What's New in SPECIATE 4.2?

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Presented by:

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What is SPECIATE?

- Database of speciated emissions profiles by source category
- Species include metals, ions, elements, organic and inorganic compounds
- Consistent Units
- Contains three categories:
    - Particulate matter (PM)
    - Volatile organic compounds (VOC)
    - Other Gases (e.g. Hg, NO/NO2/HONO, semi-volatile organic compounds)
- PM profiles are size-segregated (e.g. PM10, PM2.5)
- Housed in Microsoft Access database

Development of SPECIATE

- Collaboration involving:
  - EPA's Office of Research and Development (ORD)
  - Office of Air Quality Planning and Standards (OAQPS)
  - Office of Transportation and Air Quality (OTAQ)
  - Environment Canada
  - SPECIATE Workgroup

Why Do We Need SPECIATE?

- Create speciated emissions inventories for photochemical modeling
- Estimate toxic air pollutant emissions from various emission sources
- Provide input to source-receptor models (CMB)
- Verify profiles derived from ambient measurements using multivariate receptor models (e.g., factor analysis and positive matrix factorization)
- Provide a repository of compounds searchable by source category and pollutant

Brief History of SPECIATE Database

- Paper and computerized versions available in 1988 for EPA applications
- First electronic version (CD) distributed to the user community in 1993
- SPECIATE 3.2 posted to EPA's CHIEF website in Nov 2002
- SPECIATE 4.0 posted to EPA's CHIEF website Jan 2007
- SPECIATE 4.1 completed October 2007 for Environment Canada; final results included in SPECIATE 4.2
- SPECIATE 4.2 – Final Report Expected in April 2009, Web Browser posted March 2009

Brief History (continued)

- SPECIATE 3.2 (2002)
  - Has a front-end via desk top application
  - 1503 PM profiles
  - 565 gas profiles
  - 890 unique species

- SPECIATE 4.0 (2007)
  - Housed in MS Access®
  - 2,865 PM profiles
  - 1,215 gas profiles
  - 1,902 unique species

SPECIATE 4.2

- 3,326 PM profiles;
- 1,624 organic gas profiles;
- 237 Other Gases profiles;
- A total of 2,207 unique species
- Composite profiles for 58 (47 PM and 11 VOC) source categories;
- Every profile has been assigned to a SCC
- An updated SCC-to-SPECIATE profile cross-reference table accounting for over 80% of national VOC and PM emissions in the 2002 National Emissions Inventory (NEI)

SPECIATE 4.2 (continued)

- Final Report is In-Press
- VOC-to-TOG conversion factors for applicable gas profiles;
- A protocol for expansion of the database;
- A mapping of the new VOC compounds into model species categories;
- Review and prioritization of 49 studies entailing 614 PM and 822 VOC profiles for potential inclusion in the future SPECIATE database.
- Web application developed to provide access through a simple web interface - allows complex searches and downloads

Example of SPECIATE Data

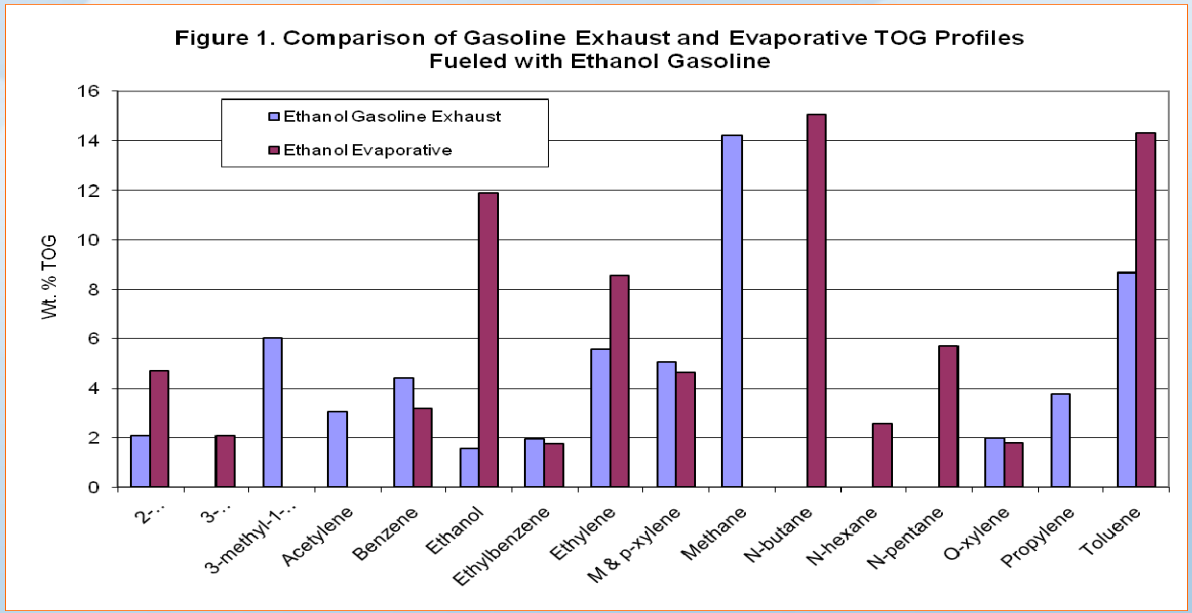
Category	Subcategory	Profile Type	Bar Chart
Motor Vehicle (1,653 profiles)	Gasoline Exhaust Gasoline Diurnal Evaporative Gasoline Hot Soak Liquid Gasoline Diesel Exhaust Diesel Headspace Evaporative Tire Wear Brake Wear	TOG; PM; SVOC; Hg; NO/NO_2/ HONO	Figure 1
Agricultural Burning (78 profiles)	Rice Straw Wheat Straw	VOC; PM	Figures 2 & 3
Forest Fire (99 profiles)	Ponderosa Pine Loblolly Pine Western Hemlock Aceraceae/ Fagaceae Palmae/ Pinaceae Poaceae/Pinaceae	VOC; PM	Figure 4
Fireplace/ Wood Stove (144 profiles)	Pine Oak Eucalyptus	VOC; PM	Figure 4

