



EPRI ICR Data Analyses

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ICR Data Available

- Part 1 - General power plant information for all coal plants
- Part II - Coal analyses (Hg, Cl, S) for all coal plants
 - Monthly coal consumption
- Part III - Flue gas measurements at 84 plants
 - Control device inlet/outlet
 - Coal analyses (Hg, S, Cl)

Objective and Approach

Estimate 1999 total and speciated Hg emissions for all US coal power plants

- Using coal data, estimate total mercury entering power plants
- Using stack data, develop predictive correlations, relationships
- Using plant and coal data - and using correlations, estimate Hg emissions for all plants

Correlation Approach

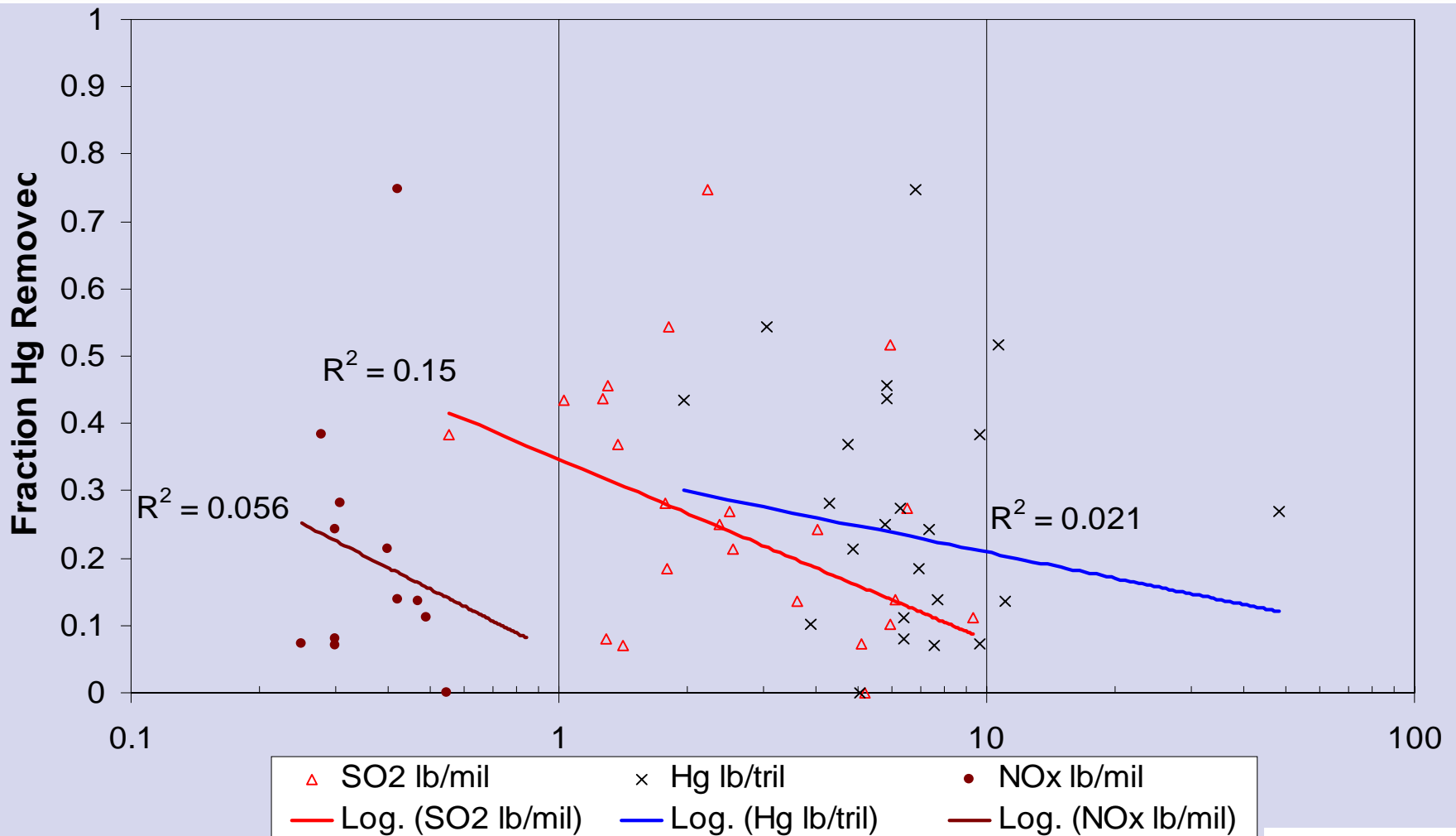
- Develop correlation based on “available” parameters
 - Data measured in ICR test report
 - Data available for all coal power plants
- Possible factors that impact Hg, but not incorporated
 - LOI, unburn carbon
 - Flue gas temperature
 - Flue gas residence time
 - Metal concentrations in coal, ash
 - Effect of SCR, SNCR, NH₃



