IMPACT AT THE
AMBIENT BOUNDARY    3.670        3.670        3.303        2.202        0.3670

DISTANCE FROM SOURCE          6.10 meters directed toward 320 degrees
RECEPTOR HEIGHT      1.68 meters
```

Example No. 1 – Steps 5 & 6

Steps 5 & 6 - For each air toxic that is a known or possible carcinogen, use the maximum ambient impact concentration determined in Step No. 4 to calculate the Maximum Individual Carcinogenic Risk (MICR) and Aggregated MICR ($MICR_A$):

MICR = [URF $(\mu g/m^3)^{-1}$] x [maximum ambient impact concentration $(\mu g/m^3)$]

MICR (Benzene) *= [5.00E-06 $(\mu g/m^3)^{-1}$] x [1.01 $(\mu g/m^3)$]* = ***5.05E-06***

	Toluene	Benzene	Xylene	Ethylbenzene	Total
Emission Rate (tpy)	9.15	0.09	4.58	0.05	
Model Result ($\mu g/m^3$)	101	1.01	50.5	0.51	
URF $(\mu g/m^3)^{-1}$		5.00E-06		2.50E-06	
MICR		5.05E-06		1.26E-06	
$MICR_A$					**6.31E-06**

Example No. 1 – Step 7

Step 7 – The $MICR_A$ is 6.31×10^{-6}, which is less than 1×10^{-5}. No further assessment of carcinogenic effects will be required. Proceed to Step No. 8.

Example No. 1 – Step 8

Step 8 - Calculate the Hazard Quotient (HQ) for each air toxic with known or possible non-carcinogenic health effects using the maximum annual ambient impact determined in Step No. 4:

HQ = [maximum ambient impact concentration ($\mu g/m^3$)] / [RfC ($\mu g/m^3$)]

HQ (Xylene)** = [50.5 ($\mu g/m^3$)] / [1.00E+02($\mu g/m^3$)] = **5.05E-01

	Toluene	Benzene	Xylene	Ethylbenzene
Emission Rate (tpy)	9.15	0.09	4.58	0.05
Model Result ($\mu g/m^3$)	101	1.01	50.5	0.51
RfC ($\mu g/m^3$)	5.00E+03	3.00E+01	1.00E+02	1.00E+03
HQ	**2.02E-02**	**3.37E-02**	**5.05E-01**	**5.05E-04**

Example No. 1 – Step 9

Step 9 – Identify which air toxics affect the same target organ or organ system to determine the cumulative Hazard Index (HI) for the proposed IP:

Chemical	Target organ (system)
Toluene	nervous system; respiratory system; development
Benzene	hematopoietic system; development; nervous system
Xylene	nervous system; respiratory system
Ethylbenzene	development; alimentary system(liver); kidney; endocrine system

Example No. 1 – Step 9 (continued)

Step 9 - Add each HQ that affects the same target organ or organ system to determine the cumulative Hazard Index (HI) for the proposed IP:

HI (Nervous System) = *[2.02E-02] + [3.37E-02] + [5.05E-01]* = ***5.59E-01***

	Toluene	Benzene	Xylene	Ethylbenzene	HI
Emission Rate (tpy)	9.15	0.09	4.58	0.05	
Model Result (µg/m^3)	101	1.01	50.5	0.51	
RfC (µg/m^3)	5.00E+03	3.00E+01	1.00E+02	1.00E+03	
HQ	2.02E-02	3.37E-02	5.05E-01	5.05E-04	
HQ (Development)	2.02E-02	3.37E-02		5.05E-04	**5.44E-02**
HQ (Nervous System)	2.02E-02	3.37E-02	5.05E-01		**5.59E-01**

Example No. 1 – Step 10

Step 10 – The HQ for each air toxic is less than 1.0 and the HI is less than 2.0. No further assessment of non-carcinogenic effects will be required. The Air Toxics Review is complete.

Example No. 1 - Summary

Installation = New Chemical Line

Air Toxics = Above *de minimis* thresholds, but below $MICR_A$ and HI/HQ thresholds.

Result = The Air Toxics Review is complete and the Installation Permit Application will be processed accordingly.

Some Terminology

What does $MICR_A = 6.31 \times 10^{-6}$ mean?!?

$1/(6.31 \times 10^{-6})$ = One (1) additional incidence of cancer per 158,479 persons.

What does HQ = 0.5 mean?!?

0.5 = Ratio of the chronic exposure level to the Reference Concentration (RfC).

Example No. 2

Installation = New Petroleum Loading Rack + 3 tanks
Size = 1.3 MGD Gasoline Throughput
Operating hours = 8,760 hours/year

Example No. 2 - Steps 1 & 2

Steps 1 & 2 - Determine which pollutants emitted from the proposed Installation Permit (IP) are classified as air toxics and determine the annual potential emissions of each individual air toxic:

	Toluene	Benzene	Xylene	Ethylbenzene	Cumene	MTBE	n-Hexane	Total
Emission Rate (tpy)	0.72	0.24	2.40	0.35	0.02	2.04	0.44	**6.21**

Stack Emissions = 3.85 tons/year
Fugitive Emissions = 2.36 tons/year

Example No. 2 – Step 3

Pollutant	*De minimis* level	IP Emissions Increase
Polychlorobiphenols	20 lbs. per year	N/A
Polycyclic Organic Matter	20 lbs. per year	N/A
Mercury	20 lbs. per year	N/A
Dioxins	0.020 lbs. per year	N/A
Furans	0.020 lbs. per year	N/A
Hazardous Air Pollutant Metals	20 lbs. per year (combined)	N/A
All Other Air Toxics	0.25 tons per year (combined)	**6.21 tons per year**

Result – Air toxics emissions are above *de minimis* level thresholds. Proceed to Step No. 4.

