

Winn, Kim S - DK-7

From: DudleyDevices@Aol.com
Sent: Monday, September 12, 2011 9:02 PM
To: FOIA
Subject: FOIA Request

The following is a New FOIA request:

Name: Douglas Albright
Organization: Actuation Test Equipment Company
Address: 3393 Eddie Road Winnebago, Illinois 61088
Phone: 815-335-1143
FAX: n/a
Email: DudleyDevices@Aol.com

Description of Request: Would you please send me documents from the BPA Hydro Optimization Team (HOT) meetings after November, 2010. Specifically, please send any agendas, hand-ins, hand-outs, overhead slides, reports and a listing of any funds expended for FCRPS hydropower maintenance, upgrades and optimization. Thank you.
Preferred format: any format is OK

Type of Requester: Business

I Agree to pay all applicable fees

RECEIVED BY BPA FOIA OFFICE THIS DATE: 9/14/11
DUE DATE: 10/13/11
LOG # BPA-2011-01861-F

9/14/2011

DRAFT SUMMARY

HOT MEETING MCNARY THEATER MAY 10, 2011

Attendee List

Waylon Bowers – HDC
Sydney Foster – Corps
Robert Siedmah – Corps
Dan Ramirez - HDC
Dan Patla –HDC
Waylon Bowers – HDC
Ed Miska - NWD
Larry Haas – HDC and co-chair
Tom Murphy – BPA and co-chair
Dick Nelson - BPA
Carolyn Foote – NWW PM
Tiffany Newton - BPA
Robert vanderBorg – NWP
Quien Nuyen – Corps (on phone)
George Brown – BPA

INTRODUCTION SUMMARY

Larry Haas (Corps – co-chair) and Tom Murphy (BPA) led introductions and reviewed the agenda. The draft summary was reviewed from last meeting and not approved yet due to follow up needed. The actions list was revised at the meeting.

Added topic: Renewable Energy Credits

Personnel Changes: Dennis Radunzel replaced Leah Wickstrom for Seattle District. Scott Bennett is at Chief Joseph.

PM's

Dennis Radunzel – NWS
Carolyn Foote – NWW
Daryl Melton – NWP

RENEWABLE ENERGY CREDIT CALCULATION

Tom Murphy (BPA) presented slides on Renewable Energy Credit Calculations.



HOTMay2011.pdf

Highlights:

- State of Oregon working on an efficiency calculation for all amounts of Renewable Energy Credits (RECs)
- Federal agencies working on developing a method to calculate and track REC's.
- Anticipating this will be a national trend
- Federal government (for Oregon only) is not willing to sell credits, but putting renewable energy into portfolios which includes 9 new runners for Grand Coulee/T2 installation and at Chief Joseph.
- The benefits will be shared by 50-60 utilities
- Regis is the "Clearing House" to show how much wind energy can be generated.
- Baseline improvement varies with time of day and flow
- Does this fall under PPEI? An agreement will be needed with the Corps and Reclamation to turn over Renewable Energy Credits (RECs)
- There is a possibility to retain the RECs
- Discussed value of RECs
- Few Mid C's have written regulations that allow them to receive energy credit
- Mid-C's agreement with Washington is still in place
- What about governor impacts?
- Need to make improvements at T2 installation for Chief Joseph to get credit for REC's
- How do we achieve penalties? Assuming different states will have different ones?
- Review of anticipated GBO data curves, index text results and higher and lower curves based on original settings.
- CAM testing - differences in data results were not very significant
- Questions were asked about power house 1&2 at Bonneville
- Starting to get in data and calculate gross head results - see slide 2

REVISED CHARTER

Ed Miska (Corps) reviewed the Corps HOT Team (revised) Charter. See version 4/15/2010.

Suggested changes: change program managers to project managers. Also, added the words does not execute projects.

The committee reviewed the old charter and revised charter.

VOTING:

The Corps HOT Team voted all 1, 2, 3's and no 4, 5, 6's and approved the charter.



FinalCharter
051011.pdf

GATE BLADE OPTIMIZER

NWW GBO

Dan Patla (Corps) discussed preliminary data measuring the following on the gate blade optimizer at McNary (4 units):

- Head
- Flow
- Wicket Gate Opening
- Blade Angle
- Power

Dan discussed work timelines and challenges with switching to a PLC platform.

The HOT Team discussed upcoming funding needs.

NWP GBO

Dan Patla (Corps) reported the following on The Dalles (2 units) and John Day (4 units) GBO:

- GBOs developed to interface with NWP 3D cam controllers
- GBOs deployment schedule at The Dalles and John Day discussed.
- Software updates dealing with unforeseen data logging problems
- Scripting fixes were developed

JDA BLADE ANGLE MEASUREMENT

Waylon Bowers (Corps) reported the following:

- Hoodtech was hired
- Corps' previously installed sensors and cables
- BAM – testing, task orders, and data gathered
- Results – bias differences in measurement due to how BAM measures blade angle (near blade centerline) and how field personnel measures (at leading and trailing edges of blade) Hysteresis
- Repeatable blade angles
- Operationally nothing to be gained by additional measuring
- Report is being developed
- Take aways: The Repeatable Blade Project will be put on hold. Another test will be conducted in two years.

Dan Ramirez will follow up with Dan Watson about possibly measuring blade angle during maintenance and developing a plan.

FY11 HEALTH CHECK

Waylon Bowers (Corps) reported the status of FY11 Health Check as follows:

- Determine sensors to install for comparison and analysis (e.g., linear vs. rotary sensors, MLDT vs. LVDT, HART vs. non-HART radar sensors)
- Order sensors
- Write test plan
- Installation of sensors on one unit
- Perform testing and analyze results
- Determine best sensors/methods to use and install sensors on more units
- The HOT committee reviewed charts of The Dalles tail water head and forebay
- Linear vs. Rotary
- Purchase order written and waiting for results

CHIEF JOSEPH FLOW TABLES

Dan Ramirez (Corps) showed flow tables of Chief Joseph unit #21 and reported on progress.

- Units 17-27 testing happened in 2010.
- Most units showed similar data shape.
- Summary results – peak at 92mw (peak efficiency)
- All unit curves implemented for units 17-27 flow tables for T2 and will be put into GDACS
- What are the benefits?
- Currently project is on hold for reporting until August data comes out.

Tom Murphy (BPA) suggested using a Pi calculation to do a comparison of the analysis.

CHIEF JOSEPH FLOW ABSOLUTE FLOW

Dan Ramirez (Corps) reported on Chief Joseph Absolute Flow as follows:

- Performance testing happened in April 2011
- New flow metrics were added into the simulation testing for units # 11 and 15
- Issues with reference flow meter configuration identified
- Waiting for results from simulations
- Reprocess the data? Pull results from scintillation testing?

- Discussed possibility of adding flow meters and not use scintillation

3D CAM OPERATIONS SURVEYS

Dan Ramirez (Corps) reported on 3D cam operations surveys.

- No data from Walla Walla
- Other data being processed
- No wide spread issues, except Lower Granite.
 - Loss of preferred AC power resulted in erroneous head inputs into 3D cam controller. Half of units affected for extended period. .
 - Plant personnel have resolved issue

CHIEF JOSEPH FLOW METER DATA TO GDACS

Larry Haas (Corps) reported making some progress on Chief Joseph meter data to GDACS. Stay tuned...

LOWER GRANITE ACCUSONIC FLOW

Dan Patla reported on the cleanup effort at Lower Granite. Discussed background on installations, A, B, C paths, problems with leaks, and inspection of transducers.

Results were good on all tested paths.

HDC will provide designs for electrical work needed. The holes will be plugged at Lower Granite and drawings and specs twill be provided. HDC will be hiring a contractor to work on flow metering.

SUBAGREEMENT PPEI

Larry Haas (Corps) discussed reprogramming needs from FY11-FY12 due to schedule delays to cover FY13 expenditures. Hopefully, no amendment will be needed for FY12.

NEXT MEETING

The HOT Team committee decided the next meeting is scheduled for October 26-27 at McNary.

Attached are slides presented at the HOT Team meeting.



HOT Meeting
5MAY2011.pdf

ACTION ITEMS

Tom Murphy will invite Deb Malin to a future meeting to give a presentation on Renewable Energy Credits (RECs)

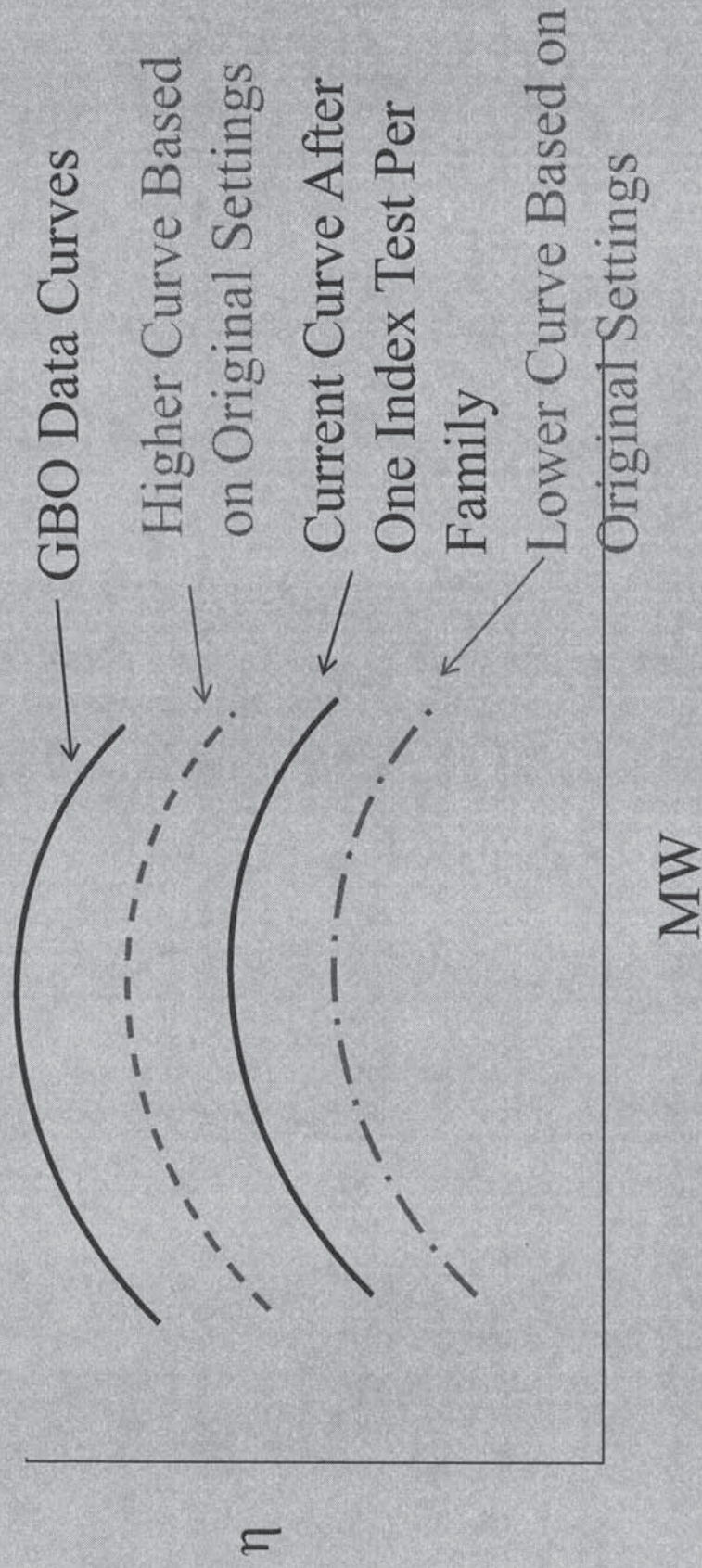
Tom Murphy will follow up on frequency movements in the gates for wind curve analysis for REC's which will be included in a study.

