UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064

January 28, 1998

Garry L. Randolph, Vice President and
Chief Nuclear Officer
Union Electric Company
P.O. Box 620
Fulton, Missouri 65251

SUBJECT: CALLAWAY PLANT RADIATION PROTECTION PROGRAM PERFORMANCE

This refers to the meeting conducted in the Region IV office on January 21, 1998. This meeting was conducted at the licensee's request to discuss the radiation protection, chemistry, and radwaste program activities. Specific topics of discussion included: 1997 performance indicators, challenges and improvement opportunities, and plans for Refueling Outage 9.

In accordance with Section 2.790 of the NRC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter will be placed in the NRC's Public Document Room. Should you have any questions concerning this matter, we will be pleased to discuss them with you.

Sincerely,

Blaine Murray

Blaine Murray, Chief
Plant Support Branch
Division of Reactor Safety

Docket No.: 50-483
License No.: NPF-30

Enclosures:
1. Attendance List
2. Licensee Presentation

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DISTRIBUTION w/Enclosures 1 and 2:
DCD (IE35)
Regional Administrator
Callaway Resident Inspector
DRS Director
DRS Deputy Director
DRP Director
DRS-PSB
Branch Chief (DRP/B)
Project Engineer (DRP/B)
Branch Chief (DRP/TSS)
C. A. Hackney, RSLO
L. T. Ricketson, DRS/PSB
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Add: RES/DET 1 1

ENCLOSURE 1

MEETING: UNION ELECTRIC - CALLAWAY PLANT

SUBJECT: Radiation Protection Activities and Performance

DATE: January 21, 1998

ATTENDANCE LIST

NAME	ORGANIZATION	POSITION TITLE
Dwight Chamberlain	NRC	Deputy Director, Division of Reactor Safety
Blaine Murray	NRC	Chief, Plant Support Branch, Division of Reactor Safety
Ray Azua	NRC	Project Engineer, Project Branch B, Division of Reactor Projects
Larry Ricketson	NRC	Senior Radiation Specialist, Plant Support Branch, Division of Reactor Safety
Mike Evans	Union Electric	Superintendent, Radiation Protection
Ron Roselius	Union Electric	Superintendent, Chemistry and Radwaste

CALLAWAY PLANT

NRC Region IV Briefing

Callaway Plant

January 21, 1998

Radiological Protection Areas

–Health Physics

–Chemistry

–Radwaste

Presented by:

M.S. Evans, Supt. HP

R.R. Roselius, Supt. Chem/RW

CALLAWAY PLANT

Purpose

- Provide an update on Callaway Plant operations and performance
- Dialogue on issues and activities related to Radiological Protection Programs
- Provide information and answer questions on topics of interest to NRC

Agenda

- 1997 Performance Indicators
  - –HP
  - –Chemistry
  - –Radwaste
- Challenges and Improvement Opportunities
  - –Axial Offset (AO)
  - –Failed Fuel
  - –Refuel 8 Corrective Actions
  - –Radwaste Processing
  - –Department Challenges and Improvement Opportunities
- Refuel Outage 9
  - –Schedule
  - –Goals
  - –Radiological Considerations
  - –Shutdown Chemistry

CALLAWAY PLANT

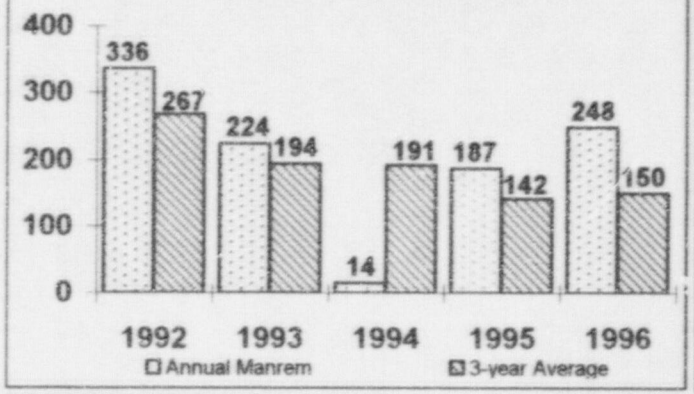
Performance Indicators

- **Health Physics**
  - Manrem Exposure
  - Liquid Rad Effluents
  - Gaseous Rad Effluents
  - Surface Contamination
- **Chemistry**
  - Chemistry Index
  - Primary to Secondary Leakage
  - RCS CRUD (Co-58)
  - RCS Dose Equiv. Iodine (DEI)
- **Radwaste**
  - Liquid Radwaste Influents
  - DAW Generation
  - Low Level Solid Radwaste
  - Radwaste Burial Performance

PERFORMANCE OBJECTIVE: MANREM EXPOSURE

Achieve manrem exposure of less than 12 for 1997 in support of a three-year average of less than 100 manrem by end of 2001. RDA/MSE

PERFORMANCE SUMMARY



Current Situation

Exposure goal was raised from 12 Manrem to 16 Manrem in July 1997. The initial exposure goal assumed NO failed fuel. Current projections show that we will be close to the 12 Manrem initially proposed. The Power reduction to 70% for AOA accounts for doses being lower than projected. The 12.8 Manrem for 1997 is the lowest Manrem achieved during a Non-Outage year.

Actions

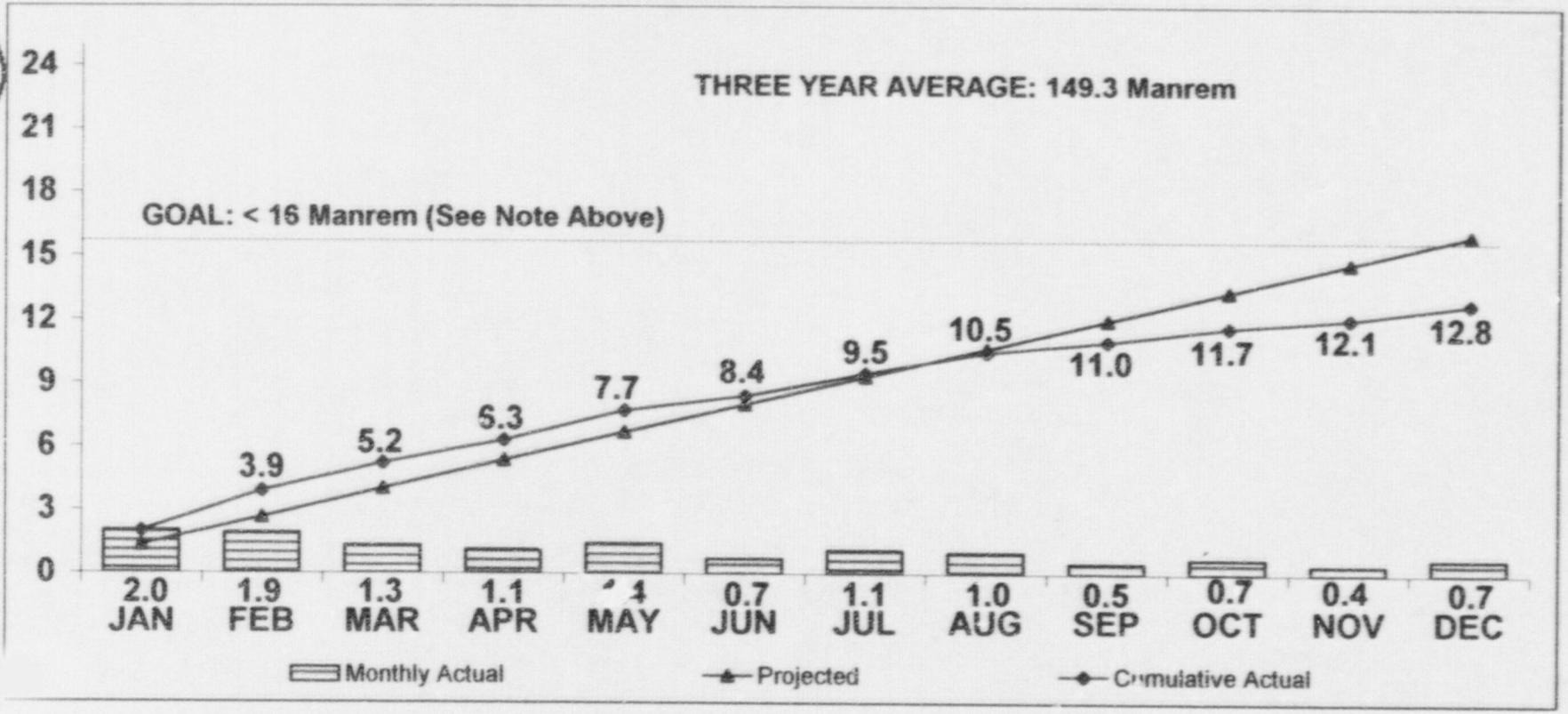
Dose rates in the plant are elevated due to failed fuel. We are continuing to monitor all areas of the plant to ensure timely updates of radiological postings should conditions change.