Example No. 2 – Step 4

Step 4 - Determine the annual average of the maximum ambient impact concentration for each air toxic at or beyond the "public exposure boundary" in terms of micrograms per cubic meter ($\mu g/m^3$):

	Toluene	Benzene	Xylene	Ethylbenzene	Cumene	MTBE	n-Hexane
Emission Rate (tpy)	0.72	0.24	2.40	0.35	0.02	2.04	0.44
Model Result ($\mu g/m^3$)	**4.50**	**1.50**	**15.00**	**2.19**	**0.13**	**12.75**	**2.75**

Example No. 2 – Steps 5 & 6

Steps 5 & 6 - For each air toxic that is a known or possible carcinogen, use the maximum ambient impact concentration determined in Step No. 4 to calculate the Maximum Individual Carcinogenic Risk (MICR) and Aggregated MICR ($MICR_A$):

MICR = [URF ($\mu g/m^3$)$^{-1}$] x [maximum ambient impact concentration ($\mu g/m^3$)]

MICR (Ethylbenzene) *= [2.50E-06 ($\mu g/m^3$)$^{-1}$] x [2.19 ($\mu g/m^3$)]* = ***5.47E-06***

	Benzene	Ethylbenzene	MTBE	Total
Emission Rate (tpy)	0.24	0.35	2.04	
Model Result ($\mu g/m^3$)	1.50	2.19	12.75	
URF ($\mu g/m^3$)$^{-1}$	5.00E-06	2.50E-06	2.60E-07	
MICR	**7.50E-06**	**5.47E-06**	**3.32E-06**	
$MICR_A$				**1.63E-05**

Example No. 2 – Step 7

Step 7 – The $MICR_A$ is 1.63 x 10^{-5}, which is greater than 1 x 10^{-5}. Facility has elected to remove one (1) tank onsite and two (2) tanks offsite. Calculate emission offsets (Offsets) in accordance with Section VII of the Policy.

	Facility Reductions (tpy)	Required Offset Ratio	Other County Reductions (tpy)	Required Offset Ratio	Total EmissionsReduction
Benzene	0.06	1.00	0.11	1.15	0.16

(Total Emissions Reduction) = (Facility Reductions)/(1.0) + (Other County Reductions)/(1.15)

Benzene Emissions Reduction *= (0.06 tpy)/(1.0) + (0.11 tpy)/(1.15)* = ***0.16 tpy***

Example No. 2 – Step 7 (continued)

Step 7 – Calculate Offsets in accordance with Section VII of the Policy.

(Total Emissions Reduction) = (Facility Reductions)/(1.0) + (Other County Reductions)/(1.15)

	Toluene	Benzene	Xylene	Ethylbenzene	Cumene	MTBE	n-Hexane	Total
Facility Reductions (tpy)	0.06	0.06	0.04	0.01	0.00	0.44	0.08	0.68
Required Offset Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Other County Reductions (tpy)	0.11	0.11	0.07	0.01	0.00	0.88	0.16	1.36
Required Offset Ratio	1.15	1.15	1.15	1.15	1.15	1.15	1.15	
Total Emission Reduction (tpy)	**0.16**	**0.16**	**0.10**	**0.02**	**0.00**	**1.20**	**0.22**	**1.86**

Example No. 2 – Step 7 (continued)

Step 7 – Run an air dispersion model with Offsets to calculate MICR reductions.

	Benzene	Ethylbenzene	MTBE	Total
Old Model Result ($\mu g/m^3$)	1.50	2.19	12.75	
New Offset Reductions ($\mu g/m^3$)	**0.98**	**0.12**	**7.52**	
New Max Ambient Impact ($\mu g/m^3$)	0.52	2.07	5.23	
URF $(\mu g/m^3)^{-1}$	5.00E-06	2.50E-06	2.60E-07	
MICR	2.62E-06	5.17E-06	1.36E-06	
$MICR_A$				**9.15E-06**

[New Max Ambient Impact ($\mu g/m^3$)*] = [Old Model Result* ($\mu g/m^3$)*] – [New Offset Reductions* ($\mu g/m^3$)*]*

New Ethylbenzene **($\mu g/m^3$)** = *[2.19* ($\mu g/m^3$)*]* – *[0.12* ($\mu g/m^3$)*]* = **2.07 ($\mu g/m^3$)**

New Ethylbenzene MICR= *[2.50E-06 ($\mu g/m^3)^{-1}$] x [2.07 ($\mu g/m^3$)]* = ***5.17E-06***

Example No. 2 – Step 7 (continued)

Step 7 – The $MICR_A$ is now 9.15×10^{-6} after applying offsets, which is less than 1×10^{-5}. See Section VII of the Policy as to how the Offsets are to be made legally binding. Proceed to Step No. 8.

Example No. 2 – Step 8

Step 8 - Calculate the Hazard Quotient (HQ) for each air toxic with known or possible non-carcinogenic health effects using the maximum annual ambient impact determined in Step No. 4:

HQ = [maximum ambient impact concentration ($\mu g/m^3$)] / [RfC ($\mu g/m^3$)]

HQ (Toluene)** = [4.5 ($\mu g/m^3$)] / [5.00E+03($\mu g/m^3$)] = **9.00E-04

	Toluene	Benzene	Xylene	Ethylbenzene	Cumene	MTBE	n-Hexane
Emission Rate (tpy)	0.72	0.24	2.40	0.35	0.02	2.04	0.44
Model Result ($\mu g/m^3$)	4.50	1.50	15.00	2.19	0.13	12.75	2.75
RfC ($\mu g/m^3$)	5.00E+03	3.00E+01	1.00E+02	1.00E+03	4.00E+02	3.00E+03	7.00E+02
HQ	**9.00E-04**	**5.00E-02**	**1.50E-01**	**2.19E-03**	**3.13E-04**	**4.25E-03**	**3.93E-03**

Example No. 2 – Step 9

Step 9 – Identify which air toxics affect the same target organ or organ system to determine the cumulative Hazard Index (HI) for the proposed IP:

Chemical	Target organ (system)
Toluene	nervous system; respiratory system; development
Benzene	hematopoietic system; development; nervous system
Xylene	nervous system; respiratory system
Ethylbenzene	development; alimentary system(liver); kidney; endocrine system
Cumene	kidney
MTBE	kidney; eyes; ailment system
n-Hexane	nervous system

Example No. 2 – Step 9 (continued)

Step 9 - Add each HQ that affects the same target organ or organ system to determine the cumulative Hazard Index (HI) for the proposed IP:

HI (Development) = *[9.00E-04] + [5.00E-02] + [2.19E-03]* = ***5.31E-02***

	Toluene	Benzene	Xylene	Ethylbenzene	n-Hexane	HI
Emission Rate (tpy)	0.72	0.24	2.40	0.35	0.44	
Model Result (µg/m^3)	4.50	1.50	15.00	2.19	2.75	
RfC (µg/m^3)	5.00E+03	3.00E+01	1.00E+02	1.00E+03	7.00E+02	
HQ	9.00E-04	5.00E-02	1.50E-01	2.19E-03	3.93E-03	
HQ (Development)	**9.00E-04**	**5.00E-02**		**2.19E-03**		**5.31E-02**
HQ (Nervous System)	**9.00E-04**	**5.00E-02**	**1.50E-01**		**3.93E-03**	**2.05E-01**

Example No. 2 – Step 10

Step 10 - The HQ for each air toxic is less than 1.0 and the HI is less than 2.0. Because Offsets were applied from Step No. 7, they shall be applied here as well. Run a model with Offsets to calculate HQ and HI reductions.