Carolyn Foote will follow up on the status for Heath Check funding at McNary.

Tom Murphy and Dan Ramirez will follow up on Pi calculation comparison for Chief Joseph flow tables (July-August operating at peak).

Larry Haas, Ed Miska, and Tom Murphy will coordinate a meeting to discuss budget reprogramming - PPEI Subagreement for FY11-FY13.

Renewable Energy Credit Calculation



RECs (Cont)

- ♦ **Difference between Current Curves After One Index Test Per Family and Curves Based on Original Settings is work done prior to Jan 2007 and does not qualify**
- ♦ **Difference between GBO Data Curves and Current Curves After One Index Test Per Family is work done after Jan 2007 and qualifies for RECs**

Charter

Hydrogeneration Optimization Team

Approved 10 May 2011

In accordance with the goal of the Federal Columbia River Power System (FCRPS) Asset Management Strategy to maximize the value of the FCRPS, we will develop tools and strategies for enhancing net revenues through hydrogeneration optimization and efficiency improvements. This is a partnership of the US Army Corps of Engineers and the Bonneville Power Administration. Our responsibility is oversight and recommendations to the JOC, through the Capital Workgroup. Implementation will be accomplished through normal Corps project management business practices.

What HOT Does:

1. Recommends overall priorities of optimization at the program level;
2. Identifies and prioritizes optimization opportunities;
3. Initiates studies in support of the optimization priorities;
4. Tasks others to develop detailed program costs and schedules;
5. Supports the Capital Work Group and JOC by evaluating and then approving/altering/disapproving detailed program plans;
6. Follows ongoing work to evaluate cost and schedules and alter the plan as appropriate;
7. Helps District Program Managers define and schedule appropriate work;
8. Assists in preparation of the Decision Support Document
9. Evaluates/approves each change in direction or schedule that is recommended to the Capital Work Group;
10. Assesses success of optimization projects;
11. Oversees overall program and looks for synergy with other non-HOT jobs;
12. Assures proper coordination is occurring;
13. Works and coordinates with other agencies to obtain synergy from their optimization programs.

What HOT Does Not Do:

1. Write subagreements – Performed by Project Managers with help from the HOT team.
2. Execute projects.

HOT Meeting

PPEI

May 10, 2011



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Kick Off

- Introductions
- Review Agenda
- Actions
- Adopt Last Minutes
- Review Revised Charter



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McNary GBO

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Background

- Gate-Blade-Optimizer (GBO)
- Efficiency
 - ▶ Head (Water Elevation Difference)
 - ▶ Flow
 - ▶ Wicket Gate Opening
 - ▶ Blade Angle
 - ▶ Power
- In the background testing



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Timeline of Work

- 26 JAN 2011 – Switch to PLC Platform, one unit trial
- 2 FEB 2011 – All units switched on (Units 14, 13, 11, 8). Unit 8 turned off after departure
- 29 MAR 2011 – GBOs identified as security threat and turned off
- 5 APR 2011 – GBOs security cleared and turned on
- 21 APR 2011 – GBOs identified as fighting 3D Cams on low blade angles; turned off.
- 3 MAY 2011 – 3D Cams fix deployed



Switch to PLC Platform

- OPC sampling limitations (10 Hz vs 50 Hz)
- LabVIEW GBO computer failures
- LabVIEW failures
- Excessive time to investigate LabVIEW
- Difficult to support two different platforms
- NERC/CIP requirements
- PLC platform is identical to digital governors



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Challenges

- Sample rate
- NERC/CIP
- 3D Cam interaction
- Fiber to units broken or not established
 - ▶ Unit 12, 9
 - ▶ Units 1-7
- Limited range of operation (this water year)
- Execution is lagging funding



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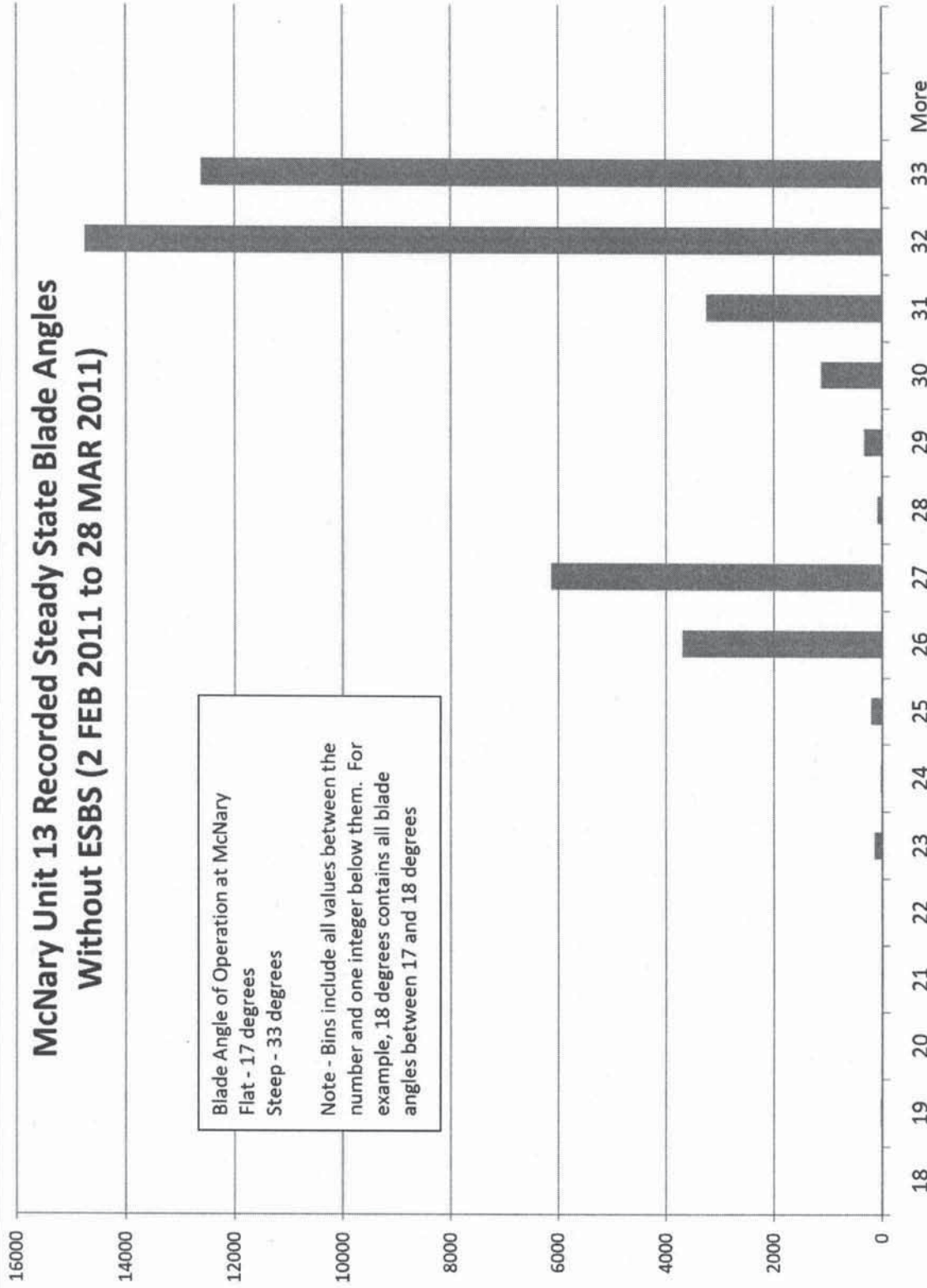
McNary Unit 13 Recorded Steady State Blade Angles **Without ESBS (2 FEB 2011 to 28 MAR 2011)**

Frequency of Recorded Steady State Blade Angles

Blade Angle of Operation at McNary
 Flat - 17 degrees
 Steep - 33 degrees

Note - Bins include all values between the number and one integer below them. For example, 18 degrees contains all blade angles between 17 and 18 degrees

Recorded Blade Angles (degrees)



Schedule

- Updated to incorporate lessons learned from NWP GBO
 - ▶ Updated in order to anticipate longer stints per unit
 - ▶ Units that require even more time to gather the data will be revisited
- Needs input from Operations regarding outages



NWP Gate Blade Optimization

May 10, 2011



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Timeline of Work

- 9 DEC 2010 – Deployment at John Day U11-14
- 14 DEC 2010 – Deployment at The Dalles U8-9
- 6 JAN 2011 – Data Pull at John Day and The Dalles
- 18 FEB 2011 – Scripting Update (database fix)
- 28 MAR 2011 – Version Update, GBOs moved
 - ▶ John Day U5-8
 - ▶ The Dalles U14-15
- 7 APR 2011 – John Day GBO Calibration Attempt
- 18 APR 2011 – John Day GBOs Calibrated



Software Updates

- Due to large amounts of data, the database overflowed (fixed on 18 FEB 2011)
 - ▶ Unforeseeable without longer duration bench testing (months)
- Multiple versions from programming on the fly (fixed on 28 MAR 2011)
 - ▶ Enabled better maintainability