1995 INPO Performance Indicator (3 Year Average) = 161.0

1996 INPO Performance Indicator (3 Year Average) = 147.0

MANREM EXPOSURE

GOOD



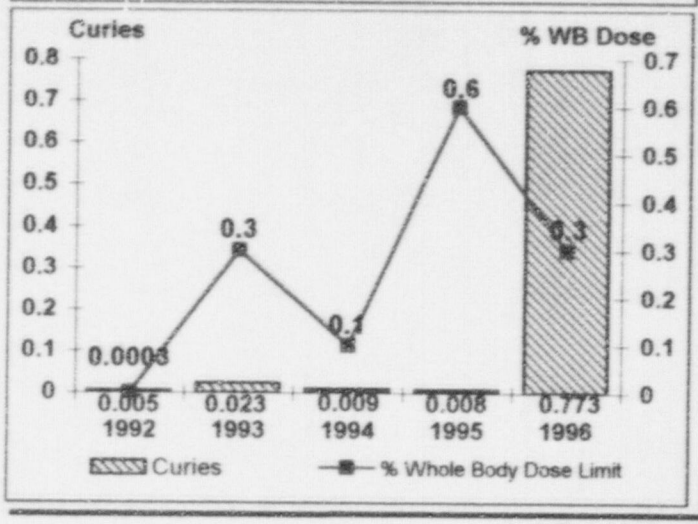
CALLAWAY PLANT

Manrem Exposure

- 3 year average being maintained at approx. 150 Manrem
- 1997 Manrem Goal
  - Assumed NO Failed Fuel
  - Based on best performance to date of 14.2 Manrem in 1994
  - Revised in July 1997
  - Power Reduction in August 1997 reduced General Area dose rates by approx. 1/2
- Improvement Opportunities
  - AO Resolution
  - Shutdown Chemistry
  - S/G Dose
    - Approx. 25-30% of outage dose
    - Pursuing electro-sleeving tube repair, currently under review
    - Anticipate approx. same failure rate as Refuel Outage 8
- 1998 Manrem Exposure Goal is 200 Manrem
  - 185 Manrem Refuel Outage 9 Dose
  - 15 Manrem Non-outage Dose

PI-17 LIQUID RADIOLOGICAL EFFLUENT RELEASES RDA/MSE

PERFORMANCE SUMMARY



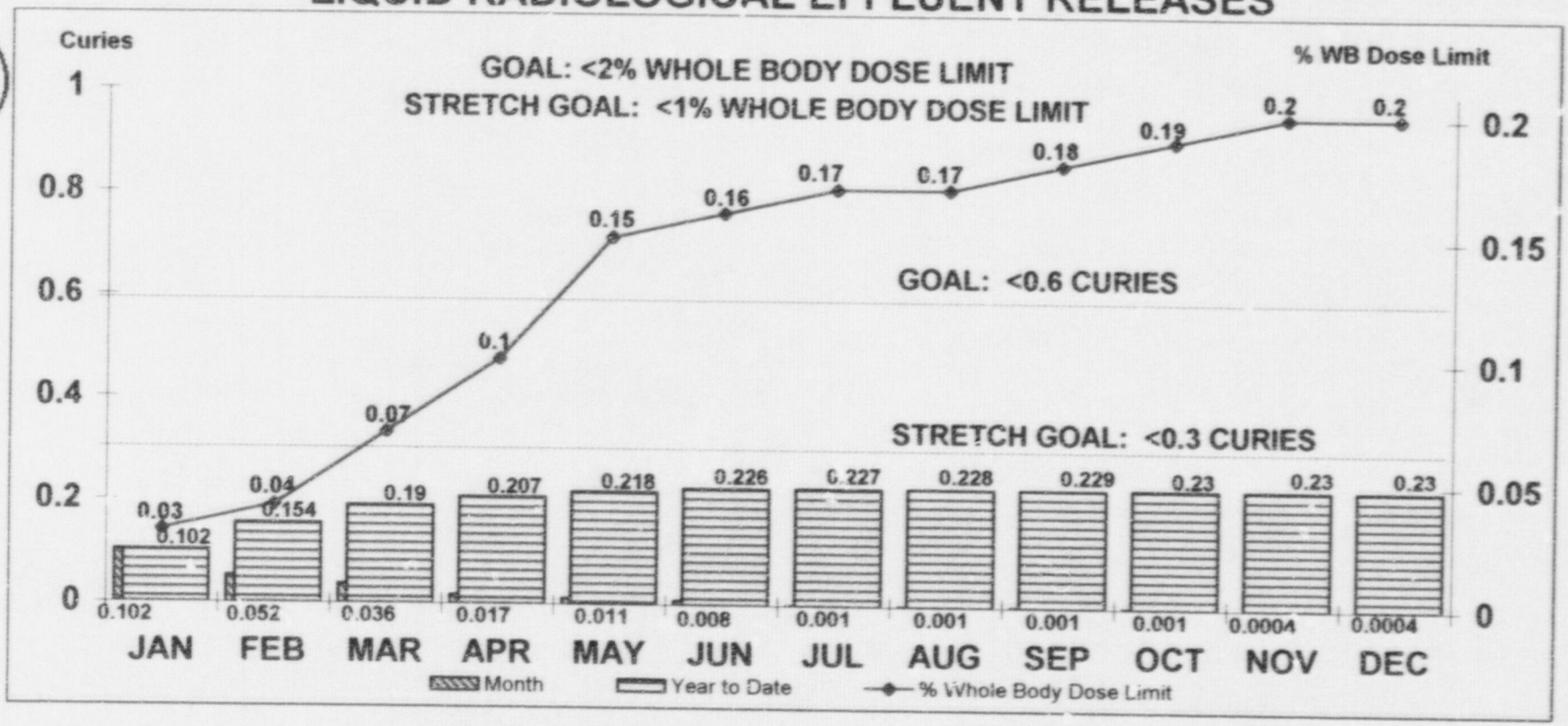
Current Situation

Both Liquid Radiological Effluent Total Curies and % of Whole Body (WB) dose limit were below the Stretch Goals established for 1997. In early April, waste processing using filtration and demineralization was discontinued. Several changes have been made to the Radwaste filtration and demineralization process and procedures. These changes will allow us to return to filtration and demineralization .

Actions

LIQUID RADIOLOGICAL EFFLUENT RELEASES

GOOD



PI-17

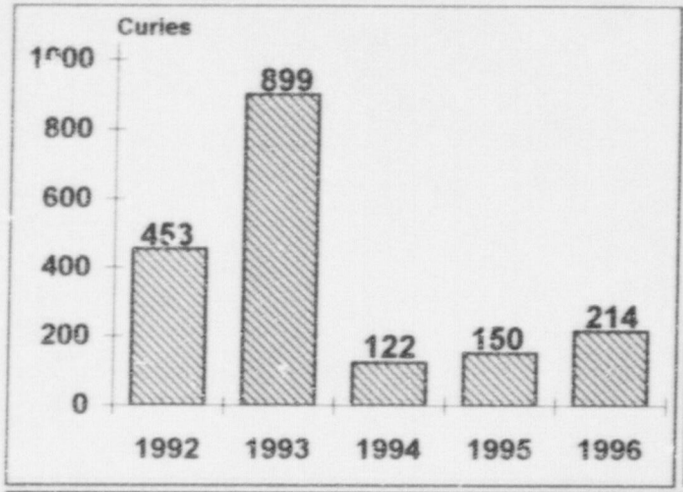
CALLAWAY PLANT

Liquid Radiological Effluents

- Goal Re-evaluated in 1996
  - Established 0.25 Curie Goal based on Industry Comparisons
  - Percent of Whole Body Limit Remained at < 1%
- Liquid Radwaste Processing
  - Moved to Filtration and Demineralization in 1996
  - Used Evaporators, Filtration, and Demineralization in 1997
  - Will use Filtration and Demineralization in 1998
- 1998 Liquid Radiological Effluents Goal is <0.25 Curies and <1% Whole Body Limit

PI-18 GASEOUS RADIOLOGICAL EFFLUENT RELEASES RDA/MSE

PERFORMANCE SUMMARY



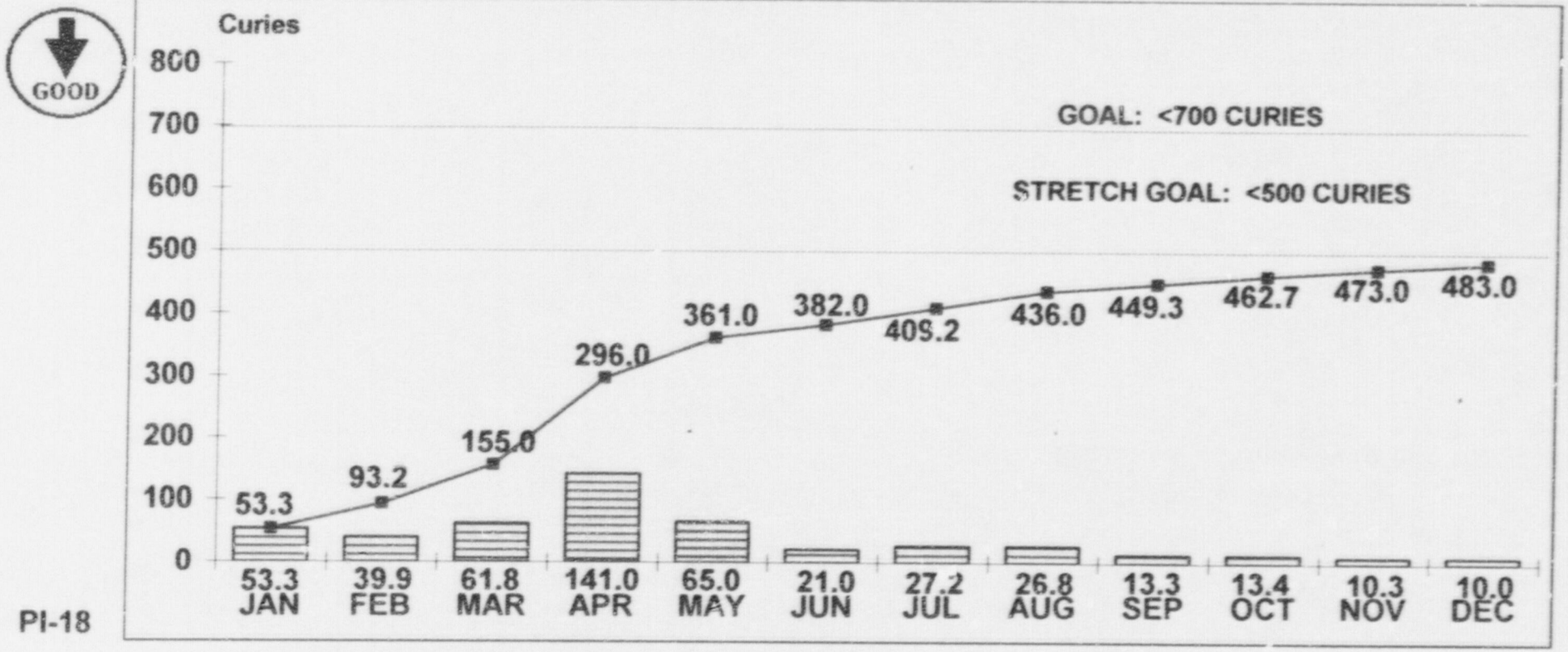
Current Situation

Gaseous Radiological Effluent Total for 1997 was 483.0 Curies, below the Stretch Goal of 500 Curies. Gaseous effluent levels trended down over the last 5 months of the year due to reducing Unit Power.

Actions

Trending of Unit Vent and Radwaste Vent gaseous levels are being performed each shift to ensure corrective actions are taken to identify and correct any elevated levels in a timely manner. Gaseous effluents for the past 2 months have been lower than previous months this cycle due to the Power reduction to 70% for AOA.