Example Profiles

- Motor Vehicle (1,653 profiles)

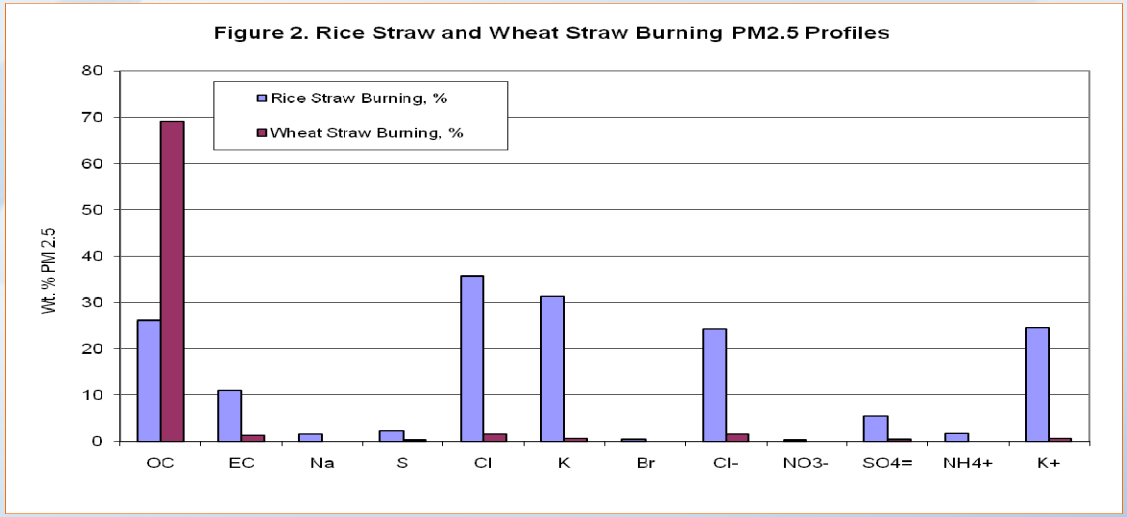
- TOG; PM; SVOC; Hg; NO/NO2/HONO

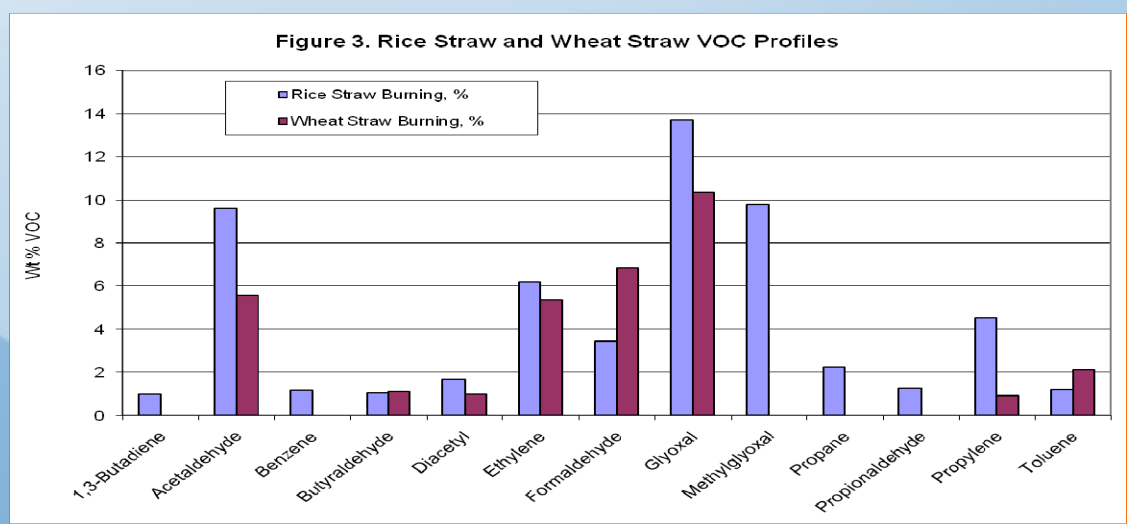
- Gasoline Exhaust
- Gasoline Hot Soak
- Liquid Gasoline
- Diesel Exhaust
- Tire Wear
- Brake Wear
- Diesel Headspace Evaporative
- Gasoline Diurnal Evaporative



Example Profiles (continued)