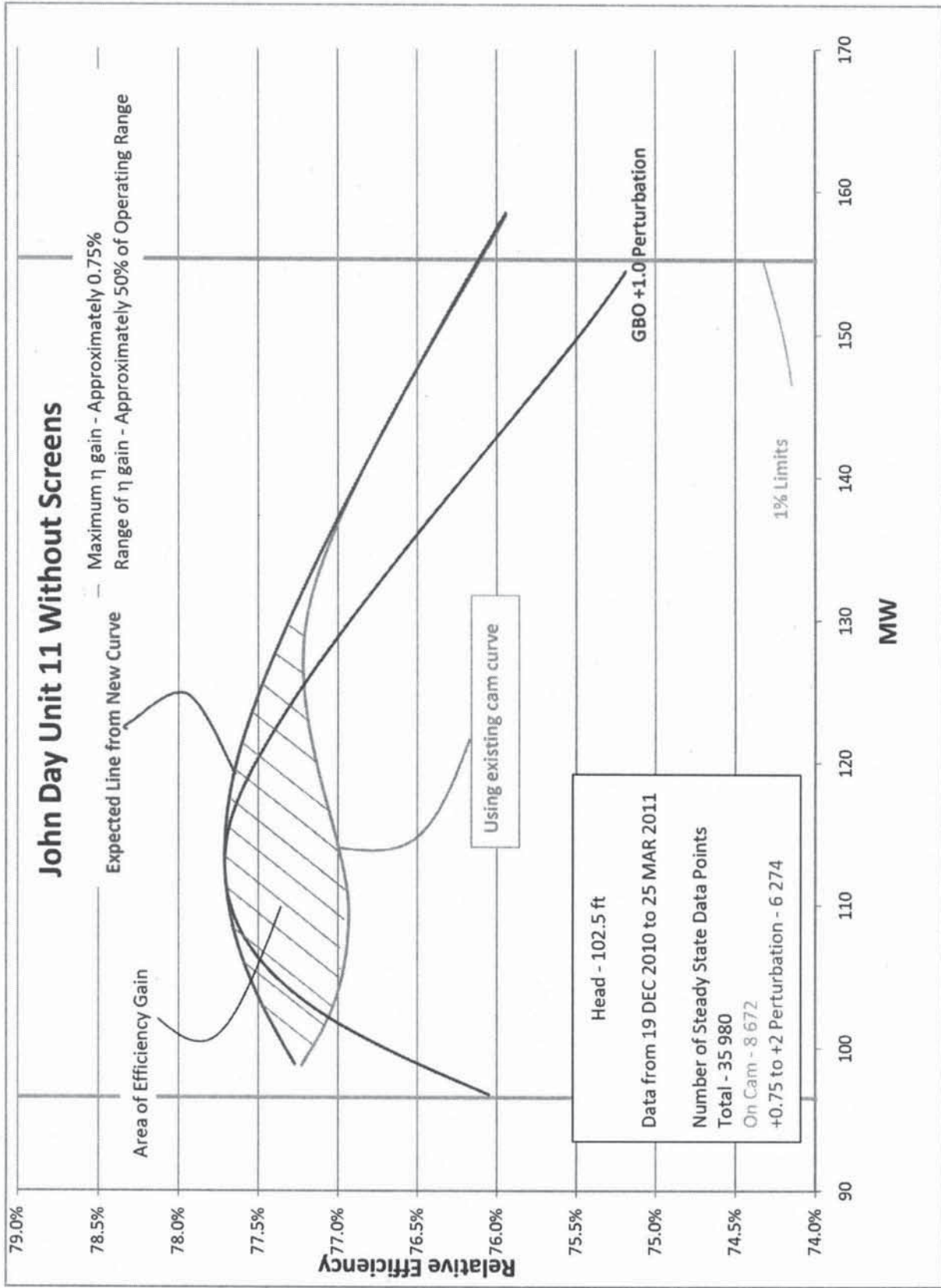
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Challenges

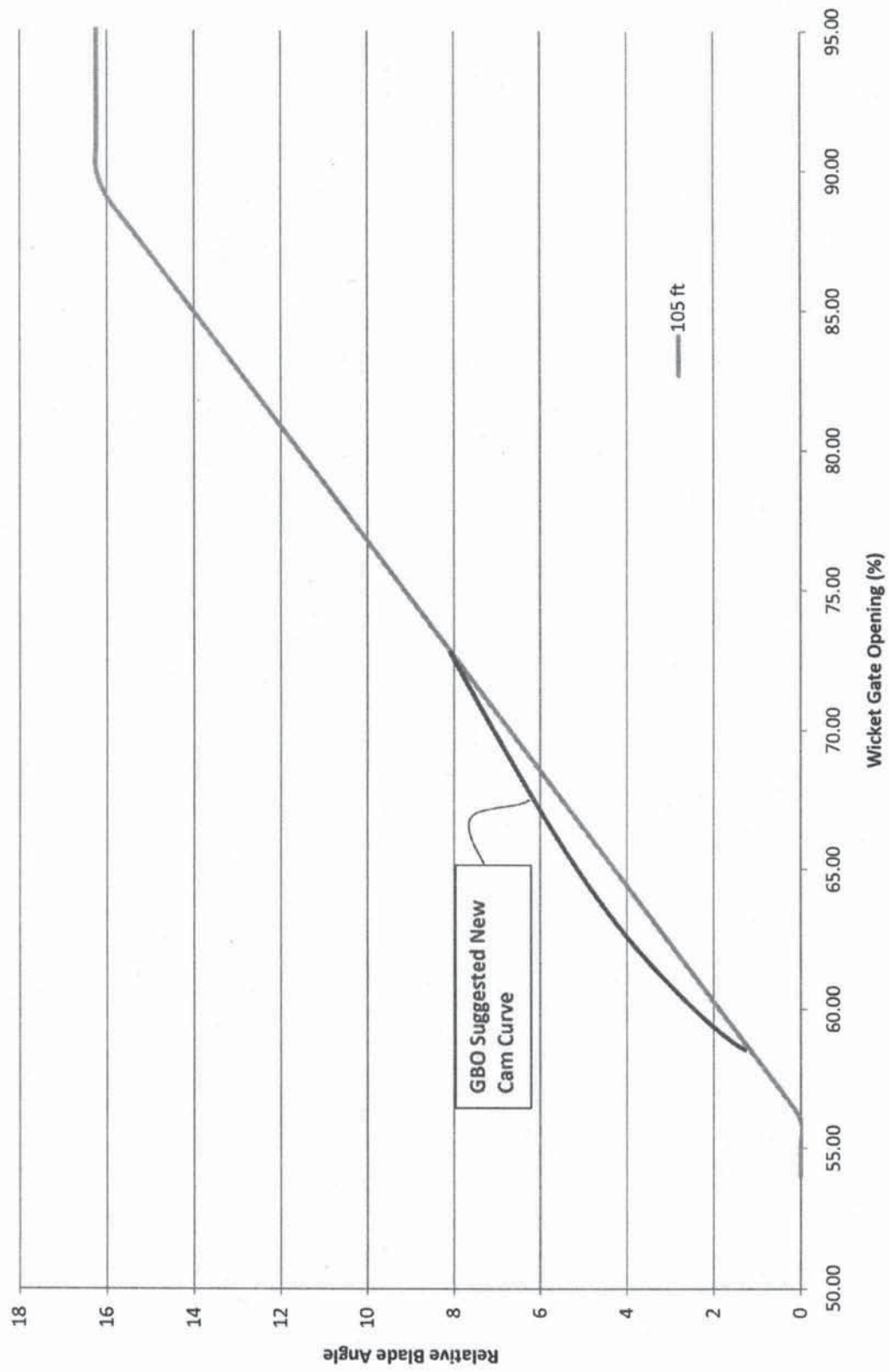
- Ability to take a unit down at John Day for GBO Calibration
- 3D Cams out of calibration (both John Day and The Dalles)
- W-K taps not working



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John Day Unit 11 Without Screens Suggested New Cam Table



Schedule

- Updated in order to anticipate longer stints per unit
- Units that require even more time to gather the data will be revisited



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John Day Blade Angle Measurement