GASEOUS RADIOLOGICAL EFFLUENT RELEASES



CALLAWAY PLANT

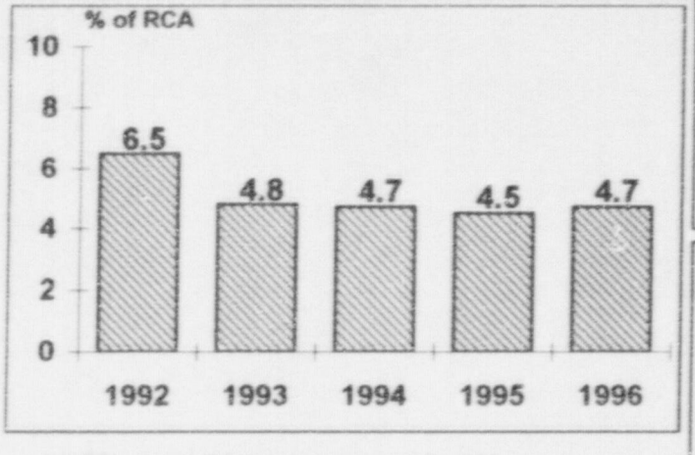
Gaseous Radiological Effluents

- Significant Increase in 1997 due to Failed Fuel
- Power Reduction in August 1997 to 70%
- 1998 Gaseous Radiological Effluents Goal is 600 Curies

PI-19 SURFACE CONTAMINATION AREA

RDA/MSE

PERFORMANCE SUMMARY



NOTE: % of RCA is based on 171,833 square feet.

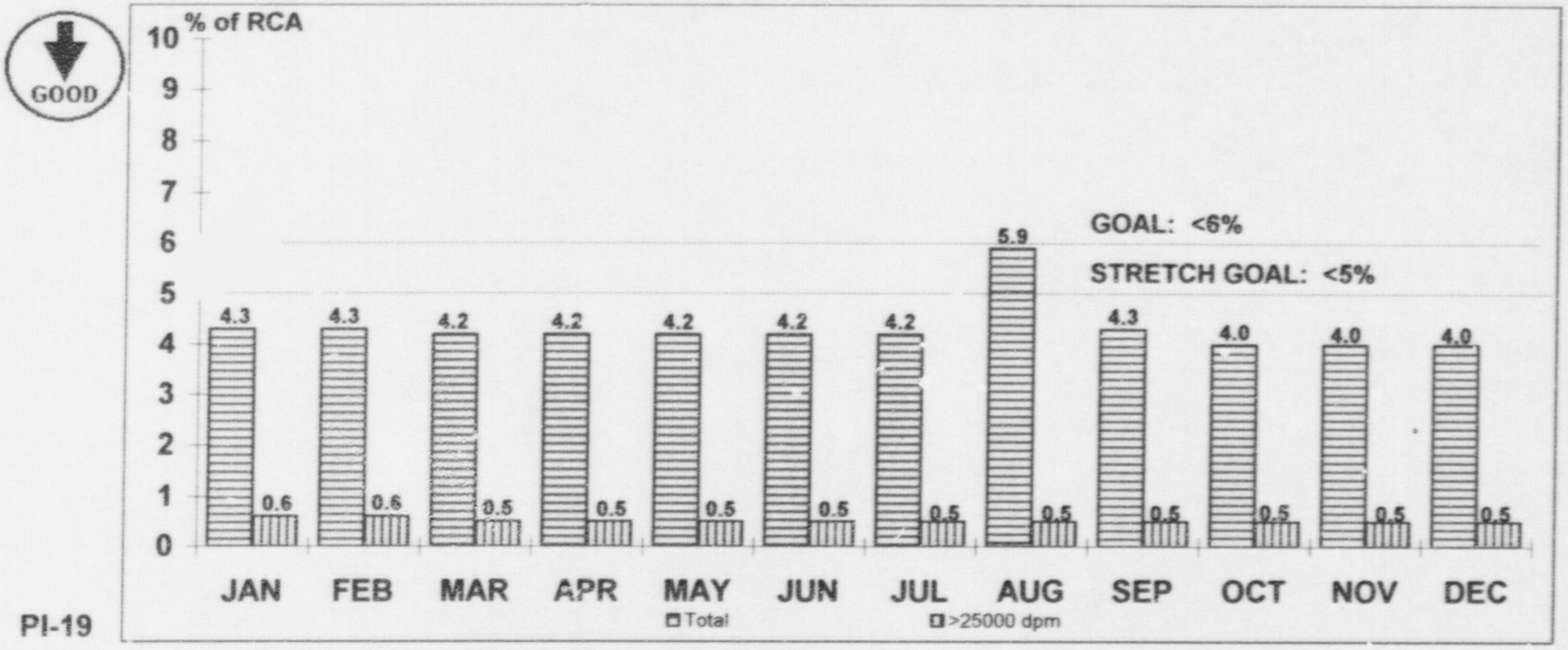
Current Situation

1997 Average % Surface Contaminated Area was 4.3%, below the 5.0% Stretch Goal.

Actions

None required.

SURFACE CONTAMINATION AREA

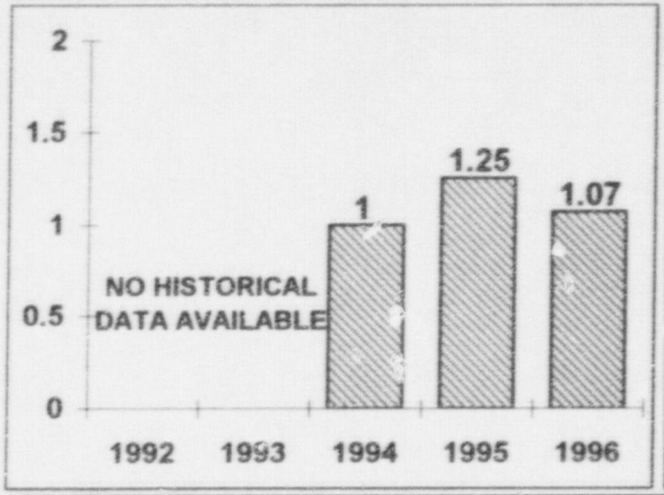


PI-19

PI-13 CHEMISTRY INDEX

RDA/ECO

PERFORMANCE SUMMARY



Current Situation

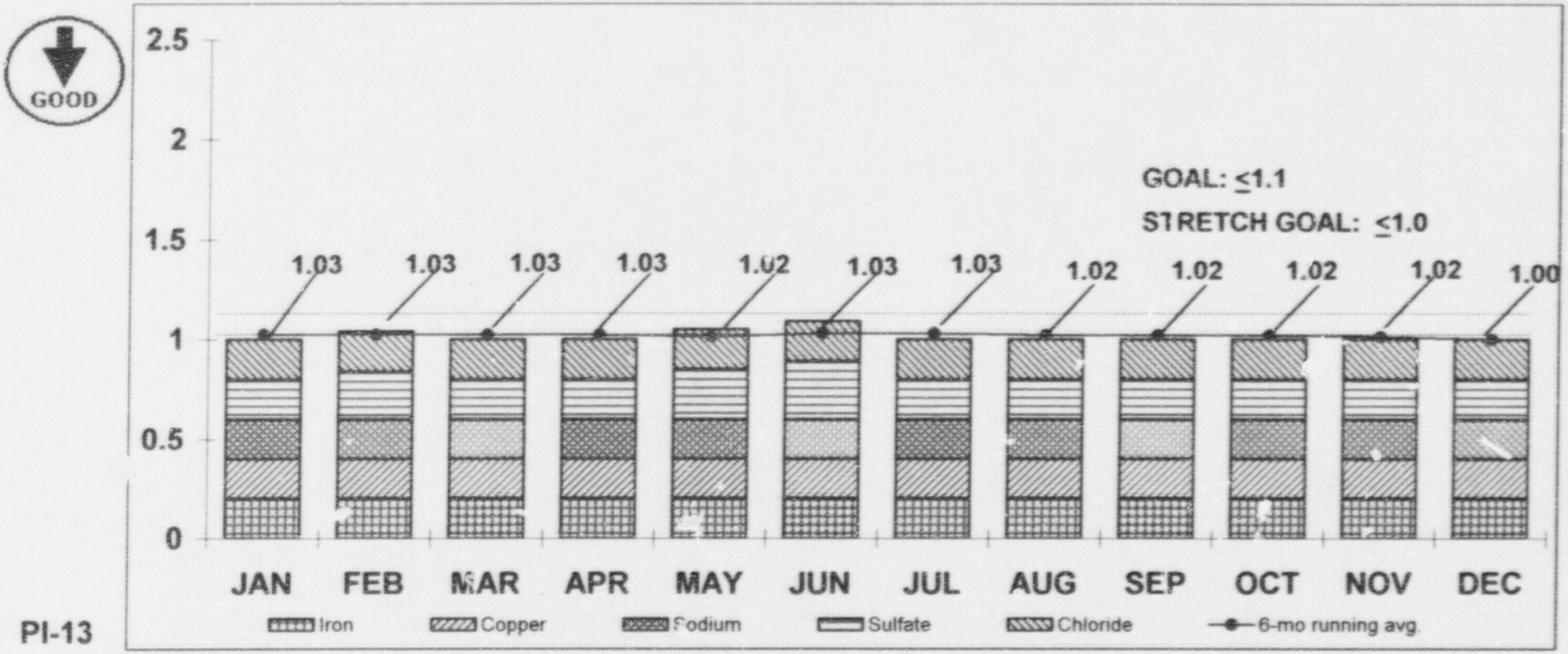
Plant power was increased 4% during December to a new level of 74%. Secondary plant chemistry parameters remained below industry medians.

Parameter	Callaway Value	Industry Median
Chloride	0.23	1.6
Sulfate	0.86	1.7
Sodium	0.33	0.8
FW Iron	2.8	5.0
FW Copper	< 0.027	0.2

Actions

Close monitoring of chemistry parameters continues.

