Using and Improving NEI Data for Residual Risk and Technology Review (RTR) Projects

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Objectives

- Review statutory background – section 112 of CAA
- General approach and review the RTR process
- Identify data issues
- Review source category examples
- Summary of overall data changes
- Data change effects on residual risk

Statutory Background – Section 112 MACT Program

- Residual risk assessment under CAA section 112(f)(2)
  - Assess the risk remaining (residual risk) after application of MACT standards and promulgate more stringent standards for a source category if necessary to protect public health with an ample margin of safety or to prevent adverse environmental effects, 8 years after promulgation of original MACT
- Technology review under CAA section 112(d)(6)
  - Review and revise MACT standards as necessary taking into account developments in practices, processes, and control technologies, every 8 years

Background on Approach

- NEI database – used as the starting point for inputs to the risk modeling, using HEM-3
- Currently conducting analysis for source categories with MACT compliance dates of 2002 and earlier
- Source categories divided into phases (Phase I and Phase II); and Phase II further divided into groups (Groups 1, 2, 3)

Phase I - Completed		Phase II, Group 1	
Coke Ovens	Gasoline Distribution	Polymers and Resins I (4 categories)	GMACT–Hydrogen Fluoride
Dry Cleaning	Ethylene Oxide Sterilizers	Polymers and Resins II (2 categories)	GMACT–Acetal Resins
Industrial Cooling Towers	Magnetic Tape	**Phase II, Group 2**	
HON	Halogenated Solvents	Petroleum Refineries	
Phase II, Group 3		**Group 2A**	
Acrylic and Modacrylic Fibers	Primary Lead Smelting	Marine Vessel Loading	Polymers and Resins I (5 categories)
Chrome Electroplating (3 subcategories)	Publicly Owned Treatment Works	Mineral Wool Production	Printing and Publishing
Ferroalloys Production	Pulp and Paper Production	Pharmaceutical Manufacturing	
Flexible Polyurethane Foam	Secondary Aluminum Production	**Group 2B**	
Off-site Waste and Recovery	Secondary Lead Smelting	Aerospace Manufacturing and Rework	Oil and Natural Gas Production
Phosphoric Acid/ Phosphoric Fertilizer Prod	Steel Pickling—HCl Process	Natural Gas Transmission and Storage	
Polycarbonates Production	Wood Furniture	**Group 2C**	
Polyether Polyols Production	Wool Fiberglass	Polymers and Resins IV (7 categories)	Shipbuilding and Ship Repair
		Primary Aluminum Reduction	

RTR Data Process – Show Me the Data!

- Conduct engineering review of NEI data
  - Included additional project data, if available and appropriate
  - Create ANPRM* data set
- Release of ANPRM to request public comments
  - Comments from State/local agencies and industry
  - Received revisions to emissions, facilities and facility names, MACT codes, stack parameters, and coordinates
  - Create NPRM data set
- Proposal and Promulgation of risk determination and standards
  - Residual risk analysis based on NPRM data set

(*ANPRM: Advanced Notice of Proposed Rule Making)

ANPRM Data Requests

Input on Source Category Representation

Names and addresses for facilities

- Which should be included but are not
- Which should not be included
- Identify area sources and provide documentation

Facility-Specific and Emissions-Point-Specific Data

Facility location and identification

- Facility name
- Facility address
- Facility category code (major or area source)

Emission point data

- SCC and **MACT codes**
- Emissions of each HAP, ton per year (tpy)
- Emissions-release point type (e.g., fugitive, vertical, horizontal, gooseneck, vertical with raincap, downward facing vent)
- Emissions-release characteristics (e.g., stack height, stack diameter, exist gas temperature, velocity, flow rate)
- Emissions point latitude and longitude coordinates

Data characteristics

- Acute emissions factors
- Speciation of metal HAPs and polycyclic organic matter
- HAP emissions performance level (i.e., actual, allowable, maximum)

Data Issues

- Are the correct facilities included in the source category and can Industry identify their facilities in the dataset?
- Are the correct emissions units included in the source category and can Industry identify emissions units within their facilities?
- How are data handled for facilities subject to multiple MACT rules?
- Are assumptions for HAP speciation correct?
- Do the emissions represent actuals or allowables?
- How will data be augmented when facilities are missing and when anticipated HAP are missing from units within a facility?
- How will EPA address incomplete control technique information?
- How to group SCCs together under source category emissions units?

