BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF HAWAII

In the Matter of the Application of	)	
	)	
HAWAII ELECTRIC LIGHT COMPANY, INC.	)	Docket No. 05-0315
	)	
For Approval of Rate Increases and Revised Rate Schedules and Rules.	)	
	)	

HELCO
VOLUMINOUS RESPONSES TO
CONSUMER ADVOCATE
INFORMATION REQUESTS

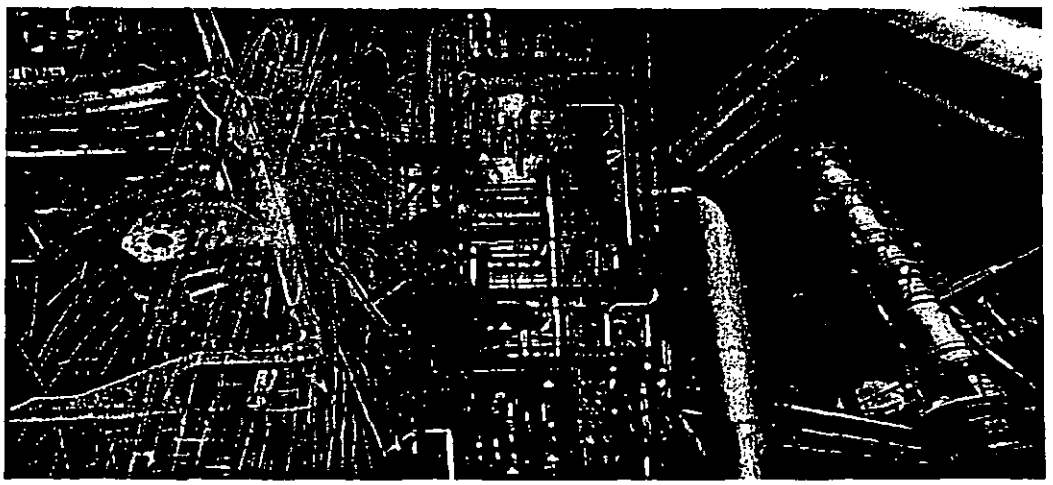
BOOK 10 OF 15

January 12, 2007

Attachment 5 contains the following subsections:

5a: pages 1 to 13
5b: pages 14 to 32
5c: pages 33 to 48
5d: pages 49 to 63
5e: pages 64 to 93
5f: pages 94 to 119
5g: pages 120 to 140
5h: pages 141 to 162
5i: pages 163 to 185

MACHINERY HEALTH REPORT



HAWAII ELECTRIC AND LIGHT COMPANY

HILO, HI

DATE: 05 DECEMBER, 2004

PREPARED BY:
CHRIS WILLS
MACHINERY HEALTH ANALYST

ISO 9001

Chris Wills
Machinery Health Analyst

Emerson Process
Management
Machinery Health Services
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Drive
Knoxville TN 37932

T (865) 250-3533
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Christopher.Wills@Emersonprocess.com

December 15, 2004

Hawaii Electric and Light Company
Attn: *Dan V. Giovanni*
54 Halekauila Street
Hilo, HI 96720

RE: Machinery Health Report

Dear Mr. Giovanni,

Emerson's Machinery Health Services are available to enhance your existing program. As requested, a vibration survey was conducted at your facility on December 13-15, 2004. The attached report is intended to inform you of any significant machinery problems or current machine condition identified during the analysis of the data for your plant. The items listed in this report have been given a priority of 1 through 6. These priorities are defined on page two of this report.

As a global leader in providing advanced plant Machinery Health Management, Emerson's dedicated professionals are committed to providing the expertise, processes, and technologies to ensure your satisfaction and deliver machinery availability and optimum asset performance. **The next scheduled visit to your plant will be January 14-17, 2005.**

If you have any questions concerning any of the information contained in this report, please contact me at (865)250-3533. We look forward to working with you again in the future and adding world class technologies to your Machinery Health Management program.

Sincerely,
Chris Wills
Machinery Health Analyst

MACHINE PRIORITY SUMMARY

CONDITION	ALARM	KEY	MACHINE SUMMARY	ACTION REQUIRED
Priority 1	Emergency		Immediate action required	Continue operation may result in machinery damage or personnel injury. **IMMEDIATE ACTION REQUIRED.**
Priority 2	High		Repair at earliest opportunity	Machinery is in advanced stages of failure. Failure is imminent if use is prolonged. **REPAIR AT EARLIEST OPPORTUNITY.**
Priority 3	Medium	3	Schedule for repair	Fault is present requires attention; however, levels do not require immediate attention. **SCHEDULE FOR REPAIR.**
Priority 4	Low	4	Preventive maintenance initiated	**Preventive maintenance should be performed** to increase machinery reliability.
Priority 5	Watch		No immediate action required (Informational purposes only)	Low level event has been noticed on this machine. **NO IMMEDIATE ACTION REQUIRED. INFORMATIONAL PURPOSES ONLY.**
Priority 6	Repair/ OK		Informational purposes only	Machine repaired. **PROVIDED FOR INFORMATION PURPOSES ONLY.**
Not Running	NR		Not Tested	NT

EMERSON
Process Management

Machine Name	Machine ID	[illegible]							
Shipman Plant 3									
Circulating Pump Motor A	SH3CIRMTRA	NR							
Circulating Pump A	SH3CIRPMPA	NR							
Cirulating Pump Motor B	SH3CIRMTRB	NR							
Circulating Pump B	SH3CIRPMPB	NR							
Condensate Pump A	SH3CNDPMPA	NR							
Condensate Pump B	SH3CNDPMPB	[illegible]							
FD/ID Fan Motor	SH3FDIDMTR	[illegible]							
ID Fan	SH3IDFAN	[illegible]							
FD Fan	SH3FDFAN	[illegible]							
Air Preheater Motor A	SH3APHMTRA	NR							
Air Preheater Motor B	SH3APHMTRB	NR							
Evaporator Pump A	SH3EVPPMPA	NR							
Evaporator Pump B	SH3EVPPMPB	NR							
Feed Water Pump Motor A	SH3FWSMTRA	NR							
Feed Water Pump A	SH3FWSPMPA	NR							
Feed Water Pump Motor B	SH3FWSMTRB	[illegible]							
Feed Water Pump B	SH3FWSPMPB	[illegible]							
Fuel Oil Pump A	SH3FOSPMPA	NR							
Fuel Oil Pump B	SH3FOSPMPB	[illegible]							
Fuel Oil CD Pump	SH3FOCDPMP	[illegible]							
Service Water Pump A	SH3SVCPMPA	[illegible]							
Service Water Pump B	SH3SVCPMPB	NR							
Joy Air Compressor Motor	SHAIRJOYMT	NR							
Joy Air Compressor	SHAIRJOYAC	NR							
Standby Air Compressor Motor	SHAIR#4MTR	NR							
Standby Air Compressor	SHAIR#4AC	NR							
Bearing Cooling Water Pump 3	SH4BCWPMP3	NR							
Water Treatment Sump Pump	SHWTSUMPMP	NR							

Legend

Priority 1 - Emergency					
Priority 2 - High Alarm					
Priority 3 - Alarm					3
Priority 4 - Low Alarm					4
Priority 5 - Watch List					[illegible]
Priority 6 - Machine OK					[illegible]
Not Running at Time of Inspection					NR
Not Tested at Time of Inspection					NT

EMERSON
Process Management

Machine Name	Machine ID								Comments
Shipman Plant 4									
Circulating Pump Motor A	SH4CIRMTRA	NR							
Circulating Pump A	SH4CIRPMPA	NR							
Cirulating Pump Motor B	SH4CIRMTRB	NR							
Circulating Pump B	SH4CIRPMPB	NR							
Condensate Pump A	SH4CNDPMPA	NR							
Condensate Pump B	SH4CNDPMPB	NR							
FD/ID Fan Motor	SH4FDIDMTR	NR							
ID Fan	SH4IDFAN	NR							
FD Fan	SH4FDFAN	NR							
Air Preheater Motor A	SH4APHMTRA	NR							
Air Preheater Motor B	SH4APHMTRB	NR							
Evaporator Pump A	SH4EVPPMPA	NR							
Evaporator Pump B	SH4EVPPMPB	NR							
Feed Water Pump Motor A	SH4FWSMTRA	NR							
Feed Water Pump A	SH4FWSPMPA	NR							
Feed Water Pump Motor B	SH4FWSMTRB	NR							
Feed Water Pump B	SH4FWSPMPB	NR							
Fuel Oil Pump A	SH4FOSPMPA	NR							
Fuel Oil Pump B	SH4FOSPMPB	NR							
Fuel Oil CD Pump	SH4FOCDPMP	NR							
Service Water Pump A	SH4SVCPMPA	NR							
Service Water Pump B	SH4SVCPMPB	NR							
Bearing Cooling Water Pump 4	SH4BCWPMP4	NR							

Legend

Priority 1 - Emergency					
Priority 2 - High Alarm					
Priority 3 - Alarm					3
Priority 4 - Low Alarm					4
Priority 5 - Watch List					
Priority 6 - Machine OK					
Not Running at Time of Inspection					NR
Not Tested at Time of Inspection					NT