[New Max Ambient Impact (µg/m³)] = *[Old Model Result* (µg/m³)] – *[New Offset Reductions* (µg/m³)]

***New Benzene* (µg/m³)** = *[1.5* (µg/m³)] – *[0.98* (µg/m³)] = ***0.52* (µg/m³)**

[New HQ] = *[New Model Result* (µg/m³)] / *[RfC* (µg/m³)]

New Benzene HQ = *[0.52 (µg/m³)⁻¹]* / *[3.00E+01 (µg/m³)]* = ***1.75E-02***

Example No. 2 – Step 10 (continued)

Step 10 – Use the Offset reductions to calculate new HQ and HI:

	Toluene	Benzene	Xylene	Ethylbenzene	n-Hexane	HI
Old Model Result (µg/m³)	4.5	1.5	15	2.19	2.75	
New Offset Reductions (µg/m³)	0.98	0.98	0.60	0.12	1.40	
New Model Result (µg/m³)	3.52	0.52	14.40	2.07	1.35	
RfC (µg/m³)	5.00E+03	3.00E+01	1.00E+02	1.00E+03	7.00E+02	
HQ	7.05E-04	1.75E-02	1.44E-01	2.07E-03	1.92E-03	
HQ (Development)	7.05E-04	1.75E-02		2.07E-03		**2.02E-02**
HQ (Nervous System)	7.05E-04	1.75E-02	1.44E-01		1.92E-03	**1.64E-01**

Example No. 2 – Step 10 (continued)

Step 10 - The HQ for each air toxic is less than 1.0 and the HI is less than 2.0. See Section VII of the Policy as to how the Offsets are to be made legally binding. The Air Toxics Review is complete.

Example No. 2 - Summary

Installation = New Petroleum Loading Rack + 3 Tanks

Air Toxics = Above *de minimis* thresholds and above the $MICR_A$ threshold.

Modifications = Offsets were applied by removing tanks onsite and offsite (within Allegheny County).

Result = Net result reduced the Air Toxics to below the $MICR_A$ threshold. The Offsets will be enforced through permit conditions. The Air Toxics Review is complete and the Installation Permit will be processed accordingly

Example No. 3

Installation = New Compressor Station (Four (4) Natural Gas-Fired Engines)

Size = 870 hp (each); 7.17 mmBTU/hr (each)

Operating hours = 8,760 hours/year

Example No. 3 - Steps 1 & 2

Steps 1 & 2 - Determine which pollutants emitted from the proposed Installation Permit (IP) are classified as air toxics and determine the annual potential emissions of each individual air toxic:

Formaldehyde (lb/hr) = [Emission Factor] x [Heat Input] x [No. of Engines]

Formaldehyde (tpy) = [Formaldehyde (lb/hr)] x [1 ton/2000 lbs] x [8760 hours/yr]

Example No. 3 – Steps 1 & 2 (continued)

		4-Engines
	lb/MMBtu	(Total tpy)
1,1,2,2-Tetrachloroethane	0.00004	0.0058
1,1,2-Trichloroethane	0.0000318	0.0046
1,1-Dichloroethane	0.0000236	0.0034
1,2-Dichloroethane	0.0000236	0.0034
1,2-Dichloropropane	0.0000269	0.0039
1,3-Butadiene	0.000267	0.0386
1,3-Dichloropropene	0.0000264	0.0038
Acetaldehyde	0.00836	1.2084
Acrolein	0.00514	0.7429
Benzene	0.00044	0.0636
Benzo(b)fluoranthene	1.66E-07	0.0000
Carbon Tetrachloride	0.0000367	0.0053
Chlorobenzene	0.0000304	0.0044
Chloroform	0.0000285	0.0041

Example No. 3 – Steps 1 & 2 (continued)

		4-Engines
	lb/MMBtu	(Total tpy)
Chrysene	6.93E-07	0.0001
Ethylbenzene	0.0000397	0.0057
Formaldehyde	0.0528	7.6317
Methanol	0.0025	0.3614
Methylene Chloride	0.00002	0.0029
n-Hexane	0.00111	0.1604
Naphthalene	0.0000744	0.0108
PAH	0.0000269	0.0039
Phenol	0.000024	0.0035
Styrene	0.0000236	0.0034
Toluene	0.000408	0.0590
Vinyl Chloride	0.0000149	0.0022
Xylene	0.000184	0.0266
Total		**10.36**

Example No. 3 – Step 3

Pollutant	*De minimis* level	IP Emissions Increase
Polychlorobiphenols	20 lbs. per year	N/A
Polycyclic Organic Matter	20 lbs. per year	7.78 lbs per year
Mercury	20 lbs. per year	N/A
Dioxins	0.020 lbs. per year	N/A
Furans	0.020 lbs. per year	N/A
Hazardous Air Pollutant Metals	20 lbs. per year (combined)	N/A
All Other Air Toxics	0.25 tons per year (combined)	**10.36 tons per year**

Result – Air toxics emissions are above *de minimis* level thresholds. Proceed to Step No. 4.

