

ICR Data Analysis Presentation for NWF

September 8, 2000



Electric Utility Air Toxics Study

- Section 112(n)(1)(A) of CAA: EPA must perform study of, and report to Congress on, the hazards to the public health of HAP emissions from utility units
- Based on the results of the study, Administrator must determine whether HAP regulations for utility units are appropriate and necessary
 - ▶ Current schedule: on or before 12/15/00



Report to Congress

- Report to Congress issued in February 1998
 - ▶ HAP of greatest concern -- mercury from coal-fired units
 - ▶ Uncertainties noted in areas of
 - Mercury contents of various coals
 - Mercury emissions data (how much, what species, factors affecting emissions)



Information Collection Request (ICR)

- Intended to inform electric utility regulatory determination
 - ▶ Approved for one year
 - ▶ No plans to continue
 - Revised TRI reporting went into effect 01/01/00
 - Includes 10 lb/yr threshold for mercury
 - ▶ Data collected will be considered along with other information (health studies, control options, etc.) to inform Administrator for the regulatory determination



ICR (cont.)

- Used to improve the overall estimate for amount and species of mercury emissions from utilities
- Speciation important for evaluating
 - ▶ Control technology effectiveness
 - ▶ Transport, deposition, and impacts



ICR (cont.)

- Identified all coal-fired utility units and their control configuration
- Required all such units to analyze coal mercury content for calendar year 1999
- Required ~85 coal-fired utility units to test for speciated mercury emissions
- Final data received by EPA June 2000
 - ▶ Preliminary analyses complete



Number of units

- Identified approximately 1,140 coal-fired utility units at approximately 450 facilities
- Coal-fired units located in 46 of 50 States
 - ▶ No units located in ID, ME, RI, or VT
- Updated control device information for each facility



Fuel Analyses

- Analyses required
 - ▶ Sulfur, Btu, ash, moisture, mercury, and chlorine content, beginning with every 6th shipment
 - ▶ Fuel use data also received
- Data review
 - ▶ Statistical analyses
 - ▶ Obvious anomalies in input
- Records of over 152,400 shipments and over 39,500 analyses



Coal Data

- Data received on
 - ▶ Anthracite (114 analyses)
 - ▶ Bituminous (27,884 analyses)
 - Includes coal from Columbia and Venezuela (270 analyses)
 - ▶ Subbituminous (8,193 analyses)
 - Includes coal from Indonesia (78 analyses)
 - ▶ Lignite (1,047 analyses)
 - ▶ Waste anthracite (culm; 377 analyses)
 - ▶ Waste bituminous (gob; 575 analyses)
 - ▶ Waste subbituminous (53 analyses)



Other Fuels

- Petroleum coke and tire-derived fuel
 - ▶ Similar in appearance and type of feed to coal
 - ▶ Used increasingly, but still in small quantities nationwide, in coal-fired boilers
- Few data previously available
 - ▶ Petroleum coke
 - Nationwide representation, including off-shore refineries
 - 1,149 analyses
 - ▶ TDF
 - Nationwide representation
 - 149 analyses



Preliminary Coal Analyses

	# of analyses	Range*	Mean*	Std. dev.*
Anthracite	114	5.02 - 35.19	13.37	6.23
Bituminous	27,884	0.04 - 103.81	7.05	6.69
SA bit	270	0.70 - 66.81	4.91	5.28
Subbit	8,193	0.39 - 71.08	5.00	3.59
Indon. subbit	78	0.79 - 4.61	2.39	0.86
Lignite	1,047	0.93 - 75.06	7.94	9.05
Waste anth	377	2.49 - 73.02	27.77	11.94
Waste bit	575	2.47 - 172.92	53.32	44.35
Waste subbit	53	5.81 - 30.35	10.79	4.66
Pet coke	1,149	0.06 - 32.16	2.16	3.18
TDF	149	0.38 - 19.89	2.79	2.78