EMERSON
Process Management

Machine Name	Machine ID								Comments
Hill Plant 5									
Circulating Pump Motor 5-A	H5CIRCMTRA								
Circulating Pump 5-A	H5CIRCPMPA								
Circulating Pump Motor 5-B	H5CIRCMTRB								
Circulating Pump 5-B	H5CIRCPMPB								
Circulating Pump Motor 5-C	H5CIRCMTRC								
Circulating Pump 5-C	H5CIRCPMPC								
Service Air Compressor Motor	H5CASACMTR	NR							
Service Air Compressor	H5AIRSAC	NR							
Inst Air Compressor Motor	H5CAIACMTR	NR							
Instrument Air Compressor	H5AIRIAC	NR							
Condensate Pump Motor A	H5CNDMTRA	NR							
Condensate Pump A	H5CNDPMPA	NR							
Condensate Pump Motor B	H5CNDMTRB	3							Excessive pump bearing wear
Condensate Pump B	H5CNDPMPB	3							Excessive pump bearing wear
Condensate Transfer Pump Mtr	H5CNDTPMTR	NR							
Condensate Transfer Pump	H5CNDTFPMP	NR							
FD Fan Motor	H5DFFDMTR								
FD Fan	H5DFFDFAN								
Evaporator Pump	H5EVAPPMP	NR							
Feed Water Pump Motor 5A	H5FSFWMTRA	NR							
Feed Water Pump 5A	H5FSFWPMPA	NR							
Feed Water Pump Motor 5B	H5FSFWMTRB								
Feed Water Pump 5B	H5FSFWPMPB								
Secondary Fuel Pump A	H5SECFPMPA	NR							
Secondary Fuel Pump B	H5SECFPMPB								
Service Water Pump Motor A	H5SVCWMTRA	NR							
Service Water Pump A	H5SVCWPMPA	NR							
Service Water Pump Motor B	H5SVCWMTRB	NR							
Service Water Pump B	H5SVCWPMPB	NR							
NR6 Primary Fuel Oil Pump	HFOPRIPMP6	NR							
NR5 Primary Fuel Oil Pump A	HFOPRIPMPA								
NR5 Primary Fuel Oil Pump B	HFOPRIPMPB	NR							
Aux Stm Lube Oil Pmp Turbine	H5ASLOPTRB	NT							
Turning Gear Oil Pump	H5TGOILPMP	NT							

Legend

Priority 1 - Emergency					
Priority 2 - High Alarm					
Priority 3 - Alarm					3
Priority 4 - Low Alarm					4
Priority 5 - Watch List					
Priority 6 - Machine OK					
Not Running at Time of Inspection					NR
Not Tested at Time of Inspection					NT

EMERSON
Process Management

Machinery	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Comments
Hill Plant 6									
Circulating Pump Motor 6-A	H6CIRCMTRA	[illegible]							
Circulating Pump 6-A	H6CIRCPMPA	[illegible]							
Circulating Pump Motor 6-B	H6CIRCMTRB	NR							
Circulating Pump 6-B	H6CIRCPMPB	NR							
Circulating Pump Motor 6-C	H6CIRCMTRC	[illegible]							
Circulating Pump 6-C	H6CIRCPMPC	[illegible]							
Circulating Pump Motor 6-D	H6CIRCMTRD	[illegible]							
Circulating Pump 6-D	H6CIRCPMPD	[illegible]							
Service Air Compressor Motor	H6AIRSAMTR	[illegible]							
Service Air Compressor	H6AIRSAC	[illegible]							
Instrument Air Comprsr Motor	H6AIRIAMTR	[illegible]							
Instrument Air Compressor	H6AIRIAC	[illegible]							
IR Air Compressor Motor	H6AIRIRMTR	[illegible]							
IR Air Compressor	H6AIRIRAC	[illegible]							
IR Air Compressor Clng Fan	H6AIRIRCF	[illegible]							
LP Heater Drip Pump	H6LHTRDPMP	[illegible]							Pump bearing defects
Condensate Pump Motor A	H6CNDMTRA	[illegible]							
Condensate Pump A	H6CNDPMPA	[illegible]							
Condensate Pump Motor B	H6CNDMTRB	NR							
Condensate Pump B	H6CNDPMPB	NR							
FD Fan High Speed Motor	H6DFDHSMTR	[illegible]							
FD Fan	H6FDFAN	[illegible]							
FD Fan Low Speed Motor	H6DFDLSMTR	[illegible]							
Evaporator Pump A	H6EVPPMPA	3							Pump bearing defects
Evaporator Pump B	H6EVPPMPB	[illegible]							
Feed Water Pump Mtr A	H6FWBFMTRA	NR							
Feed Water Pump 6A	H6FWBFPMPA	NR							
Feed Water Pump Mtr B	H6FWBFMTRB	[illegible]							
Feed Water Pump 6B	H6FWBFPMPB	[illegible]							
Secondary Fuel Oil Pump A	H6SFOPMPA	NR							
Secondary Fuel Oil Pump B	H6SFOPMPB	[illegible]							
Reblr Cond Drain Tank Pump A	H6CNDDTKPA	[illegible]							
Reblr Cond Drain Tank Pump B	H6CNDDTKPB	NR							
Service Water Pump A	H6SVCWPMPA	[illegible]							
Service Water Pump B	H6SVCWPMPB	NR							
Gland Seal Pump	H6GLSLPMP	[illegible]							
DC Lube Oil Pump	H6DCLOPMP	NT							
Turning Gear Lube Oil Pump	H6TGLOPMP	NT							
Aux Lube Oil Pump	H6SALOPMP	NT							

Legend

Priority 1 - Emergency					
Priority 2 - High Alarm					
Priority 3 - Alarm					3
Priority 4 - Low Alarm					4
Priority 5 - Watch List					[illegible]
Priority 6 - Machine OK					[illegible]
Not Running at Time of Inspection					NR
Not Tested at Time of Inspection					NT

EMERSON.
Process Management

Pumps									
Circ Water Pump Motor A	PUCWPMTRA	NR							
Circ Water Pump Motor B	PUCWPMTRB	NR							
Circ Water Pump Motor C	PUCWPMTRC	NR							
Plant Air Compressor Motor A	PUAIRMTRA	NR							
Plant Air Compressor A	PUAIRCOMPA	NR							
Plant Air Compressor Motor B	PUAIRMTRB	NR							
Plant Air Compressor B	PUAIRCOMPB	NR							
Cond Drain to MU Tank Pump	PUCDNTKPMP	NR							
Cond Make-up Pump Motor A	PUCDMUMTRA	NR							
Cond Make-up Pump A	PUCDMUPMPA	NR							
Cond Make-up Pump Motor B	PUCDMUMTRB	NR							
Cond Make-up Pump B	PUCDMUPMPB	NR							
Condensate Pump Motor A	PUCONDMTRA	NR							
Condensate Pump A	PUCONDPMPA	NR							
Condensate Pump Motor B	PUCONDMTRB	NR							
Condensate Pump B	PUCONDPMPB	NR							
Diesel Oil Pump A	PUDFOPMPA	NR							
Diesel Oil Pump B	PUDFOPMPB	NR							
ID High Speed Motor	PUIDHSMTR	NR							
ID Fan	PUDFIDFAN	NR							
ID Low Speed Motor	PUIDLSMTR	NR							
FD High Speed Motor	PUFDHSMTR	NR							
FD Fan	PUDFFDFAN	NR							
FD Low Speed Motor	PUFDLSMTR	NR							
Feed Water Pump Motor A	PUFSFWMTRA	NR							
Feed Water Pump A	PUFSFWPMPA	NR							
Feed Water Pump Motor B	PUFSFWMTRB	NR							
Feed Water Pump B	PUFSFWPMPB	NR							
Fuel Oil Transfer Pump	PUFOFWDPMP	NR							
Fuel Oil Unloading Pump	PUFOSULPMP	NR							
Fuel Oil Pump A	PUFOFOPMPA	NR							
Fuel Oil Pump B	PUFOFOPMPB	NR							
DC Bearing Oil Pump	PUDCBRGPMP	NR							
Vapor Extraction Pump	PUVPREXPMP	NR							
Lube Oil Pump A	PULOSPMPA	NR							
Lube Oil Pump B	PULOSPMPB	NR							
Service Water Pump A	PUSVCWPMPA	NR							
Service Water Pump B	PUSVCWPMPB	NR							
HP Water Pump	PUSVCHPPMP	NR							
Flush Pump	PUSVCFLPMP	NR							
County Water Papaya Pump A	PUSCCWPMPA	NR							
County Water Papaya Pump B	PUSCCWPMPB	NR							
Hydraulic Pump Motor A	PUHYDPMTRA	NR							
Hydraulic Pump A	PUHYDPMPA	NR							
Hydraulic Pump Motor B	PUHYDPMTRB	NR							
Hydraulic Pump B	PUHYDPMPAB	NR							
Sump Pump	PUWTSMPPMP	NR							

Legend					
Priority 1 - Emergency					
Priority 2 - High Alarm					
Priority 3 - Alarm					3
Priority 4 - Low Alarm					4
Priority 5 - Watch List					
Priority 6 - Machine OK					
Not Running at Time of Inspection					NR
Not Tested at Time of Inspection					NT

12/15/04

Machinery Health Summary Report

CHRIS WILLS/300

Area: H5 Hill Plant 5			
Urgency	Equipment	Problem	Extended Description
Alarm	H5CNDMTRB Condensate Pump Motor B	13-Dec-04 - Imbalance	Vibration amplitudes of nearly 1 in/sec are present at the upper end of the motor. This is most likely the result of excessive clearances in the pump bearings due to wear. RECOMMENDATIONS: 1) The pump needs to be pulled, inspected, and rebuilt.