CHEMISTRY INDEX



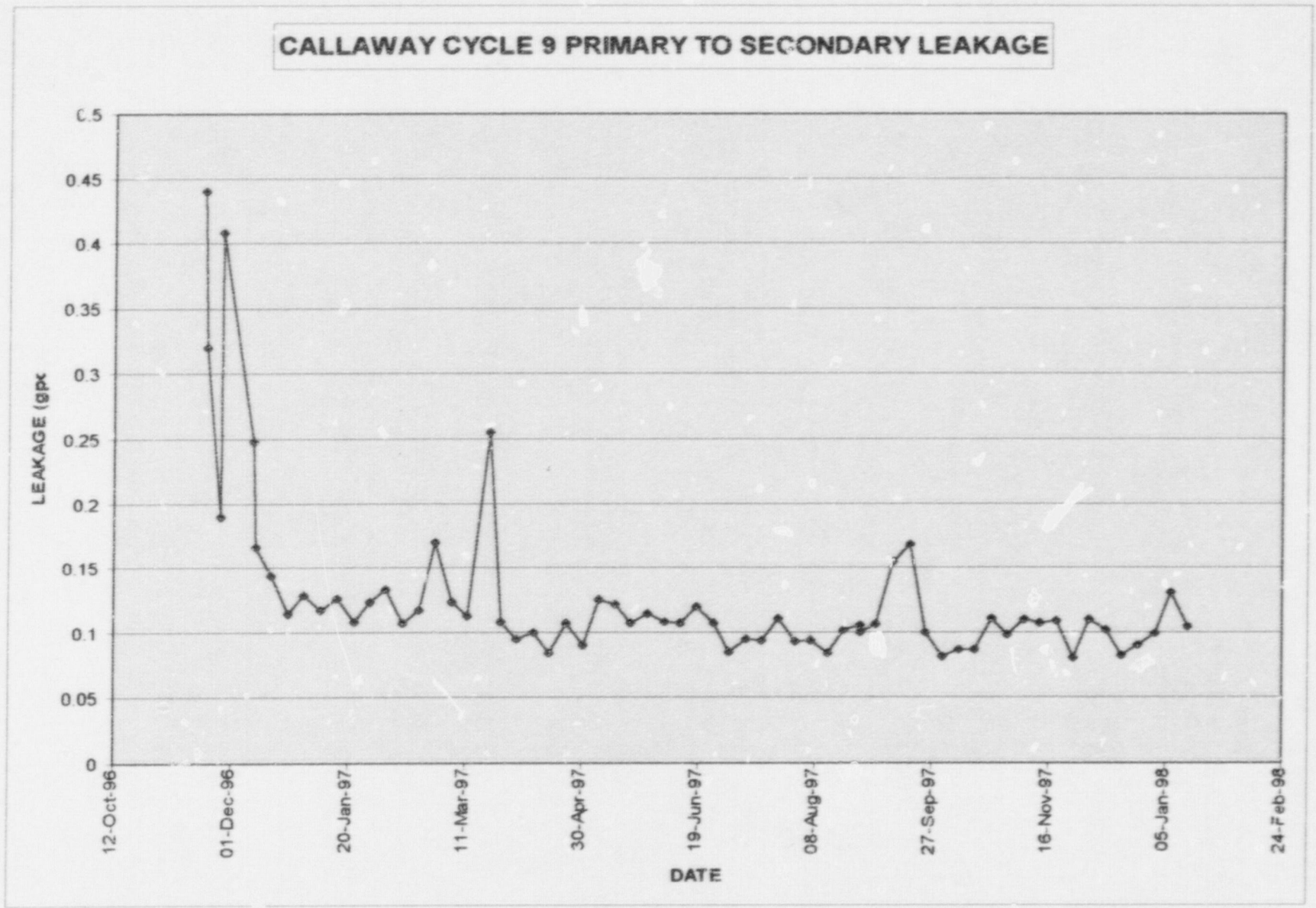
PI-13

CALLAWAY PLANT

Chemistry Index

- Indicator of Secondary Chemistry performance
- Measure of how well taking care of S/G
- 1.0 is best performance achievable
- All 5 index parameters better than industry median
- 1997 average 1.01
- 1996 average 1.06

Primary to Secondary Leakage

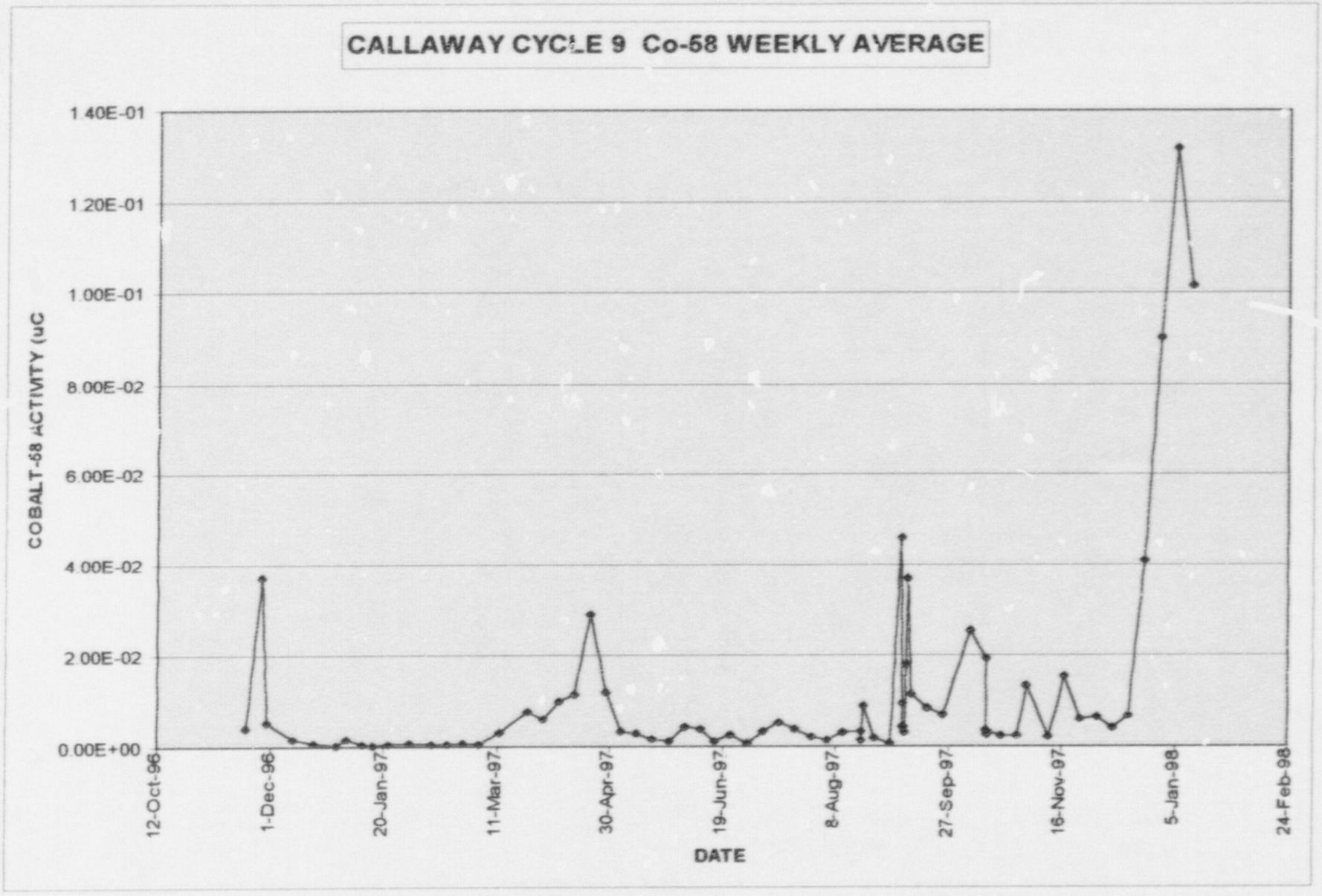


CALLAWAY PLANT

Primary to Secondary Leakage

- S/G integrity good
- Leakage dropped following RFO8
- Lowest leakage experienced for last several cycles
- N-16 monitors
- Programmatic improvements in detection and response

RCS Cobalt 58



CALLAWAY PLANT

RCS CRUD

- Levels elevated compared to Cycle 8
- Increases with changes in Axial Offset
- Trending up w/ ammonia addition
- CVCS letdown line dose rates have not increased