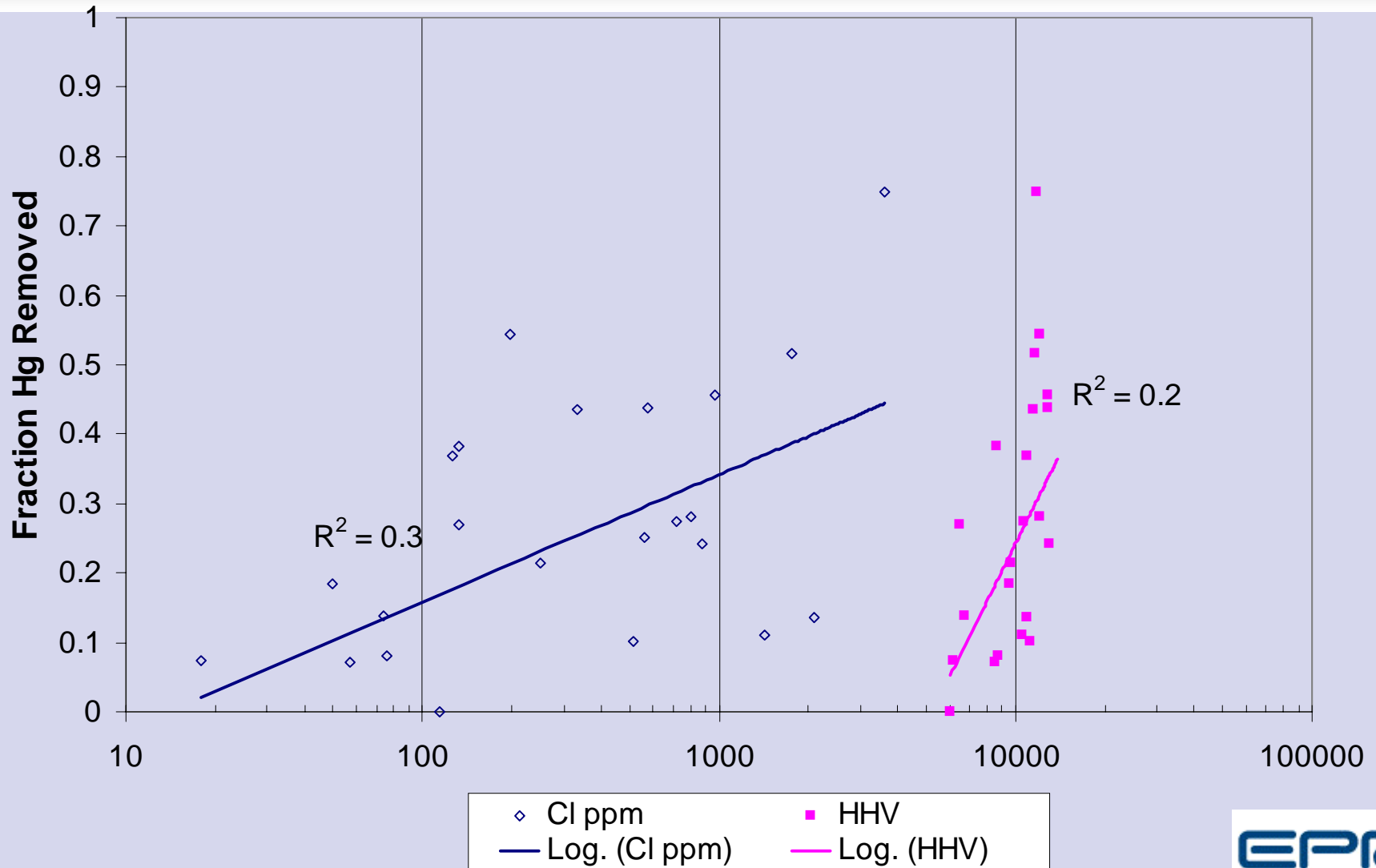
Divided Industry into 12 Control Technology Categories

