

Presented
TO D.D.
5 Nov 01

Superior Special Services, Inc Variance Request

Chapter 62-737

Management of Spent Mercury-Containing Lamps and
Devices Destined for Recycling

Background

- Superior Special Services, Inc. (SSS), Tallahassee, FL
 - Mercury reclamation facility
- HW C & E Inspection – January 17, 2001
 - Three violations
 - Exceed storage container capacity
 - Failure to comply with sampling plan
 - Failure to comply with 99% reclamation rate
 - Enforcement resulting in Short Form Consent Order
 - Civil Penalty and Costs of \$6,600
 - Required to submit variance request for 99% reclamation rate
 - Petition for Variance from Rule 62-737-860(4)
 - Received August 8, 2001
 - Public Notice of Receipt of Petition Completed
 - Waiver of 30-Day Time Limit until October 30, 2001

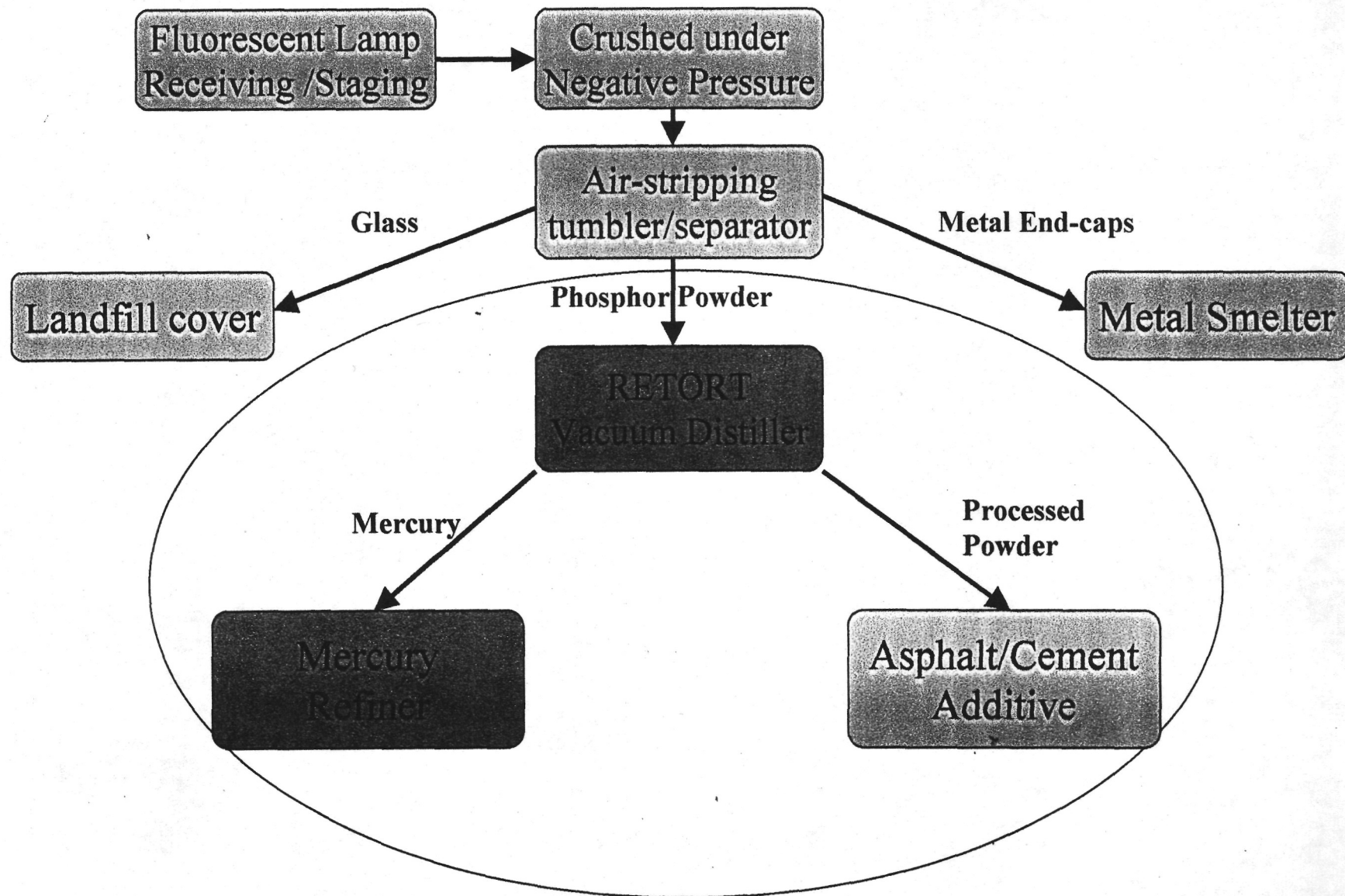
Rule 62-737.860

- Additional Permitting Requirements for Mercury Reclamation Facilities
 - “ **737.860(4)** –Facilities shall maintain quality control and testing records based on statistically significant and updated laboratory analyses that use an EPA-approved methodology for analyzing total