Example No. 3 – Step 4

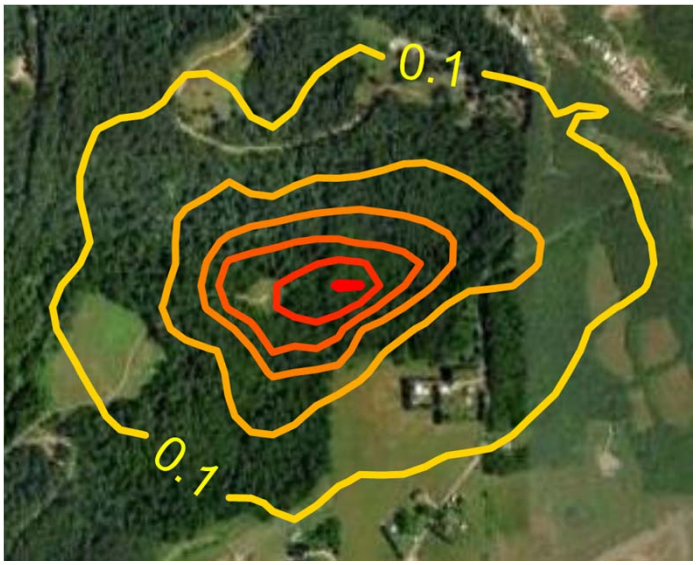
Step 4 - Determine the annual average of the maximum ambient impact concentration for each air toxic at or beyond the "public exposure boundary" in terms of micrograms per cubic meter ($\mu g/m^3$):

	Model ($\mu g/m^3$)
1,1,2,2-Tetrachloroethane	0.00142
1,1,2-Trichloroethane	0.00113
1,1-Dichloroethane	0.00084
1,2-Dichloroethane	0.00084
1,2-Dichloropropane	0.00096
1,3-Butadiene	0.00949
1,3-Dichloropropene	0.00094
Acetaldehyde	0.29726
Acrolein	0.18277

	Model ($\mu g/m^3$)
Benzene	0.01565
Benzo(b)fluoranthene	0.00001
Carbon Tetrachloride	0.00130
Chlorobenzene	0.00108
Chloroform	0.00101
Chrysene	0.00002
Ethylbenzene	0.00141
Formaldehyde	1.87744
Methanol	0.08889

	Model ($\mu g/m^3$)
Methylene Chloride	0.00071
n-Hexane	0.03947
Naphthalene	0.00265
PAH	0.00096
Phenol	0.00085
Styrene	0.00084
Toluene	0.01451
Vinyl Chloride	0.00053
Xylene	0.00654

Example No. 3 – Step 4 (continued)



Example No. 3 – Steps 5 & 6

Steps 5 & 6 - *MICR = [URF ($\mu g/m^3$)$^{-1}$] x [maximum ambient impact concentration ($\mu g/m^3$)]*

	Model	URF	MICR
	($\mu g/m^3$)	($\mu g/m^3$)$^{-1}$	
1,1,2,2-Tetrachloroethane	0.00142	5.80E-05	8.25E-08
1,1,2-Trichloroethane	0.00113	1.60E-05	1.81E-08
1,1-Dichloroethane	0.00084	1.60E-06	1.34E-09
1,2-Dichloroethane	0.00084	2.10E-05	1.76E-08
1,2-Dichloropropane	0.00096	1.00E-05	9.56E-09
1,3-Butadiene	0.00949	3.00E-05	2.85E-07
1,3-Dichloropropene	0.00094	4.00E-06	3.75E-09
Acetaldehyde	0.29726	2.70E-06	8.03E-07
Benzene	0.01565	5.00E-06	7.82E-08
Benzo(b)fluoranthene	0.00001	1.10E-04	6.49E-10

	Model	URF	MICR
	($\mu g/m^3$)	($\mu g/m^3$)$^{-1}$	
Carbon Tetrachloride	0.00130	6.00E-06	7.83E-09
Chloroform	0.00101	2.30E-05	2.33E-08
Chrysene	0.00002	1.10E-05	2.71E-10
Ethylbenzene	0.00141	2.50E-06	3.53E-09
Formaldehyde	1.87744	1.30E-05	**2.44E-05**
Methylene Chloride	0.00071	1.00E-06	7.11E-10
Naphthalene	0.00265	3.40E-05	8.99E-08
Vinyl Chloride	0.00053	6.60E-06	3.50E-09
$MICR_A$			**2.58E-05**

Example No. 3 – Step 7

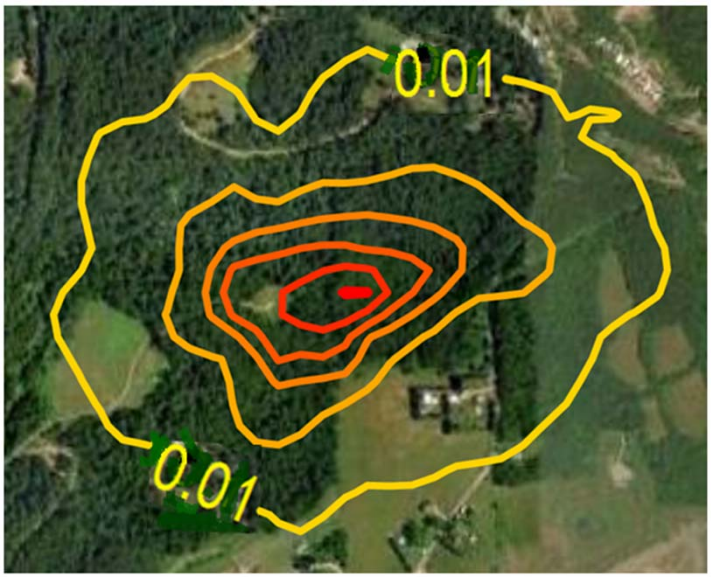
Step 7 – The $MICR_A$ is 2.58×10^{-5}, which is greater than 1×10^{-5}. No Offsets available. Use process changes to reduce air toxics emissions.

Example No. 3 – Step 7 (continued)

Step 7 – The facility has elected to install an oxidation catalyst on each engine that is capable of reducing all HAPs by 87.3%. The facility has also elected to increase stack height from 20ft to 40ft.

Re-run the air dispersion model with emission reductions and the new stack heights.

Example No. 3 – Step 7 (continued)



Example No. 3 – Step 7 (continued)

Step 7 – Use the results of the model to calculate the new MICR and $MICR_A$.