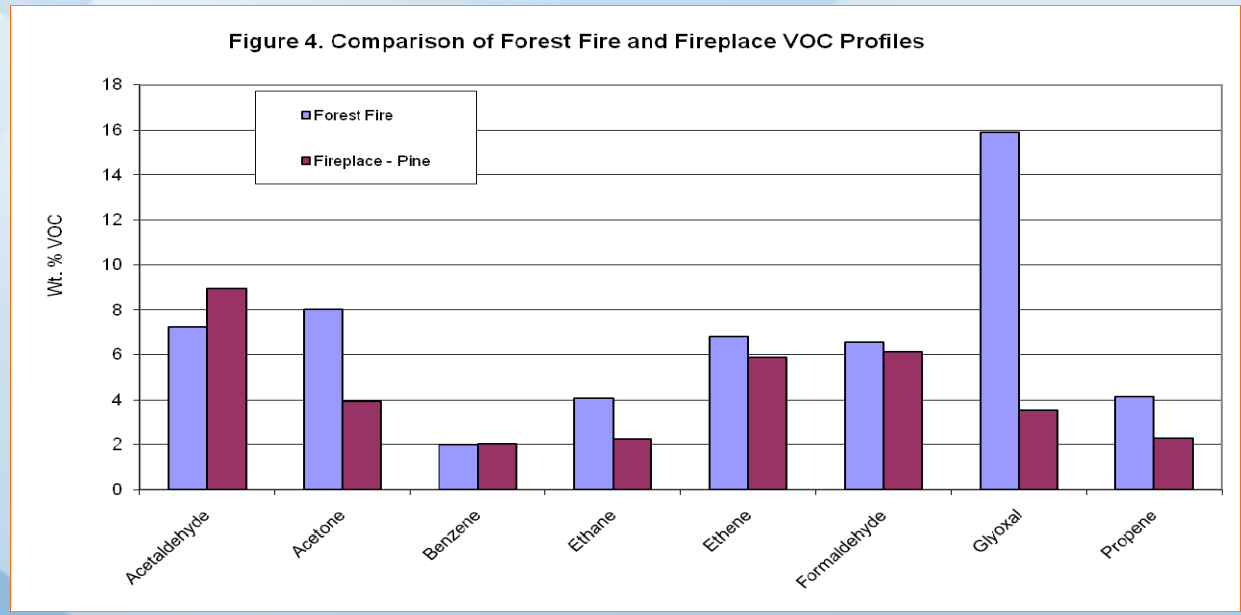
- Agricultural Burning (78 profiles)
- Rice Straw, Wheat Straw
- VOC; PM



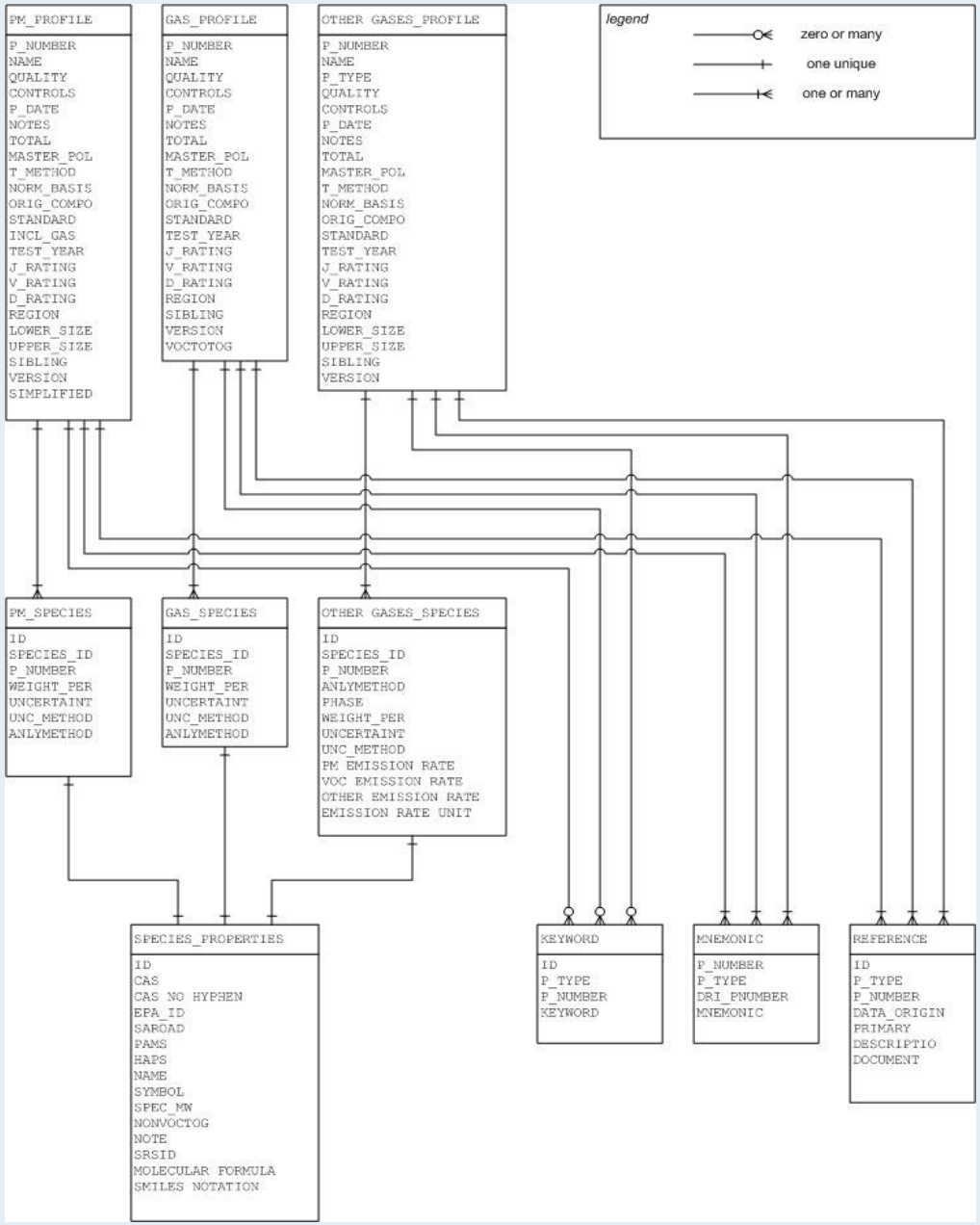


Example Profiles (continued)