Controls	Test Sites	US Sites	Tons Hg Entering
<i>Across Particulate Controls</i>			
ESP cold	18	674	39.4
ESP hot	9	120	5.5
Fabric Filter	9	58	2.9
FBC FF	5	39	3.4
Vent. Scrubber	9	32	2.2
IGCC	2	2	0.07
FBC ESPc	1	1	0.02
<i>Across FGD Systems</i>			
ESPc FGDw	11	117	16.8
ESPh FGDw	6	20	1.6
FF FGDw	2	14	1.5
FGDd FF	10	47	1.6
FGDd ESPc	3	5	0.3

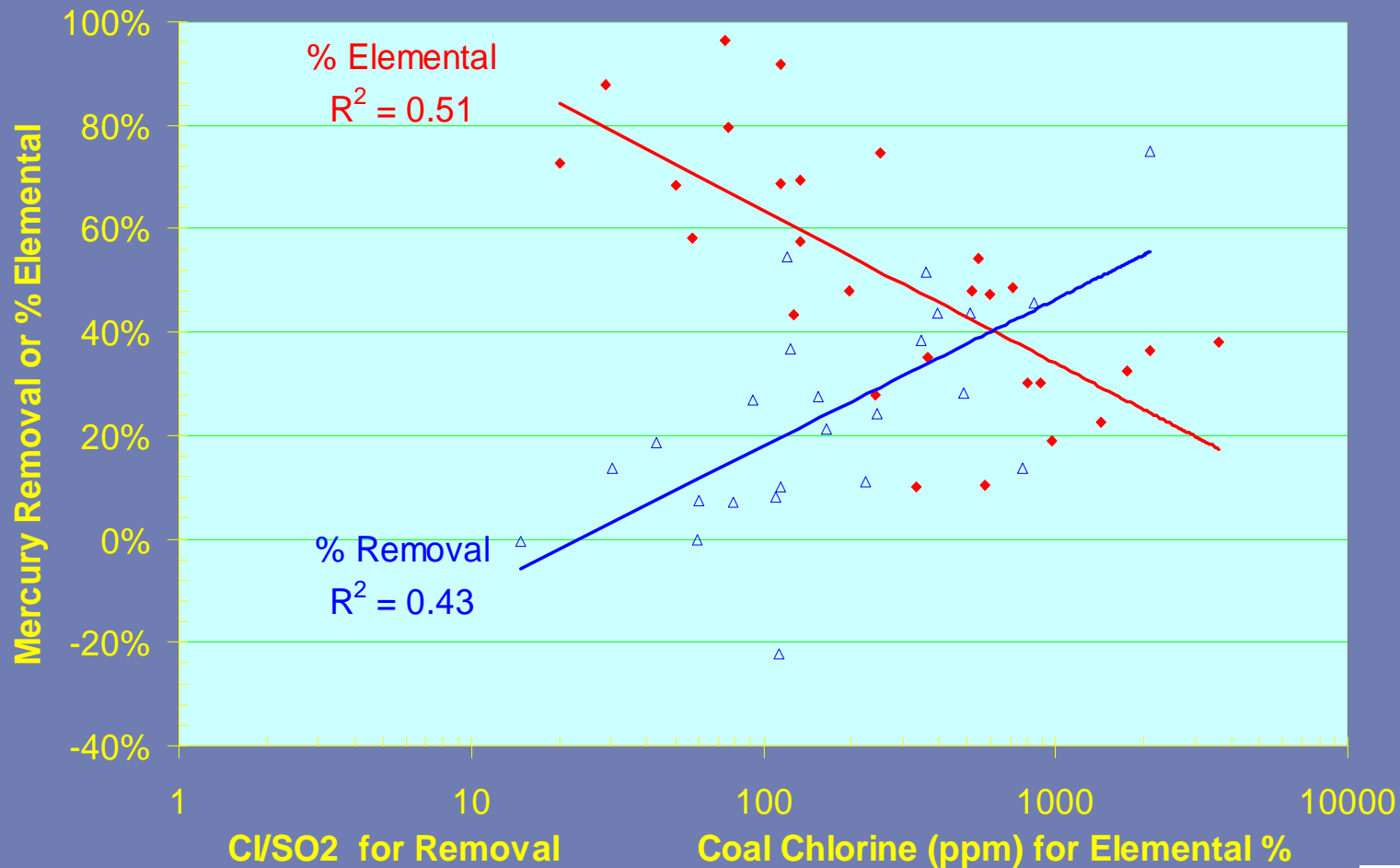
Effect of NOx, SO2, Hg on Hg Removal ESPs (cold) Category