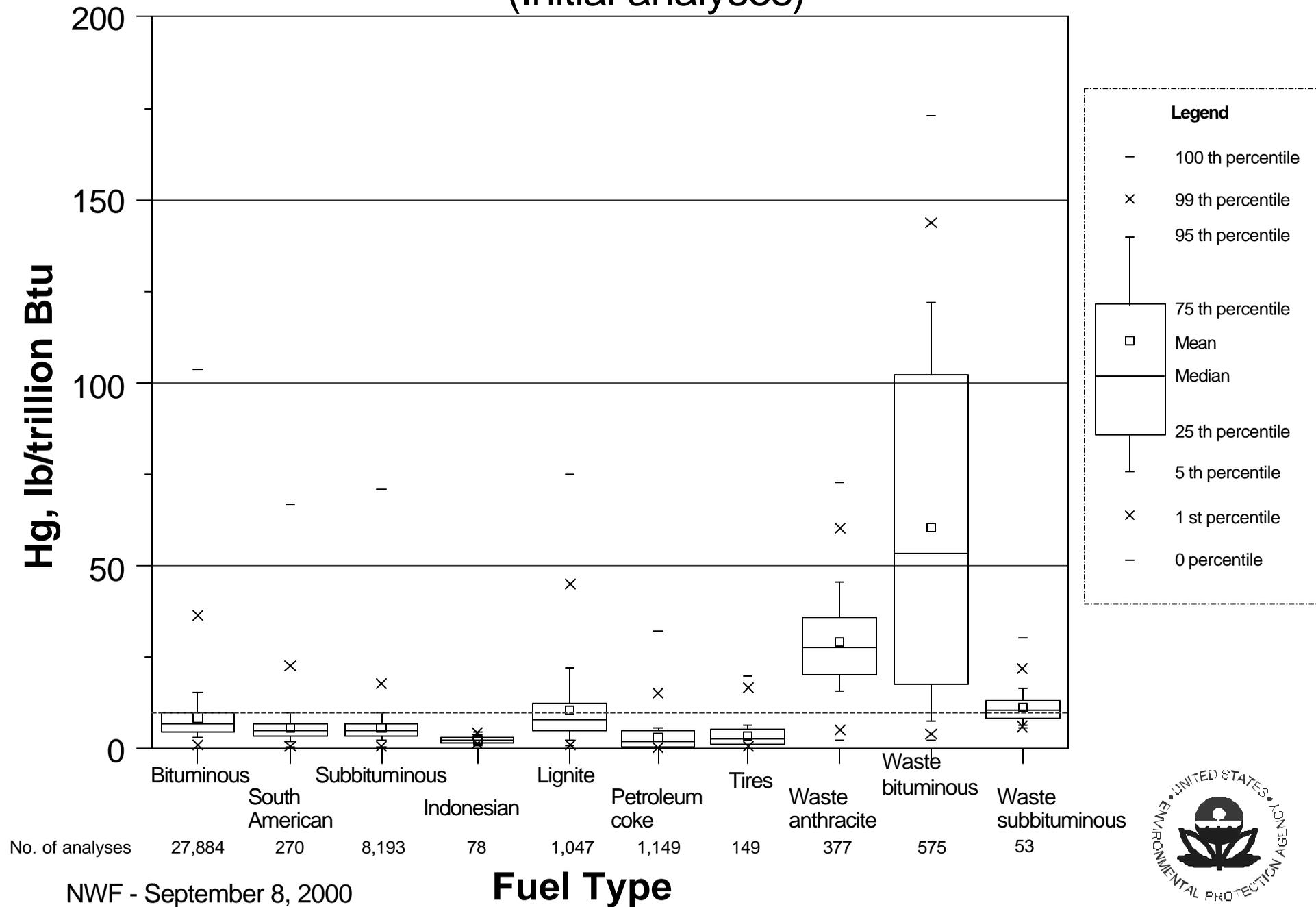
* lb Hg/trillion Btu

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1999 ICR Data Analyses - Mercury in Fuels

(Initial analyses)