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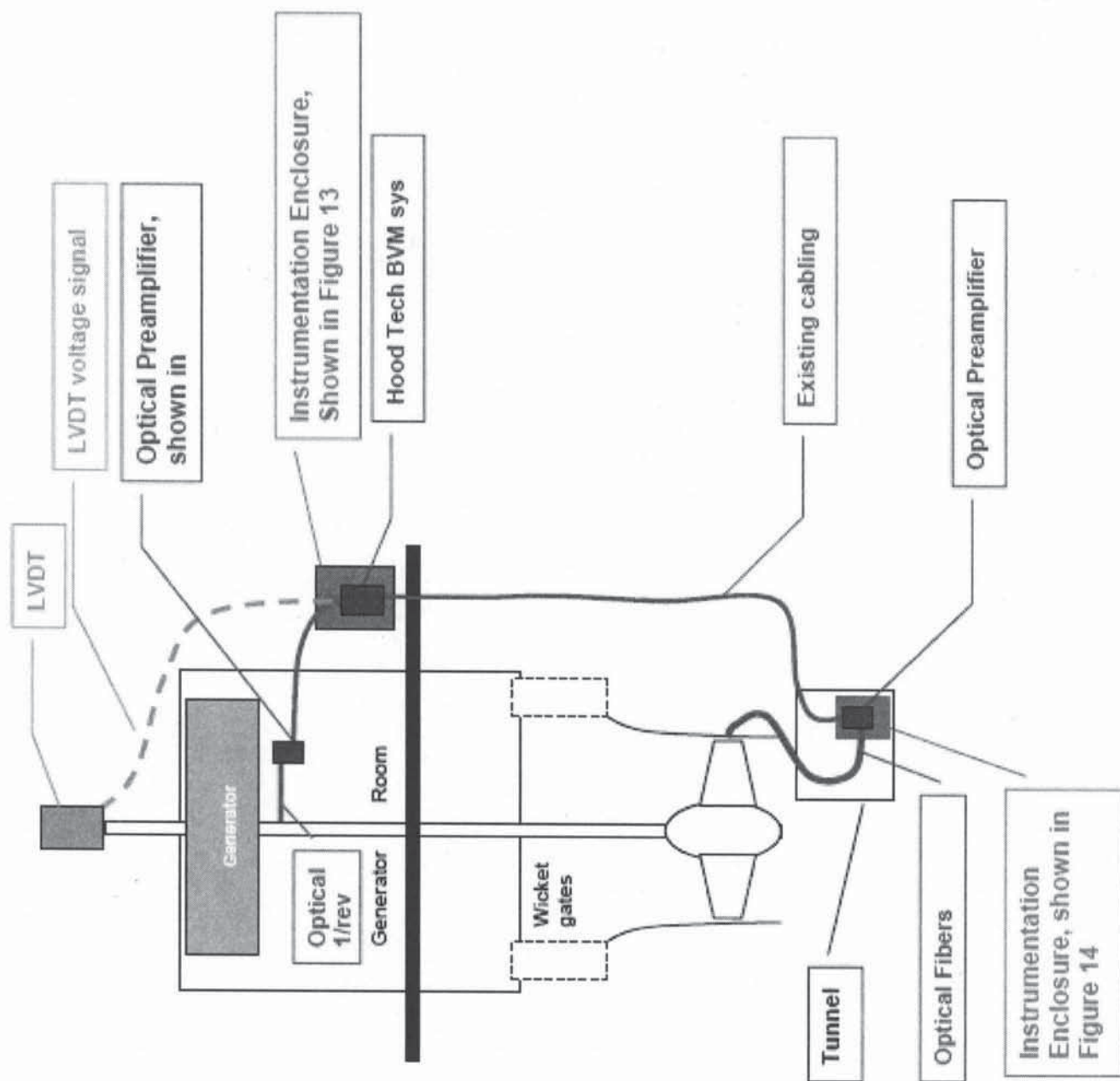
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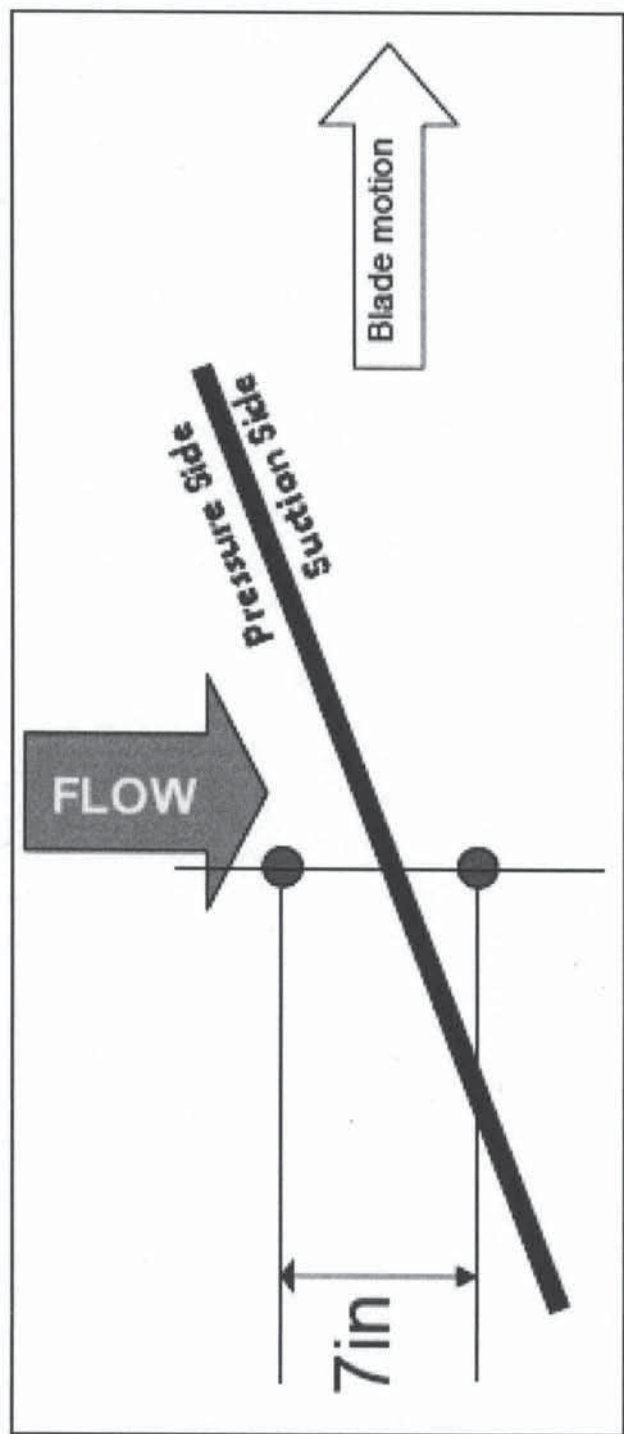
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BAM



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BAM

- September 2010 testing
 - ▶ 2/2 Banner optical sensors functional
 - ▶ 1/2 PCB sensors functional (one is shorted)
 - ▶ 0/2 Honeywell pressure probes working (could be probe or wiring)
 - ▶ 2/2 Inprox sensors functional, but noisy with incorrect frequencies
- Task order
 - ▶ IDIQ with HDR to HoodTech
 - ▶ Install their equipment to use our optical sensors
 - ▶ Data gather for 30 days
 - ▶ Report on BAM versus LVDT
 - ▶ Determine if we want to do long term data gathering

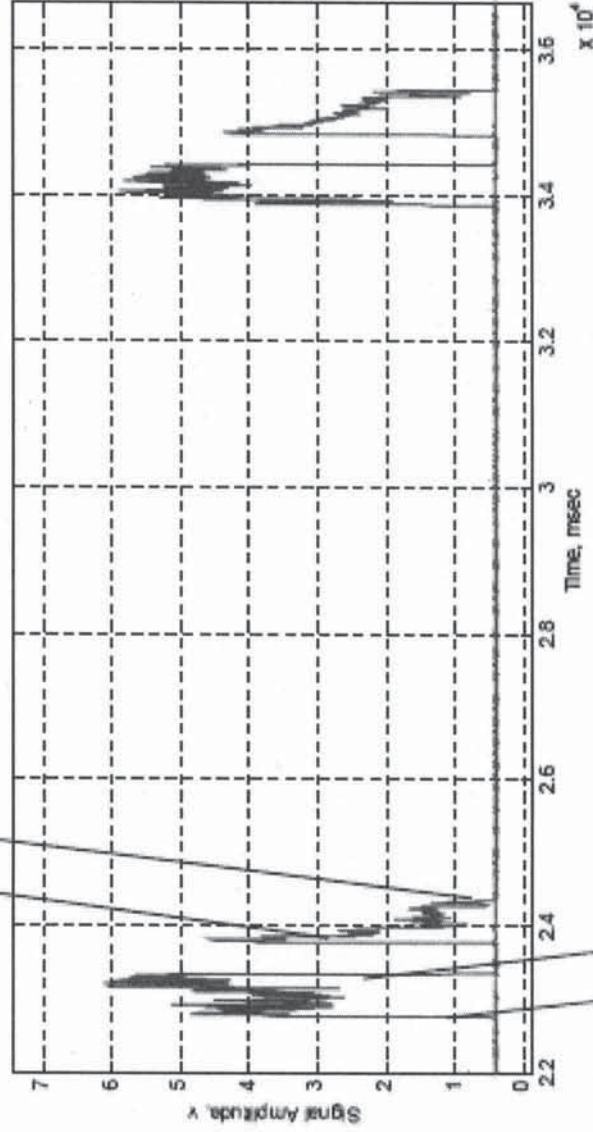


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BAM

Lower sensor observing arriving edge of blade (suction side)

Lower sensor observing departing edge of blade (pressure side),
The poor, unreliable optical edge of the pressure side makes it
very difficult to assess blade angle on the pressure side.



Upper sensor observing departing edge of
blade, pressure side

Upper sensor observing arriving
edge of blade, suction side



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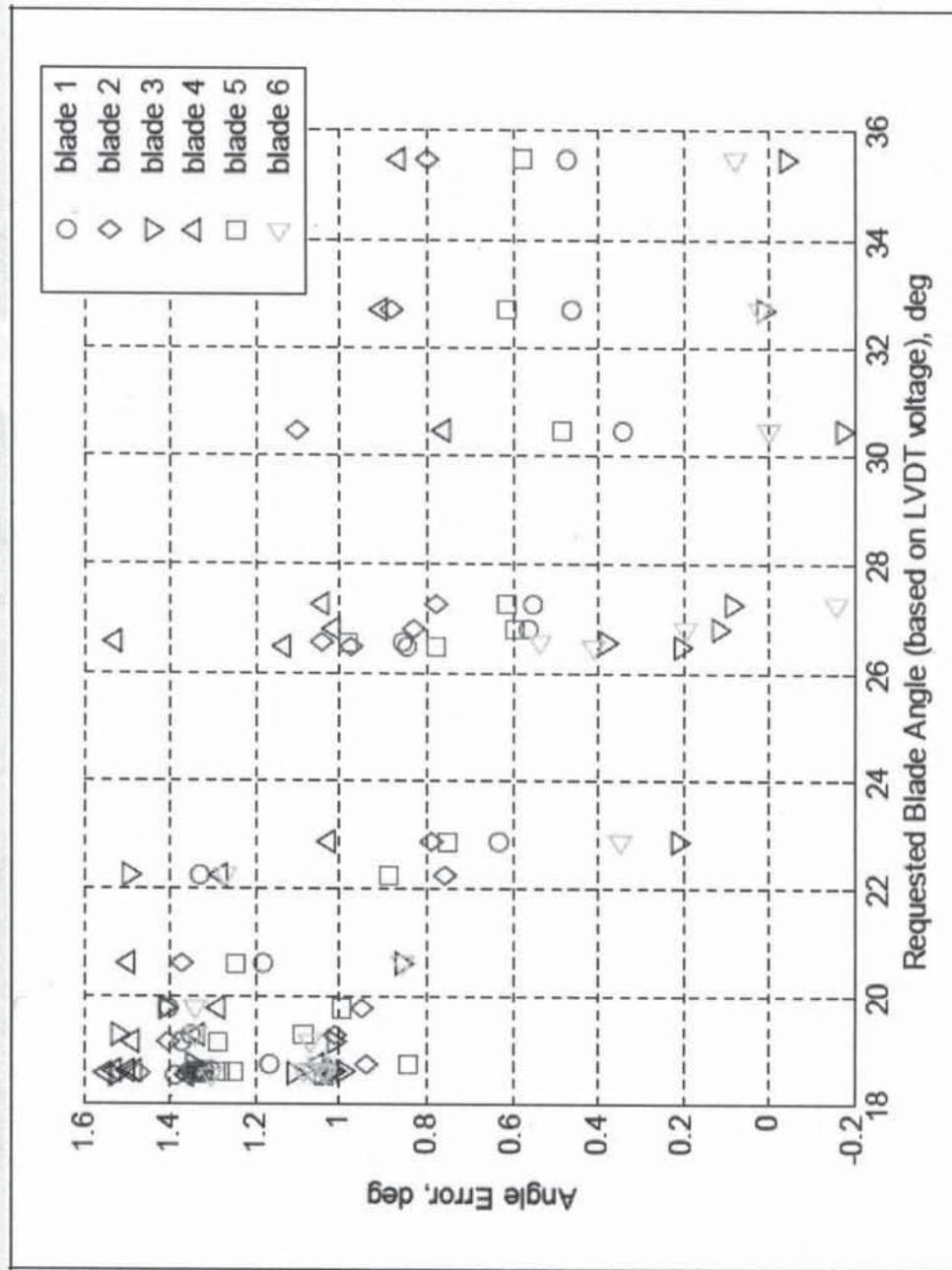
BAM