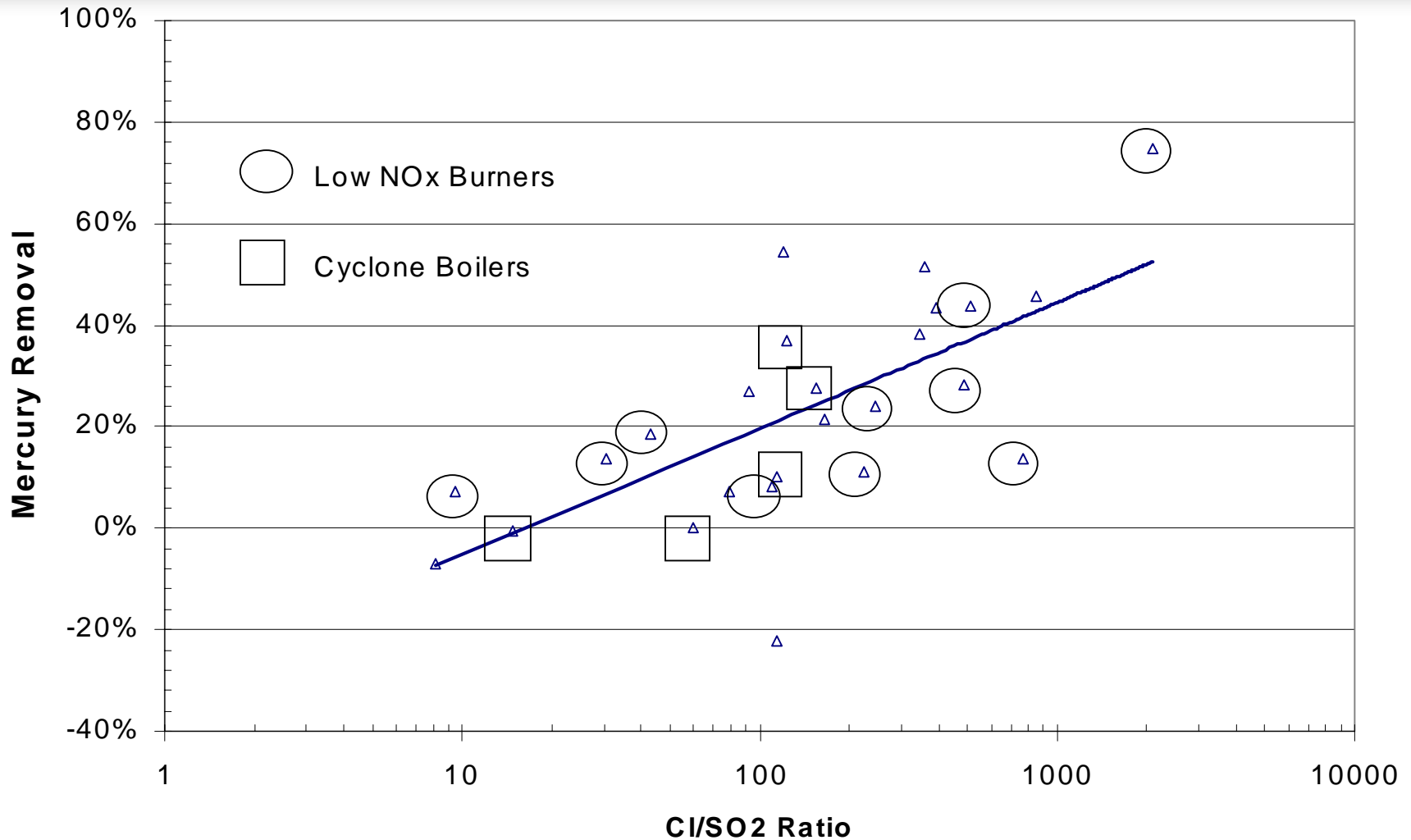
Effect of Cl and HHV (coal type) on Hg Removal - ESPs (cold) Category