- Forest Fire
  (99 profiles) VOC, PM
  - Ponderosa Pine
  - Loblolly Pine
  - Western Hemlock
  - Aceraceae/ Fagaceae
  - Palmae/ Pinaceae
  - Poaceae/Pinaceae
- Fireplace/Wood Stove
  (144 profiles) VOC; PM
  - Pine
  - Oak
  - Eucalyptus



SPECIATE Data Diagram



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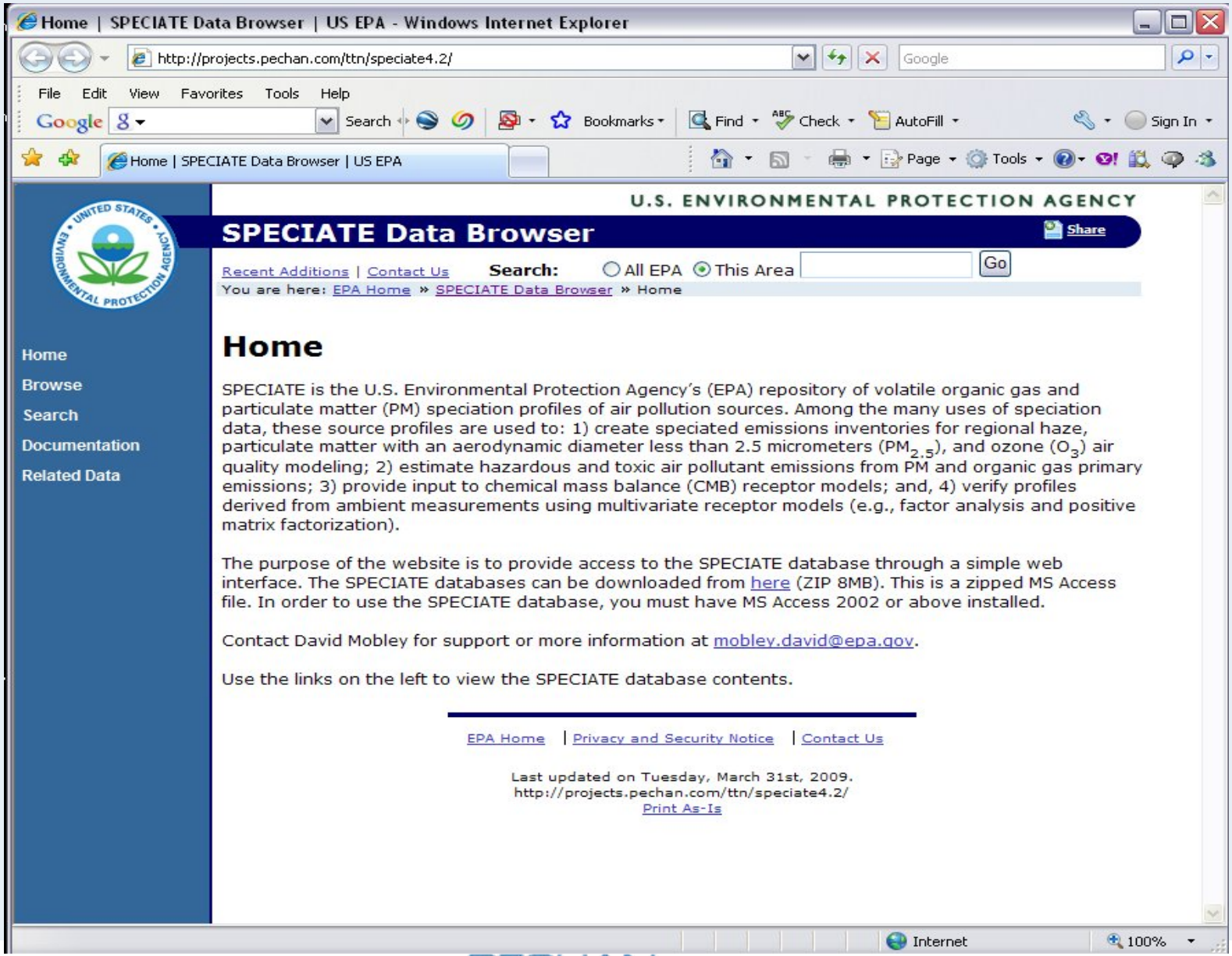
The SPECIATE Data Browser