Are the correct facilities included in the source category?

Petroleum Refineries

Petroleum Refining Source Category MACT1 – Dropped Facilities

NEISiteID	FacilityName	City	State	Reason for Deleting
NEI12419	NEDERLAND MARINE TERMINAL	NEDERLAND	TX	Terminal
NEI21174	CENCO OIL	SANTA FE SPRINGS	CA	Closed 1995
NEI24425	CONOCOPHILLIPS - SANTA MARIA	SANTA MARIA	CA	Not a Refinery
NEI39879	RIVERHEAD TERMINAL-CONOCOPHILLIPS	RIVERHEAD	NY	Terminal
NEI40622	BP WEST COAST PRODUCTS, LLC	PORTLAND	OR	Not a Refinery
NEI46497	CHEVRON PHILLIPS CHEMICAL PUERTO RICO CORE INC.	GUAYAMA	PR	p-xylene manuf; closed 2002
NEIAR1070110	TE PRODUCTS PIPELINE COMPANY	HELENA	AR	Terminal
NEICA03713	ARCO PRODUCTS CO. MARINE TERMINAL	LONG BEACH	CA	Terminal
NEIDE0050093	MARITRANS	DELAWARE BAY	DE	Not a Refinery
NEIIN371	MARATHON ASHLAND PET., CLARKSVILLE TERM.	CLARKSVILLE	IN	Terminal
NEILA13809	UNION CARBIDE/TAFT & STAR	HAHNVILLE	LA	Chemical Plant
NEINY2640500	EXXONMOBIL - PORT MOBIL TERMINAL	STATEN ISLAND	NY	Terminal
NEIPA2125	GULF OIL LIMITED PARTNERSHIP NEVILLE IS	PITTSBURGH	PA	Not a Refinery
NEIPA2136	MOTIVA ENTERPRISES LLC	CORAOPOLIS, PA	PA	Terminal
NEIWV0730002	ST. MARYS REFINING COMPANY	ST. MARYS	WV	Terminal

Are the correct facilities included in the source category?

Marine Vessel Loading

- Public comment: “San Bernard Terminal Dock No. 1” with NEI number “NEI3TX48039San” in Sweeny, TX, address of “CR 372 at San Bernard River” renamed to “ConocoPhillips San Bernard Terminal Dock No. 1”
  - Looked at all facilities in ANPRM dataset in Brazoria Co. TX: Not in ANPRM dataset?
  - NEITXT$11613—ConocoPhillips San Bernard Terminal; Sweeny, TX; CR 372
  - NEI2TX139—San Bernard Terminal; Sweeny, TX; end of CR 321, on Ave. A (CR 372) 2
  - NEI6519—ConocoPhillips Sweeny; Old Ocean, TX; Hwy 35 and 524 at Old Ocean

How are data handled for facilities subject to multiple MACT rules?

Petroleum Refineries

- Petroleum Refining MACT 1 (MACT Code 0503)
  - Thermal cracking
  - Vacuum distillation
  - Crude distillation
  - Hydrotreating
  - Hydrorefining
  - Isomerization
  - Polymerization
  - Lube oil processing
  - Hydrogen production
  - Fugitive emissions and Equipment Leak emissions from FCCU, CRU, and SRU would be covered here
  - etc.
- Petroleum Refining MACT 2 (MACT Code 0502)
  - Catalytic cracking units (FCCU)
  - Catalytic reforming units (CRU)
  - Sulfur plant units (SRU)

Are assumptions for HAP speciation correct?
Wool Fiberglass

- Cr emitted from deterioration of Cr refractories
- Cr test data available from state agency showed 100% Cr 6+
- Used worse case speciation profile at 100% Cr 6+ (applied for generically-reported Cr cpds)
- Currently preparing ANPRM dataset

Are assumptions for HAP speciation correct?
Aerospace Manufacturing and Rework

- Cr emitted from source category; 61 facilities of 137 facilities reported Cr or Cr cpds emissions
- In ANPRM, assumed 25% Cr 6+ (based on information from 1 facility)
- Public comments ranged from 0% to 100% Cr 6+
- EPA reviewed and confirmed the 25% Cr 6+ (applied for generically-reported Cr cpds)