Pollutant	Model	URF	MICR
	(µg/m³)	(µg/m³)$^{-1}$	
1,1,2,2-Tetrachloroethane	0.00014	5.80E-05	8.30E-09
1,1,2-Trichloroethane	0.00011	1.60E-05	1.82E-09
1,1-Dichloroethane	0.00008	1.60E-06	1.35E-10
1,2-Dichloroethane	0.00008	2.10E-05	1.77E-09
1,2-Dichloropropane	0.00010	1.00E-05	9.62E-10
1,3-Butadiene	0.00095	3.00E-05	2.86E-08
1,3-Dichloropropene	0.00009	4.00E-06	3.78E-10
Acetaldehyde	0.02990	2.70E-06	8.07E-08
Benzene	0.00157	5.00E-06	7.87E-09
Benzo(b)fluoranthene	0.00000	1.10E-04	6.53E-11

Pollutant	Model	URF	MICR
	(µg/m³)	(µg/m³)$^{-1}$	
Carbon Tetrachloride	0.00013	6.00E-06	7.88E-10
Chloroform	0.00010	2.30E-05	2.34E-09
Chrysene	0.00000	1.10E-05	2.73E-11
Ethylbenzene	0.00014	2.50E-06	3.55E-10
Formaldehyde	0.18885	1.30E-05	**2.46E-06**
Methylene Chloride	0.00007	1.00E-06	7.15E-11
Naphthalene	0.00027	3.40E-05	9.05E-09
Vinyl Chloride	0.00005	6.60E-06	3.52E-10
$MICR_A$			**2.60E-06**

Example No. 3 – Step 7 (continued)

Step 7 – The $MICR_A$ is now 2.60 x 10^{-6} after process changes, which is less than 1 x 10^{-5}. See Section VII of the Policy as to how the process changes and emission reductions are to be made legally binding.

Example No. 3 – Step 8

Step 8 - *HQ = [maximum ambient impact concentration ($\mu g/m^3$)] / [RfC ($\mu g/m^3$)]*

	Model	RfC	HQ
	($\mu g/m^3$)	($\mu g/m^3$)	
1,2-Dichloroethane	0.00084	400	2.10E-06
1,2-Dichloropropane	0.00096	4	2.39E-04
1,3-Butadiene	0.00949	2	4.75E-03
1,3-Dichloropropene	0.00094	20	4.69E-05
Acetaldehyde	0.29726	140	2.12E-03
Acrolein	0.18277	0.02	**9.14E+00**
Benzene	0.01565	30	5.22E-04
Carbon Tetrachloride	0.00130	100	1.30E-05
Chlorobenzene	0.00108	1000	1.08E-06
Chloroform	0.00101	300	3.38E-06

	Model	RfC	HQ
	($\mu g/m^3$)	($\mu g/m^3$)	
Ethylbenzene	0.00141	1000	1.41E-06
Formaldehyde	1.87744	9	2.09E-01
Methanol	0.08889	4000	2.22E-05
Methylene Chloride	0.00071	400	1.78E-06
n-Hexane	0.03947	700	5.64E-05
Naphthalene	0.00265	3	8.82E-04
Phenol	0.00085	200	4.27E-06
Styrene	0.00084	1000	8.39E-07
Toluene	0.01451	5000	2.90E-06
Xylene	0.00654	100	6.54E-05

Example No. 3 – Step 9

Step 9 - Add each HQ that affects the same target organ or organ system to determine the cumulative Hazard Index (HI) for the proposed IP:

	Model	RfC	HQ
	(µg/m³)	(µg/m³)	
Acetaldehyde	0.29726	140	2.12E-03
Acrolein	0.18277	0.02	9.14E+00
Formaldehyde	1.87744	9	2.09E-01
Naphthalene	0.00265	3	8.82E-04
Toluene	0.01451	5000	2.90E-06
HI (respiratory)			**9.36E+00**

Example No. 3 – Step 10

Step 10 - The HQ for Acrolein is greater than 1.0 and the HI is greater than 2.0. Because process changes (87.3% HAPs reduction from the oxidation catalysts and stack height increases from 20ft to 40 ft) were already applied from Step No. 7, they shall be applied here as well. Re-run the air dispersion model with new inputs.

Example No. 3 – Step 10 (continued)

Step 10 – Results after process changes:

	Model (µg/m³)	RfC (µg/m³)	HQ
1,2-Dichloroethane	0.00008	400	2.11E-07
1,2-Dichloropropane	0.00010	4	2.41E-05
1,3-Butadiene	0.00095	2	4.77E-04
1,3-Dichloropropene	0.00009	20	4.72E-06
Acetaldehyde	0.02990	140	2.14E-04
Acrolein	0.01838	0.02	**9.19E-01**
Benzene	0.00157	30	5.25E-05
Carbon Tetrachloride	0.00013	100	1.31E-06
Chlorobenzene	0.00011	1000	1.09E-07
Chloroform	0.00010	300	3.40E-07

	Model (µg/m³)	RfC (µg/m³)	HQ
Ethylbenzene	0.00014	1000	1.42E-07
Formaldehyde	0.189	9	2.10E-02
Methanol	0.00894	4000	2.24E-06
Methylene Chloride	0.00007	400	1.79E-07
n-Hexane	0.00397	700	5.67E-06
Naphthalene	0.00027	3	8.87E-05
Phenol	0.00009	200	4.29E-07
Styrene	0.00008	1000	8.44E-08
Toluene	0.00146	5000	2.92E-07
Xylene	0.00066	100	6.58E-06
HI (respiratory)			**9.41E-01**

Example No. 3 – Step 10 (continued)

Step 10 - The HQ for each air toxic is now less than 1.0 and the HI is less than 2.0. See Section VII of the Policy as to how the process changes and emission reductions are to be made legally binding. The Air Toxics Review is complete

Example No. 3 - Summary

Installation = New Compressor Station (Four (4) Natural Gas-Fired Engines)

Air Toxics = Above *de minimis* thresholds and above the $MICR_A$ threshold and HI/HQ thresholds.

Modifications = Offsets were not available. Process changes were made including increasing the stack height (20 to 40 ft) and adding an oxidation catalyst (87.3% HAPs removal efficiency). Air Toxics were reduced to below the $MICR_A$ and HI/HQ thresholds.

Result = The Air Toxics Review is complete. The process modifications will be enforced through permit conditions and the Installation Permit will be processed accordingly.

QUESTIONS?

Contact Information

Gregson Vaux – gvaux@achd.net
Tony Sadar – asadar@achd.net
David Good – dgood@achd.net

ACHD Air Quality: 412-578-8115

Guide to the Policy for Air Toxics Review of Installation Permit Applications

This 10-step guide has been developed for Installation Permit (IP) Applicants to assist in fulfilling the requirements of the *Policy for Air Toxics Review of Installation Permit Applications* (Policy) approved by the Allegheny County Board of Health on November 7, 2012 and revised on January 9, 2013.

1. **Determine which pollutants emitted from the proposed Installation Permit (IP) are classified as air toxics.** See Sections II and VI of the Policy or the Appendix of this guide for the definition of 'Air Toxic' and the sources of toxicity information hierarchy.

2. **Determine the annual potential emissions (in tons per year) of each individual air toxic.** The potential emissions of each air toxic shall include all point-source (stack) and fugitive emission increases solely from the proposed IP.