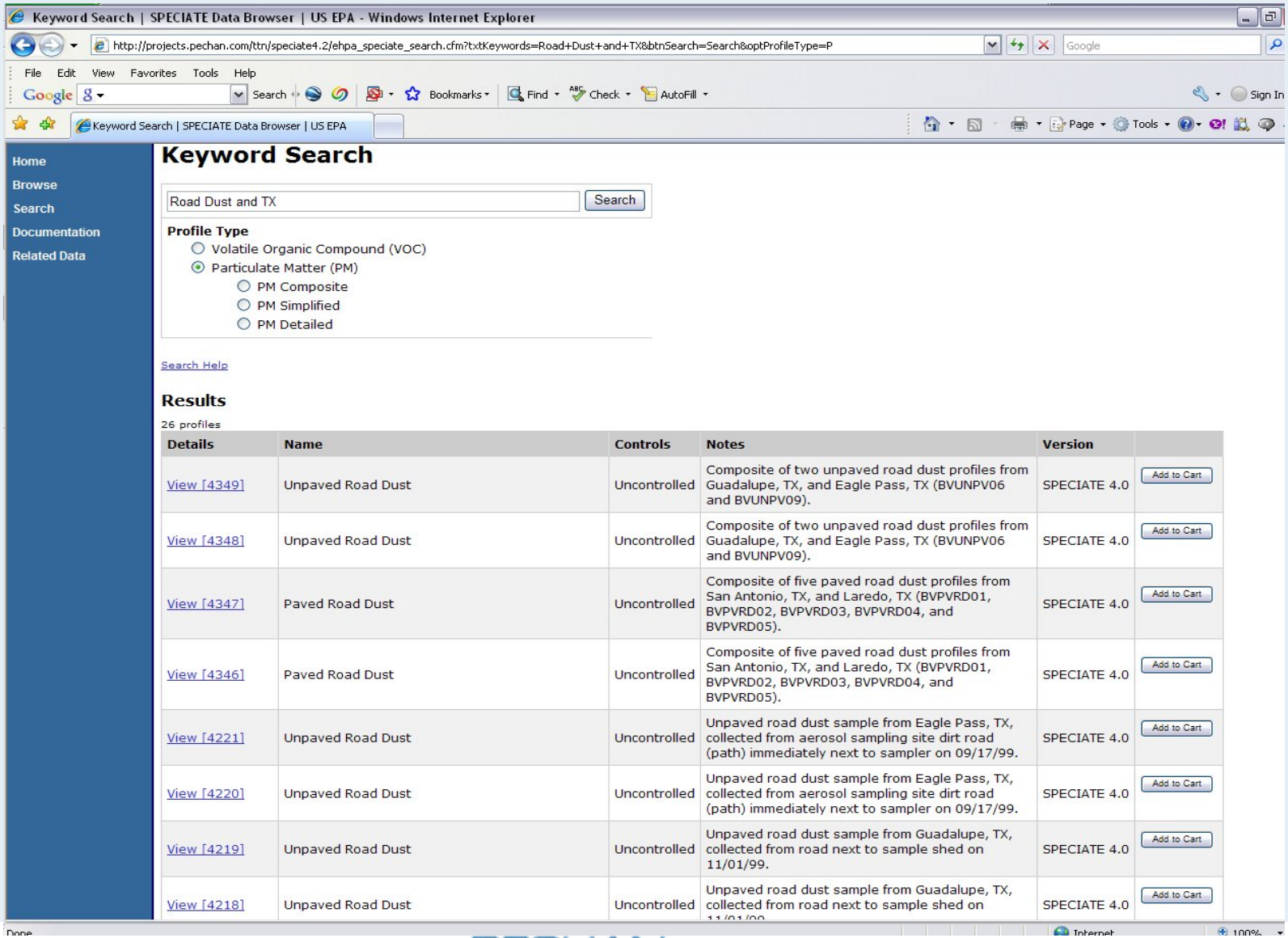
- Web-based application
  - ColdFusion® and Oracle®
- Accessed through internet browser
- Allows data searches by pollutant, key word, and category
- Allows data download
- No need to purchase or use Access