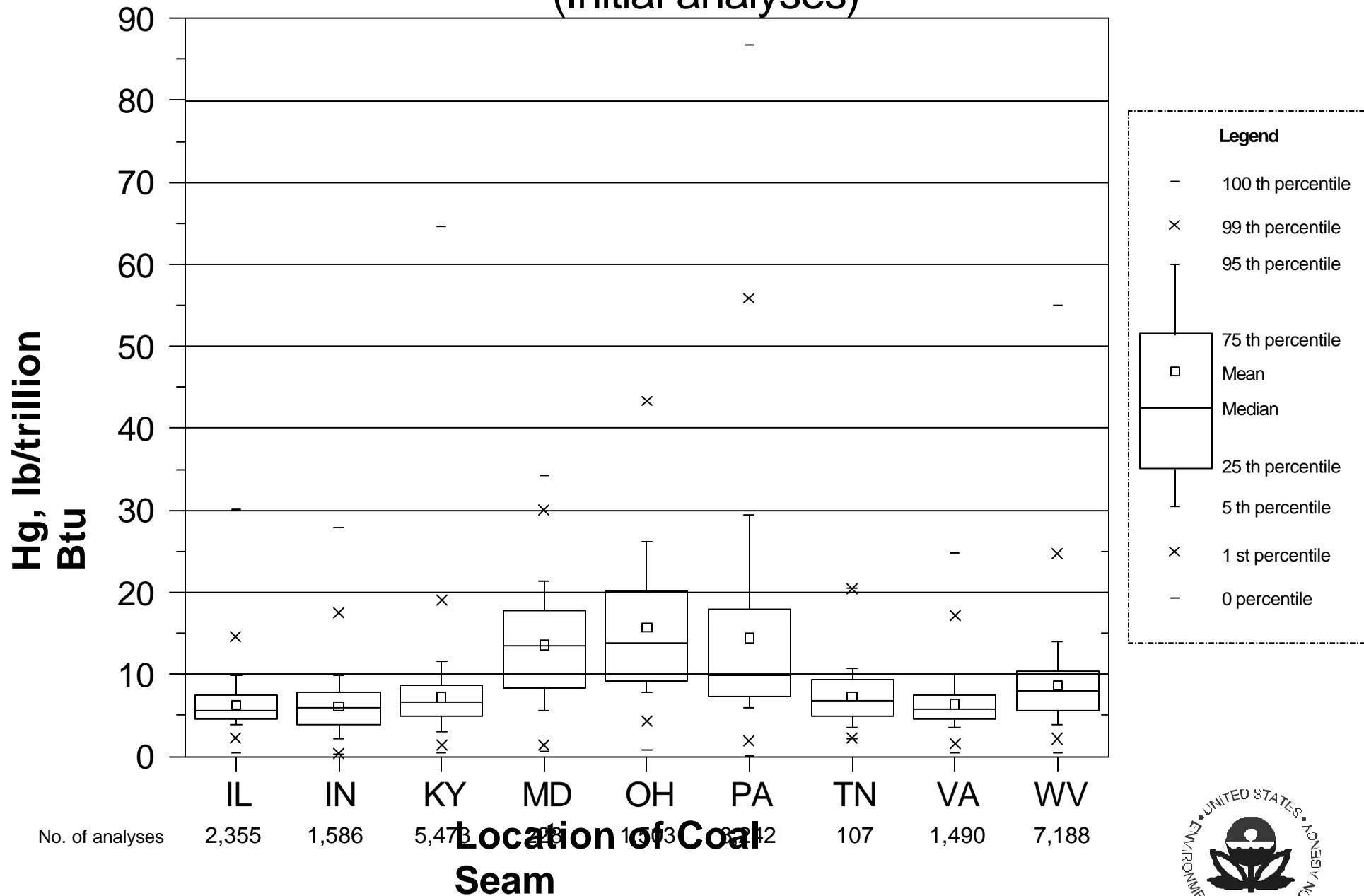


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1999 ICR Data Analyses - Eastern Bituminous

(Initial analyses)