RCS Dose Equivalent Iodine

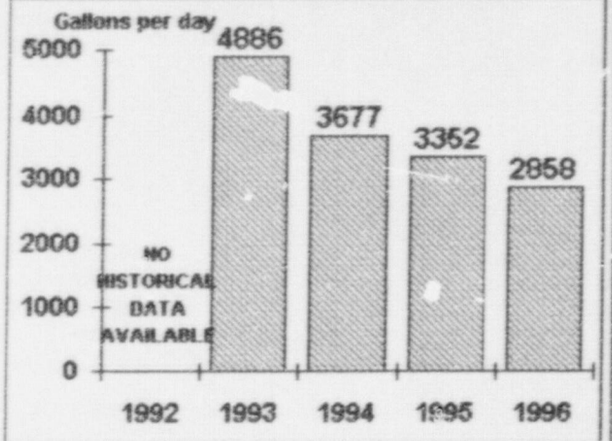
CALLAWAY PLANT

RCS DEI-131

- Fuel defect early in cycle
- 1-3 defects
- DEI 1.3E-2 uci/ml
- Tight defect

PI-14 LIQUID RADWASTE INFLUENTS RDA/RDM

PERFORMANCE SUMMARY



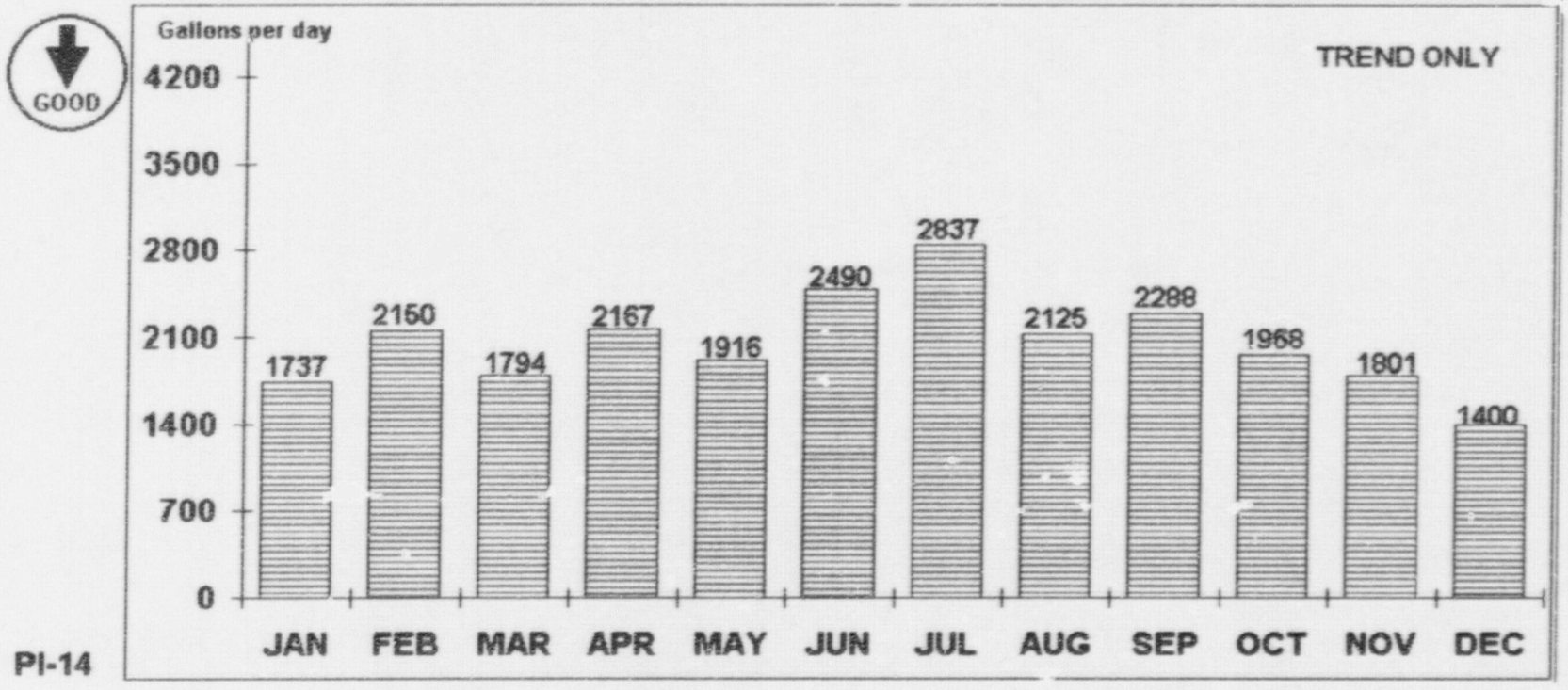
Current Situation

Primary drain influents have continued to decline reflecting an overall tighter plant and attention to unexplained influents. Average Daily influents for 1997 was 2,056 gallons per day.

Actions

None required.

LIQUID RADWASTE INFLUENTS



PI-14

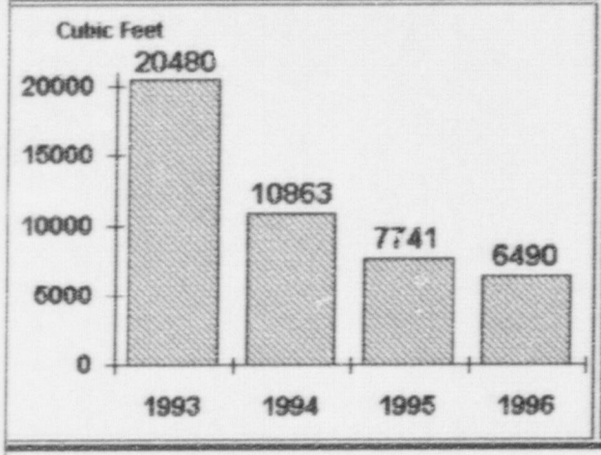
CALLAWAY PLANT

Liquid Radwaste Influents

- Directly correlates to liquid effluent releases and solid radwaste generation
- All time low
- 28% reduction from 1996
- 57% reduction from 1993
- Reasons
  - Plant material condition
  - Coordination of draining with Operations
  - Leakage monitoring and response

PI-15 DAW GENERATION — RDA/RDM

PERFORMANCE SUMMARY



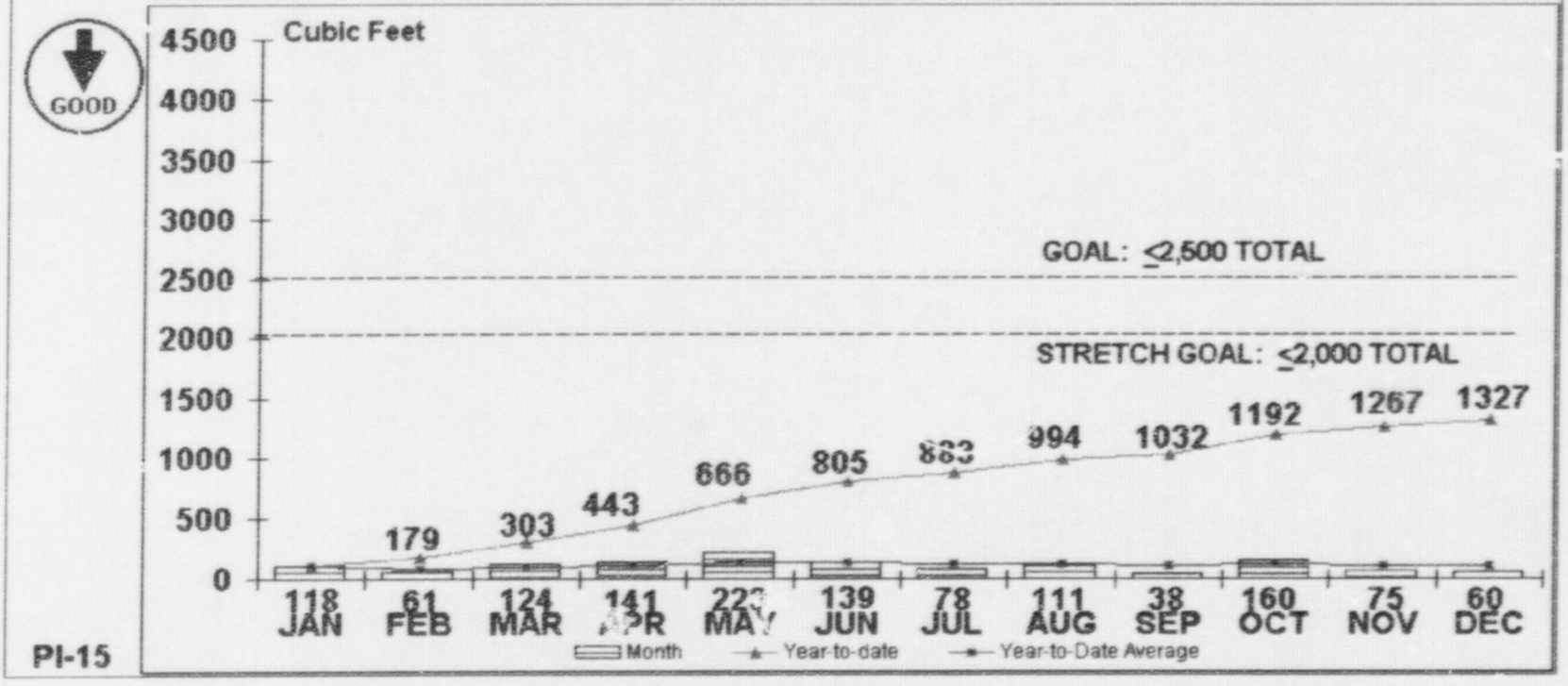
Current Situation

Generated 33.4 cubic feet of incinerable DAW and 26.9 cubic feet of compactible DAW during November, 1997

Actions

Numbers generated using new weight to density conversion assumptions. All previous data for 1997 has been updated with new conversion figures (15# / ft3 for compactibles and 12# / ft3 for incinerables). Conversion figures used at the beginning of 1997 were 3 years old and did not reflect the continuously changing nature of our waste streams.