- Results
 - ▶ Max error between requested angle (from the LVDT) and measured angle (from the optical sensors) was 1.6 degrees.
 - ▶ Largest measured errors occurred when trying to move the blades by small margins.
 - ▶ At a requested angle of 26.5 degrees the blades disagreed by as much as 1.5 degrees.
 - ▶ At a requested angle of 18.5 degrees the blades disagreed by as much as 0.5 degrees.
 - ▶ The blades would dither minimally from rev to rev (0.05 degrees standard deviation) at a given blade angle request



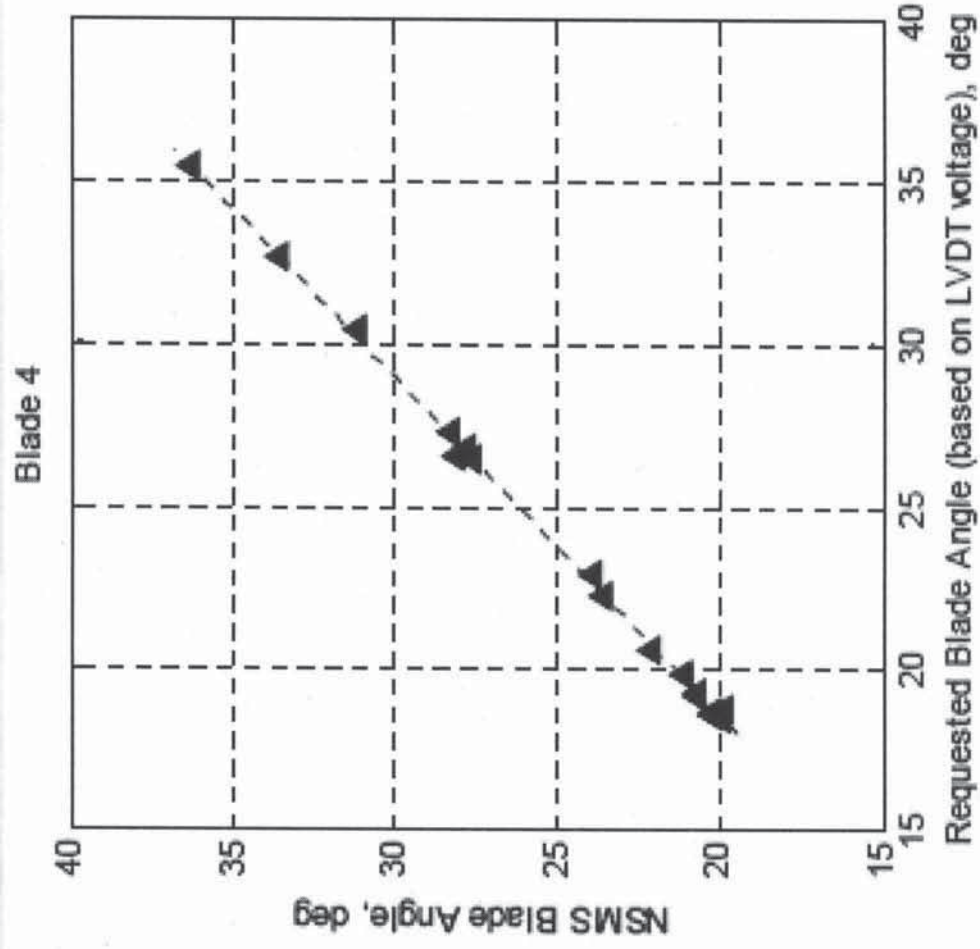
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Blade Angle Error



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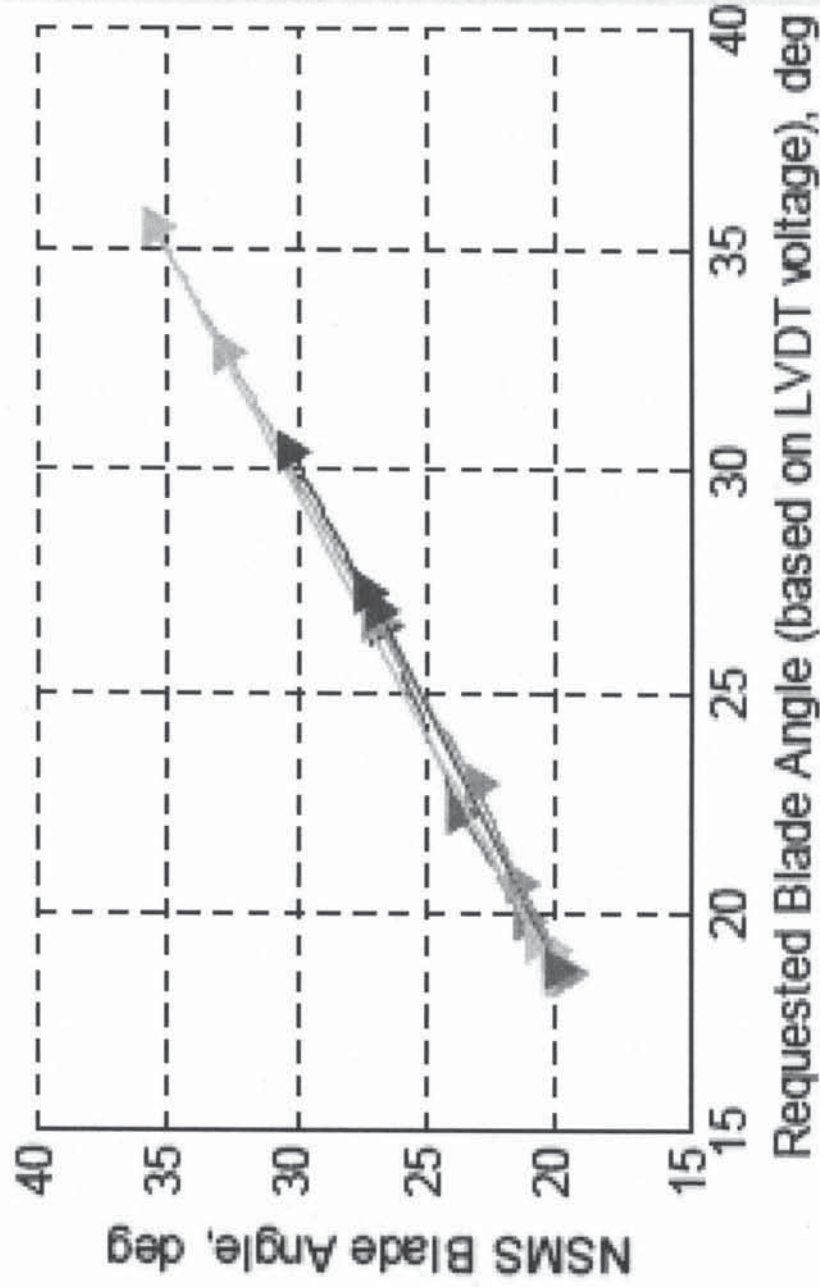
Requested vs Measured



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Hysteresis

Blade 3



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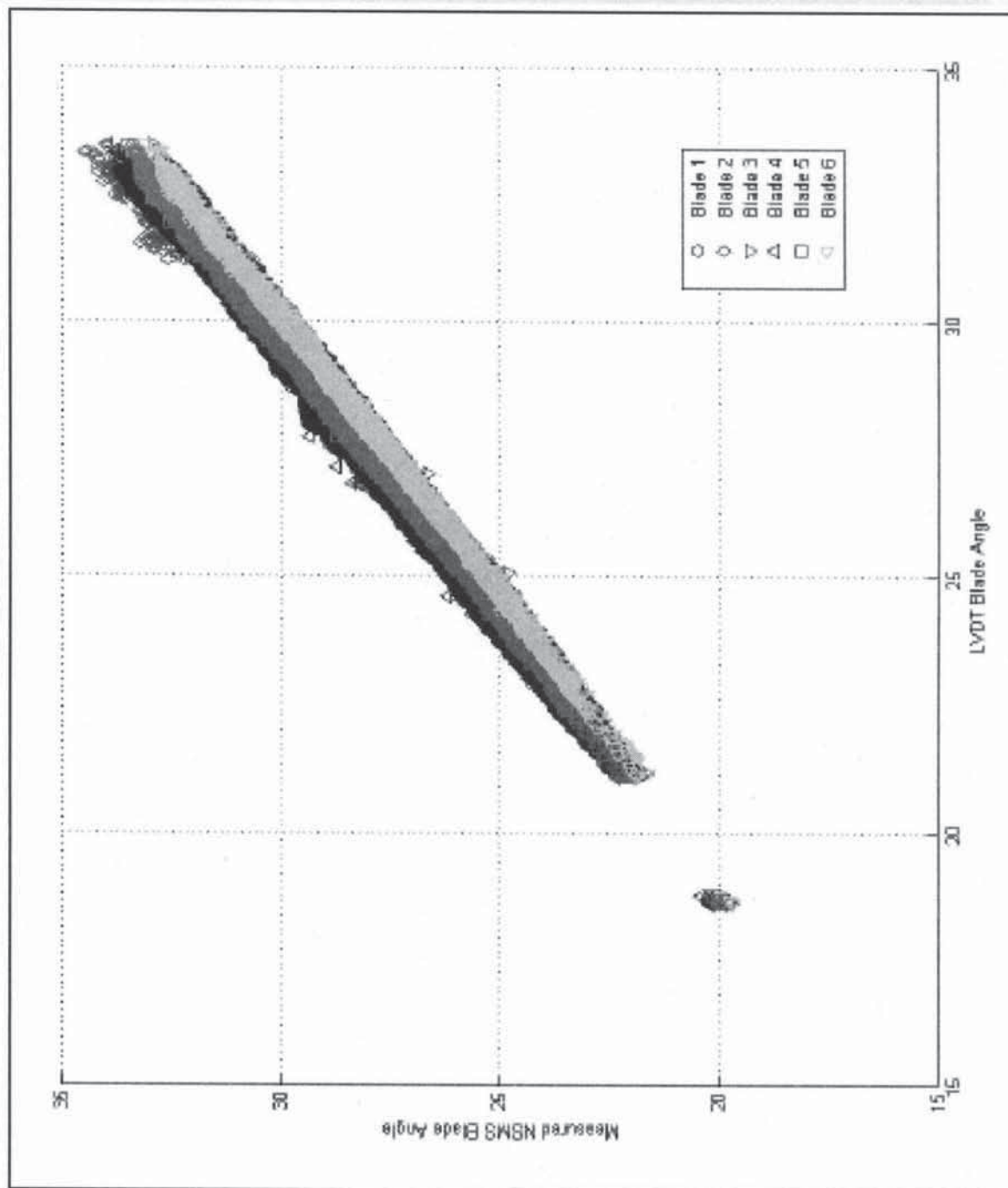
Extended Data Gathering