mercury content, as specified in the facility’s operating permit issued under this Chapter, and that demonstrate at least semi-annually an effective reclamation rate of 99 percent of the mercury introduced into the process, or a resulting total mercury concentration below the method detection limit.”
 - **Additionally, Permit HO37-272625** states: “The permittee shall maintain quality control and testing records demonstrating, using an EPA approved methodology (SW 846, latest edition) for analyzing total mercury content, an effective reclamation rate of 99 percent of the mercury introduced into the process or a resulting total mercury concentration below the method detection limit.”

IMAGE QUALITY

AS YOU VIEW THE FOLLOWING
DOCUMENT, PLEASE NOTE THAT
PORTIONS OF THE ORIGINAL WERE OF
POOR QUALITY

Mercury Reclamation Process



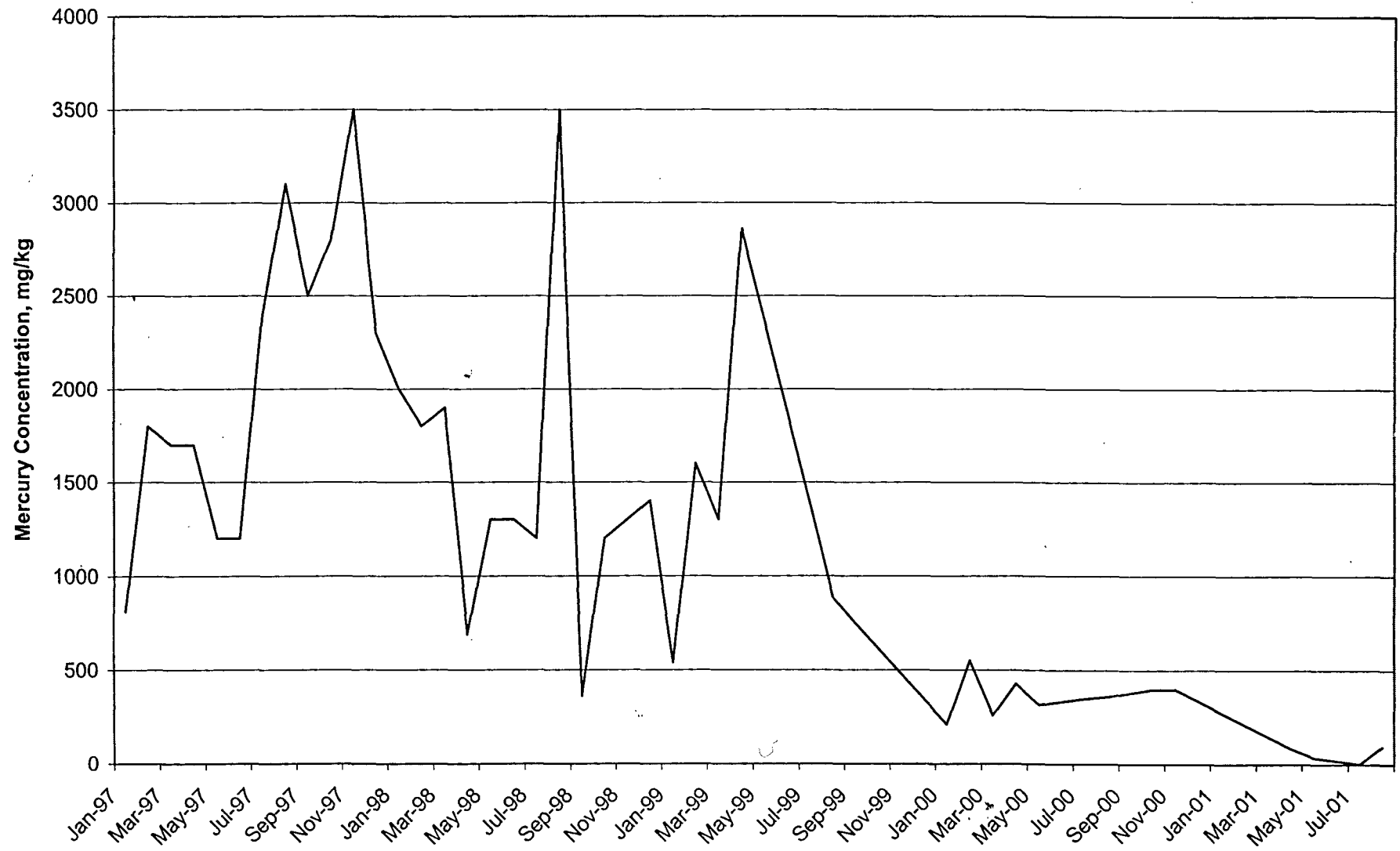
Variance Request

- Seeking relief under section 120.542 FS
 - Request variance to mercury 99% reclamation rate
 - Proposing modified mercury reclamation rate
 - Rate schedule based on pre-retort mercury concentration of the material to be processed.