Do the emissions represent actuals or allowables?
Mineral Wool Production

- MACT std has Emissions Factor format:
  - 0.1 lb PM/ton melt
  - 0.06 lb Formaldehyde/ton melt
- Emissions test data available; calculated “average” emissions levels for the industry
  - 0.044 lb PM/ton melt
  - 0.038 lb Formaldehyde/ton melt
- Compared the average “actual” emissions levels for the industry to the MACT limits.
  - PM: 0.1 / 0.044 = 2.3; so MACT allowable PM emission rate is **2.3x** higher than avg emissions
  - Formaldehyde: 0.06 / 0.038 = 1.6; so MACT allowable Formaldehyde emission rate is **1.6x** higher than avg emissions
- Estimate allowables at ~**2x** higher than actuals

Do the emissions represent actuals or allowables?
Aerospace Manufacturing and Rework

- One facility with markedly higher emissions – **40x** higher than next closest facility
- Reviewed permit, TRI data, and contacted the facility
- "Allowable," but back-calculated from a fenceline ambient concentration limit by modeling – gave an unrealistic even implausible allowable level
  - At maximum production, 365 d/yr, not reach these levels
- Worked with facility to provide more realistic emissions levels

What to do about missing data or missing HAP?
Pulp and Paper MACT II

- Expect Cd and Hg emissions from all facilities but only reported from a few facilities
- Power boilers, recovery furnaces, smelt dissolving tanks (SDT), lime kilns, and other combustion sources
- Identified units by SCCs that were missing Cd and Hg
- Used AP-42 emissions factors, NCASI emissions factors along with activity levels to estimate emissions.
- Used average EF and worse-case EF depending on information on specific type of source

What to do about missing data or missing HAP?
Wool Fiberglass

- Expect HAP metals emissions (As, Cr, etc.) and MeOH emissions from all facilities but only reported from about half of facilities
- Developed overall source category factors based on those facilities that did report specific HAP
  - Summed emissions and developed ratio
  - Cr: 0.35 ton Cr/3,434 ton PM10: 0.0001019 ton Cr/ ton PM10
  - MeOH: 1,132 ton MeOH/337 ton Formald. = 3.36 ton MeOH/ton Formald.

What to do about incomplete control technique information?
Marine Vessel Loading

- Question about control level at St. Linden Terminal in Linden, NJ:
  - NEI facility ID of NEINJ030093
  - Address of “South Wood Avenue”
  - APC_ID field is “Unknown”
- No facility contact information given in NEI
- No listing of facility found; Looked at state permit site for NJ DEP for all facilities in Union County
- Contacted facility and they confirmed “Controlled”

All facilities in Union County NJ – Find St. Linden MVL Terminal

PI Number	Facility Name	Facility Address	Facility City
40192	NEW YORK TERMINALS LLC	534 SOUTH FRONT ST	ELIZABETH
40608	PORT AUTHORITY OF NEW YORK & NEW JERSEY	NEWARK INTERNATIONAL AIRPORT	NEWARK
41738	SUPPORT TERMINAL OPERATING PARTNERSHIP LP	EXXONMOBIL REFINING & SUPPLY COMPANY	LINDEN
41766	TUSCAN DAIRY FARMS	750 UNION AVE	UNION
41767	INFINEUM USA LP - BAYWAY CHEMICAL PLANT	Corner of Park & Brunswick Avenues	Linden
41780	BUCKEYE PIPE LINE CO LINDEN STATION	BUCKEYE PIPE LINE COMPANY LP	LINDEN
41799	ST LINDEN TERMINAL LLC INLAND FACILITY	4501 TREMLEY PT RD	LINDEN
41800	ST LINDEN TERMINAL LLC SHORESIDE FACILITY	4501 TREMLEY PT RD	LINDEN
41801	GULF OIL LTD PARTNERSHIP LINDEN TERMINAL	2600 MARSHES DOCK RD	LINDEN
41802	INTERBAKE FOODS INC	891 NEWARK AVE	ELIZABETH
41803	CITGO PETROLEUM CORP LINDEN TERMINAL	4801 **SOUTH WOOD AVE**	LINDEN
41805	CONOCO PHILLIPS	1400 Park Ave	Linden