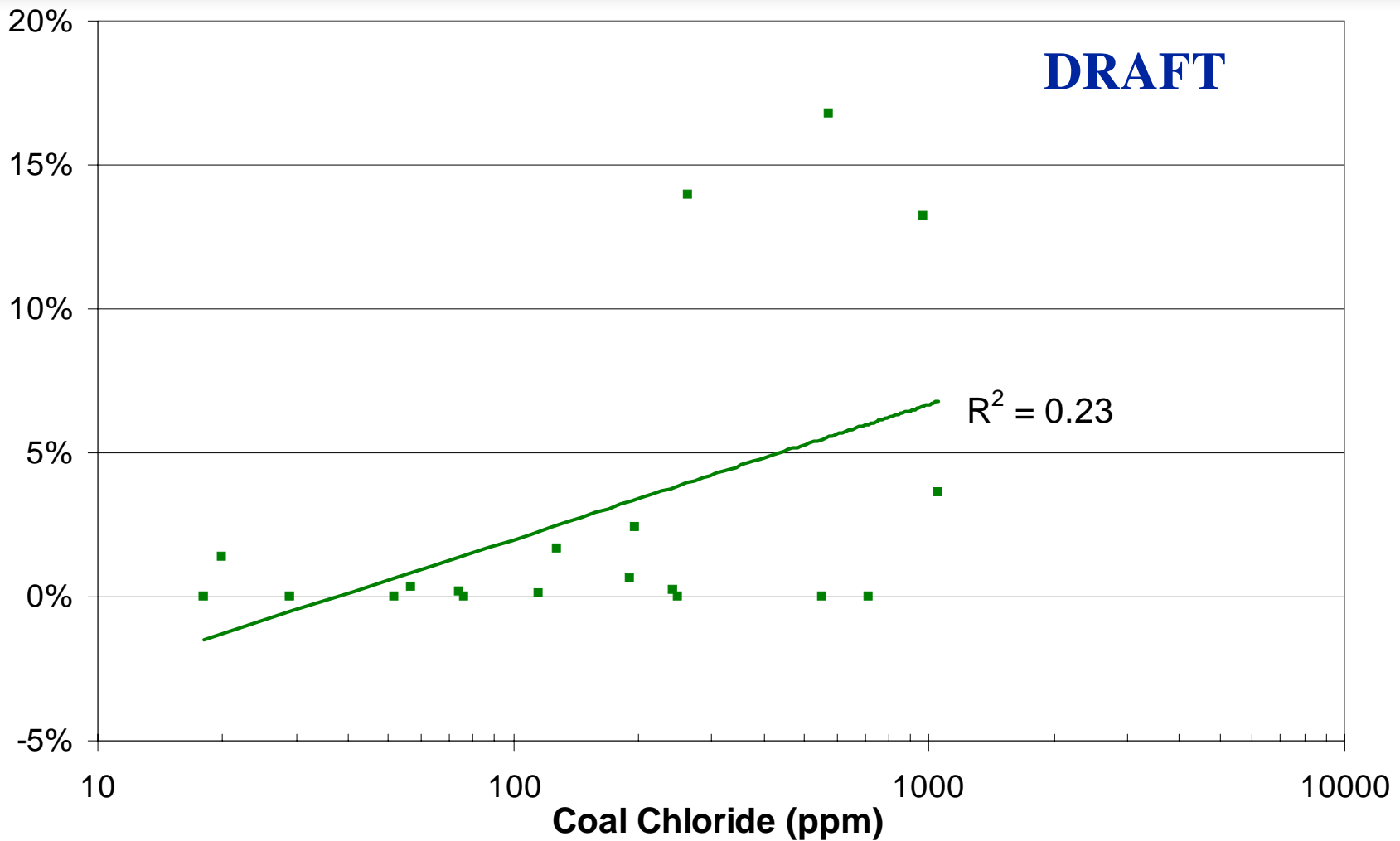
ESPs (cold) - Correlations for Hg Removal, Speciation (% Elemental)



Effect of Firing Configuration



Cold ESPs: Hg in Particulates Employ average particulate Hg



Calculation Methodology for Industry Estimate

- Calculate Hg entering power plant (ICR Part II)
- Calculate % Hg removal based on mean Cl and S in the coal (ICR Part II)
- Calculate % elemental Hg based on mean Cl
- Particulate Hg is an average of the data
- % Oxidized = $100 - \text{Elemental Hg} - \text{Particulate Hg}$

Methodology - Constraints

- Limitations - more variables? not directly correlated, e.g. temperature, LOI, ash, etc.
- Coal analyses defines mercury entering boiler
- Assume no mercury in bottom ash
- Did not extrapolate the correlation beyond the existing data
- No negative or $>100\%$ of input emissions (possible with correlations)

EPRI Mercury Emission Estimates

- 1999 Hg emissions from coal plants = 45 tons
 - Estimate 75 tons entering plants
 - Average 40% removal from existing controls tech.
- Large uncertainty in EPRI correlations for some of the less populated categories
 - Sufficient data for the key categories (ESPc, ESPc/FGDw)
- Variability, uncertainty - primarily plant-specific
 - Other independent variables not incorporated such as LOI, flue gas temperature, others?
- Effect of SCR, SNCR ?
 - Estimate >55% (MW) will install by 2010