“Green” Fluorescent Lamps

- SSS opened Tallahassee facility in 1996
- Lamp manufactures have since reduced the concentration of mercury in lamps
 - These lamps entering waste stream in recent years
 - Manufactures continue efforts to reduce mercury content
- The result is a reduced concentration of mercury in the phosphor powder derived from the processing of lamps
- SSS believes that as the pre-retort mercury concentration decreases, the amount of time required to volatilize and capture 99% of the mercury increases “logarithmically”.

Pre-Retort Mercury Concentrations



Alternatives

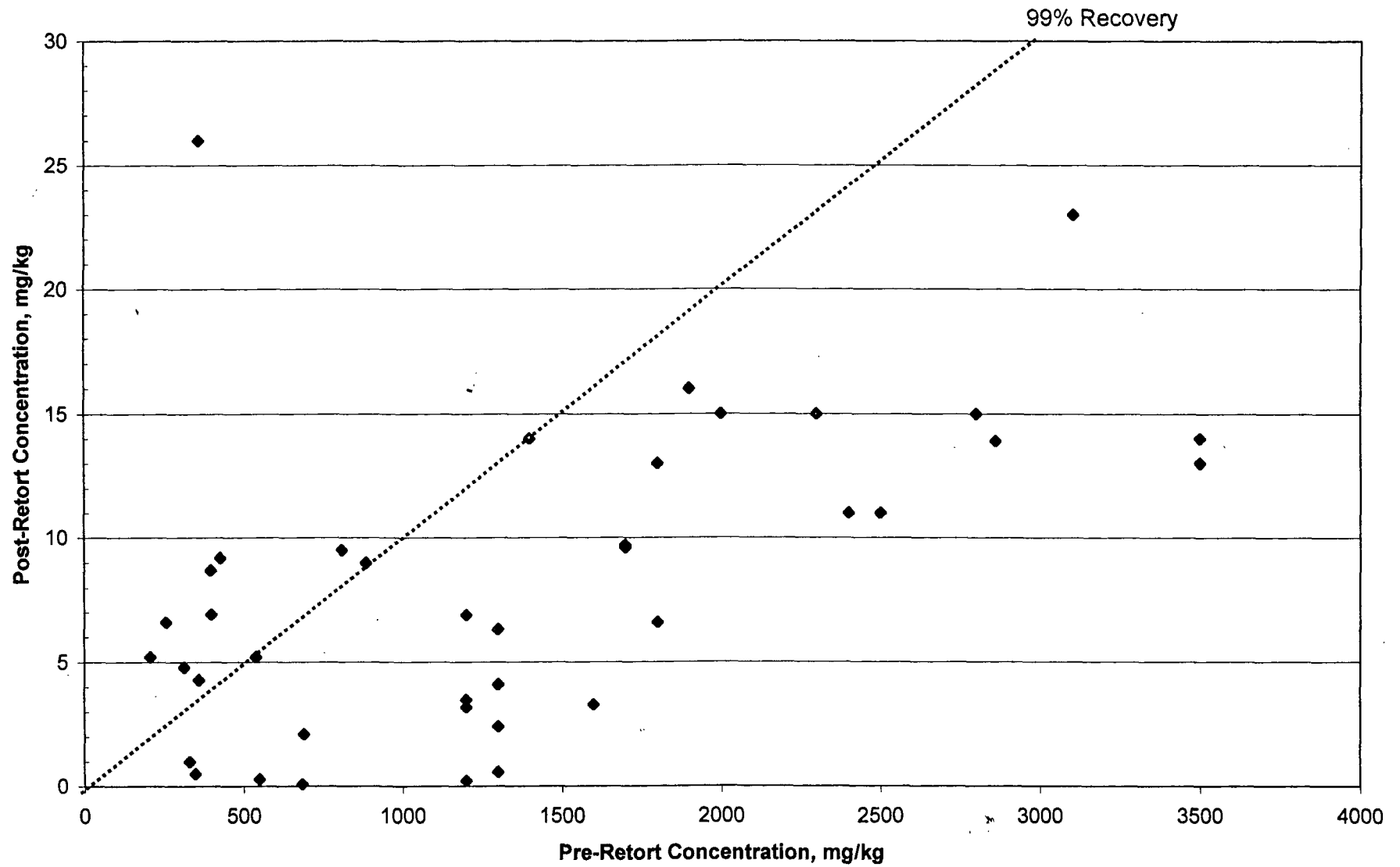
- Increase the retort processing time
- Increase surface area of material to be processed
- Increase peak operating temperature of the retort
- Modify the regulatory 99% recovery criteria to a lower percentage