Overall Summary of ANPRM Data Changes – Phase II, Group 1

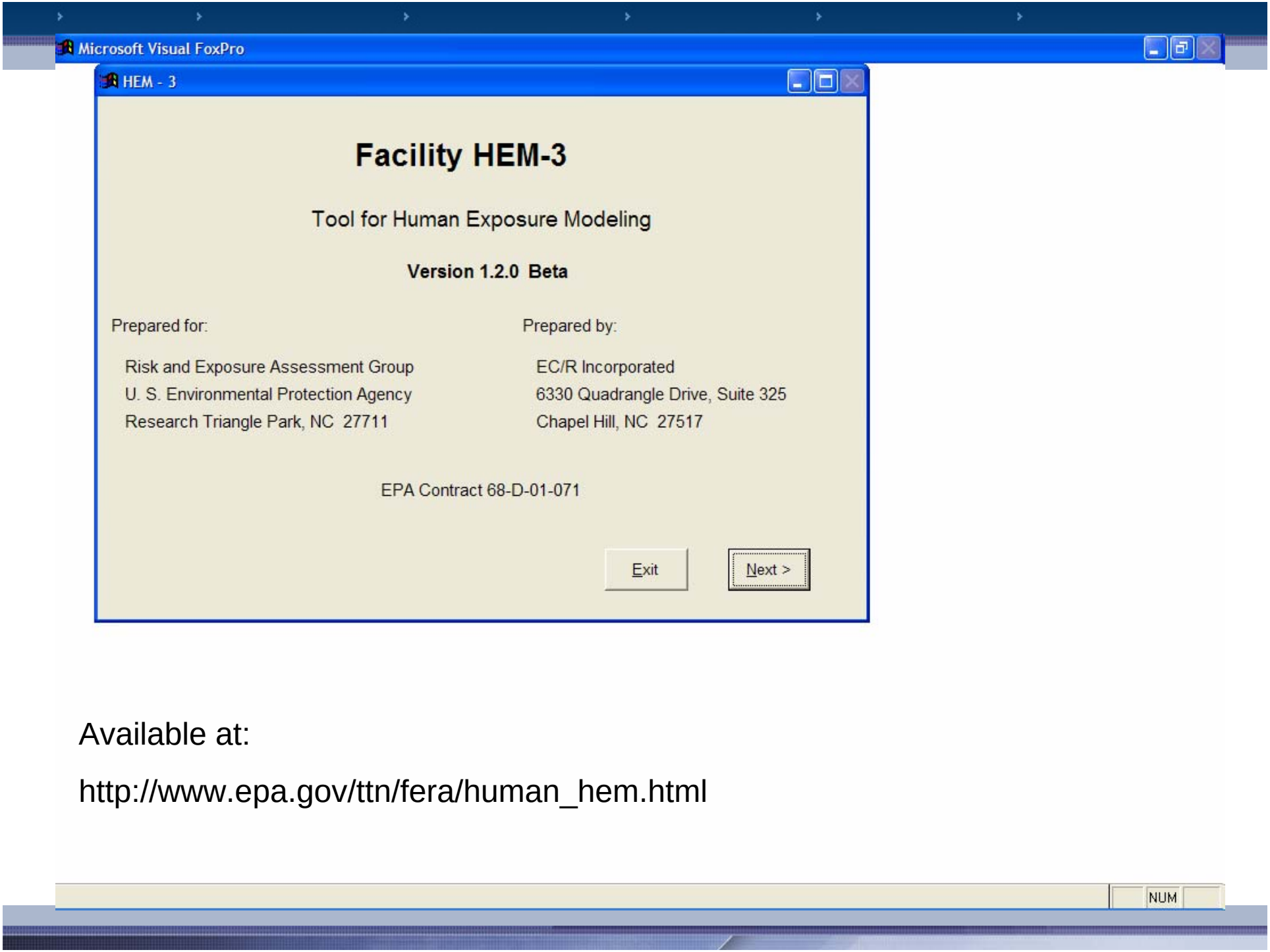
MACT Code	MACT Source Category	Original Number of Facilities	Revised Number of Facilities	Original Emissions (total tons)	Revised Emissions (total tons)	Percentage of Change in Emissions
1301	GMACT—Acetal Resins Production	3	3	38.48	38.48	0.00%
1307	Polymers and Resins I—Butyl Rubber Production	2	2	502.0	502.0	0.00%
1312	Polymers and Resins II—Epoxy Resins Production	3	4	15.47	15.59	0.77%
1313	Polymers and Resins I—Ethylene–Propylene Rubber Production	5	5	1,067	1,062	-0.47%
1409	GMACT—Hydrogen Fluoride Production	2	2	5.48	5.48	0.00%
1320	Polymers and Resins I—Neoprene Production	1	1	289.1	138.9	-52%
1322	Polymers and Resins II—Non-Nylon Polyamides Production	4	4	6.37	6.37	0.00%