- 19 Jan 2011 – 31 March 2011



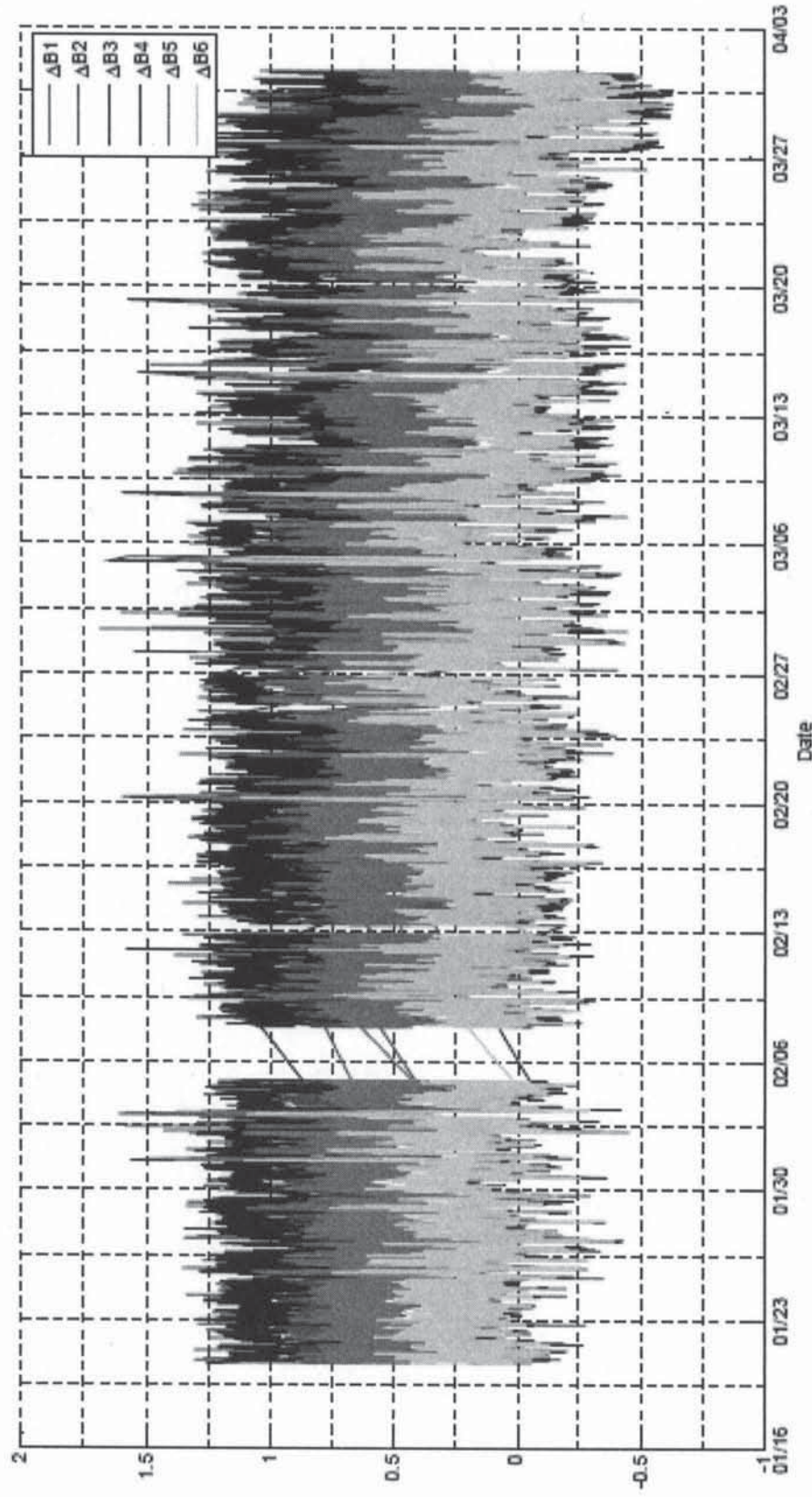
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BAM



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Extended Data Gathering Error



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BAM

- Where do we go from here?



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Health Check

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Health Check

- *FY11*
 - ▶ Determine sensors to install for comparison and analysis (e.g., linear vs. rotary sensors, MLDT vs. LVDT, HART vs. non-HART radar sensors)
 - ▶ Order sensors
 - ▶ Write test plan
 - ▶ Installation of sensors on one unit
 - ▶ Perform testing
 - ▶ Analyze results
 - ▶ Determine best sensors/methods to use and install sensors on more units



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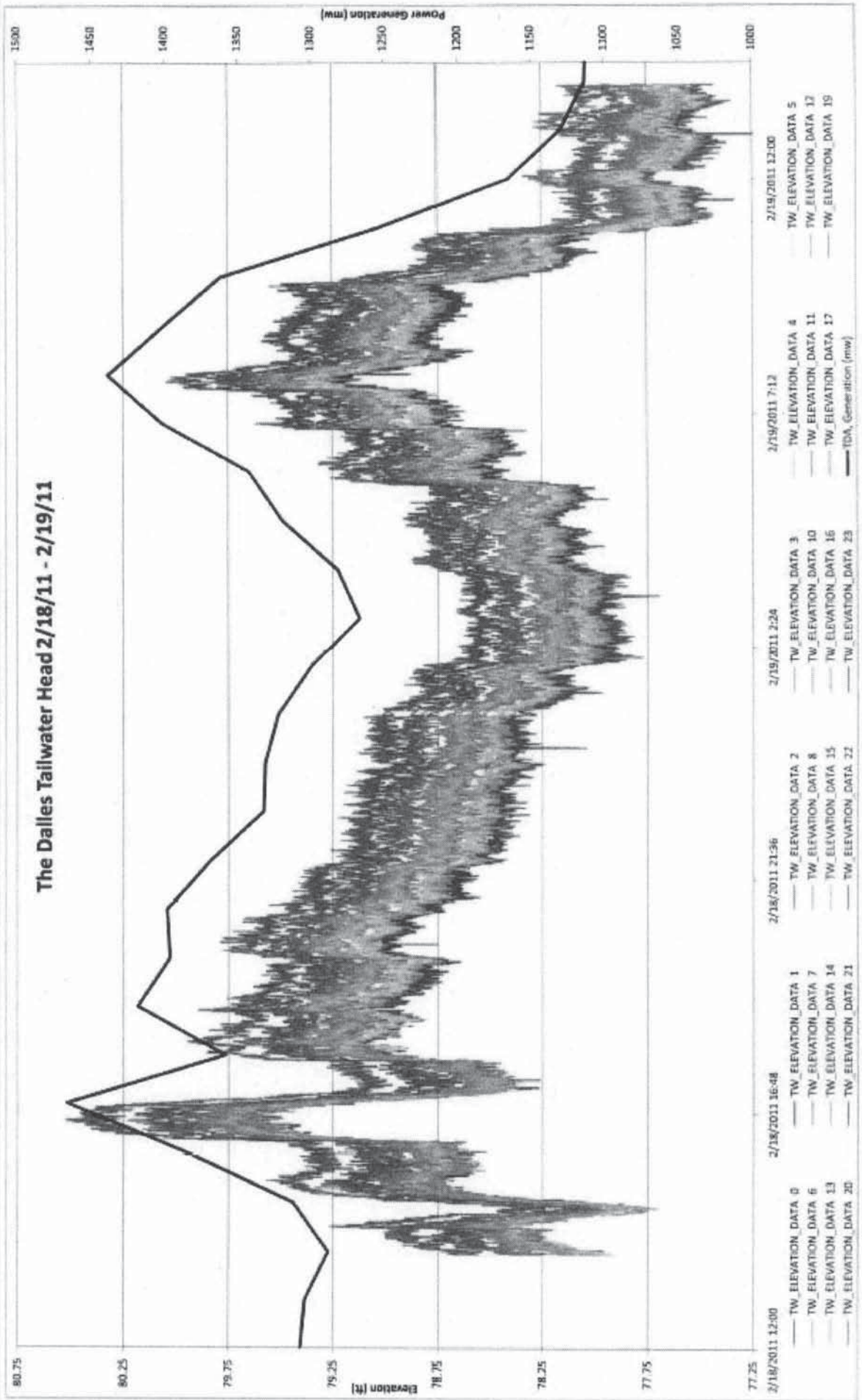
Health Check

- Purchase Order Written
 - ▶ Magnetostrictive Linear Position Transducer x 2
 - ▶ Compare on Lower Columbia – LVDT vs MLPT
- Head Radar Sensors
 - ▶ Not included in purchase order
 - ▶ Reviewed data from GBO
- PLC
 - ▶ Using GBO units
 - ▶ Existing spare I/O
 - ▶ Code is ready to go



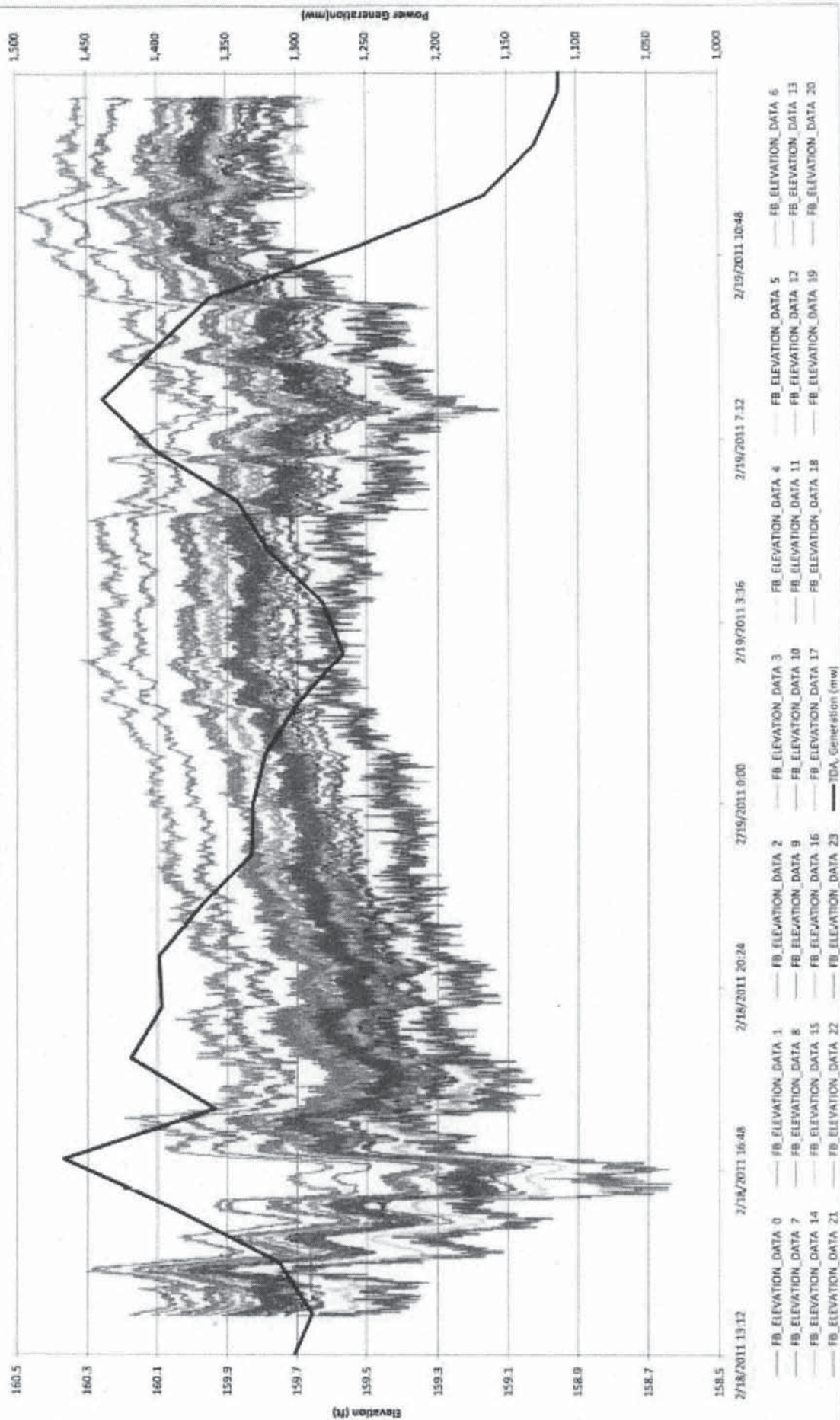
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Health Check