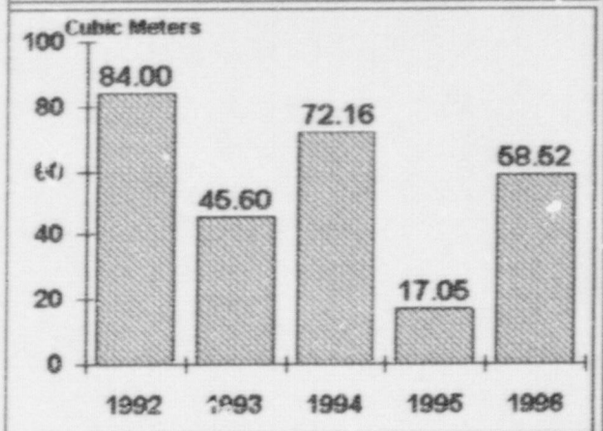
DAW GENERATION



PI-15

PI-16 LOW-LEVEL SOLID RADWASTE — RDA/RDM

PERFORMANCE SUMMARY



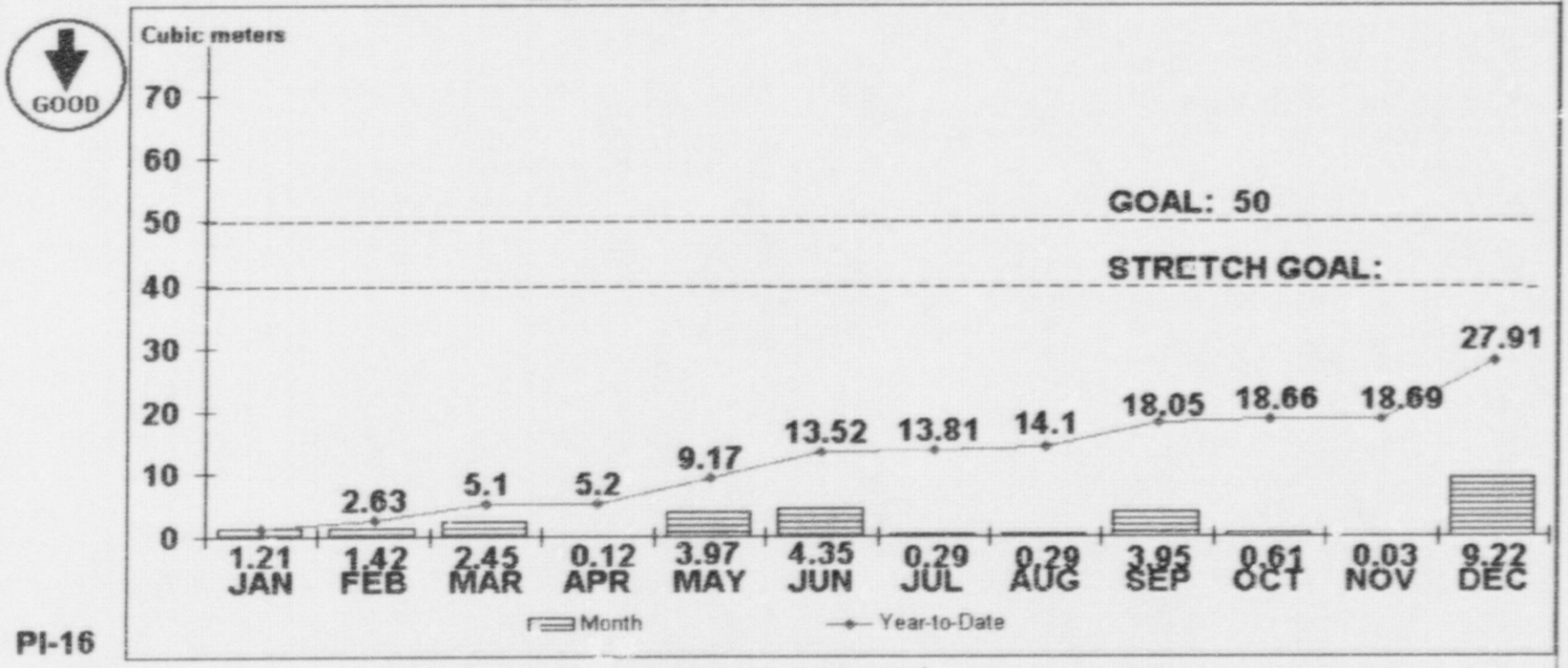
Current Situation

325.4 cubic feet (9.22 cubic meters) of waste were buried in December, 1997. This consisted of 298.8 cubic feet of compactible DAW that was processed by CNSI in March, 1997 from shipment 97-0014, 21.8 cubic feet of compactible DAW from shipments 97-0005 and 97-0035 processed by SEG (now GTS-Duratek), and 4.6 cubic feet from shipment 97-0003.

Actions

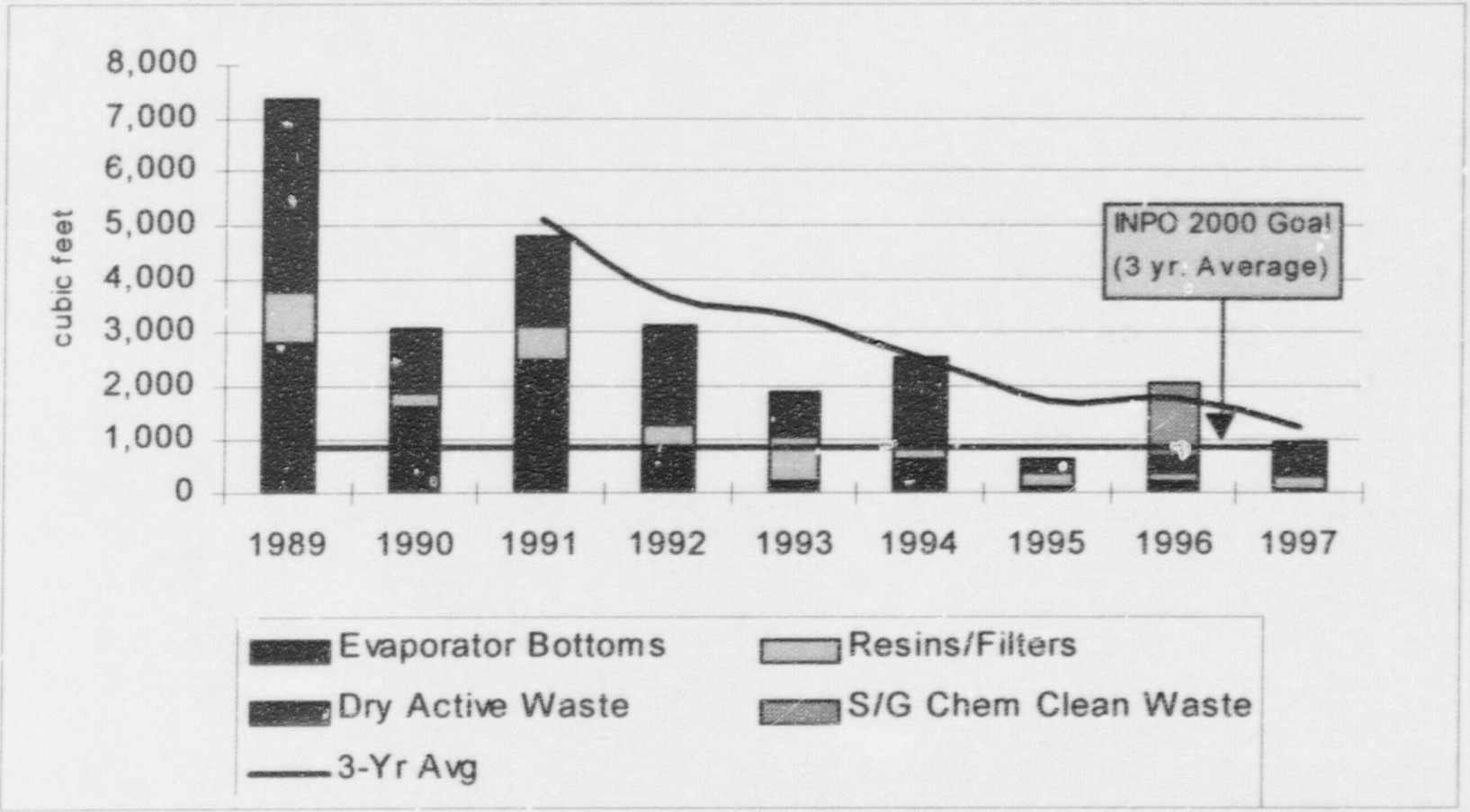
None required.

LOW-LEVEL SOLID RADWASTE



PI-16

CALLAWAY BURIAL PERFORMANCE



Challenges and Improvement Opportunities

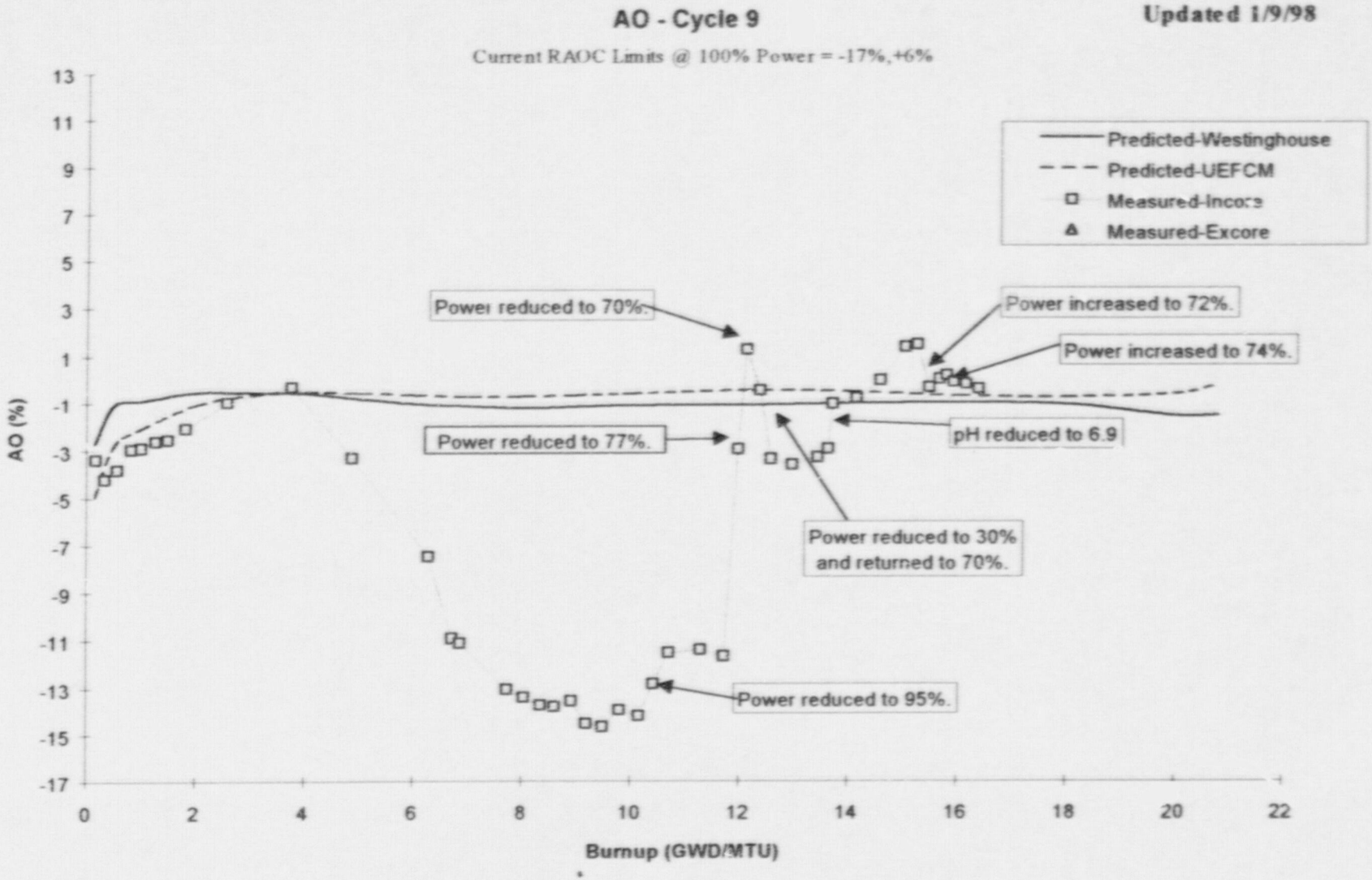
- Axial Offset
- Fuel Defect
- Refuel 8 Corrective Actions
  - HP
  - Chemistry / Radwaste
- Radwaste Processing
- Department Challenges and Improvement Opportunities
  - HP
  - Chemistry / Radwaste

CALLAWAY PLANT

Axial Offset

- More significant than Cycle 8
- Down power to 70% due to shutdown margin concerns
- Currently at 74% w/ AO trending +
- Corrective Actions
  - Core redesigned for Cycle 10
  - RCS pH control - constant 7.1 pH cycle 9 and 7.2 pH cycle 10
  - Ammonia Addition to RCS
- RFO9 Impact