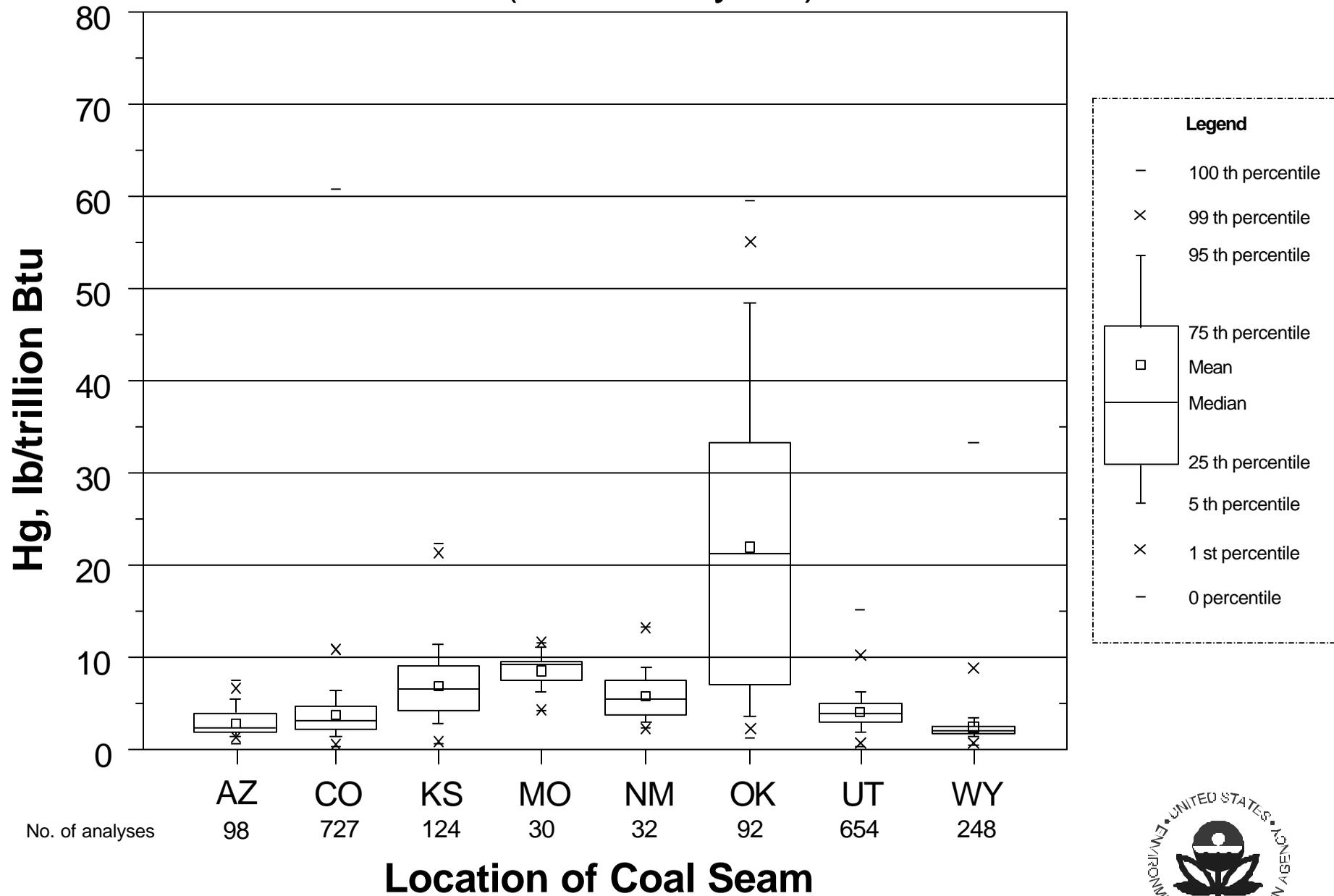


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