Health Check

The Dalles Forebay Head 2/18/11 - 2/19/11



Health Check

- Linear vs Rotary
 - ▶ Take the MLPT to NWW
 - ▶ Cheaper to install
 - ▶ Use the GBO again



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Chief Joseph Individual Flow Tables

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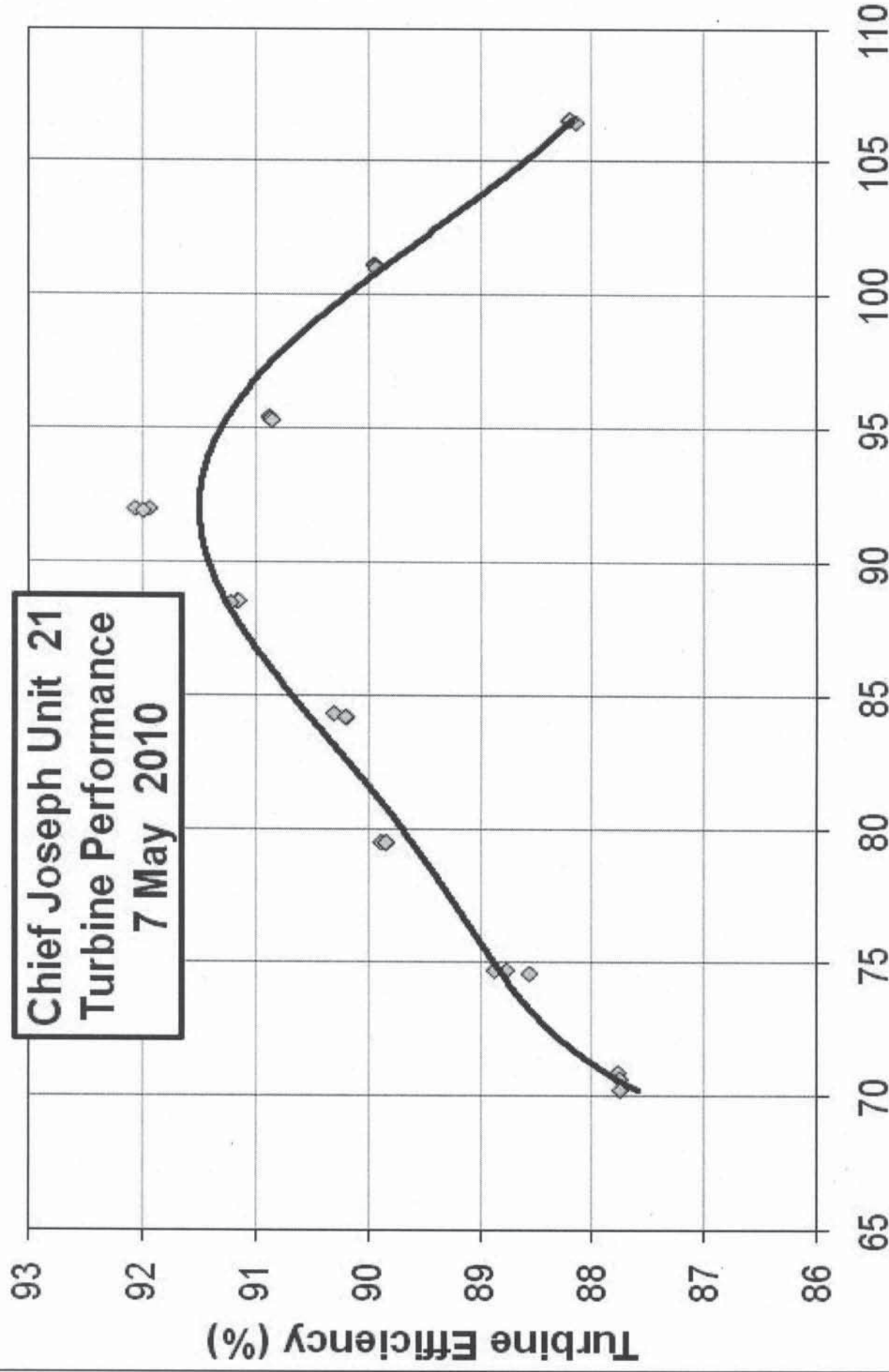


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**Chief Joseph Unit 21
Turbine Performance
7 May 2010**



Generator Output (MW)
Results adjusted to 170 feet net head

Summary of Results

Unit	Date of Test	Generator Output @ Peak (MW)	Approximate Drop in Efficiency @ 70 MW	Approximate Drop in Efficiency @ 105 MW
17	5 May	90.7	4.8%	3.9%
18	5 May	91.3	5.0%	4.0%
19	6 May	93.1	4.8%	3.1%
20	6 May	90.5	4.0%	3.2%
21	7 May	92.0	4.4%	3.4%
22	18 May	89.3	3.4%	3.4%
23	18 May	91.1	4.1%	3.4%
24	19 May	90.6	4.5%	3.5%
25	19 May	92.8	4.4%	3.0%
26	20 May	92.4	4.6%	3.5%
27	20 May	89.2	4.0%	3.7%



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Chief Joseph Absolute Flow

May 10, 2011



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3D CAM Operational Surveys

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3D CAM

- Spring surveys in progress
- No widespread issues
- Lower Granite



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Flow Meter Data to GDACS

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Lower Granite Flow Meter Clean-Up

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May 10, 2011

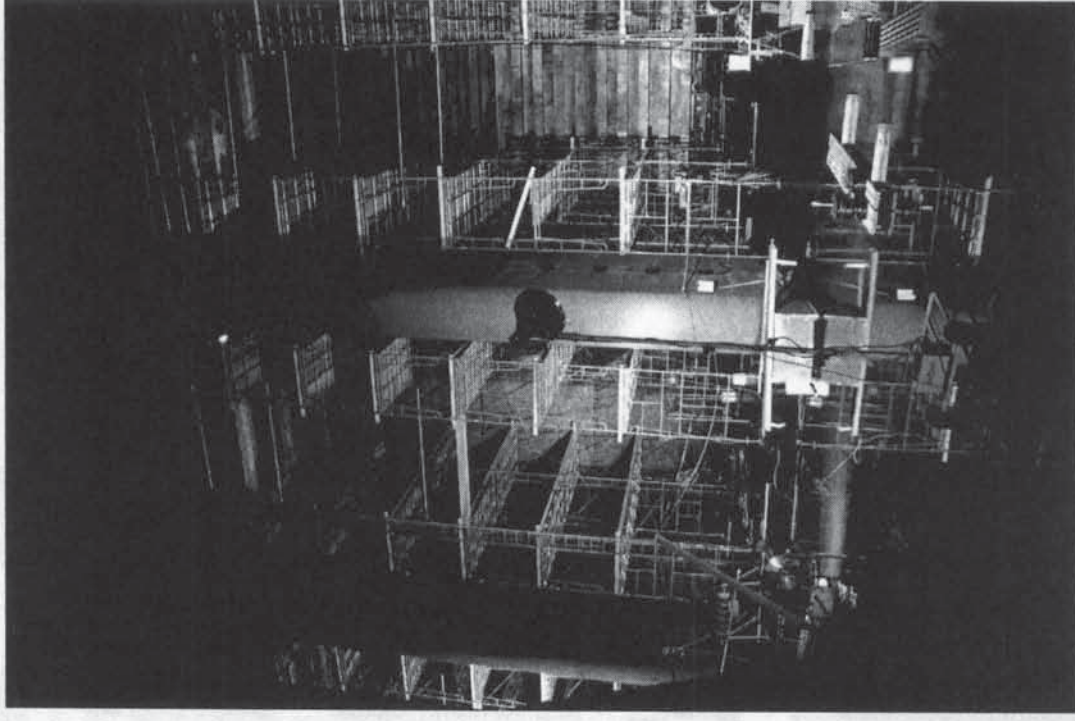


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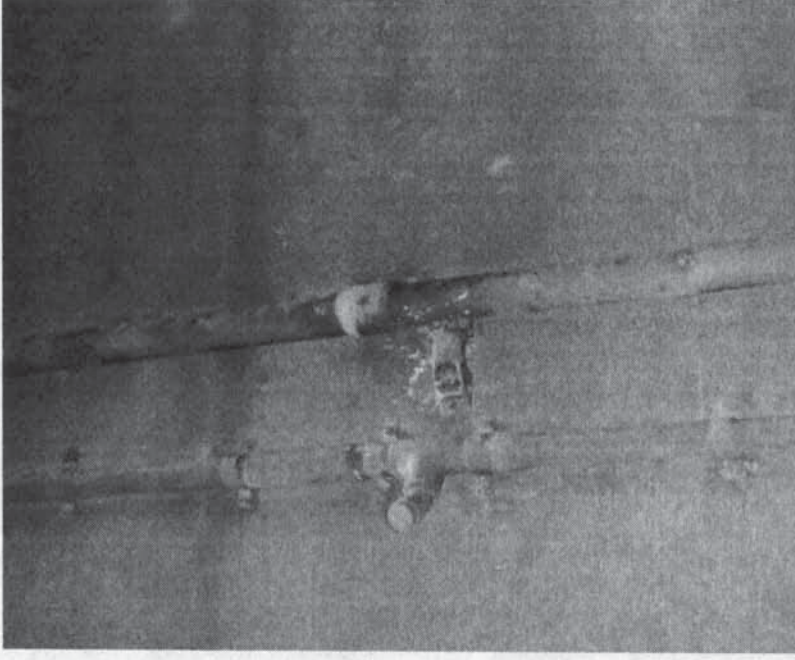
Background