Overall Summary of ANPRM Data Changes – Phase II, Group 2

MACT Code	MACT Source Category	Original Number of Facilities	Revised Number of Facilities	Original Emissions (total tons)	Revised Emissions (total tons)	Percentage of Change in Emissions
0701	Aerospace Industries	301	267	2,337	1,509	-35%
0603	Marine Vessel Loading	126	135	256.0	248.1	-3.1%
0409	Mineral Wool Production	12	8	509.1	430.8	-15%
0504	Natural Gas Transmission and Storage	123	123	273.2	330.5	21%
0501	Oil and Natural Gas Production	2,823	5,463	10,515	13,737	31%
0503	Petroleum Refineries	153	152	8,510	5,717	-33%
1201	Pharmaceutical Production	222	27	2,465	1,051	-57%
1311	Polymers and Resins I—Epichlorohydrin Elastomers Production	1	1	105.5	105.5	0.00%
1315	Polymers and Resins I—Hypalon Production	1	1	32.00	30.60	-4.4%
1321	Polymers and Resins I—Nitrile Butadiene Rubber Production	4	5	82.91	50.57	-39%
1325	Polymers and Resins I—Polybutadiene Rubber Production	5	4	2,311	1,992	-14%
1339	Polymers and Resins I—Styrene-Butadiene Rubber/Latex Production	15	14	351.8	306.9	-13%

Risky Business

- How did we perform the risk assessment for RTR?
  - Inhalation Assessment
    - Utilizes Human Exposure Model 3 (HEM3)
  - Multipathway/Ecological Assessment
    - Utilize TRIM Screen Model



Available at:

http://www.epa.gov/ttn/fera/human_hem.html

RTR: HEM3 Summary

- Based on EPA's AERMOD (07026)
  - Gaussian plume model

$$C = \frac{Q}{2\pi\sigma_y(x)\sigma_z(x)u} e^{\frac{-y^2}{2\sigma_y(x)^2}} \left[e^{\frac{-(z-h)^2}{2\sigma_z(x)^2}} + e^{\frac{-(z+h)^2}{2\sigma_z(x)^2}} \right]$$

- Q= emission rate and H is plume release height and X is downwind distance

- Run for each facility in source category to predict both chronic & acute; cancer & noncancer risks
- Receptors based on 2000 census blocks
- Meteorological data selected for each facility

RTR: Inhalation Assessment Results

- Chronic
  - Maximum Individual Risk (MIR) - highest risk at a census block centroid (cancer & noncancer)
  - Cancer incidence
  - Cancer risk distributions
- Acute
  - Maximum off-site impact – highest of census block and polar grid receptors
- Population risk levels
  - Facility and source category cancer incidence levels