Area: H6 Hill Plant 6			
Urgency	Equipment	Problem	Extended Description
Alarm	H6EVPPMPA Evaporator Pump A	13-Dec-04 - Antifriction bearing defect	Bearing excitements are present on the pump. RECOMMENDATIONS: 1) Replace pump bearings.
[redacted]	H6LHTRDPMP LP Heater Drip Pump	13-Dec-04 - Antifriction bearing defect	Bearing excitements are present on the pump. RECOMMENDATIONS: 1) Continue to monitor for increase in vibration levels.
[redacted]	H6FDFAN FD Fan	13-Dec-04 - Excessive sleeve bearing clearances	A high level of vibration at turning speed along with the presence of multiple turning speed harmonics in the fft indicate excessive clearance is present in the fan bearings. RECOMMENDATIONS: 1) Keep a close eye on the overall level of vibration and the number of turning speed harmonics. If vibration levels increase, the bearings will have to be replaced

Machinery Health Detail Report

12/15/04

CHRIS WILLS/300

Area H5 Hill Plant 5

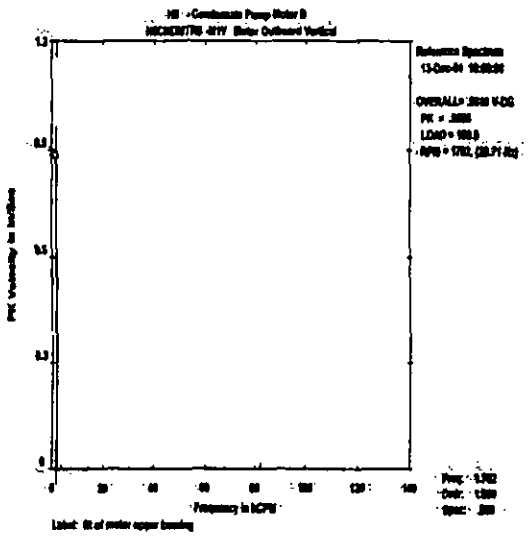
Equipment H5CNDMTRB Condensate Pump Motor B

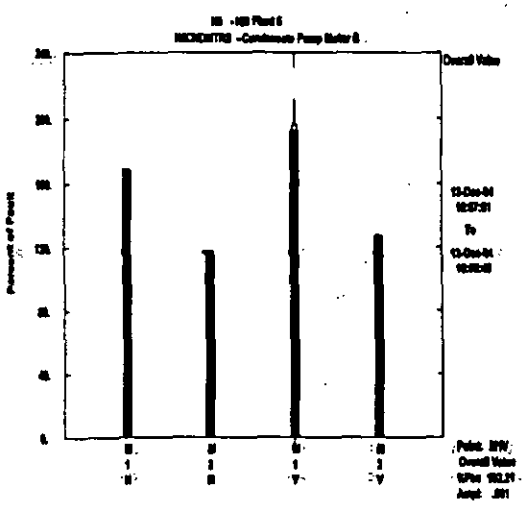
Urgency: Alarm

Problem: 13-Dec-04 - Imbalance

Explanation: Vibration amplitudes of nearly 1 in/sec are present at the upper end of the motor. This is most likely the result of excessive clearances in the pump bearings due to wear.

RECOMMENDATIONS: 1) The pump needs to be pulled, inspected, and rebuilt.





Machinery Health Detail Report

12/15/04

CHRIS WILLS/300

Area H6 Hill Plant 6

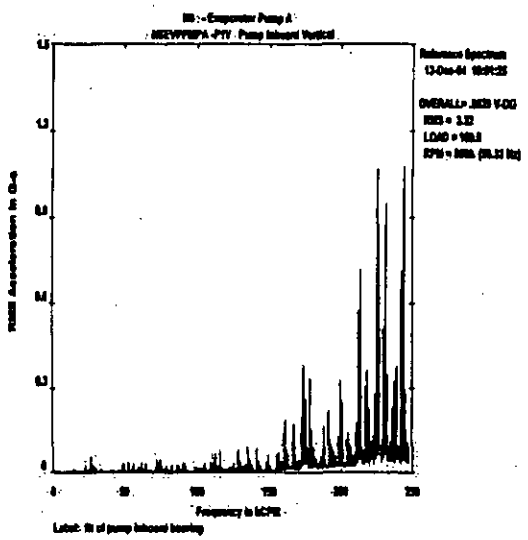
Equipment H6EVPPMPA Evaporator Pump A

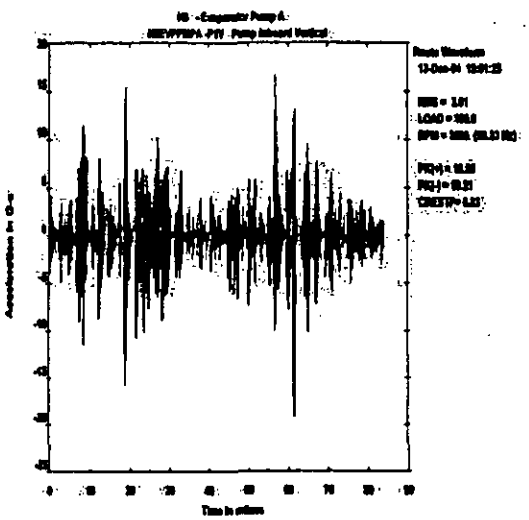
Urgency: Alarm

Problem: 13-Dec-04 - Antifriction bearing defect

Explanation: Bearing excitements are present on the pump.

RECOMMENDATIONS: 1) Replace pump bearings.





Machinery Health Detail Report

12/15/04

CHRIS WILLS/300

Area H6 Hill Plant 6

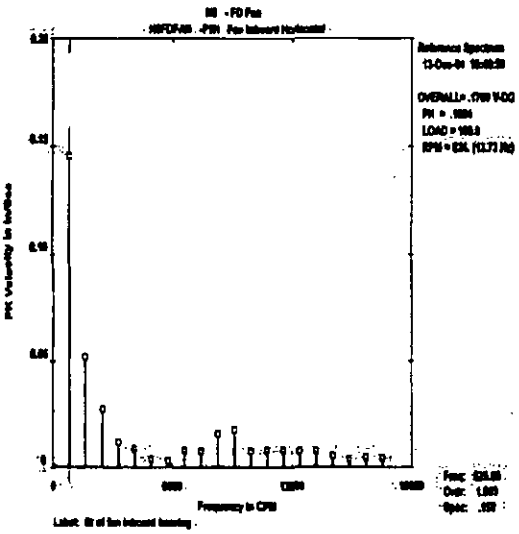
Equipment H6FDFAN FD Fan

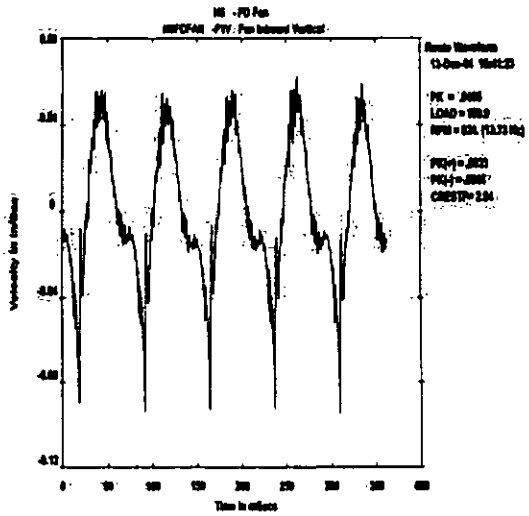
Urgency: [redacted]

Problem: 13-Dec-04 - Excessive sleeve bearing clearances

Explanation: A high level of vibration at turning speed along with the presence of multiple turning speed harmonics in the fft indicate excessive clearance is present in the fan bearings.