3. **Compare the annual potential emissions calculated in Step No. 2 above to the *de minimis* levels in Table I below.** If the potential emissions exceed any of the *de minimis* levels in Table I, proceed to Step No. 4. If the potential emissions are equal to or lower than all of the *de minimis* levels in Table I, the Air Toxics Review is complete and the results shall be included in the proposed IP application.

Table I

Pollutant	*De minimis* level
Polychlorobiphenols (PCBs)	20 lbs. per year
Polycyclic Organic Matter (POM)	20 lbs. per year
Mercury	20 lbs. per year
Dioxins	0.020 lbs. per year
Furans	0.020 lbs. per year
Hazardous Air Pollutant Metals (MHAP)	20 lbs. per year (combined)
All Other Air Toxics	0.25 tons per year (combined)

4. **Determine the annual average of the maximum ambient impact concentration for each air toxic at or beyond the "public exposure boundary" in terms of micrograms per cubic meter ($\mu g/m^3$).** The Applicant shall use modeling procedures consistent with Section V of the Policy.

5. **For each air toxic that is a known or possible carcinogen, use the maximum ambient impact concentration determined in Step No. 4 to calculate the Maximum Individual Carcinogenic Risk (MICR).**

$$MICR = [URF\ (\mu g/m^3)^{-1}] \times [\text{maximum ambient impact concentration}\ (\mu g/m^3)]$$

6. **Calculate the sum of each individual MICR found in Step No. 5 to determine the "aggregated MICR" ($MICR_A$) for the proposed IP.**

   $MICR_A = MICR_1 + MICR_2 + MICR_3 + \ldots. + MICR_n$

7. **Determine further requirements based on the $MICR_A$ results of Step No. 6:**

   a. If the $MICR_A$ is less than 1×10^{-5}, no further assessment of carcinogenic effects will be required. Proceed to Step No. 8.
   b. If the $MICR_A$ is greater than 1×10^{-5}, the applicant shall perform an emissions modeling analysis that includes the increase in potential emissions from the proposed IP, emission offsets from the facility and other nearby existing sources, actual emissions from all other sources in applicant's entire facility, and actual emissions from other nearby existing permitted sources. Emission Offsets can be applied in accordance with Section VII of the Policy and 25 Pa.Code §127.207(1).The results shall be evaluated by the Department.
   c. If the $MICR_A$ is greater than 1×10^{-4}, the IP will be subject to Section VIII of the Policy.

8. **Calculate the Hazard Quotient (HQ) for each air toxic with known or possible non-carcinogenic health effects using the maximum annual ambient impact determined in Step No. 4.**

   HQ = [maximum ambient impact concentration ($\mu g/m^3$)] / [RfC ($\mu g/m^3$)]

9. **Calculate the sum of each individual HQ found in Step No. 8 that affects the same target organ or organ system to determine the cumulative Hazard Index (HI) for the IP.**

   $HI = HQ_1 + HQ_2 + HQ_3 + \ldots\ldots + HQ_n$

10. **Determine further requirements based on the HQ and HI results of Step Nos. 8 and 9:**

    a. If the HQ for each air toxic is less than or equal to 1.0 and the HI is less than 2.0, no further assessment of non-carcinogenic effects will be required.
    b. If the HQ for each air toxic is greater than 1.0 or the HI is greater than 2.0, the applicant shall perform emissions modeling analysis that includes the increase in potential emissions from the proposed IP, emission offsets from the facility and other nearby existing sources, actual emissions from all other sources in applicant's entire facility, and actual emissions from other nearby existing permitted sources. Emission Offsets can be applied in accordance with Section VII of the Policy 25 Pa.Code §127.207(1).
    c. The results shall be evaluated by the Department.

Appendix A

Glossary:

Aggregated MICR ($MICR_A$) - the sum of the MICRs for each individual substance.

Air Toxic - *"*air-borne pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, respiratory illness, neurological effects, or to cause adverse environmental effects that are predictive of adverse human health consequences.*"* This definition only includes compounds that have inhalation toxicity information in the references cited in Section VI of the Policy. This definition does not include CO_2 or criteria pollutants (other than Lead).

***De Minimis* Levels** - emission increases of specific air toxics which are not expected to significantly affect public health.

Emission Offsets (Offsets) - reductions in air toxics emissions at existing sources (including mobile sources) within Allegheny County that may be used to compensate for the emissions resulting from the installation proposed in the IP.

Hazard Index (HI) - the sum of the Hazard Quotients (HQ) for substances that affect the same target organ or organ system.

Hazard Quotient (HQ) - the ratio of the expected air toxic concentration to its corresponding RfC.

Maximum Individual Carcinogenic Risk (MICR) - the probability of developing cancer by an individual exposed to the expected concentrations of all substances in the ambient air over a 70-year period aggregated over the proposed increased potential air toxic emissions.

Public Exposure Boundary - the point of the nearest regularly occupied or likely to be regularly occupied (at least 6 hours per day for a minimum of 30 days per calendar year) structure beyond the applicant's property line.

Reference Concentration (RfC) - an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

Unit Risk Factor (URF) - "the upper-bound excess lifetime cancer risk factor estimated to result from continuous exposure to an agent at a concentration of 1 μg/m³ in air." The interpretation of URF would be as follows: if URF = 2×10^{-6} per $\mu g/m^3$, 2 excess cancer cases (upper bound estimate) are expected to develop per 1,000,000 people if exposed daily for a lifetime to 1 μg of the chemical per cubic meter air.

Sources of Toxicity Information:

1. **EPA's Integrated Risk Information System (IRIS) -** http://www.epa.gov/IRIS/
2. **EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)** - http://hhpprtv.ornl.gov/index.html
3. **Cal EPA Toxicity Criteria Database** - http://www.oehha.ca.gov/risk/ChemicalDB/index.asp
4. **Agency for Toxic Substances and Disease Registry (ATSDR) -** http://www.atsdr.cdc.gov/
5. **Health Effects Assessment Summary Tables (HEAST)** - http://www.epa.gov/

Other References:

1. **25 Pa.Code §127.207(1)** - http://www.pacode.com/secure/data/025/chapter127/s127.207.html

ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

Policy for Air Toxics Review of Installation Permit Applications

As approved by the Allegheny County Board of Health on November 7, 2012 and amended on January 9, 2013.