http://projects.pechan.com/ttn/speciate4.2/

Home Index Screen

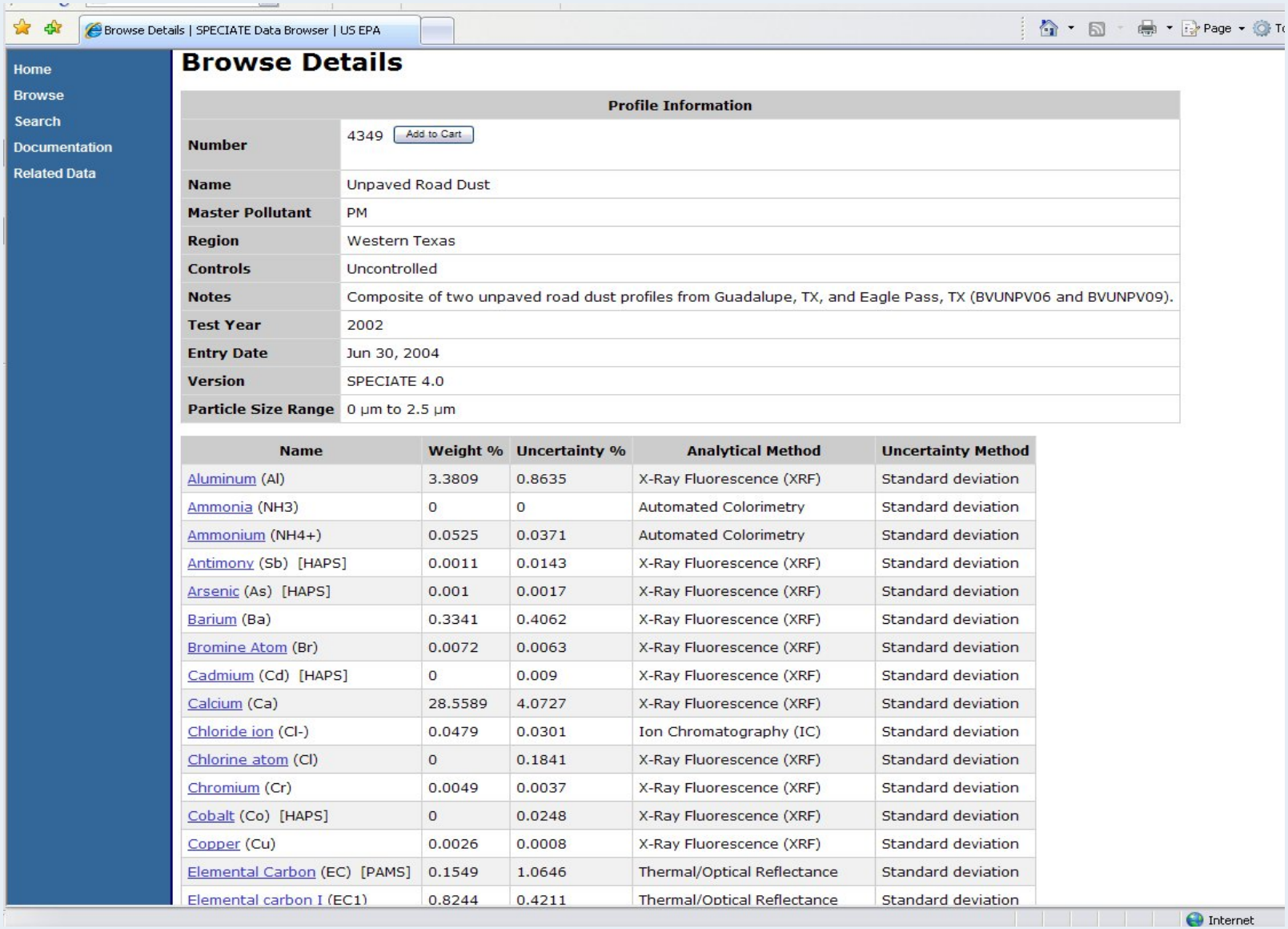


Keyword Search



Details	Name	Controls	Notes	Version	
View [4349]	Unpaved Road Dust	Uncontrolled	Composite of two unpaved road dust profiles from Guadalupe, TX, and Eagle Pass, TX (BVUNPV06 and BVUNPV09).	SPECIATE 4.0	Add to Cart
View [4348]	Unpaved Road Dust	Uncontrolled	Composite of two unpaved road dust profiles from Guadalupe, TX, and Eagle Pass, TX (BVUNPV06 and BVUNPV09).	SPECIATE 4.0	Add to Cart
View [4347]	Paved Road Dust	Uncontrolled	Composite of five paved road dust profiles from San Antonio, TX, and Laredo, TX (BVPVRD01, BVPVRD02, BVPVRD03, BVPVRD04, and BVPVRD05).	SPECIATE 4.0	Add to Cart
View [4346]	Paved Road Dust	Uncontrolled	Composite of five paved road dust profiles from San Antonio, TX, and Laredo, TX (BVPVRD01, BVPVRD02, BVPVRD03, BVPVRD04, and BVPVRD05).	SPECIATE 4.0	Add to Cart
View [4221]	Unpaved Road Dust	Uncontrolled	Unpaved road dust sample from Eagle Pass, TX, collected from aerosol sampling site dirt road (path) immediately next to sampler on 09/17/99.	SPECIATE 4.0	Add to Cart
View [4220]	Unpaved Road Dust	Uncontrolled	Unpaved road dust sample from Eagle Pass, TX, collected from aerosol sampling site dirt road (path) immediately next to sampler on 09/17/99.	SPECIATE 4.0	Add to Cart
View [4219]	Unpaved Road Dust	Uncontrolled	Unpaved road dust sample from Guadalupe, TX, collected from road next to sample shed on 11/01/99.	SPECIATE 4.0	Add to Cart
View [4218]	Unpaved Road Dust	Uncontrolled	Unpaved road dust sample from Guadalupe, TX, collected from road next to sample shed on	SPECIATE 4.0	Add to Cart