Axial Offset Cycle 9

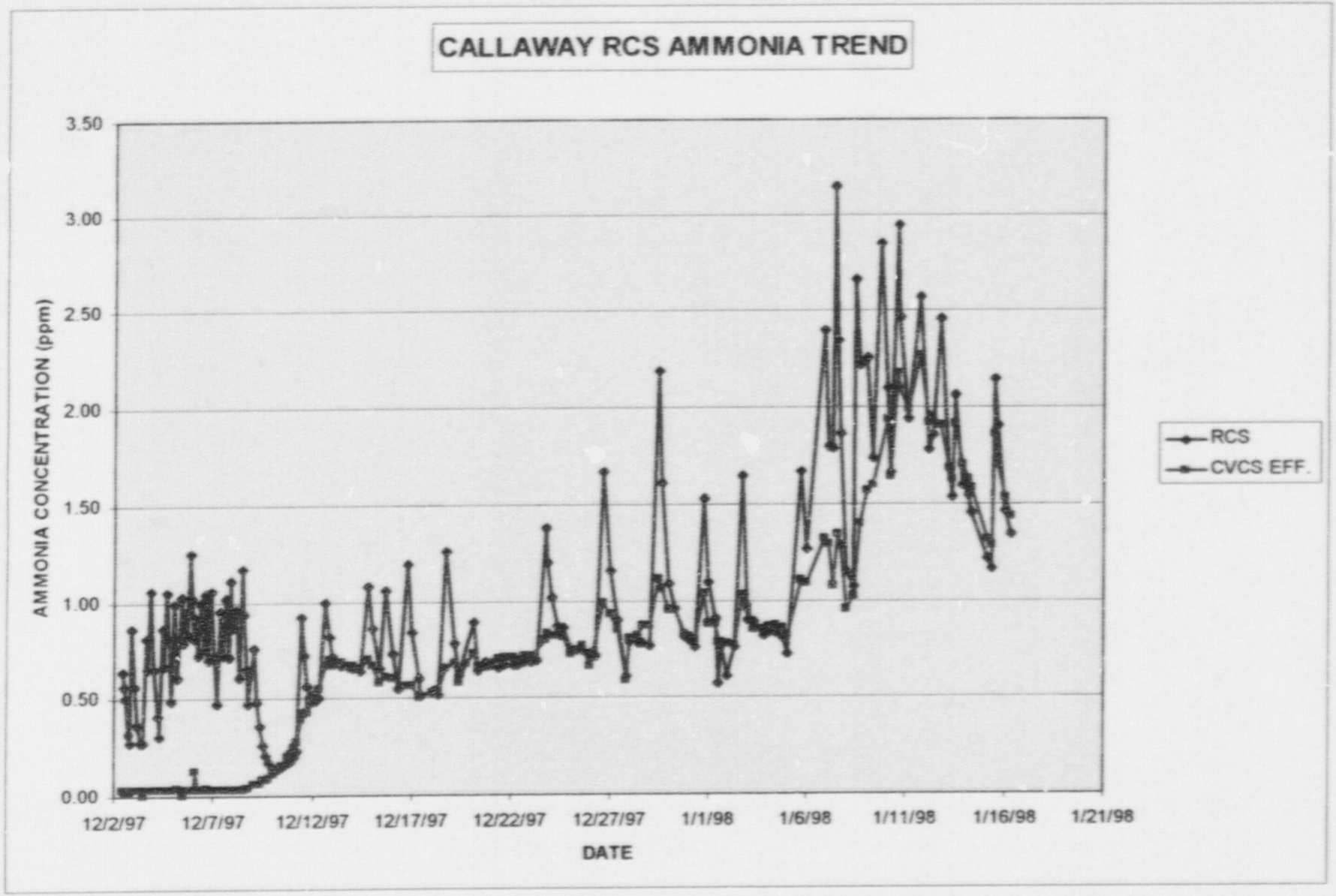


CALLAWAY PLANT

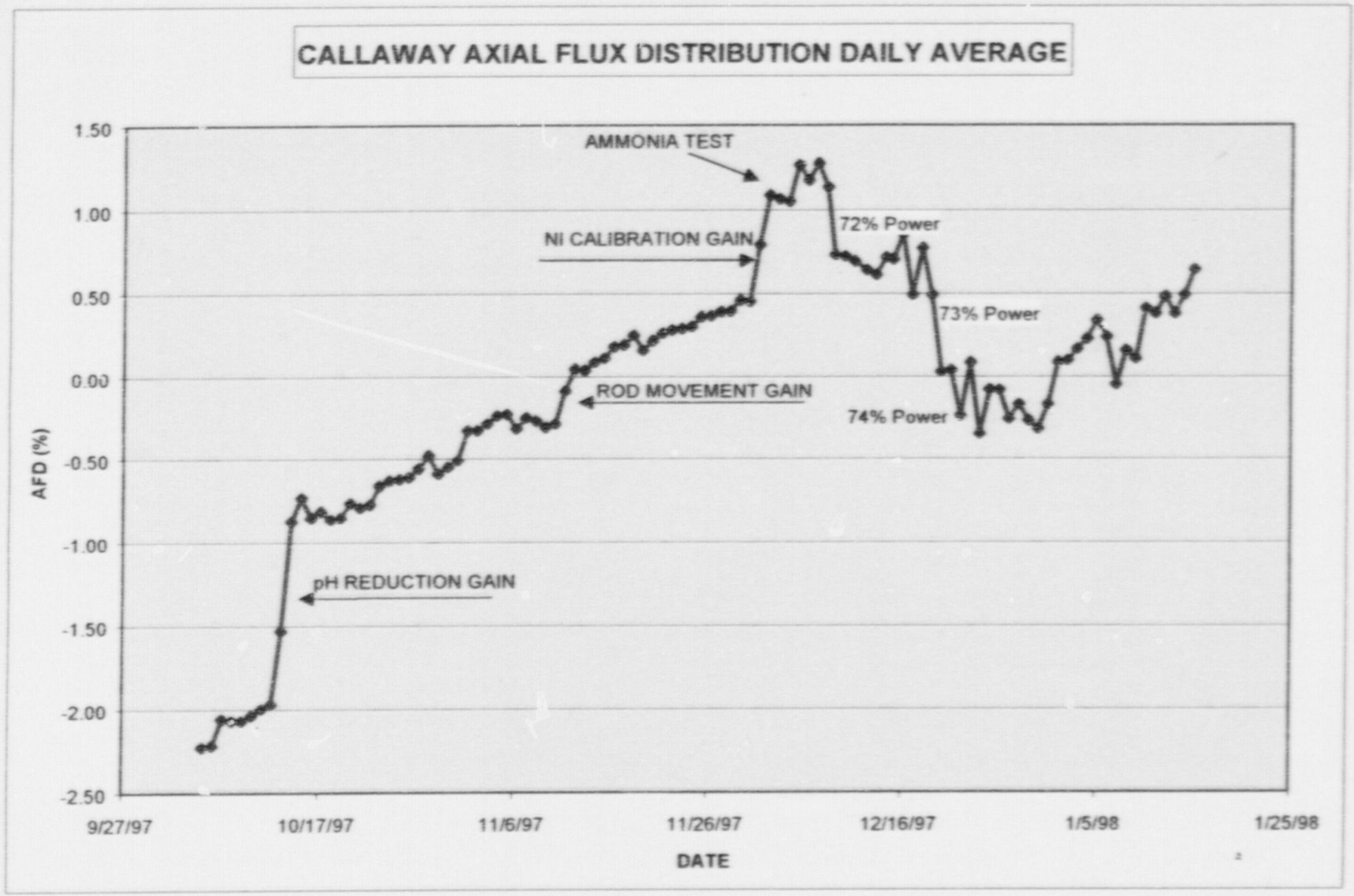
Ammonia Addition to the RCS

- Purpose - complex with Ni rich deposits on fuel and solublize the corrosion layer resulting in AO improvement
- Technical Bases - Siemens international experience
- Governed by procedure and 50.59 FSE
- Over 50 additions performed
- No CRUD Bursts or filter plugging
- RCS CRUD levels elevated

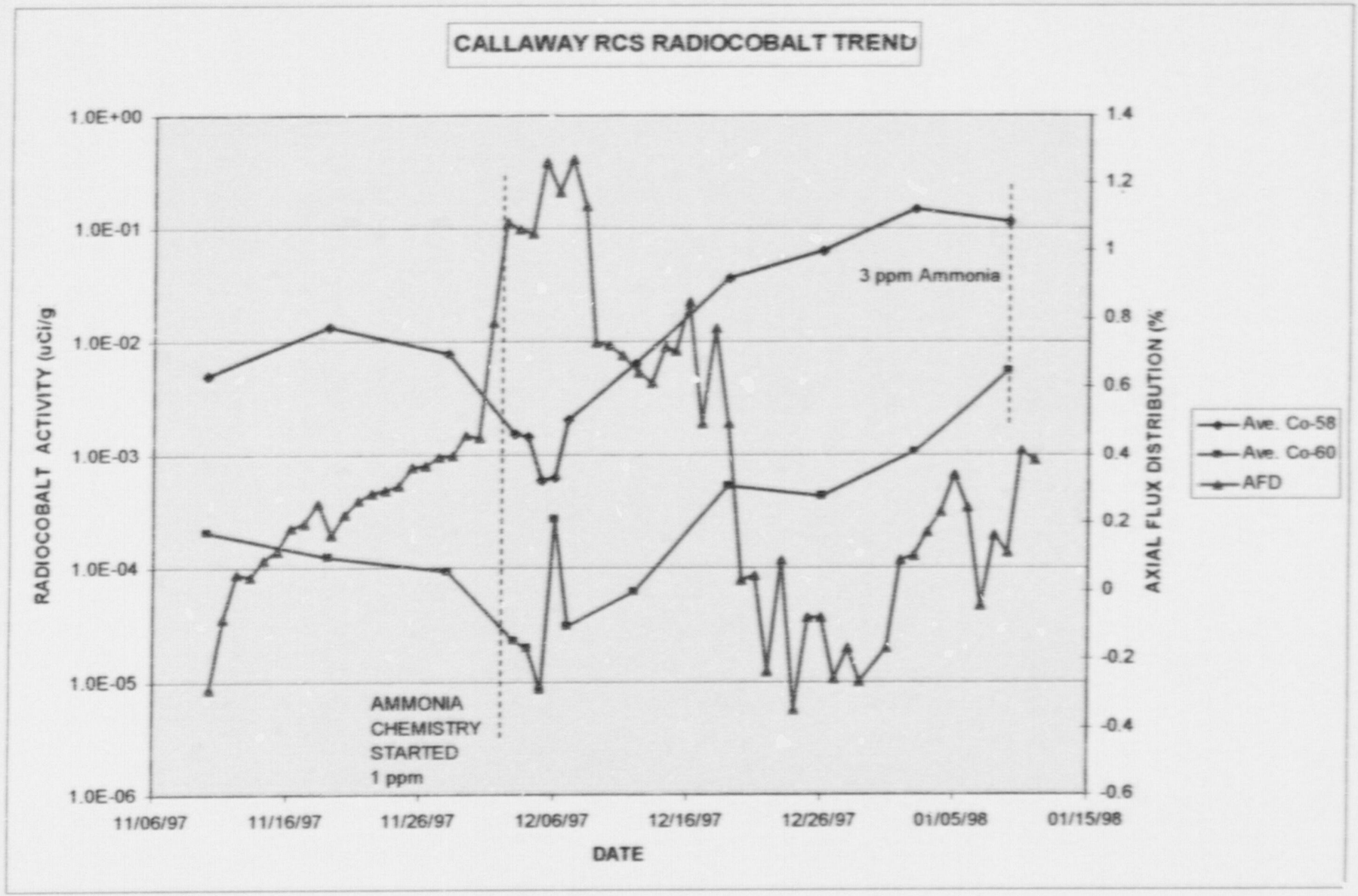
RCS Ammonia


CALLAWAY RCS AMMONIA TREND
AMMONIA CONCENTRATION (ppm)
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
12/2/97
12/7/97
12/12/97
12/17/97
12/22/97
12/27/97
1/1/98
1/6/98
1/11/98
1/16/98
1/21/98
DATE
RCS
CVCS EFF.