RECOMMENDATIONS: 1) Keep a close eye on the overall level of vibration and the number of turning speed harmonics. If vibration levels increase, the bearings will have to be replaced





Machinery Health Detail Report

12/15/04

CHRIS WILLS/300

Area H6 Hill Plant 6

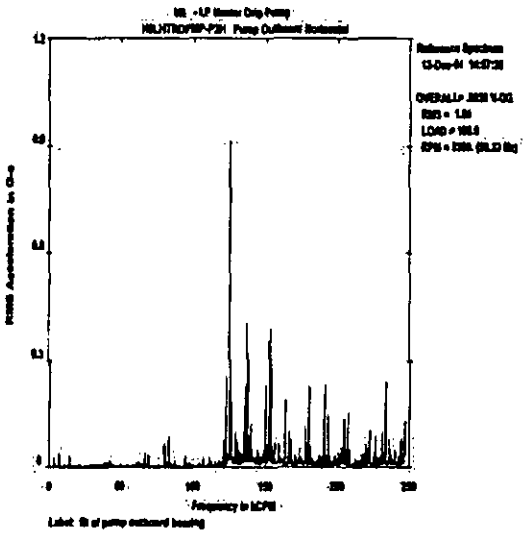
Equipment H6LHTRDPMP LP Heater Drip Pump

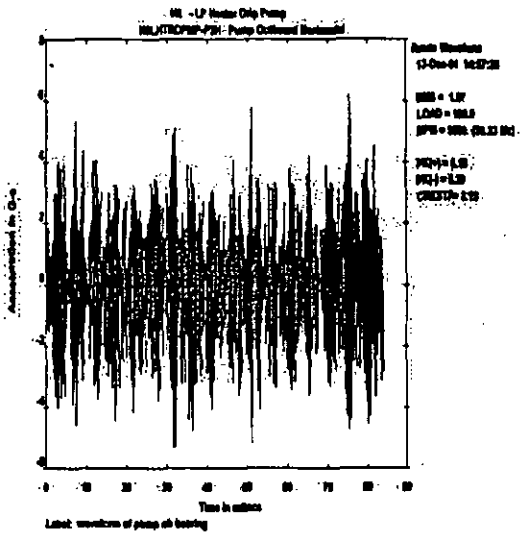
Urgency: [redacted]

Problem: 13-Dec-04 - Antifriction bearing defect

Explanation: Bearing excitements are present on the pump.

RECOMMENDATIONS: 1) Continue to monitor for increase in vibration levels.





ISO 9001

Joe Potter
Senior Machinery Health Analyst

Emerson Process Management
Machinery Health Services
835 Innovation Drive
Knoxville TN 37932

T (316) 708-2279
F (865) 216-1496
Joe.potter@emersonprocess.com

January 13, 2006

Hawaiian Electric Light Company
Attn: Norman Verbanic
Maintenance Superintendent
54 Halekauila St
Hilo, HI 96721

RE: Machinery Health Report

Dear Mr. Verbanic:

Emerson's Machinery Health Services are available to enhance your existing program. As requested, a Vibration survey was conducted at your facility on January 06 - 11, 2006. The attached report is intended to inform you of any significant machinery problems or current machine conditions identified during the analysis of the data for your plant. The items listed in this report have been given a priority of 1 through 5.

As a global leader in providing advanced plant Machinery Health Management, Emerson's dedicated professionals are committed to providing the expertise, processes, and technologies to ensure your satisfaction and deliver machinery availability and optimum asset performance. **The next scheduled visit to your plant will be February 10 - 15, 2006.**

If you have any questions concerning any of the information contained in this report, please contact me at (316)708-2279. We look forward to working with you again in the future and adding world class technologies to your Machinery Health Management program.

Sincerely,

Joe Potter
Senior Machinery Health Analyst

CSI

EMERSON.
Process Management

EMERSON
Process Management

Machinery Health Report For Vibration Testing Conducted January 06 - 11, 2006 At Hawaii Electric Light Company Hilo, Hawaii

Report Prepared by:
Joe Potter
Sr. Machinery Health Analyst

EMERSON
Process Management

Machinery Health Report
Executive Summary

A vibration survey was conducted at your facility in Hilo on January 06 - 11, 2006. Both Hill units were tested with Puna and Shipman 3 & 4 during this visit. The following pages include a summary of the equipment tested and detailed descriptions of the identified faults and recommended actions.

A total of 6 cases were identified where action is required by Helco, the required actions are summarized below. More details about these faults are provided later in this report.

Recommended Actions, sorted by criticality

Balancing
Hill 5 Condensate Pump Motor A – Sent in for routine check with balancing rotating components.

Balancing
Hill 5 Condensate Pump Motor B – Sent in for routine check with balancing rotating components.

Bearings, Alignment & Balance
Hill 5 Feed Water Pump 5B – Balancing rotating components and confirming alignment between components and replacing motor bearings.

Lubrication
Hill 6 IR Air Compressor Motor – Grease Bearings

Balance
Shipman 3 Condensate Pump B – Balance rotating components.

Alignment
Shipman 4 Feed Water Pump Motor A – Check alignment between components to ensure performance.

If you have any questions regarding this report, please contact Joe Potter at 316-708-2279 or via e-mail at joe.potter@emersonprocess.com.

EMERSON. Process Management

Shipman Plant

Machinery Health Condition Matrix

Unit	Equipment ID	Description	Jun-05	Sep-05	Dec-05	Jan-06	Notes
4	Shipman 4	Turbine #4	Unit Down for Outage	OK	Unit Down for Outage	OK	
4	SH4CIRMTRA	Circulating Pump Motor A		OK		OK	
4	SH4CIRPMPA	Circulating Pump A		OK		OK	
4	SH4CIRMTRB	Cirulating Pump Motor B		OK		OK	
4	SH4CIRPMPB	Circulating Pump B		OK		OK	
4	SH4CNDPMPA	Condensate Pump A		OK		OK	
4	SH4CNDPMPB	Condensate Pump B		NR		OK	
4	SH4FDIDMTR	FD/ID Fan Motor		OK		OK	
4	SH4IDFAN	ID Fan		OK		OK	
4	SH4FDFAN	FD Fan		OK		OK	
4	SH4APHMTRA	Air Preheater Motor A		NR		NR	
4	SH4APHMTRB	Air Preheater Motor B		OK		OK	
4	SH4EVPPMPA	Evaporator Pump A		NR		NR	
4	SH4EVPPMPB	Evaporator Pump B		NR		NR	
4	SH4FWSMTRA	Feed Water Pump Motor A		4		4	
4	SH4FWSPMPA	Feed Water Pump A		4		4	
4	SH4FWSMTRB	Feed Water Pump Motor B		NR		NT	Unit pulled.
4	SH4FWSPMPB	Feed Water Pump B		NR		NT	
4	SCAPH-A	Drip Pump Motor A		NT		OK	
4	SCAPHP-A	Drip Pump A		NT		OK	
4	SCAPH-B	Drip Pump Motor B		NT		NR	
4	SCAPHP-B	Drip Pump B		NT		NR	
4	SH4FOSPMPA	Fuel Oil Pump A		OK		OK	
4	SH4FOSPMPB	Fuel Oil Pump B		NR		NR	
4	SH4FOCDPMP	Fuel Oil CD Pump		OK		OK	
4	SH4SVCPMPA	Service Water Pump A		OK		OK	
4	SH4SVCPMPB	Service Water Pump B		NR		NR	
4	SH4BCWPMP	Bearing Cooling Water Pump 4		NR		NR	
4	SHWTSUMPMP	Water Treatment Sump Pump		NT		NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON Process Management

Machinery Health Condition Matrix

Shipman Plant (Cont)

Unit	Equipment ID	Description	Jun-05	Sep-05	Dec-05	Jan-06	Notes
3	Shipman 3	Turbine #3	Unit Down for Outage	OK	Unit Down for Outage	OK	
3	SH3CIRMTRA	Circulating Pump Motor A		OK		OK	
3	SH3CIRPMPA	Circulating Pump A		OK		OK	
3	SH3CIRMTRB	Cirulating Pump Motor B		OK		OK	
3	SH3CIRPMPB	Circulating Pump B		OK		OK	
3	SH3CNDPMPA	Condensate Pump A		NR		OK	
3	SH3CNDPMPB	Condensate Pump B		3		3	
3	SH3FDIDMTR	FD/ID Fan Motor		OK		OK	
3	SH3IDFAN	ID Fan		OK		OK	
3	SH3FDFAN	FD Fan		OK		OK	
3	SH3APHMTRA	Air Preheater Motor A		OK		OK	
3	SH3APHMTRB	Air Preheater Motor B		NR		NR	
3	SH3EVPPMPA	Evaporator Pump A		NR		NR	
3	SH3EVPPMPB	Evaporator Pump B		NR		NR	
3	SH3FWSMTRA	Feed Water Pump Motor A		NR		OK	
3	SH3FWSPMPA	Feed Water Pump A		NR		OK	
3	SH3FWSMTRB	Feed Water Pump Motor B		OK		NR	
3	SH3FWSPMPB	Feed Water Pump B		OK		NR	
3	SCAPH-A	Drip Pump Motor A		NT		OK	
3	SCAPHP-A	Drip Pump A		NT		OK	
3	SCAPH-B	Drip Pump Motor B		NT		NR	
3	SCAPHP-B	Drip Pump B		NT		NR	
3	SH3FOSPMPA	Fuel Oil Pump A		NR		NR	
3	SH3FOSPMPB	Fuel Oil Pump B		OK		OK	
3	SH3FOCDPMP	Fuel Oil CD Pump		OK		OK	
3	SH3SVCPMPA	Service Water Pump A		OK		OK	
3	SH3SVCPMPB	Service Water Pump B		OK		NR	
3	SH3BCWPMP	Bearing Cooling Water Pump 3		3		NR	
3	#1SHAIRJOYMT	#1Joy Air Compressor Motor		OK		OK	
3	SHAIRJOYAC#1	#1Joy Air Compressor		OK		OK	
3	#1SHAIRJOYMT	#2Joy Air Compressor Motor		NT		NR	
3	SHAIRJOYAC#1	#2Joy Air Compressor		NT		NR	
3	SHCIRWMTR1	Circ Water Pump Motor #1		NR		NT	
3	SHCIRWPMP1	Circulating Water Pump #1		NR		NT	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON
Process Management