Recent Phosphor Powder Processing Results

Total Concentration mg/kg

Date	Pre-retort	Post-retort	Percent Reduction
Jan-97	810	9.500	98.83%
Feb-97	1800	6.600	99.63%
Mar-97	1700	9.700	99.43%
Apr-97	1700	9.600	99.44%
May-97	1200	3.500	99.71%
Jun-97	1200	3.200	99.73%
Jul-97	2400	11.000	99.54%
Aug-97	3100	23.000	99.26%
Sep-97	2500	11.000	99.56%
Oct-97	2800	15.000	99.46%
Nov-97	3500	14.000	99.60%
Dec-97	2300	15.000	99.35%
Jan-98	2000	15.000	99.25%
Feb-98	1800	13.000	99.28%
Mar-98	1900	16.000	99.16%
Apr-98	690	2.100	99.70%
May-98	1300	4.100	99.68%
Jun-98	1300	0.560	99.96%
Jul-98	1200	0.220	99.98%
Aug-98	3500	13.000	99.63%
Sep-98	360	26.000	92.78%
Oct-98	1200	6.900	99.43%
Nov-98	1300	6.300	99.52%
Dec-98	1400	14.000	99.00%
Jan-99	540	5.200	99.04%
Feb-99	1600	3.300	99.79%
Mar-99	1300	2.400	99.82%
Apr-99	2860	13.900	99.51%
May-99			No retort processing
Jun-99			No retort processing
Jul-99			No retort processing
Aug-99	885	9.000	98.98%
Sep-99			No retort processing
Oct-99			No retort processing
Nov-99			No retort processing
Dec-99	685	0.082	99.99%
Jan-00	209	5.213	97.51%
Feb-00	550	0.280	99.95%
Mar-00	257	6.600	97.43%
Apr-00	427	9.200	97.85%
May-00	314	4.800	98.47%
Jun-00	332	1.000	99.70%
Jul-00	349	0.500	99.86%
Aug-00	359	4.300	98.80%
Sep-00			No retort processing
Oct-00	399	6.920	98.27%
Nov-00	397	8.700	97.81%