I. PURPOSE

This document establishes the policy the Allegheny County Health Department Air Quality Program (the Department), will use for evaluating the human health impacts of new or significantly modified sources emitting toxic air emissions into the ambient air. This policy document is effective until modified by the Department or until formal rules are promulgated.

This policy does not change any federal, state or County requirements including, but not limited to, all Best Available Control Technology (BACT), New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPS), New Source Review (NSR), Prevention of Significant Deterioration (PSD) and Allegheny County Health Department Rules and Regulations, Article XXI, Air Pollution Control (Article XXI).

There is no intent on the part of the Department to give this policy the weight or deference of a regulation. This document establishes the framework for the Department to exercise its administrative discretion in the future. The Department reserves the discretion to deviate from this policy statement if circumstances warrant.

II. APPLICABILITY

This policy applies to applications for an Installation Permit (IP) required under the provisions of Article XXI, including new facilities, modifications to existing facilities, or addition of new equipment, that are expected to increase the net potential air toxics emissions from the facility into the ambient air and do not belong to any one or more of the following categories:

a. Projects that result in an emissions increase less than the *de minimis* levels stated below. For the purposes of this policy, "*de minimis* levels" are *"emission increases of specific air toxics which are not expected significantly affect public health."* For Polychlorobiphenols, Polycyclic Organic Matter, and Mercury the *de minimis* level is 20 lbs. per year. For Dioxins and Furans the *de minimis* level is 0.020 lbs. per year. For Hazardous Air Pollutant (HAP) Metals the *de minimis* level is 20 lbs per year total for all HAP metals combined. For all other air toxics the *de minimis* level is 0.25 tons per year total for all air toxics combined..

b. Projects that are solely for the installation or in-kind replacement of pollution control device.

c. Activities included on the Allegheny County Installation Permit Exemptions list (Article XXI 2102.04.a.5) or otherwise exempt under Article XXI.

d. Projects that include equipment where EPA has published risk assessment guidance (e.g, Municipal Waste Combustors). The Department will implement the EPA procedures in place of this guideline when appropriate.

For the purpose of this policy, "air toxics" are those pollutants defined as *"air-borne pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, respiratory illness, neurological effects, or to cause adverse environmental effects that are predictive of adverse human health consequences."* This definition only includes compounds that have inhalation toxicity information in the references cited in Section VI of this policy, but does not include criteria pollutants or CO_2.

III. AUTHORITY

With few exceptions, any person installing, modifying, replacing, reconstructing, or reactivating a source of air pollution or air pollution control equipment within the County must first obtain an IP from the Department. Article XXI § 2102.04.b.7 states, *"The Department shall not issue any Installation Permit unless it has . . . received a complete application meeting the requirements of this Part, which application includes or demonstrates that: . . . Emissions from the proposed source will not endanger the public health, safety, or welfare. . . "*

This policy specifies the guidelines which the Department will use, along with other relevant information, to determine whether the application sufficiently demonstrates that the proposed installation will not endanger the public health, safety and welfare of Allegheny County.

IV. GUIDELINES

For IP applications covered by this policy, the Department will require the applicant to perform: a) an analysis of the carcinogenic health effects of air toxic emissions; and b) an analysis of the non-carcinogenic health effects of air toxic emissions, and include such analysis as part of the IP application.

a. Analysis of Carcinogenic Health Effects

The IP application should contain an analysis demonstrating to the Department's satisfaction that the combined impact of the proposed increased potential air toxic emissions with known or possible carcinogenic health effects does not result in an aggregated Maximum Individual Carcinogenic Risk (MICR) that poses an undue human health risk at or beyond the public exposure boundary. For the purposes of this policy, the "public exposure boundary" is the point of the nearest regularly occupied or likely to be regularly occupied (at least 6 hours per day for

a minimum of 30 days per calendar year) structure beyond the applicant's property line." MICR is defined as the probability of developing cancer by an individual exposed to the expected concentrations of all substances in the ambient air over a 70-year period aggregated over the proposed increased potential air toxic emissions. The aggregated MICR for a mixture of substances is equal to the sum of the MICRs for each individual substance.

If the MICR due solely to the net potential increase in air toxics emissions from the proposed IP is less than 1×10^{-5} at or beyond the applicant's property line, taking into account both the IP and offsets from the facility and offsets from nearby existing sources, no further assessment for carcinogenic effects will be required. The offsets should be modeled at their specific locations and conditions.

If the MICR due solely to the net potential increase in air toxics emissions from the proposed IP is greater than 1×10^{-5} at or beyond the public exposure boundary taking into account both the IP and offsets from the facility and offsets from other nearby existing sources, the Department will require an emissions modeling analysis that includes the increase in potential emissions from the proposed IP, emission offsets from the facility and other nearby existing sources, actual emissions from all other sources in applicant's entire facility, and actual emissions from other nearby existing permitted sources that are expected to have a significant effect to the extent that such data is available. The Department will assess the public health risk, taking into consideration the assumptions and uncertainties inherent in the risk characterization, and the public health significance of the estimated risk. Based on this assessment, the Department may require additional actions to reduce risk. Such actions may include, but are not limited to: ambient air monitoring, more stringent emission controls, controls at other sources within the facility, or additional offsets.

A MICR due solely to the net potential increase in air toxics emissions from the proposed IP that is greater than 1×10^{-4} at or beyond the applicant's property line taking into account both the IP and offsets from the facility and offsets from other nearby existing sources represents a public health risk of serious concern. This case should be a considered a deviation subject to Section VIII of this policy.

b. Analysis of Non-Carcinogenic Health Effects

The IP application should contain an analysis demonstrating to the Department's satisfaction that the increased ambient concentration of any individual air toxic resulting from the proposed increase in potential air toxic emissions with known or possible non-carcinogenic health effects will not exceed the Reference Concentration (RfC) at or beyond the applicant's property line. For the purposes of this policy, RfC is the continuous inhalation exposure concentration of a substance that is likely to be without an appreciable risk of adverse health effects to the human population (including susceptible subgroups) over a lifetime.

If the proposed installation results in potential increases of multiple air toxics, the IP application should contain an analysis calculating the cumulative Hazard Index (HI). For the purposes for this policy, the HI is defined as the sum of the Hazard Quotients (HQ) for

substances that affect the same target organ or organ system. The HQ is defined as the ratio of the expected air toxic concentration to its corresponding RfC.