Machinery Health Condition Matrix

Hill Plant

Unit	Equipment ID	Description	Jun-05	Sep-05	Dec-05	Jan-06	Notes
5	H5B APHMTR	H5B APH Drive Motor	NT	NR	NR	NR	
5	H5B APHGBX	H5B APH Gearbox	NT	NR	NR	NR	
5	H5CIRCMTRA	Circulating Pump Motor 5-A	OK	OK	OK	OK	
5	H5CIRCPMPA	Circulating Pump 5-A	OK	OK	OK	OK	
5	H5CIRCMTRB	Circulating Pump Motor 5-B	OK	OK	OK	OK	
5	H5CIRCPMPB	Circulating Pump 5-B	OK	OK	OK	OK	
5	H5CIRCMTRC	Circulating Pump Motor 5-C	OK	OK	OK	OK	
5	H5CIRCPMPC	Circulating Pump 5-C	OK	OK	OK	OK	
5	H5CASACMTR	Service Air Compressor Motor	NR	NR	NR	NR	
5	H5AIRSAC	Service Air Compressor	NR	NR	NR	NR	
5	H5CAIACMTR	Inst Air Compressor Motor	NR	NR	NR	NR	
5	H5AIRIAC	Instrument Air Compressor	NR	NR	NR	NR	
5	H5CNDMTRA	Condensate Pump Motor A	OK	NR	3	3	
5	H5CNDPMPA	Condensate Pump A	OK	NR	OK	OK	
5	H5CNDMTRB	Condensate Pump Motor B	OK	3	3	3	
5	H5CNDPMPB	Condensate Pump B	OK	OK	OK	OK	
5	H5CNDTPMTR	Condensate Transfer Pump Mtr	NR	NR	NR	NR	
5	H5CNDTFPMP	Condensate Transfer Pump	NR	NR	NR	NR	
5	H5DFFDMTR	FD Fan Motor	OK	OK	OK	OK	
5	H5DFFDFAN	FD Fan	OK	OK	OK	OK	
5	H5EVAPPMP	Evaporator Pump	NR	NR	NR	NR	
5	H5FSFWMTRA	Feed Water Pump Motor 5A	3	NR	OK	OK	
5	H5FSFWPMPA	Feed Water Pump 5A	OK	NR	OK	OK	
5	H5FSFWMTRB	Feed Water Pump Motor 5B	NR	3	3	3	
5	H5FSFWPMPB	Feed Water Pump 5B	NR	OK	OK	OK	
5	H5SECFPMPA	Secondary Fuel Pump A	NT	OK	OK	OK	
5	H5SECFPMPB	Secondary Fuel Pump B	NT	OK	NR	NR	
5	H5SVCWMTRA	Service Water Pump Motor A	NR	NR	OK	NR	
5	H5SVCWPMPA	Service Water Pump A	NR	NR	NT	NR	
5	H5SVCWMTRB	Service Water Pump Motor B	NR	NR	OK	NR	
5	H5SVCWPMPB	Service Water Pump B	NR	NR	NT	NR	
5	HFOPRIPMP6	NR6 Primary Fuel Oil Pump	OK	NR	NR	NR	
5	HFOPRIPMPA	NR5 Primary Fuel Oil Pump A	NR	OK	NR	NR	
5	HFOPRIPMPB	NR5 Primary Fuel Oil Pump B	OK	NR	OK	NR	
5	H5ASLOPTRB	Aux Stm Lube Oil Pmp Turbine	NR	NR	NR	NR	
5	H5TGOILPMP	Turning Gear Oil Pump	NR	NR	NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON
Process Management

Machinery Health Condition Matrix

Hill Plant (cont)

Unit	Equipment ID	Description	Jun-05	Sep-05	Dec-05	Jan-06	Notes
5	H5DFSDOMTR	#5 Diesel Oil Pump Motor	NR	NR	NR	NR	
5	H5DFSDOPMP	#5 Diesel Oil Pump	NR	NR	NR	NR	
6	H6 APH MTR	H6APH Drive Motor	NT	NR	NR	NR	
6	H6 APH GBX	H6 APH Gearbox	NT	NR	NR	NR	
6	H6CIRCMTRA	Circulating Pump Motor 6-A	OK	OK	OK	OK	
6	H6CIRCPMPA	Circulating Pump 6-A	OK	OK	OK	OK	
6	H6CIRCMTRB	Circulating Pump Motor 6-B	NR	NR	NR	NR	
6	H6CIRCPMPB	Circulating Pump 6-B	NR	NR	NR	NR	
6	H6CIRCMTRC	Circulating Pump Motor 6-C	NT	OK	OK	OK	
6	H6CIRCPMPC	Circulating Pump 6-C	NT	OK	OK	OK	
6	H6CIRCMTRD	Circulating Pump Motor 6-D	NT	OK	OK	OK	
6	H6CIRCPMPD	Circulating Pump 6-D	NT	OK	OK	OK	
6	H6AIRSAMTR	Service Air Compressor Motor	OK	OK	OK	OK	
6	H6AIRSAC	Service Air Compressor	OK	OK	OK	OK	
6	H6AIRIAMTR	Instrument Air Comprsr Motor	OK	OK	OK	OK	
6	H6AIRIAC	Instrument Air Compressor	OK	OK	OK	OK	
6	H6AIRIRMTR	IR Air Compressor Motor	3	NR	NR	NR	
6	H6AIRIRAC	IR Air Compressor	OK	NR	NR	NR	
6	H6AIRIRCF	IR Air Compressor Clng Fan	OK	NR	NR	NR	
6	H6LHTRDPMP	LP Heater Drip Pump	OK	OK	NT	NR	
6	H6CNDMTRA	Condensate Pump Motor A	NR	OK	OK	OK	
6	H6CNDPMPA	Condensate Pump A	NR	OK	OK	OK	
6	H6CNDMTRB	Condensate Pump Motor B	OK	NR	OK	OK	
6	H6CNDPMPB	Condensate Pump B	OK	NR	OK	OK	
6	H6DFDHSMTR	FD Fan High Speed Motor	OK	NR	OK	OK	
6	H6FDFAN	FD Fan	3	3	OK	OK	
6	H6DFDLSMTR	FD Fan Low Speed Motor	OK	OK	OK	OK	
6	H6EVPPMPA	Evaporator Pump A	NR	2	OK	OK	
6	H6EVPPMPB	Evaporator Pump B	NR	OK	OK	OK	
6	H6FWBFMTRA	Feed Water Pump Mtr A	NR	OK	OK	OK	
6	H6FWBFPMPA	Feed Water Pump 6A	NR	OK	OK	OK	
6	H6FWBFMTRB	Feed Water Pump Mtr B	OK	NR	OK	OK	
6	H6FWBFPMPB	Feed Water Pump 6B	OK	OK	OK	OK	
6	H6SFOPMPA	Secondary Fuel Oil Pump A	NT	OK	OK	OK	
6	H6SFOPMPB	Secondary Fuel Oil Pump B	NT	NR	NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON. Process Management

Machinery Health Condition Matrix

Hill Plant (cont)

Unit	Equipment ID	Description	Jun-05	Sep-05	Dec-05	Jan-06	Notes
6	H6CNDDTKPA	Reblr Cond Drain Tank Pump A	OK	OK	OK	OK	
6	H6CNDDTKPB	Reblr Cond Drain Tank Pump B	NR	NR	NR	NR	
6	H6SVCWPMPA	Service Water Pump A	OK	OK	OK	OK	
6	H6SVCWPMPB	Service Water Pump B	NR	NR	NR	NR	
6	H6SVCBPMP	Booster Pump	NT	OK	NT	OK	
6	H6GLSLPMP	Gland Seal Pump	NT	OK	NT	OK	
6	H6DCLOPMP	DC Lube Oil Pump	NR	NR	NR	NR	
6	H6TGLOPMP	Turning Gear Lube Oil Pump	NR	NR	NR	NR	
6	H6SALOPMP	Aux Lube Oil Pump	NR	NR	NR	NR	
6	H6DFDOMTRA	Diesel Oil Pump Motor A	NR	NR	NR	NR	
6	H6DFDOPMPA	Diesel Oil Pump A	NR	NR	NR	NR	
6	H6DFDOMTRB	Diesel Oil Pump Motor B	NR	NR	NR	NR	
6	H6DFDOPMPB	Diesel Oil Pump B	NR	NR	NR	NR	