Pre-retort VS Post-retort Mercury Concentrations



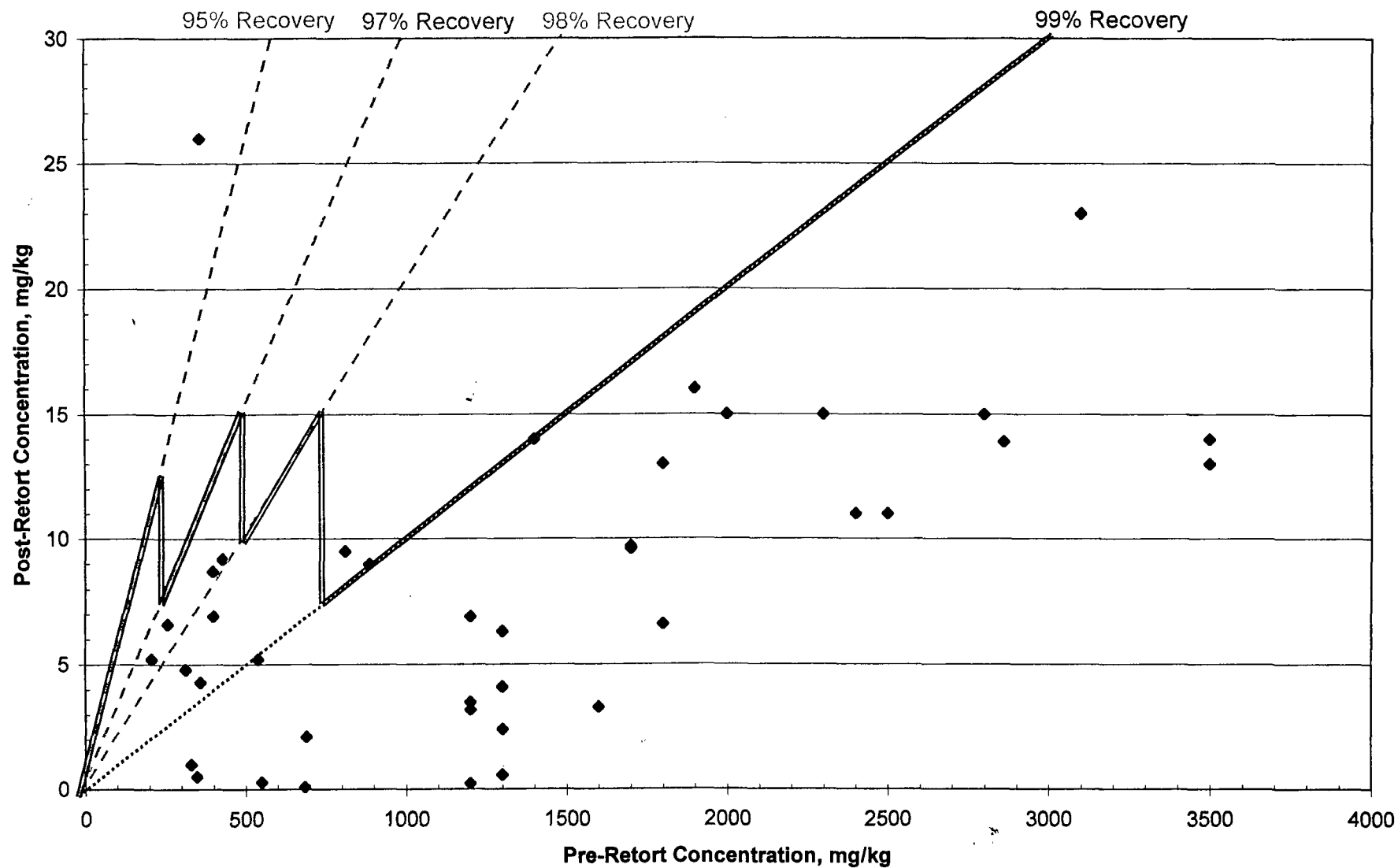
SSS Proposal

- Modify regulatory recovery criteria

Rate schedule based on the pre-retort concentration of mercury in the material to be processed.

<u>Pre-retort Concentration</u>	<u>Min Reclamation Rate</u>
Greater than 750 mg/kg	99 percent
500 – 750 mg/kg	98 percent
250 – 500 mg/kg	97 percent
Less than 250 mg/kg	95 percent

Pre-retort VS Post-retort Mercury Concentrations



Approach

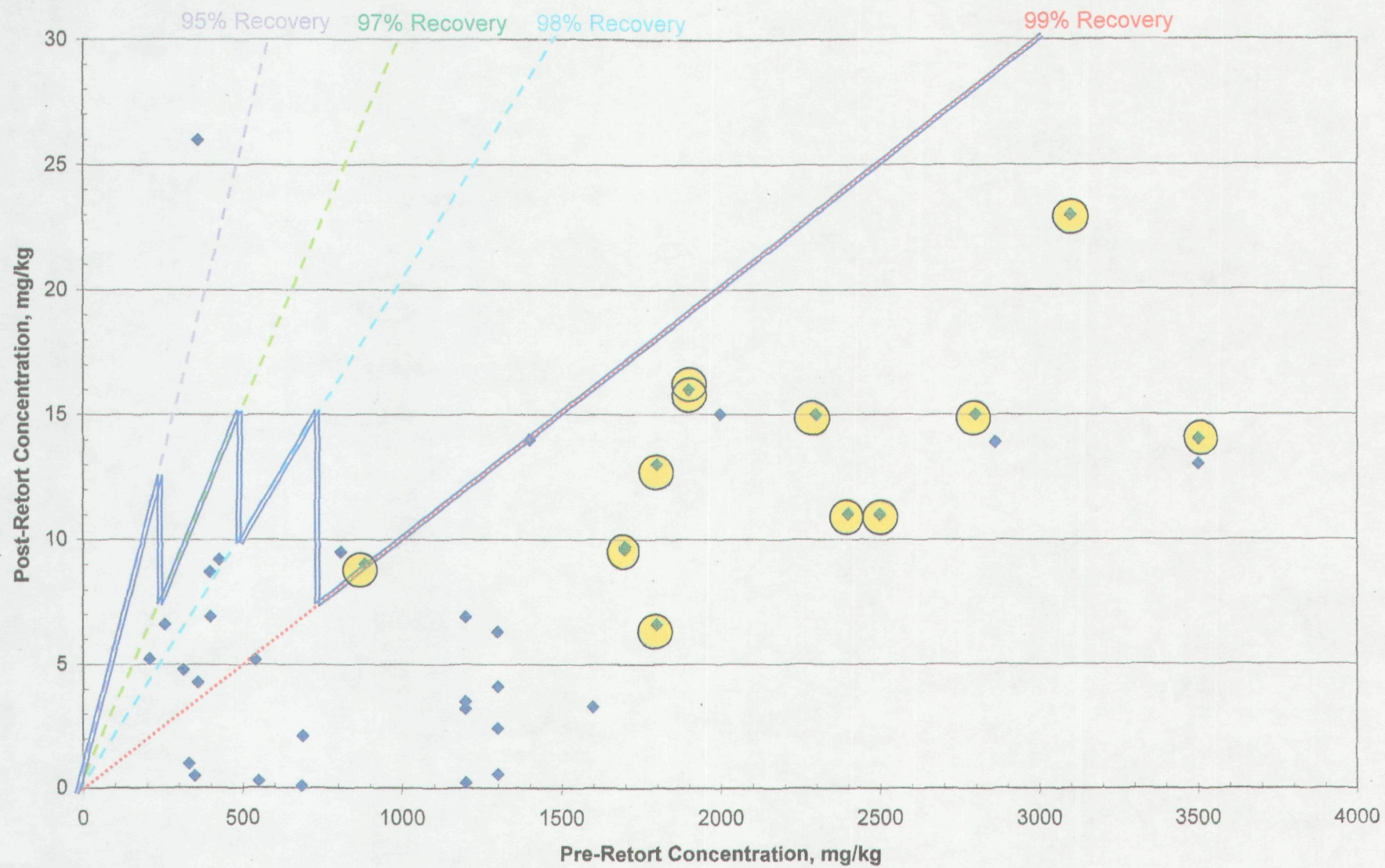
- No convincing factual data to eliminate process modification alternatives
- Historic sampling data supports temporary reclamation rate modifications
 - Total mg/kg vs TCLP mg/L
 - 1997 post-retort concentrations above rate modification proposal(s)
- Ensure protection of the environment while collecting additional data.