- 1995 Install
 - ▶ Bay A (18 paths)
 - ▶ Bay B (8 paths)
 - ▶ Bay C (8 paths)
- 2003 Install
 - ▶ Bay A (18 paths) (18 v paths)
 - ▶ Bay B (18 paths) (18 v paths)
 - ▶ Bay C (18 paths) (18 v paths)
- Problems with leaks



Unwatered Inspection (8 NOV 2011)

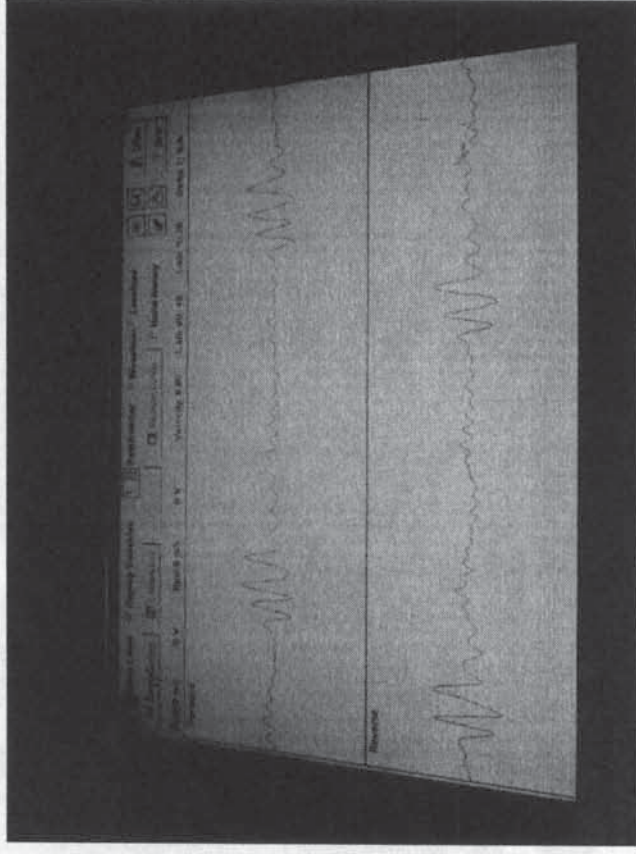
- Visual inspection of transducers
- Semi-functional inspection of flow meters
 - ▶ Turned on
 - ▶ Signal?



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Watered Up Inspection (22 FEB 2011)

- Flow meters powered up
- Signals checked
 - ▶ dB gain
 - ▶ Signal to Noise Ratio
- Results showed success
 - ▶ All tested paths
 - ▶ 3 paths did not have terminals



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Status

- HDC provided design for plugging holes
- HDC provided rough design for project to complete electrical work
 - ▶ Lower Granite requested supply spec and drawings, HDC in process of completing
- Lower Granite slated for plugging holes in 6 weeks
- Lower Granite has no timeline on electrical work



Work to be Completed

- HDC is to provide supply spec and drawings to Lower Granite
- Lower Granite is to complete work
- HDC is to get a contractor on board to commission the flow meters



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Wrap Up

- Subagreement
- Other items



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POWER PLANT EFFICIENCY IMPROVEMENTS

See below for approved forecast amounts per last agreement between the USACE and BPA. Actual expenditures for FY10 and FY11 are estimated at \$690,400 and \$944,500.

Hydro Optimization Team (H.O.T.) (Expense)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
Walla Walla District			
McNary			
PM	21	15	15
Team Meetings	4		
HDC-HOT support	293	10	10
Total Walla Walla	318	25	25
Seattle District			
Chief Joseph			
PM	10	5	5
Team Meetings	51	5	5
HDC-HOT support	94	15	15
Total Chief Joseph	155	25	25
Albeni Falls	2		
Total Seattle	157	25	25
Portland District			
Bonneville			
PM	43	10	10
Team Meetings	48	5	5
HDC-HOT support	158	15	15
Total Bonneville	248	30	30
The Dalles	37		
John Day	71		
Total Portland	356	30	30
Total Hydro Optimization Team	813	80	80

Detail Operational Surveys

Operational Surveys (Expense)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
McNary			
PM	12	5	5
E&D	82	20	20
S&A	0		
EDC	0		
Project Coord	5	5	5
Contracting (Adv & Award)	0		
Contracts	0		
McNary Total	99	30	30
Ice Harbor			
PM	7		
E&D	142	13	13
S&A	0		
EDC	0		
Project Coord	5	5	5
Contracting (Adv & Award)	0		
Contracts	0		
Ice Harbor Total	154	18	18
Lower Monumental			
PM	1		
E&D	33	14	14
S&A	0		
EDC	0		
Project Coord	5	5	5
Contracting (Adv & Award)	0		
Contracts	0		
Lower Monumental Total	38	19	19
Little Goose			
PM	3		
E&D	38	13	13
S&A	0		
EDC	0		
Project Coord	5	5	5
Contracting (Adv & Award)	0		
Contracts	0		
Little Goose Total	46	18	18
Lower Granite			
PM	0		
E&D	35	15	15
S&A	0		
EDC	0		
Project Coord	3	5	5
Contracting (Adv & Award)	0		
Contracts	0		
Lower Granite Total	38	20	20
Total Operational Surveys - Walla Walla	375	105	105

Detail Operational Surveys (Continued)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
The Dalles			
PM	10		
E&D	67	16	16
S&A	0		
EDC	0		
Project Coord	21	5	5
Contracting (Adv & Award)	0		
Contracts	0		
The Dalles Total	98	21	21
Bonneville (BN2)			
PM	9		
E&D	33	10	10
S&A	0		
EDC	0		
Project Coord	0	4	4
Contracting (Adv & Award)	0		
Contracts	0		
Bonneville B2 Total	42	14	14
Bonneville (BN1)			
PM	2		
E&D	52	10	10
S&A	0		
EDC	0		
Project Coord	8	4	4
Contracting (Adv & Award)	0		
Contracts	0		
Bonneville B1 Total	62	14	14
John Day			
PM	10		
E&D	85	14	14
S&A	0		
EDC	0		
Project Coord	13	5	5
Contracting (Adv & Award)	0		
Contracts	0		
John Day Total	108	19	19
Total Operational Surveys - Portland	310	68	68
TOTAL OPERATIONAL SURVEYS	685	173	173

Detail Gate/Blade Optimizer

Gate/Blade Optimizer (T1) DEVELOPMENT AND PROGRAMMING (Capital)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
McNary			
PM	122	10	5
E&D	1,303	140	100
S&A	0		
EDC	0		
Project Coord	7	10	5
Contracting	0		
Contracts	0		
FY Totals	1,431	160	110
Ice Harbor			
PM	0		
E&D	0		
S&A	0		
EDC	0		
Project Coord	0		
Contracting	0		
Contracts	0		
FY Totals	0	0	0
Lower Monumental			
PM	0		
E&D	0		
S&A	0		
EDC	0		
Project Coord	0		
Contracting	0		
Contracts	0		
FY Totals	0	0	0
Little Goose			
PM			
E&D			
S&A			
EDC			
Project Coord			
Contracting (Adv & Award)			
Contracts (programming)			
FY Totals	0	0	0
Dworshak	2		
FY Totals	2	0	0
Lower Granite			
PM	2		
E&D	0		
S&A	0		
EDC	0		
Project Coord	0		
Contracting (Adv & Award)	0		
Contracts (programming)	0		
FY Totals	2	0	0
Total T1 - Walla Walla	1,435	160	110

Detail Gate/Blade Optimizer (Continued)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
Bonneville			
PM	10	15	10
E&D	47	50	120
S&A	0		
EDC	0		
Project Coord	4	10	10
Contracting (Adv & Award)	0		
Contracts (programming)	0	150	
FY Totals	61	225	140
The Dalles			
PM	0	15	10
E&D	0	50	120
S&A	0		
EDC	0		
Project Coord	1	5	10
Contracting (Adv & Award)	0	15	2
Contracts (programming)	0	200	10
FY Totals	1	285	152
John Day			
PM	0	15	10
E&D	0	50	120
S&A	0		
EDC	0		
Project Coord	3	5	10
Contracting	0		
Contracts	0	150	
FY Totals	3	220	140
Total T1 - Portland	64	730	432
Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
T1 - Seattle	0	0	0
TOTAL Gate/Blade Optimizer (T1) Development	1,499	890	542

Absolute Flow for Kaplan Turbines (Expense)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
TOTAL ABSOLUTE FLOW - PORTLAND	201	0	0

Absolute Flow for Francis Turbines (Capital)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
Ch Joe			
PM	8	10	10
E&D	155	70	80
S&A	0		
EDC	0		
Project Coord	0	10	20
Contracting (Adv & Award)	13	5	5
Contracts	196	75	
FY Totals	372	170	115
TOTAL ABSOLUTE FLOW - SEATTLE	372	170	115

Install and Test Acoustic Flow Sensors (Capital)			
Project/Work Item	Costs FY00-09	Cost FY10	Cost FY11
Dworshak			
PM	20	2	
E&D	79		
S&A	5		
EDC	2		
Project Coord	17		
Contracting (Adv & Award)	3		
Contracts	466		
	592	2	0
Lower Granite			
PM	19	5	5
E&D	84	30	45
S&A	0		
EDC	0		
Project Coord	66	5	5
Contracting (Adv & Award)	0		
Contracts	571		45
	740	40	100
TAL ACOUSTIC FLOW SENSORS - WALLA WALLA	1,332	42	100

Project/Work Item	Costs FY00-09	Cost FY10	Cost FY11
Ch Joe			
PM	8	10	
E&D	0	30	
S&A	0		
EDC	0		
Project Coord	0	15	
Contracting (Adv & Award)	0		
Contracts	0		
	8	55	0
TOTAL ACOUSTIC FLOW SENSORS - SEATTLE	8	55	0
TOTAL ACOUSTIC FLOW SENSORS	1,340	97	100

Detail

Kaplan and Francis Unit Health Check (Capital)

Project/Work Item	Actuals FY00-09	Allocation	
		FY10	FY11
McNary			
PM	8	8	
E&D	87	20	
S&A	0		
EDC	0		
Project Coord	0	5	
Contracting	0		
Contracts	0		
FY Totals	95	33	0
TOTAL Kaplan Health Check- Walla Walla	95	33	0
TOTAL Francis Health Check - Seattle	8	0	0
TOTAL Kaplan and Francis Unit HEALTH CHECK	103	33	0