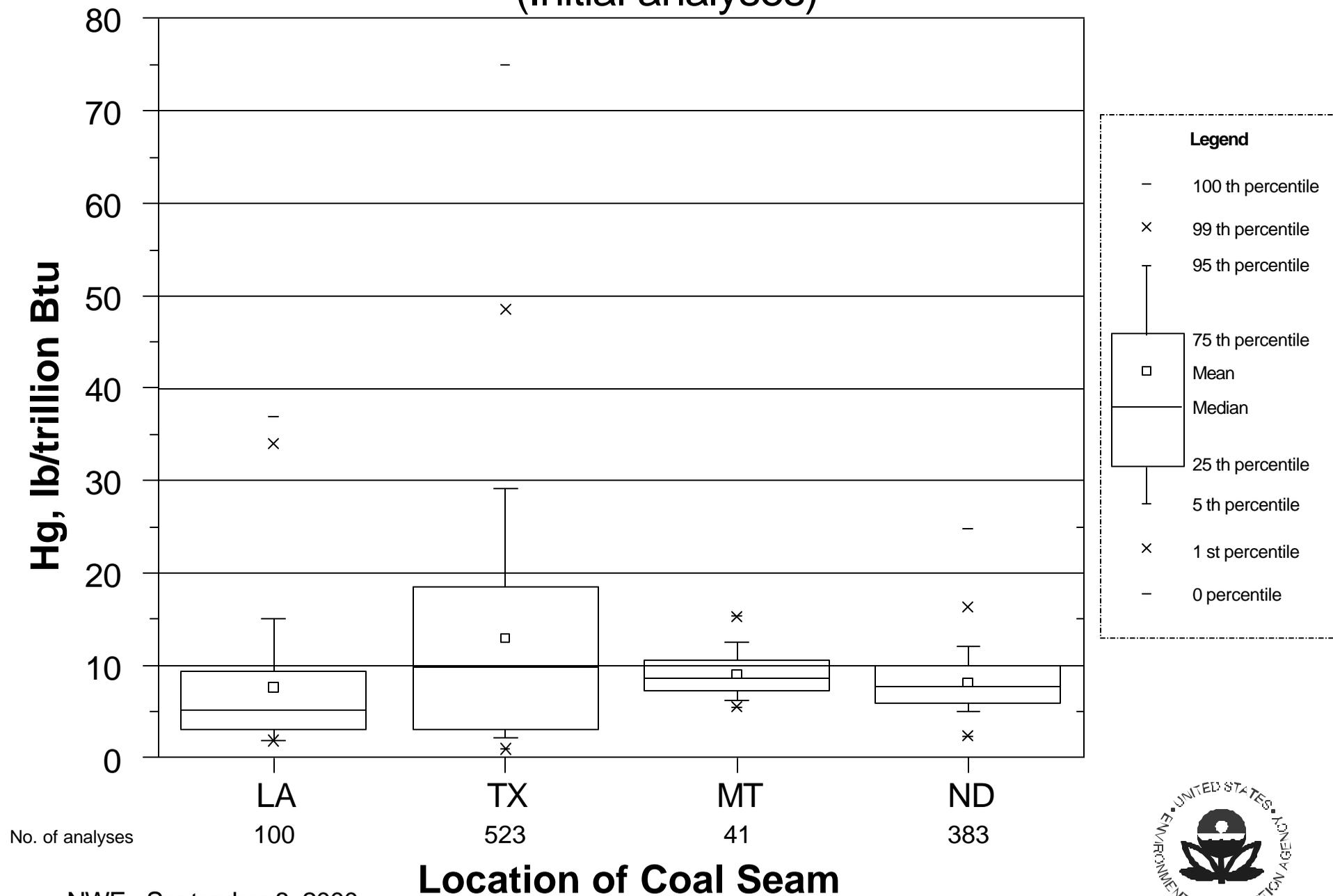
1999 ICR Data Analyses - Western Bituminous

(Initial analyses)