RTR: Multipathway and Ecological Screening

- Iterative process for source categories emitting PBT-HAPS

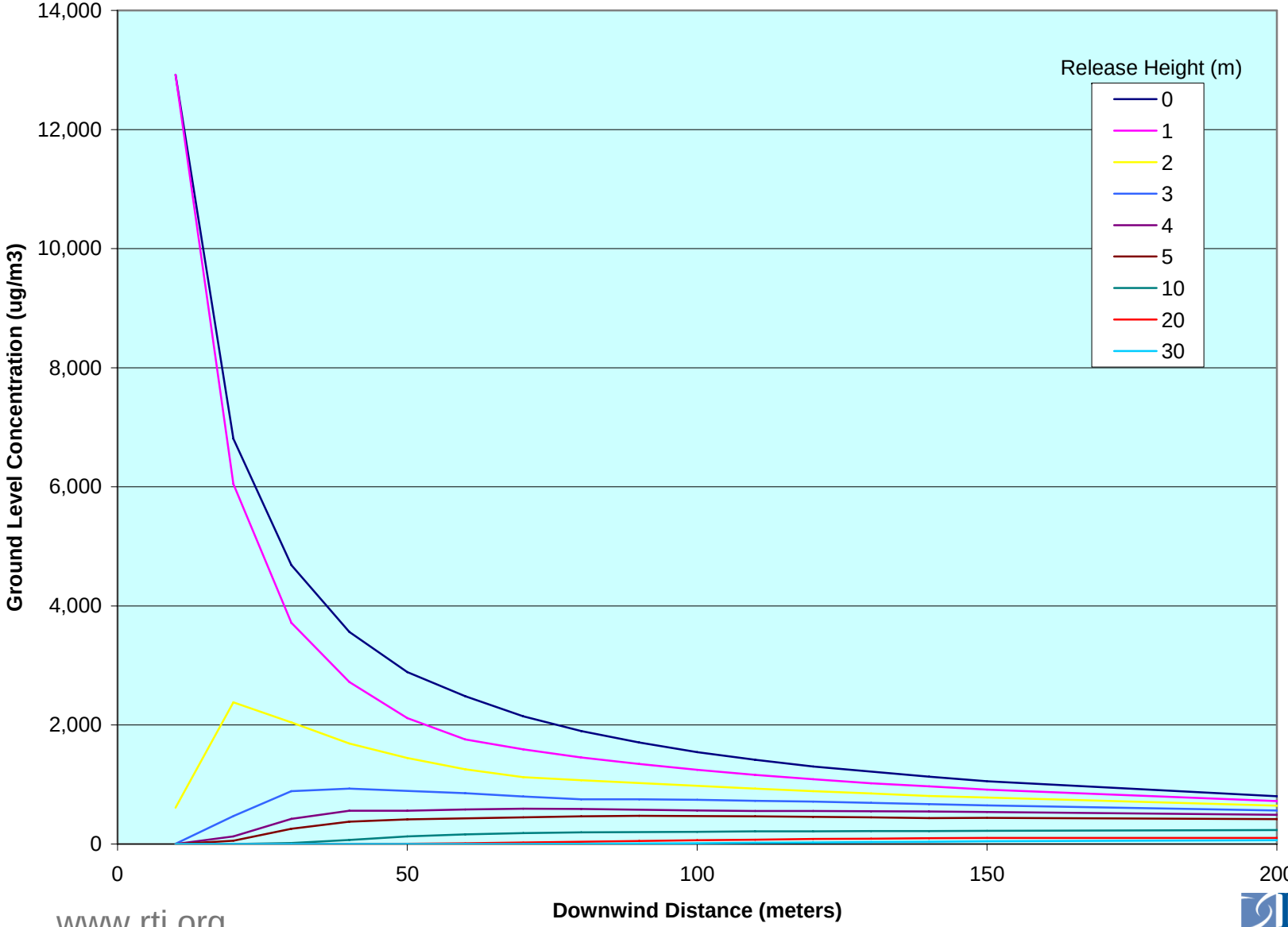
•Cadmium compounds
•Chlordane
•Chlorinated dibenzodioxins and furans
•DDE
•Heptachlor
•Hexachlorobenzene
•Hexachlorocyclohexane (all isomers)
•Lead compounds
•Mercury compounds
•Methoxychlo
•Polychlorinated biphenyls
•Polycyclic organic matter
•Toxaphene
•Trifluralin

- TRIM model (multipathway) in screening mode
- TRIM model in refined mode

How does the inventory effect risk?