If the HQ of each emitted air toxic is less than 1.0 and the HI is less than 2.0 at or beyond the public exposure boundary due solely to the net potential increase in the air toxics emissions from the proposed IP, taking into account both the IP and offsets from the facility and offsets from other nearby existing sources, the Department will approve the non-carcinogenic risk analysis and no further assessment of non-carcinogenic effects will be required.

If the HQ of any emitted air toxic is greater than 1.0 or the HI is greater than 2.0 at or beyond the public exposure boundary due solely to the net potential increase in the air toxics emissions from the proposed IP, taking into account both the IP and offsets from the facility and offsets from other nearby existing sources, the Department will require an emissions modeling analysis that includes the increase in potential emissions from the proposed IP, emission offsets from the facility and other nearby existing sources, actual emissions from all other sources in applicant's entire facility, and actual emissions from other nearby existing permitted sources that are expected to have a significant effect to the extent that such data is available. The Department will then assess the public health risk and, taking into consideration the assumptions and uncertainties inherent in the risk characterization, and the public health significance of the estimated risk. Based on this assessment, the Department may require additional actions to reduce risk. Such actions may include, but are not limited to: ambient air monitoring, more stringent emission controls, controls at other sources within the facility, or additional offsets.

V. EMISSIONS MODELING ANALYSIS

a. Selection of Models

At the applicant's discretion, any appropriate model, including but not limited to those listed in 40 CFR 51 Appendix W, may be used in the emissions modeling analysis required by this policy. At the applicant's discretion, it may use an appropriate screening or refined model. These models include but are not limited to:

SCREEN3	TSCREEN	RTDM3.2
AERSCREEN	COMPLEX1	CALPUFF
CTSCREEN	VALLEY	AERMOD

The Department will review the choice of model and model inputs to determine appropriateness and accuracy. The applicant will correct any deficiencies. Any appropriate and properly implemented model which produces results meeting the guidelines of Section IV will satisfy the requirements of this policy, the results of any other model notwithstanding.

b. Meteorological Data

Applicants should use available meteorological data most representative of the site, including but not limited to available site-specific data, data maintained by ACHD, data from Pittsburgh

International Airport, or data from the Allegheny County Airport. The Department will review the appropriateness of the data selected.

c. Modeling Protocols

Applicants are not required to submit modeling protocols as part of the emissions modeling analysis. However ACHD encourages applicants to develop a modeling protocol for review by ACHD staff, especially when using a refined model, such as AERMOD or CALPUFF.

VI. SOURCES OF TOXICITY INFORMATION

Risk estimates are used to guide government or corporate actions, not to determine a person's risk. The best available recognized and peer reviewed science should be used to conduct risk assessments required by this policy. In general, if risk assessment information is available in EPA's Integrated Risk Information System (IRIS) for the air toxics under evaluation, there is no need to search further for additional sources of information. If such information is not available in IRIS, the applicant should use other sources of available information based on the hierarchy presented below:

Tier 1 - EPA's Integrated Risk Information System (IRIS)
Tier 2 - EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs)
Tier 3 - Other Toxicity Values

Sources of Tier 3 values include: California Environmental Protection Agency (Cal EPA) Reference Exposure Levels (RELs), Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs), and Health Effects Assessment Summary Tables (HEAST) toxicity values.

The hierarchy defined in this Section may be altered for specific air toxics if it can be demonstrated to the Department's satisfaction that the information obtained by following the hierarchy does not represent the best available science.

For those air toxics for which the toxicity information is presented as a range of values within the database, the mid-range value should be used in calculations in the absence of relevant site specific factors that would recommend the use of a value elsewhere in the range.

VII. EMISSION OFFSETS

If the applicant for an IP is unable to demonstrate to the Department's satisfaction that emissions from the proposed installation meet the guidelines defined in this policy, the IP may still be approved if the applicant secures a sufficient amount of Emission Offsets (Offsets) as defined in this policy. However, IPs utilizing offsets that result in a MICR greater than 1×10^{-4} should be considered a deviation subject to Section VIII of this policy.

For the purposes of this policy, Offsets are defined as reductions in air toxics emissions at existing sources (including mobile sources) within Allegheny County that may be used to compensate for the

emissions resulting from the installation proposed in the IP. Unless specified differently in this policy, Offsets will be subject to similar offset requirements contained in 25 Pa. Code §127.207(1), as applicable. Generally, Offsets must be made legally binding by a Department order or permit condition and actually occur no later than the date on which the IP's proposed installation commences operation (exclusive of any Department approved shakedown period for replacement units). The reductions must be maintained throughout the operating life of the sources for which the IP was issued. Offsets cannot be created from emissions reductions required by Federal, State, or Article XXI requirements or reductions made more than five years prior to the date of the IP application. In addition, credit for Offsets cannot be taken for potential emissions which were never achieved or emitted, or for reductions that have been used for previous IP's.

a. Required Offsets for Emissions with Carcinogenic Health Effects

The ratio of actual air toxics emission reductions to new emissions must be greater than or equal to the applicable ratio specified in Table I. It is not necessary that the emission reductions be the same air toxics pollutant as the new emissions. However, when different pollutants are involved, each Offset Ratio must be calculated for each offsetting pollutat using the following equation:

$$OR = OR_{T1} \times (URF_e/URF_r)$$

Where:

OR = Required Offset Ratio
OR_{T1}= Offset Ratio from Table I
URF_e=Unit Risk Factor of the pollutant in the new emissions (from data sources in Section VI)
URF_r=Unit Risk Factor of the pollutant in the reduction (from data sources in Section VI)

Table I Offset Ratios

Location of Emission Reduction	**Ratio or Emission Reduction to New Emissions**
Within the Same Facility as the IP	1 to 1
Other Locations in Allegheny County	1.15 to 1
Mobile Sources in Allegheny County	1.5 to 1

b. Required Offsets for Emissions with Non-Carcinogenic Health Effects

Applicants may offset air toxics emissions with non-carcinogenic health effects at the ratios specified in Table I. However, the emission reductions must be the same air toxics pollutant as the new emissions.

VIII. DEVIATIONS

The Director of the Allegheny County Health Department may approve deviations from this policy if it is determined that the proposed increase in potential emissions of air toxics has been controlled to the maximum practical amount and does not pose an unacceptable human health risk. Any deviations must be approved in writing and documented in the Technical Support Document of the applicable IP.

IX. EFFECTIVE DATE

This policy will replace the existing air toxics review policy 90 days after approval by the Allegheny County Board of Health. Unless requested by the applicant, this policy will not be applied retroactively to any complete IP application filed before the effective date.