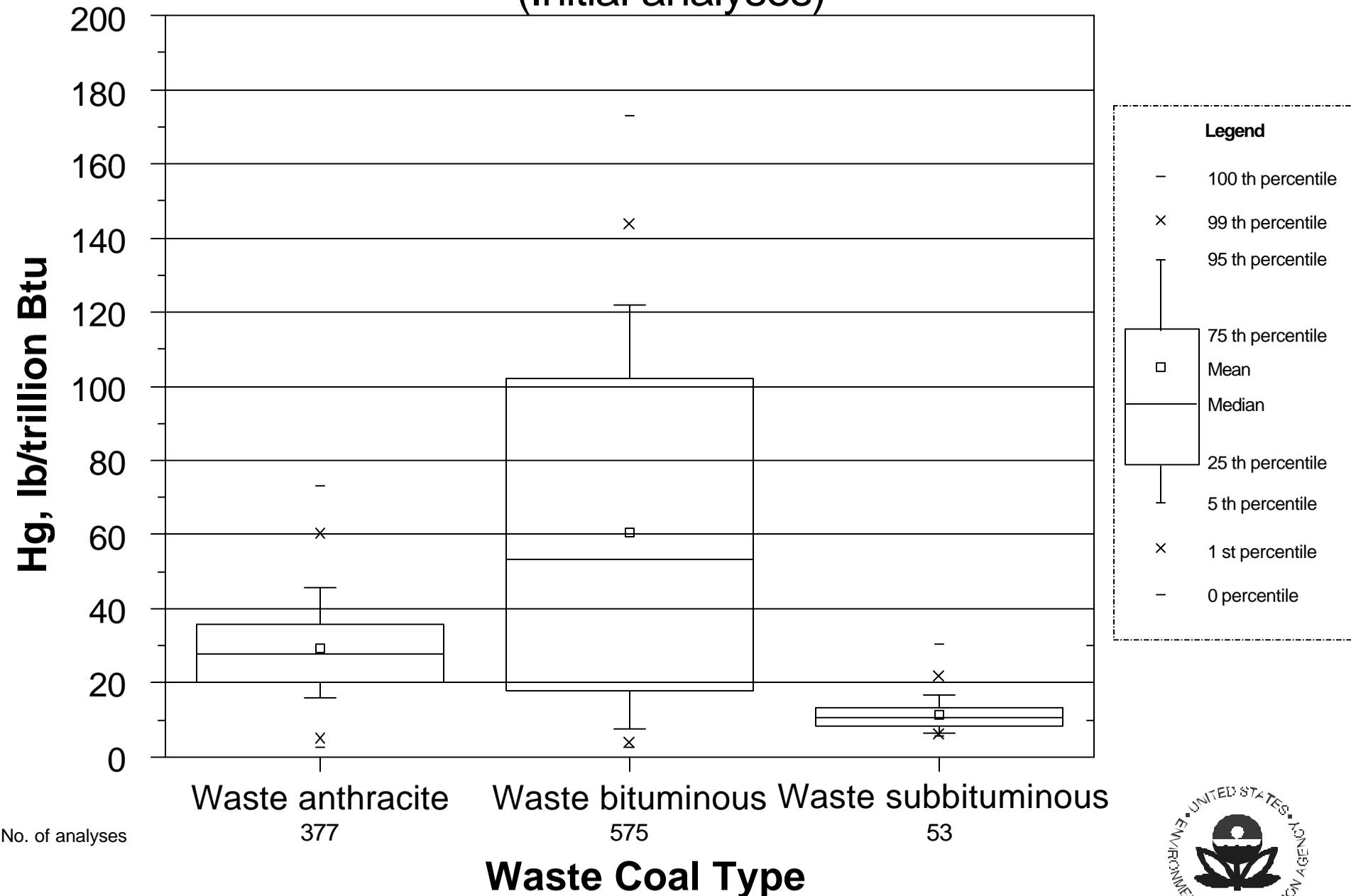
1999 ICR Data Analyses - Lignite

(Initial analyses)



1999 ICR Data Analyses - Waste Coal

(Initial analyses)