Historic Mercury Concentrations in Processed Materials					
RCRA MERCURY TCLP LEVEL 0.2 mg/L					
Phosphor Powder Post-retort			Aluminum Endcaps		
Date	Total mg/kg	TCLP mg/L	Date	Total mg/kg	TCLP mg/L
Feb-95	6.50	<0.0015	Dec-94	2.200	<0.0014
Feb-95	7.00	0.0750	Feb-95	1.600	0.0150
Feb-95	4.40	<0.0015	Mar-95	0.079	0.0025
Mar-95	7.20	<0.0016	Mar-95	8.400	0.0036
Mar-95	10.00	<0.0014	Apr-95	0.950	<0.0012
Apr-95	5.60	0.0021	May-95	2.400	<0.0014
May-95	9.00	0.0196	May-95	3.400	<0.0014
Jun-95	9.50	<0.0014	Jun-95	0.700	<0.0018
Jun-95	15.00	0.0054	Jul-95	0.330	<0.0015
Aug-95	1.80	<0.0013	Aug-95	1.100	<0.0015
Aug-95	21.00	<0.0015	Oct-95	3.400	0.0320
Nov-95	7.00	<0.0013	Nov-95	5.600	<0.0015
Jan-96	4.20	<0.0014	Jan-96	0.320	<0.0014
Feb-96	1.10	<0.0015	Feb-95	2.300	0.0019
Mar-96	22.00	0.0031			
Crushed Glass			HID Capules		
Date	Total mg/kg	TCLP mg/L	Date	Total mg/kg	TCLP mg/L
Aug-94	2.20	0.1000	Oct-95	0.83	<0.0020
Aug-94	1.30	0.0830			
Dec-94	2.10	0.1020			
Feb-95	3.50	0.1120			
Feb-95	2.30	0.0650			
Feb-95	1.20	0.0580			
Feb-95	0.96	0.0500			
Mar-95	1.20	0.1030			
Apr-95	2.20	0.0170			
May-95	2.70	0.1110			
May-95	2.20	0.1060			
May-95	0.89	0.0450			
Jun-95	3.60	0.1800			
Jul-95	<0.013	<0.0013			
Jul-95	1.20	0.0530			
Aug-95	0.37	0.0098			
Oct-95	3.50	0.0290			
Nov-95	0.03	<0.0015			
Jan-96	3.10	0.0610			
Feb-96	2.30	0.0650			