Puna Plant

Equipment ID	Description	Jun-05	Sep-05	Dec-05	Jan-06	Notes
PUCWPMTRA	Circ Water Pump Motor A	Unit Down for Outage	OK	OK	OK	
PUCWPMTRB	Circ Water Pump Motor B		OK	OK	OK	
PUCWPMTRC	Circ Water Pump Motor C		OK	OK	OK	
PUAIRMTRA	Plant Air Compressor Motor A		NR	OK	OK	
PUAIRCOMPA	Plant Air Compressor A		NR	OK	OK	
PUAIRMTRB	Plant Air Compressor Motor B		OK	NR	OK	
PUAIRCOMPB	Plant Air Compressor B		4	NR	OK	
PUCDNTKPMP	Cond Drain Pmp to MU Tank		NR	NR	NR	
PUCDMUMTRA	Cond Make-up Pump Motor A		NR	OK	OK	
PUCDMUPMPA	Cond Make-up Pump A		NR	OK	OK	
PUCDMUMTRB	Cond Make-up Pump Motor B		NR	OK	OK	
PUCDMUPMPB	Cond Make-up Pump B		NR	OK	OK	
PUCONDMTRA	Condensate Pump Motor A		OK	4	OK	
PUCONDPMPA	Condensate Pump A		OK	OK	OK	
PUCONDMTRB	Condensate Pump Motor B		NR	OK	OK	
PUCONDPMPB	Condensate Pump B		NR	OK	OK	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON
Process Management

Machinery Health Condition Matrix

Puna Plant (cont)

Equipment ID	Description	Jun-05	Sep-05	Dec-05	Jan-06	Notes
PUDFOPMPA	Diesel Oil Pump A	Unit Down for Outage	NR	NR	NR	
PUDFOPMPB	Diesel Oil Pump B		OK	NT	NT	
PUIDHSMTR	ID High Speed Motor		NR	OK	OK	
PUDFIDFAN	ID Fan		OK	OK	OK	
PUIDLSMTR	ID Low Speed Motor		OK	OK	OK	
PUFDHSMTR	FD High Speed Motor		OK	OK	OK	
PUDFFDFAN	FD Fan		OK	OK	OK	
PUFDLSMTR	FD Low Speed Motor		NR	OK	OK	
PUFSFWMTRA	Feed Water Pump Motor A		OK	3	NT	
PUFSFWPMPA	Feed Water Pump A		OK	3	NT	
PUFSFWMTRB	Feed Water Pump Motor B		NR	OK	OK	
PUFSFWPMPB	Feed Water Pump B		NR	OK	OK	
PUFOFWDPMP	Fuel Oil Transfer Pump		NR	NR	NR	
PUFOSULPMP	Fuel Oil Unloading Pump		NR	NR	NR	
PUFOFOPMPA	Fuel Oil Pump A		OK	OK	OK	
PUFOFOPMPB	Fuel Oil Pump B		NR	OK	NR	
PUDCBRGPMP	DC Bearing Oil Pump		NR	NR	NR	
PUVPREXPMP	Vapor Extraction Pump		NR	NR	OK	
PULOSPMPA	Lube Oil Pump A		OK	OK	OK	
PULOSPMPB	Lube Oil Pump B		NR	NR	NR	
PUSVCWPMPA	Service Water Pump A		NR	NT	NR	
PUSVCWPMPB	Service Water Pump B		NR	NT	NR	
PUSVCHPPMP	HP Water Pump		3	3	OK	
PUSVCFLPMP	Flush Pump		3	OK	OK	
PUSCCWPMPA	County Water Papaya Pump A		OK	OK	OK	
PUSCCWPMPB	County Water Papaya Pump B		NR	NR	NR	
PUHYDPMTRA	Hydraulic Pump Motor A		OK	OK	OK	
PUHYDPMPA	Hydraulic Pump A		OK	OK	OK	
PUHYDPMTRB	Hydraulic Pump Motor B		NR	NR	NR	
PUHYDPMPAB	Hydraulic Pump B		NR	NR	NR	
PUWTSMPPMP	Sump Pump		NR	NR	NR	
PUTGLESPMP	Gland Exhaust Pump		OK	NT	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

01/16/06

Machinery Health Summary Report

Administrator/300

Area: H5 Hill Plant 5

Urgency	Equipment	Problem	Extended Description
Priority-3	H5CNDMTRA Condensate Pump Motor A	06-Jan-06 - Imbalance - Motor, AC Induction	Analysis: Motor still showing a high amplitude within the 1 times running speed. Please note below the spectrum showing a strong running speed peak with am amplitude of 2.92 In/Sec. Extremely high. Also note the increasing trend. Recommend: Checking periodically for increasing vibration within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.
Priority-3	H5CNDMTRB Condensate Pump Motor B	10-Jan-06 - Imbalance - Motor, AC Induction	Analysis: Motor still showing a high amplitude @ 1 times running speed. Please note below the spectrum showing a strong running speed peak with am amplitude of 2.51 In/Sec. Extremely high. Also note the increasing trend. Recommend: Checking periodically for increasing vibration within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.
Priority-3	H5FSFWMTRB Feed Water Pump Motor 5B	10-Jan-06 - Bearing defect with Misalignment - Motor, AC	Analysis: Motor still showing a high amplitude within the 2 and 1 times running speed parameter. This looks like misalignment with imbalance being related to bearing defects. Please note below the spectrum showing a strong 2x running speed peak with am amplitude of .470 In/Sec. Also please note the increasing trend display. Recommend: Checking periodically for increasing vibration within the 1x & 2 times RPM parameter. Replacing motor bearings and when time is available having unit sent in for routine check with balancing rotating components. Also confirm alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.

Area: S3 Shipman Plant 3

Urgency	Equipment	Problem	Extended Description
Priority-3	SH3CNDPMPB Condensate Pump B	11-Jan-06 - Imbalance - Motor, AC Induction	Analysis: Motor still showing high indication of unbalance. Please note below the spectrum showing a strong running speed, @ 1x's peak. Also note the increasing trend. Recommend: Checking periodically for progression within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.

01/16/06

Machinery Health Summary Report

Administrator/300

Urgency	Equipment	Problem	Extended Description
Priority-4	SH4FWSMTRA Feed Water Pump Motor A	09-Jan-06 - Misalignment - Motor, AC Induction	Analysis: Unit Still showing indication of misalignment. Note the dominating two times running speed, which is a good indication of misalignment. Also note the increasing trend. Recommend: Checking periodically for increasing vibration and confirming alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.

Machinery Health Detail Report

01/16/06

Administrator/300

Area H5 Hill Plant 5

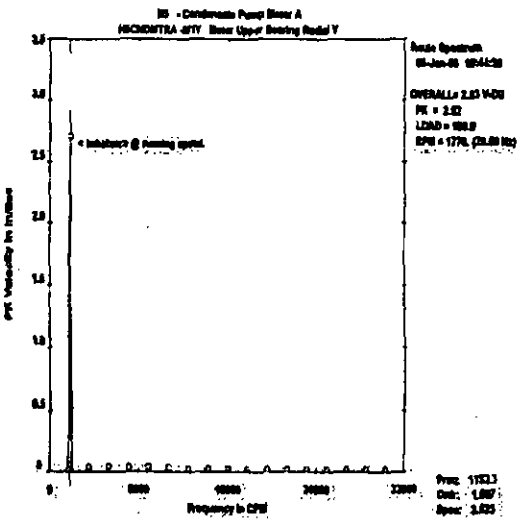
Equipment H5CNDMTRA Condensate Pump Motor A

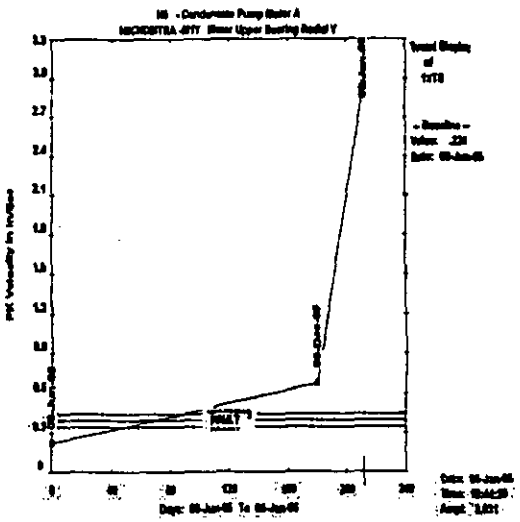
Urgency: Priority-3

Problem: 06-Jan-06 - Imbalance - Motor, AC Induction

Explanation: Analysis: Motor still showing a high amplitude within the 1 times running speed. Please note below the spectrum showing a strong running speed peak with am amplitude of 2.92 in/Sec. Extremely high. Also note the increasing trend.

Recommend: Checking periodically for increasing vibration within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.