Browse Details



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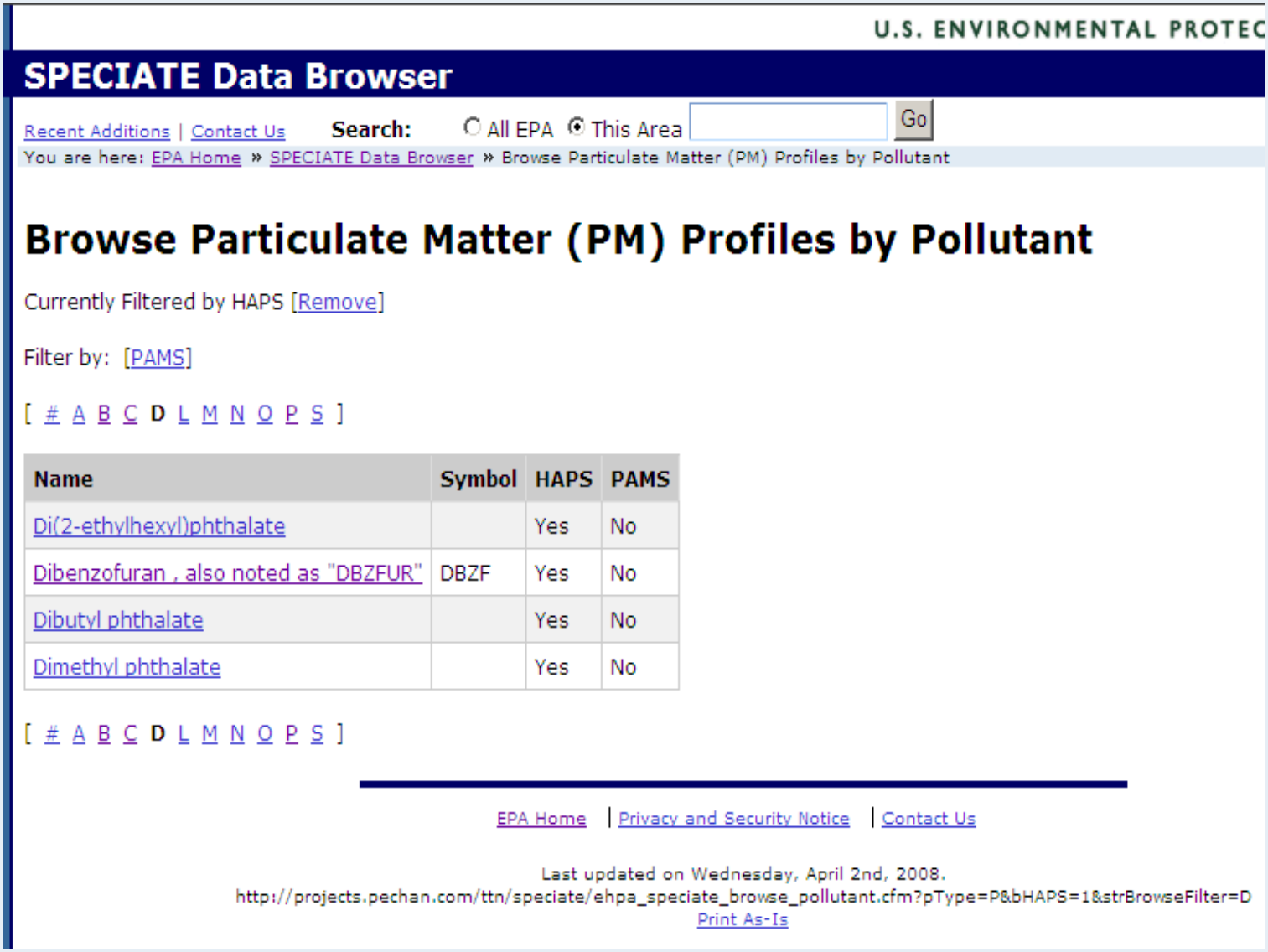
Browse PM by Pollutant



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Browse Particulate Matter (PM) Profiles by Pollutant

Currently Filtered by HAPS [Remove]

Filter by: [PAMS]

[# A B C **D** L M N O P S]

Name	Symbol	HAPS	PAMS
Di(2-ethylhexyl)phthalate		Yes	No
Dibenzofuran , also noted as "DBZFUR"	DBZF	Yes	No
Dibutyl phthalate		Yes	No
Dimethyl phthalate		Yes	No

[# A B C **D** L M N O P S]

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Last updated on Wednesday, April 2nd, 2008.
http://projects.pechan.com/ttn/speciate/ehpa_speciate_browse_pollutant.cfm?pType=P&bHAPS=1&strBrowseFilter=D
Print As-Is

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Results for Dibenzofuran

View [4400]	Oil Refinery	Unknown	Dilution tunnel sampling of a combined-cycle generating unit employing a General Electric Frame 7FA gas turbine with steam augmentation at Site E. The unit is a single shaft design, with the single generator driven by a shaft common to both the gas and the steam turbine. Hot exhaust gases from the turbine pass through a heat recovery steam generator (HRSG) before venting into the atmosphere via the stack. The total nominal capacity of the cogeneration facility is 240 MW. The unit fired natural gas for these tests. #2 run (9/7/01).	Add to Cart
View [4401]	Oil Refinery	Unknown	Dilution tunnel sampling of a combined-cycle generating unit employing a General Electric Frame 7FA gas turbine with steam augmentation at Site E. The unit is a single shaft design, with the single generator driven by a shaft common to both the gas and the steam turbine. Hot exhaust gases from the turbine pass through a heat recovery steam generator (HRSG) before venting into the atmosphere via the stack. The total nominal capacity of the cogeneration facility is 240 MW. The unit fired natural gas for these tests. #3 run (9/8/01).	Add to Cart
View [4403]	Oil Refinery	Unknown	Average of CCGU_E1, CCGU_E2 and CCGU_E3.	Add to Cart
View [4558]	Vehicle exhaust - gasoline - Catalyst	Catalytic converter	Weight percentages are from the undenuded sampling train. Downstream of the organics denuder, OC = 31.8% of the fine particle mass.	Add to Cart
View [4559]	Vehicle exhaust - gasoline - Noncatalyst	None	Weight percentages are from the undenuded sampling train. Downstream of the organics denuder, OC = 58.3% of the fine particle mass.	Add to Cart
View [4675]	Medium duty trucks - diesel	Catalytic converter	Weight percentages are from the filter downstream of an organics denuder. On the undenuded filter, OC = 30.4% of the fine particle mass.	Add to Cart