= Data from 1997

Pre-retort VS Post-retort Mercury Concentrations



Compromise Proposal

- Temporary variance – 2 years

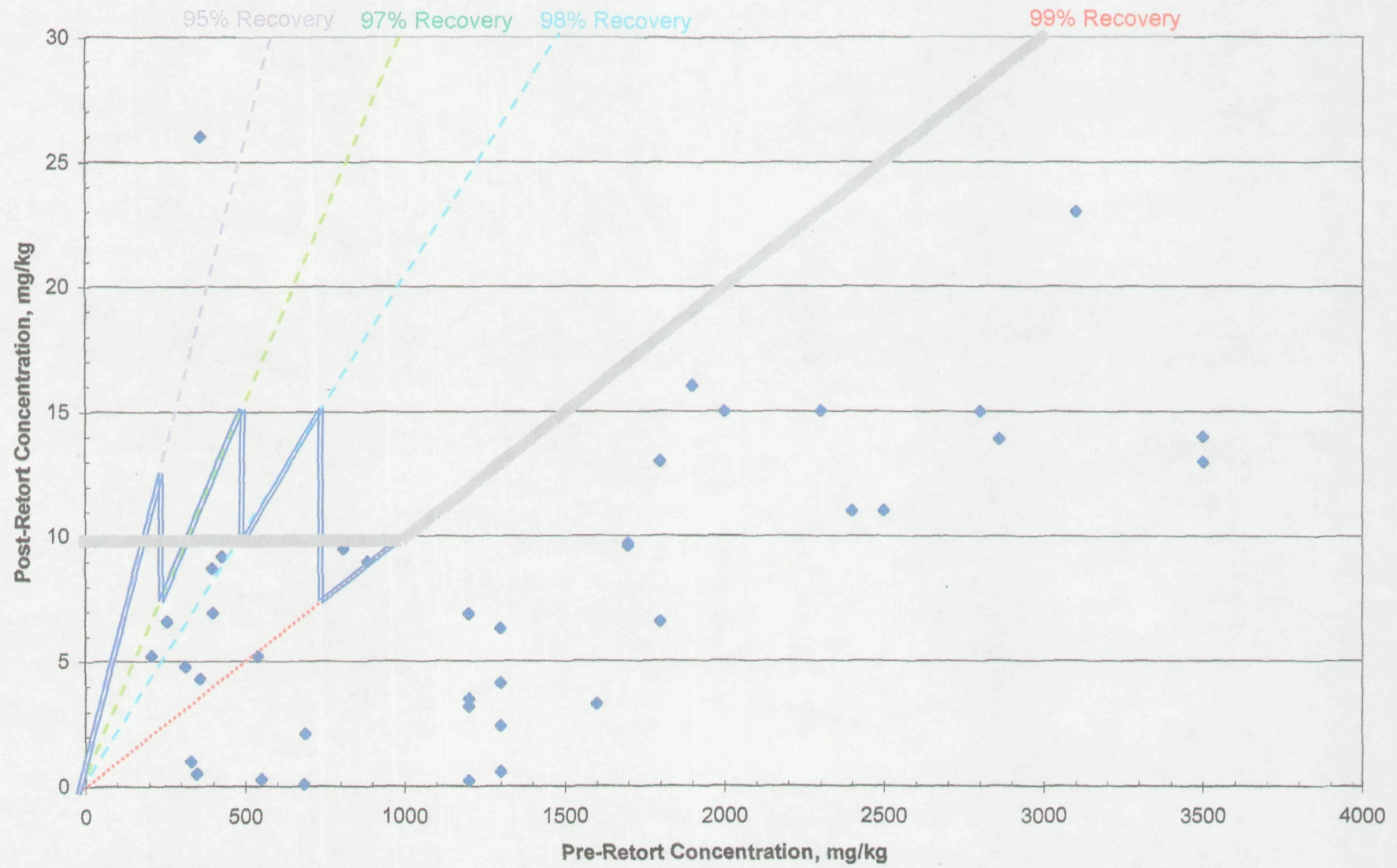
- **Modified reclamation rate**

<u>Pre-retort Concentration</u>	<u>Min Reclamation Rate</u>
Greater than 1000 mg/kg	99 percent
Less than 1000 mg/kg	Less than 10 mg/kg residual Hg