Machinery Health Detail Report

01/16/06

Administrator/300

Area H5 Hill Plant 5

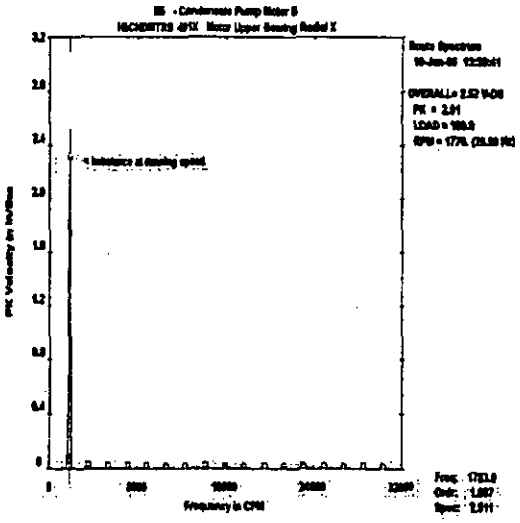
Equipment H5CNDMTRB Condensate Pump Motor B

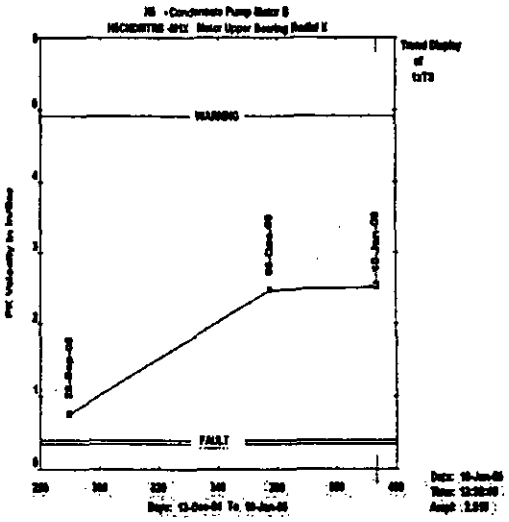
Urgency: Priority-3

Problem: 10-Jan-06 - Imbalance - Motor, AC Induction

Explanation: Analysis: Motor still showing a high amplitude @ 1 times running speed. Please note below the spectrum showing a strong running speed peak with am amplitude of 2.51 In/Sec. Extremely high. Also note the increasing trend.

Recommend: Checking periodically for increasing vibration within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.





Machinery Health Detail Report

01/16/06

Administrator/300

Area H5 Hill Plant 5

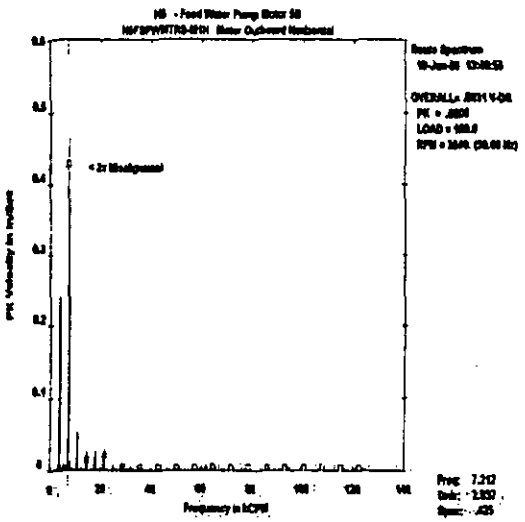
Equipment H5FSFWMTRB Feed Water Pump Motor 5B

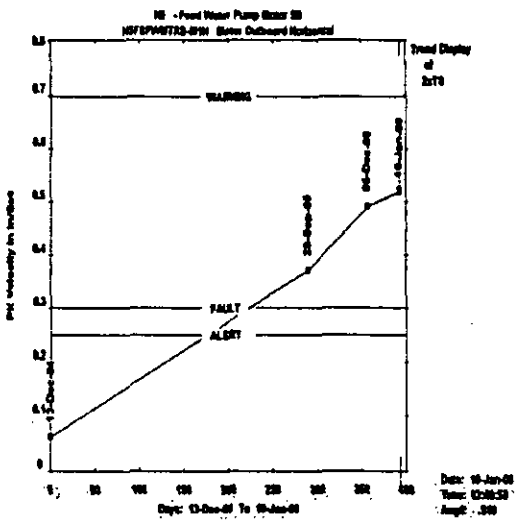
Urgency: Priority-3

Problem: 10-Jan-06 - Bearing defect with Misalignment - Motor, AC Induction

Explanation: Analysis: Motor still showing a high amplitude within the 2 and 1 times running speed parameter. This looks like misalignment with imbalance being related to bearing defects. Please note below the spectrum showing a strong 2x running speed peak with am amplitude of .470 In/Sec. Also please note the increasing trend display.

Recommend: Checking periodically for increasing vibration within the 1x & 2 times RPM parameter. Replacing motor bearings and when time is available having unit sent in for routine check with balancing rotating components. Also confirm alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.





Machinery Health Detail Report

01/16/06

Administrator/300

Area S3 Shipman Plant 3

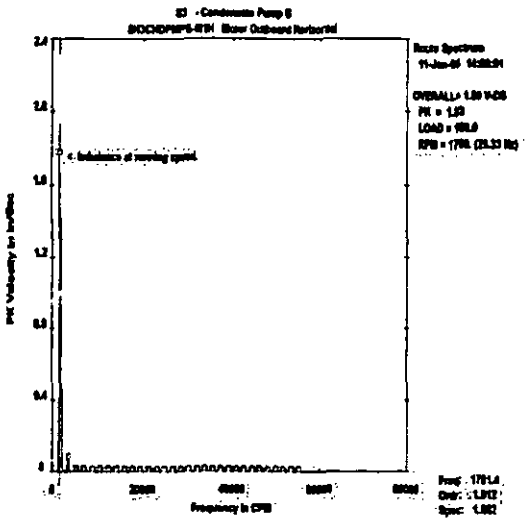
Equipment SH3CNDPMPB Condensate Pump B

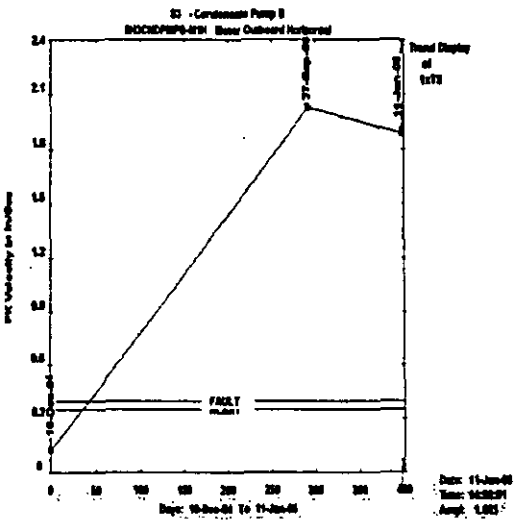
Urgency: Priority-3

Problem: 11-Jan-06 - Imbalance - Motor, AC Induction

Explanation: Analysis: Motor still showing high indication of unbalance. Please note below the spectrum showing a strong running speed, @ 1x's peak. Also note the increasing trend.

Recommend: Checking periodically for progression within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.





Machinery Health Detail Report

01/16/06

Administrator/300

Area S4 Shipman Plant 4

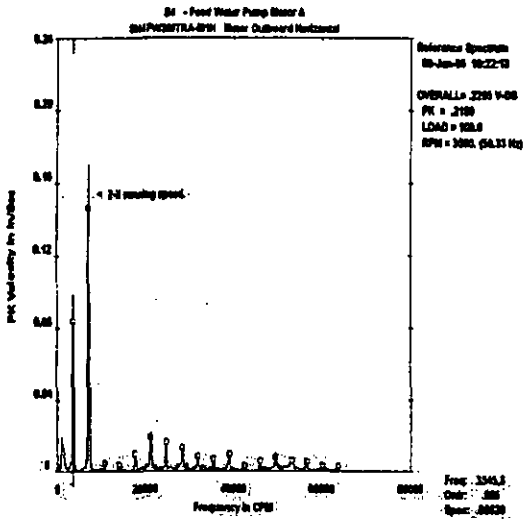
Equipment SH4FWSMTRA Feed Water Pump Motor A

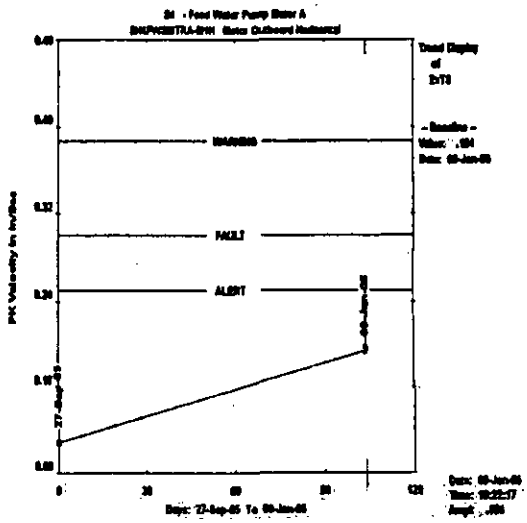
Urgency: Priority-4

Problem: 09-Jan-06 - Misalignment - Motor, AC Induction

Explanation: Analysis: Unit Still showing indication of misalignment. Note the dominating two times running speed, which is a good indication of misalignment. Also note the increasing trend.

Recommend: Checking periodically for increasing vibration and confirming alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.





Machinery Health Follow Up Report

01/16/06

Administrator/300

Area: Hill Plant 5

Equipment: H5CNDMTRA Condensate Pump Motor A

Title: 06-Jan-06 - Imbalance - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor still showing a high amplitude within the 1 times running speed. Please note below the spectrum showing a strong running speed peak with am amplitude of 2.92 In/Sec. Extremely high. Also note the increasing trend.

Recommend: Checking periodically for increasing vibration within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.