Results for profile 4400

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Profile Information	
Number	4400 Add to Cart
Name	Oil Refinery
Master Pollutant	PM
Region	United States
Controls	Unknown
Notes	Dilution tunnel sampling of a combined-cycle generating unit employing a General Electric Frame 7FA gas turbine with steam augmentation at Site E. The unit is a single shaft design, with the single generator driven by a shaft common to both the gas and the steam turbine. Hot exhaust gases from the turbine pass through a heat recovery steam generator (HRSG) before venting into the atmosphere via the stack. The total nominal capacity of the cogeneration facility is 240 MW. The unit fired natural gas for these tests. #2 run (9/7/01).
Test Year	2001
Entry Date	Jun 30, 2004
Version	SPECIATE 4.0
Particle Size Range	0 µm to 2.5 µm

Name	Weight %	Uncertainty %	Analytical Method	Uncertainty Method
1&2-ethylnaphthalene (ENAP)	0.146150023	0.007767115	Filter/PUF/XAD/PUF Cartridges; GC/MS	Standard

139 Additional Compounds

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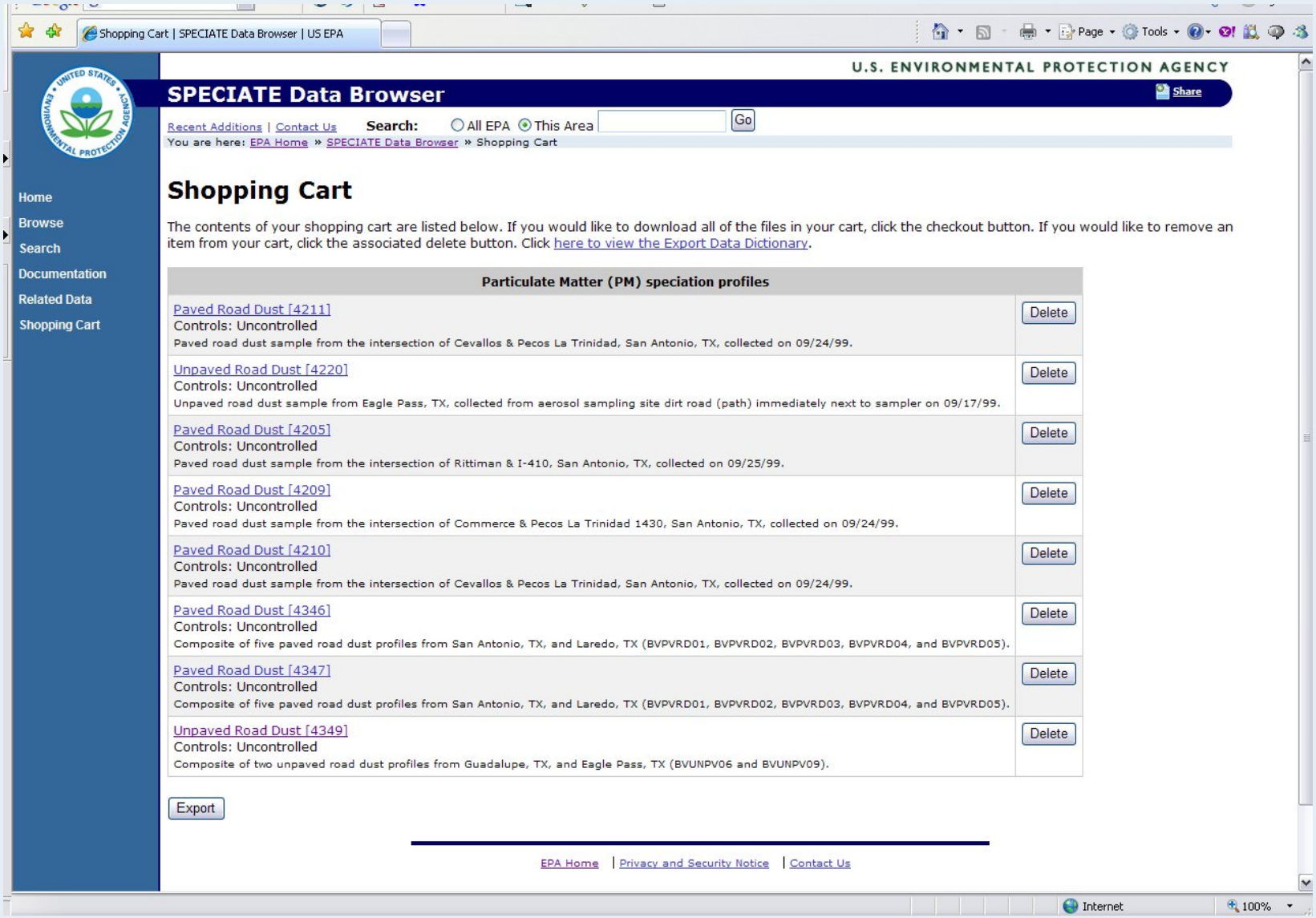
Shopping Cart



Conclusion

- SPECIATE 4.2 and its Data browser represent a significant enhancement of the data available to characterize emissions by species and source category.
- The SPECIATE Data Browser makes it easy for non Access users to view and use SPECIATE data
- New source profiles and application features will be added In future revisions
- You can help by supplying data
  - Electronic data preferred
- Questions/Comments/Suggestions
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  - Lee Beck - beck.lee@epa.gov
- http://cfpub.epa.gov/si/speciate/
- http://projects.pechan.com/ttn/speciate4.2/