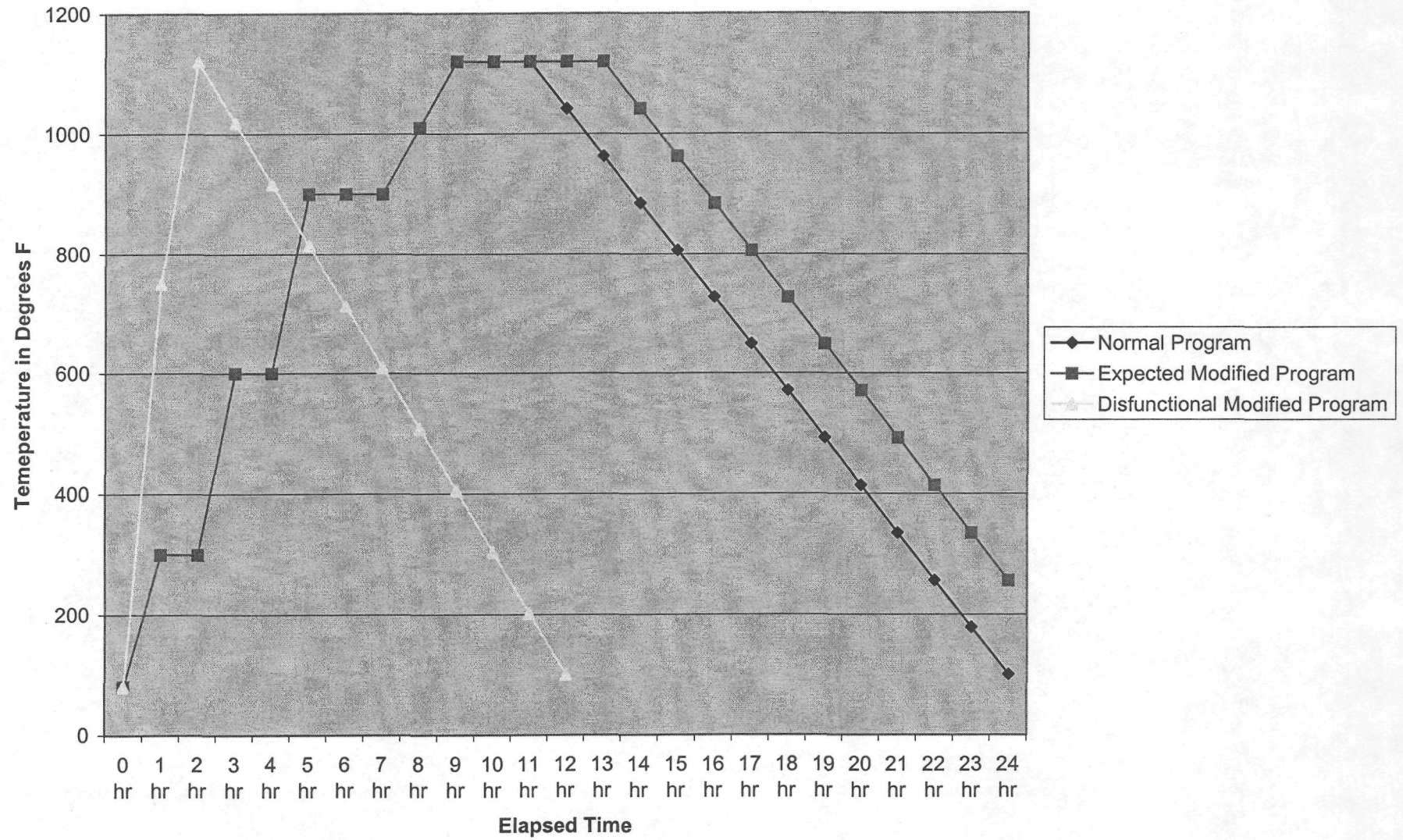
- **Required to collect data on process modification alternatives**

- Increase the retort processing time
- At least two additional technology alternatives

Pre-retort VS Post-retort Mercury Concentrations



Retort Temperature Curves



Comparison of Retort Technologies

Tallahassee

Retort manufactured by Denver Mineral. Full drums placed into the retort oven and heated. Air is drawn off the oven chamber by a vacuum pump and pulled through a series of heat exchangers.

Post Processing Concentrations

Average	3.40 mg/kg
Range	0.1 – 9.2 mg/kg

Stoughton MA

Retorts manufactured by MRT. Thirty liter canisters are stacked four high and placed into the retort chamber and air is drawn out of the chamber by a vacuum pump and drawn through a series of heat exchangers. The unit uses a nitrogen purge in the retort chamber and oxygen injection into an afterburner for control of organics (pyrolyzed plastics).

Post Processing Concentrations

Average	7.28 mg/kg
Range	2.4 – 14.4 mg/kg

Port Washington

Retort manufactured by Effective Energy Control. Full drums are placed into a natural gas fired oven. The drums are fitted with special lids, which attach directly to the vacuum system. Air is drawn from the drums through a catalytic afterburner, an oxygen scavenger and a packed column that serves as a heat exchanger and scrubber.

Post Processing Concentrations

Average	26 mg/kg
Range	0.52 – 49 mg/kg

Comparison of the ratio of surface area to volume.

Tallahassee and Port Washington

Both of these units process the powder in 55-gallon drums resulting in a ratio of 11 square centimeters per liter of material.

Stoughton

The MRT units use 30-liter canisters with a diameter of 40.5 cm resulting in a ration of 43.2 square centimeters per liter of material.