- Amount of specific HAP compounds emitted (Q)
  - Concentration (and risk) is directly proportional to the emission rate
- Emission release point/stack coordinates (x)
  - Concentration is inversely proportional plume travel distance
- Stack parameters: height, diameter, exit gas temperature, exit gas velocity, exit gas flow rate. (h)
  - Concentration is inversely proportional plume release elevation (physical plume height and plume rise)
- Area Source parameter: width, length, height of area source
  - Concentration is inversely proportional to surface area

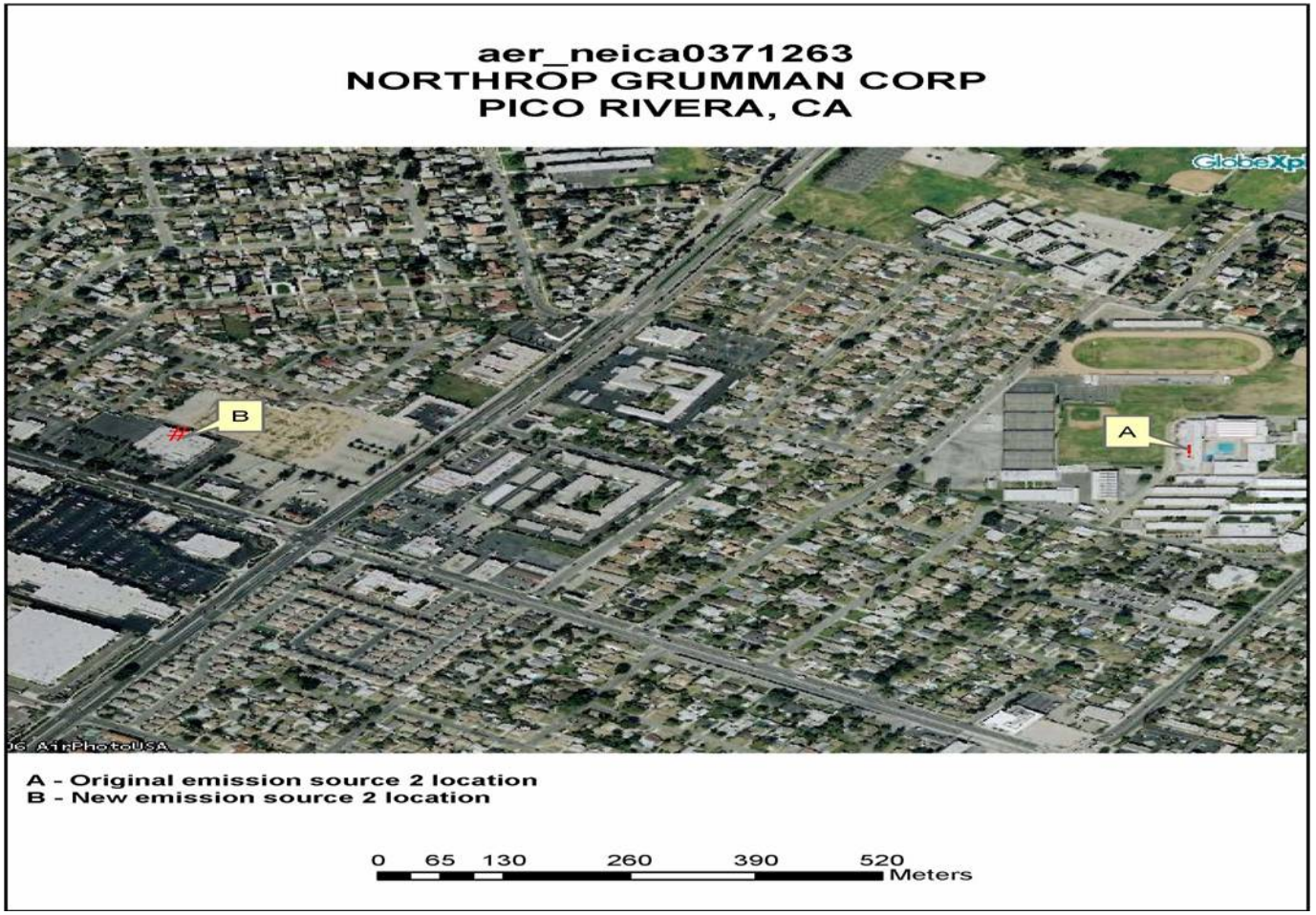
Plume concentration as a function of release height and downwind distance



Source Location Example 1

MIR:
Location A = 100 in a million
Location B = 5 in a million

Source Location Example 2



MIR:
Location A = 1000 in a million
Location B = 4000 in a million