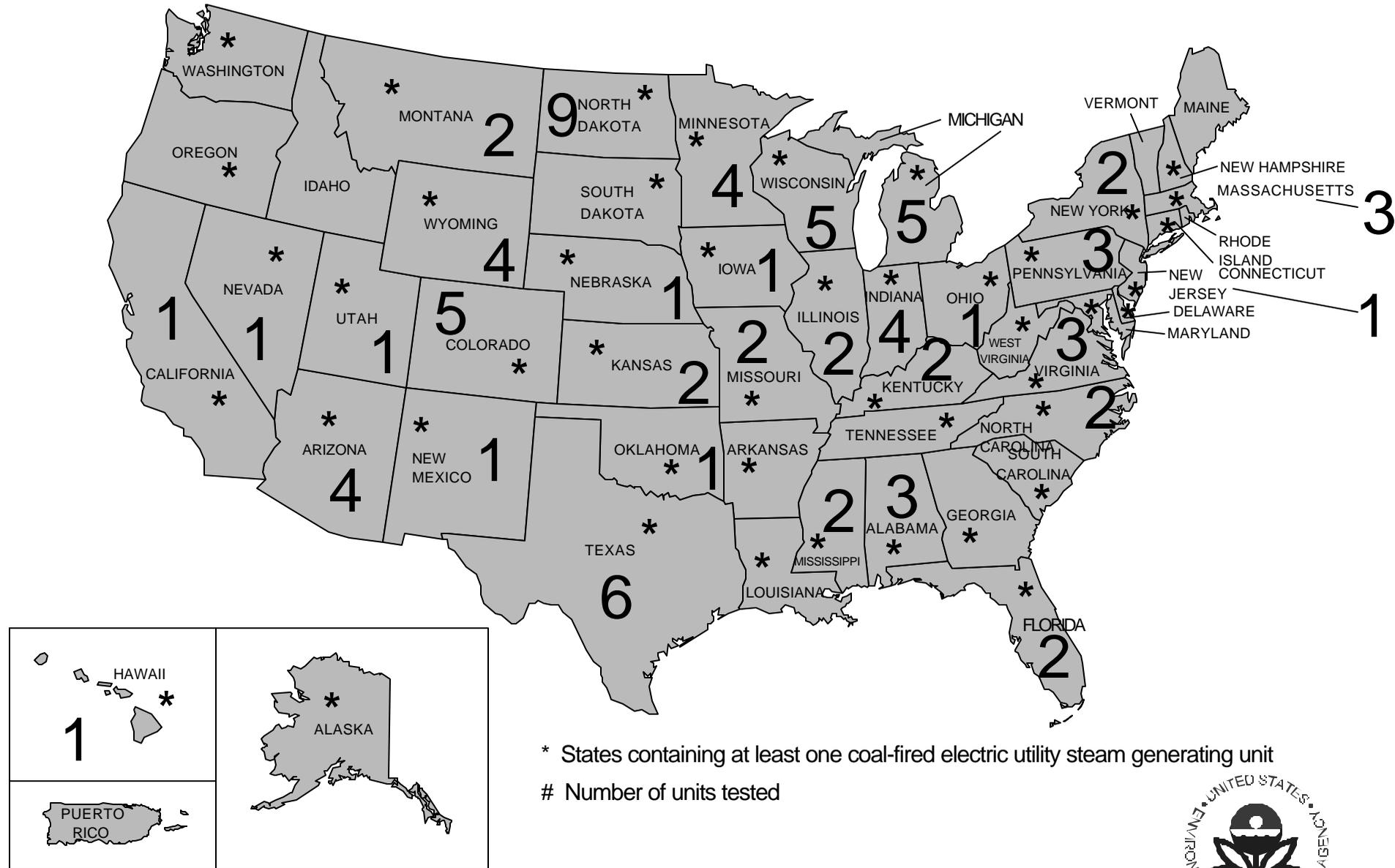


Speciated Emission Tests

- Units randomly selected based on matrix categories
 - ▶ Type of coal
 - ▶ Type of SO₂ control
 - ▶ Type of particulate control
- Included 13 tests from DOE program
- Three units excused from testing
- Six units tested voluntarily by companies outside ICR effort



Location of Tested Units



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Speciated Mercury Emissions Data Analyses

- Extracted data from reports into spreadsheet for further analyses
 - ▶ Examined data for "weird" results
 - ▶ Explored several approaches to analyze data
- Test reports posted on web site
- Spreadsheets will be posted in future
 - ▶ Raw extracted data
 - ▶ Control device analyses
 - ▶ Nationwide mercury emission estimate



Handling of “weird” data

- Data examined for “visual” outlier points
 - ▶ Reexamined 12 emission test reports
 - Found 2 reports where data transcription errors had been made in our database
 - For the remainder of reports, no indication as to why given value out of range of others within test or within group
 - ▶ Made changes for transcription errors; no other data “deferred” from analysis at this time
 - Feel that it is not appropriate to “slice” data too fine



Analysis Approach Used

- Exploring approach that looks at all control devices on a given plant as one, rather than as a series of individual controls
 - ▶ Seems to use "power" of new data best
 - ▶ Best reflects new thought(s) on how mercury may behave in boiler systems
 - ▶ Uses information that Hg control may be dependent on all factors

System-specific Method

- Method of estimation under evaluation
 - ▶ Emission modification factor based on total mercury removal through all control devices
 - If one control: use inlet/outlet data from Ontario-Hydro method
 - If two controls: use coal data in/Ontario-Hydro data out
 - ▶ Bins defined for fuel-boiler-control(s) match
 - ▶ Industry sorted by bins

Comparison with Industry

- EPRI has also been analyzing data
 - ▶ Used an algorithm approach
 - Correlates mercury emissions with chlorine content of coal for each fuel-boiler-control(s) combination
 - Analysis results consistent with EPA results



Control Technology Assessment

- Mercury removal by existing controls on bituminous coal-fired PC boilers higher than expected
 - ▶ Increase of 5 to 35 percentage points over that used in Report to Congress
- Mercury removal on subbituminous-fired and lignite-fired boilers only low to moderate
 - ▶ Lower than found for bituminous in most cases
 - ▶ Little difference over that used in Report to Congress



Control Assessment (cont.)

- PM scrubbers are not generally effective for mercury capture
- SNCR and SCR systems may enhance mercury control in ESP and FF systems on bituminous coal
 - ▶ Limited data indicate removal efficiencies may move into the 90%+ range
 - ▶ Further research needed
- Mercury control on waste coals appears to be >90%



Data Availability

- ICR information located at:
 - ▶ <http://www.epa.gov/ttn/uatw/combust/utiltox/utoxpg.html>
 - Background material
 - Coal data for 1999
 - List of plants
 - *Summary analyses of speciated emission data {future}*
 - ▶ <http://www.utility.rti.org>
 - Speciated mercury emission test reports in "pdf" format *{will be migrated to EPA site in near future}*



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