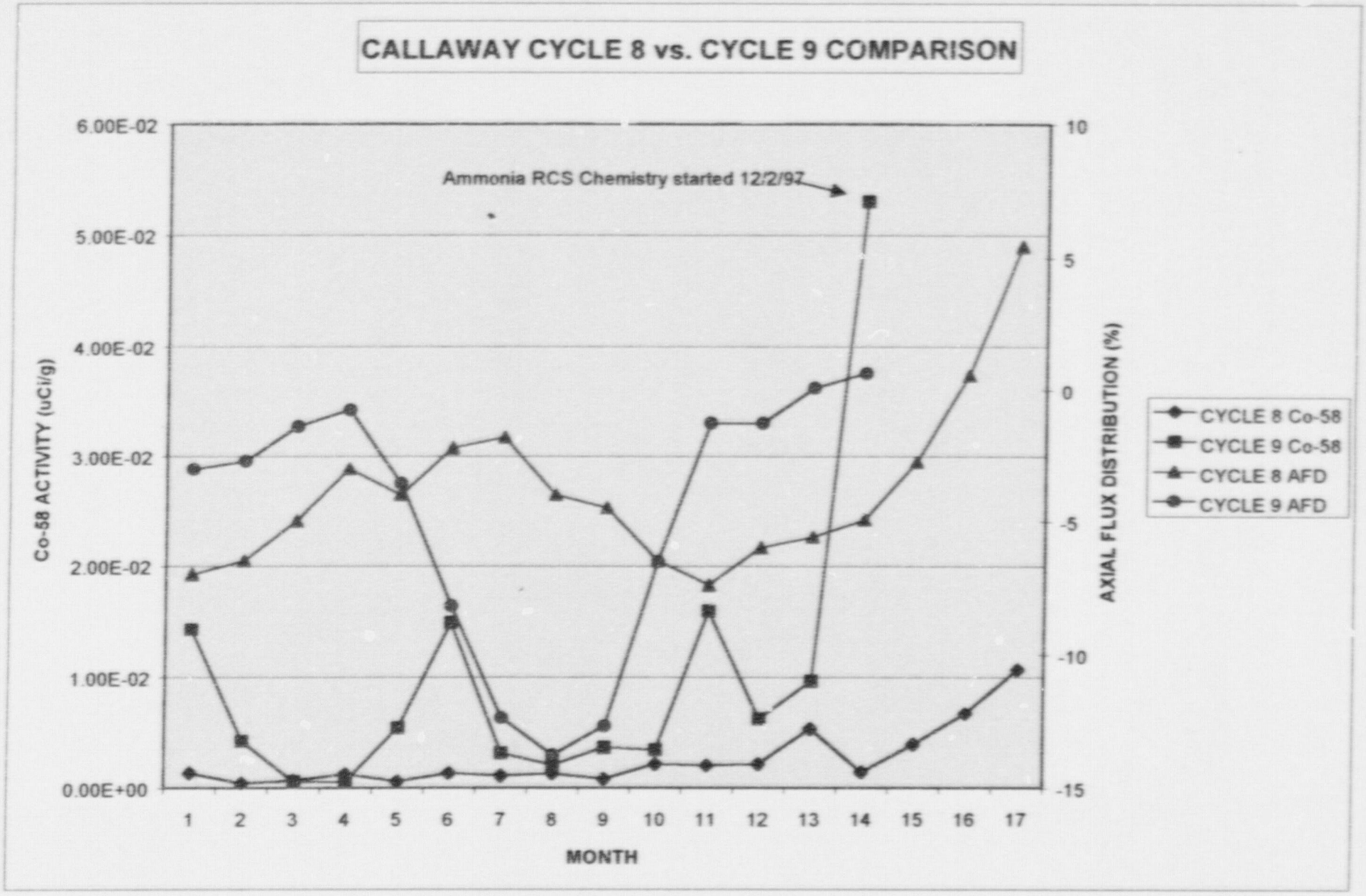
Axial Flux Distribution



RCS Cobalt 58 and 60



Cycle 8 and 9 Comparison



CALLAWAY PLANT

Fuel Defect

- Failure in fresh, high flux assembly
- 20 x Fuel Reliability Index for zero defects
- RCS fission gases 0.5 -1.0 uci/g
- Fuel Failure Action Plan
- Potential outage impact of large spike at shutdown

CALLAWAY PLANT

Refuel 8 HP Corrective Actions

- Increase Manning of Vendor Technicians due to AO impact
- Engineering Evaluation of Pressurizer Spray Flow during Cooldown is being evaluated
- Implementing additional Guidance for Cavity and Head work activities
- Prioritize Temp Shielding Installation
  - Loop Piping
  - Pressurizer Spray and Surge Lines
- Establish ALARA contact in Outage Maintenance Facility
- Re-evaluating Cavity Decon, pursuing remote vacuuming and detergent decon in lieu of diver and strippable coating
- Installation of Permanent Postings for Bioshield Entrances during Outages
- Revised procedural guidance for RCP Shipping Container Surveys and included in Training of Technicians

Chemistry RFO8 High Dose Rate Self Assessment

- Detailed Assessment conducted w/ assistance of industry experts
- Independent Review by EPRI and Peers
- Conclusions:

  Root Cause - AOA

  Avoid modified 7.4 pH regime

  Shutdown Chemistry does not lower dose rate

  Keep H2 elevated during acid reducing conditions

  Extend Acid reducing time during shutdown

  Minimize acid reducing conditions during startup

CALLAWAY PLANT

Liquid Radwaste Processing

- Implemented demineralization processing in July of 1996.
  - Last to use evaporators
  - Cesium selective resin
  - Install plant equipment used
- Demineralization discontinued in April 1997 due to elevated Co-58 levels
- Corrective Actions
  - Admin limit placed on activity released
  - New charcoal used for Cobalt removal
  - 0.5 micron bag filter installed
  - Implement used of additional charcoal bed for reprocessing
- Restarted Demin Processing in December 1997
- 1997 Totals

  2.3 E-1 curies released

  6.09 E-3 mrem (0.2% of annual limit)

HP Department Challenges and Improvement Opportunities

- FSAR Review and Procedure Revision
  - FSAR Review on-going
  - STS Implementation in March 1999
- ALARA Program Improvements
  - Outage Review Board Membership Revised
  - Post Job Review Threshold Reduced from 20 to 7.5 Manrem
  - ALARA Suggestion Program
    - Implementing site-wide simplified Suggestion Program for Refuel 9
    - 1997 SOS Suggestions - 8, Requests for Resolution (Design) - 10
    - 1998 YTD SOS Suggestions - 2, Requests for Resolution (Design) - 0
- High Radiation Area Controls
  - Signage is being revised for DHRA and DREA postings
  - Installation of Gate for HP control of Emergency Personnel Hatch

CALLAWAY PLANT

HP Department Challenges and Improvement Opportunities

- Self Assessment
  - ALARA Program assessment in January 1998
  - Participation in Assessments at other plants
  - Increase number of Self Assessments in HP Area
- Contamination Control
  - Conditional Release Program revised, adding additional signage
- Health Physics Facilities and Equipment
  - RCA Tool Room, Auxiliary Building 1974'- January 1998
  - Automated Access Control Applications - February 1998
  - RAM Storage Building - February 1998
  - Laundry and Decontamination Facility - March 1998
  - Remote Monitoring Task Team - July 1998

Chemistry and Radwaste Department Challenges and Improvement Opportunities

CALLAWAY PLANT

- Self Assessments
- Housekeeping Ownership
- Sustained Radwaste performance
- FSAR Review and Procedure Revision Initiative
- Chemistry Technician Fundamentals Knowledge
- PASS Performance

	% Availability 1997
In-line Gamma Spec	94%
In-Line Boron	99%
In-line Dissolved H2	87%
Grab Sampler	89%
Overall	99%

CALLAWAY PLANT

Refuel Outage 9

- Scope
- Schedule
- Radiological Considerations
- Shutdown Chemistry

CALLAWAY PLANT

Refuel 9 Scope

- S/G nozzle dam after fuel off load
- New refuel machine
- Replace B RCP Motor and pump internals
- 100% ECT of 4 S/G
- Electro-sleeving tube repair
- Safety train work
- 40 Design Changes implemented

CALLAWAY PLANT

Refuel 9 Schedule

- Duration 28 days
- Shutdown to Mode 5 - 28 hours
- RCS Clean-up post H2O2 add - 76 hours
- S/G ISI and repair - 214 hours
- Fuel offload 29 hours

CALLAWAY PLANT

Refuel 9 Radiological Considerations

- High Noble Gas Levels due to Failed Fuel
- Potential Iodine Spike after Shutdown
- Potential High Particulate Levels and Associated Hot Spot and Contamination Control Concerns
- Radiation Levels may be much higher than in the past due to magnitude of AOA

CALLAWAY PLANT

Refuel 9 Shutdown Chemistry

- De-lithiate RCS
- Elevated H2
- 24 hours in acid reducing conditions
- Chem degas and H2O2 addition
- Clean-up prior to securing RCPs
- Flood up target 0.05 uci/cc Co-58 and 0.01 uci/cc I-131
- Lessons Learned from other plants