Actual Case

Corrective Actions Taken:

Area: Hill Plant 5

Equipment: H5CNDMTRB Condensate Pump Motor B

Title: 10-Jan-06 - Imbalance - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor still showing a high amplitude @ 1 times running speed. Please note below the spectrum showing a strong running speed peak with am amplitude of 2.51 In/Sec. Extremely high. Also note the increasing trend.

Recommend: Checking periodically for increasing vibration within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.

Actual Case

Corrective Actions Taken:

Machinery Health Follow Up Report

01/16/06

Administrator/300

Area: Hill Plant 5
Equipment: H5FSFWMTRB Feed Water Pump Motor 5B

Title: 10-Jan-06 - Bearing defect with Misalignment - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor still showing a high amplitude within the 2 and 1 times running speed parameter. This looks like misalignment with imbalance being related to bearing defects. Please note below the spectrum showing a strong 2x running speed peak with am amplitude of .470 In/Sec. Also please note the increasing trend display.

Recommend: Checking periodically for increasing vibration within the 1x & 2 times RPM parameter. Replacing motor bearings and when time is available having unit sent in for routine check with balancing rotating components. Also confirm alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.

Actual Case

Corrective Actions Taken:

Area: Shipman Plant 3
Equipment: SH3CNDPMPB Condensate Pump B

Title: 11-Jan-06 - Imbalance - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor still showing high indication of unbalance. Please note below the spectrum showing a strong running speed, @ 1x's peak. Also note the increasing trend.

Recommend: Checking periodically for progression within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.

Actual Case

Corrective Actions Taken:

Machinery Health Follow Up Report

01/16/06

Administrator/300

Area: Shipman Plant

Equipment: SH4FWSMTRA Feed Water Pump Motor A

Urgency: Priority-4

Title: 09-Jan-06 - Misalignment - Motor, AC Induction

Explanation: Analysis: Unit Still showing indication of misalignment. Note the dominating two times running speed, which is a good indication of misalignment. Also note the increasing trend.

Recommend: Checking periodically for increasing vibration and confirming alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.

Actual Case

Corrective Actions Taken:

ISO 9001

Joe Potter
Senior Machinery Health Analyst

Emerson Process Management
Machinery Health Services
835 Innovation Drive
Knoxville TN 37932

T (316) 708-2279
F (865) 218-1496
Joe.potter@emersonprocess.com

February 23, 2006

Hawaiian Electric Light Company
Attn: Norman Verbanic
Maintenance Superintendent
54 Halekauila St
Hilo, HI 96721

RE: Machinery Health Report

Dear Mr. Verbanic:

Emerson's Machinery Health Services are available to enhance your existing program. As requested, a Vibration survey was conducted at your facility on February 17 - 23, 2006. The attached report is intended to inform you of any significant machinery problems or current machine conditions identified during the analysis of the data for your plant. The items listed in this report have been given a priority of 1 through 5.

As a global leader in providing advanced plant Machinery Health Management, Emerson's dedicated professionals are committed to providing the expertise, processes, and technologies to ensure your satisfaction and deliver machinery availability and optimum asset performance. **The next scheduled visit to your plant will be March 20 - 23, 2006.**

If you have any questions concerning any of the information contained in this report, please contact me at (316)708-2279. We look forward to working with you again in the future and adding world class technologies to your Machinery Health Management program.

Sincerely,

Joe Potter
Senior Machinery Health Analyst

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Process Management

Machinery Health Report
For Vibration Testing Conducted
February 17 - 23, 2006
At
Hawaii Electric Light Company
Hilo, Hawaii

Report Prepared by:
Joe Potter
Sr. Machinery Health Analyst

EMERSON
Process Management

Machinery Health Report
Executive Summary

A vibration survey was conducted at your facility in Hilo on February 17 - 23, 2006. Hill 5 was tested with Puna and Shipman 3 & 4 during this visit. The following pages include a summary of the equipment tested and detailed descriptions of the identified faults and recommended actions.

A total of 4 cases were identified where action is required by Helco, the required actions are summarized below. More details about these faults are provided later in this report.

Recommended Actions, sorted by criticality

Check Electrical, Bearings, Alignment & Balance
- Hill 5 Feed Water Pump 5B – Check Electrical, Balancing rotating components and confirming Alignment between components and replace motor bearings.

Lubrication
- Hill 6 IR Air Compressor Motor – Grease Bearings

Balance
- Shipman 3 Condensate Pump B – Balance rotating components.

Bearings, Alignment
- Shipman 4 Feed Water Pump Motor A – Check Alignment between components to ensure performance and replace motor bearings.

If you have any questions regarding this report, please contact Joe Potter at 316-708-2279 or via e-mail at joe.potter@emersonprocess.com.

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Process Management

Shipman Plant

Machinery Health Condition Matrix

Unit	Equipment ID	Description	Sep-05	Dec-05	Jan-06	Feb-06	Notes
4	Shipman 4	Turbine #4	OK	Unit Down for Outage	OK	OK	
4	SH4CIRMTRA	Circulating Pump Motor A	OK		OK	OK	
4	SH4CIRPMPA	Circulating Pump A	OK		OK	OK	
4	SH4CIRMTRB	Cirulating Pump Motor B	OK		OK	OK	
4	SH4CIRPMPB	Circulating Pump B	OK		OK	OK	
4	SH4CNDPMPA	Condensate Pump A	OK		OK	OK	
4	SH4CNDPMPB	Condensate Pump B	NR		OK	OK	
4	SH4FDIDMTR	FD/ID Fan Motor	OK		OK	OK	
4	SH4IDFAN	ID Fan	OK		OK	OK	
4	SH4FDFAN	FD Fan	OK		OK	OK	
4	SH4APHMTRA	Air Preheater Motor A	NR		NR	NR	
4	SH4APHMTRB	Air Preheater Motor B	OK		OK	OK	
4	SH4EVPPMPA	Evaporator Pump A	NR		NR	NR	
4	SH4EVPPMPB	Evaporator Pump B	NR		NR	NR	
4	SH4FWSMTRA	Feed Water Pump Motor A	4		4	OK	
4	SH4FWSPMPA	Feed Water Pump A	4		4	OK	
4	SH4FWSMTRB	Feed Water Pump Motor B	NR		NT	NT	
4	SH4FWSPMPB	Feed Water Pump B	NR		NT	NT	
4	SCAPH-A	Drip Pump Motor A	NT		OK	NR	
4	SCAPHP-A	Drip Pump A	NT		OK	NR	
4	SCAPH-B	Drip Pump Motor B	NT		NR	NR	
4	SCAPHP-B	Drip Pump B	NT		NR	NR	
4	SH4FOSPMPA	Fuel Oil Pump A	OK		OK	OK	
4	SH4FOSPMPB	Fuel Oil Pump B	NR		NR	NR	
4	SH4FOCDPMP	Fuel Oil CD Pump	OK		OK	OK	
4	SH4SVCPMPA	Service Water Pump A	OK		OK	OK	
4	SH4SVCPMPB	Service Water Pump B	NR		NR	NR	
4	SH4BCWPMP	Bearing Cooling Water Pump 4	NR		NR	NR	
4	SHWTSUMPMP	Water Treatment Sump Pump	NT		NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON Process Management

Machinery Health Condition Matrix

Shipman Plant (Cont)

Unit	Equipment ID	Description	Sep-05	Dec-05	Jan-06	Feb-06	Notes
3	Shipman 3	Turbine #3	OK	Unit Down for Outage	OK	OK	
3	SH3CIRMTRA	Circulating Pump Motor A	OK		OK	OK	
3	SH3CIRPMPA	Circulating Pump A	OK		OK	OK	
3	SH3CIRMTRB	Cirulating Pump Motor B	OK		OK	OK	
3	SH3CIRPMPB	Circulating Pump B	OK		OK	OK	
3	SH3CNDPMPA	Condensate Pump A	NR		OK	OK	
3	SH3CNDPMPB	Condensate Pump B	3		3	3	
3	SH3FDIDMTR	FD/ID Fan Motor	OK		OK	OK	
3	SH3IDFAN	ID Fan	OK		OK	OK	
3	SH3FDFAN	FD Fan	OK		OK	OK	
3	SH3APHMTRA	Air Preheater Motor A	OK		OK	OK	
3	SH3APHMTRB	Air Preheater Motor B	NR		NR	NR	
3	SH3EVPPMPA	Evaporator Pump A	NR		NR	NR	
3	SH3EVPPMPB	Evaporator Pump B	NR		NR	NR	
3	SH3FWSMTRA	Feed Water Pump Motor A	NR		OK	3	
3	SH3FWSPMPA	Feed Water Pump A	NR		OK	OK	
3	SH3FWSMTRB	Feed Water Pump Motor B	OK		OK	OK	
3	SH3FWSPMPB	Feed Water Pump B	OK		OK	OK	
3	SCAPH-A	Drip Pump Motor A	NT		OK	NR	
3	SCAPHP-A	Drip Pump A	NT		OK	NR	
3	SCAPH-B	Drip Pump Motor B	NT		NR	NR	
3	SCAPHP-B	Drip Pump B	NT		NR	NR	
3	SH3FOSPMPA	Fuel Oil Pump A	NR		NR	NR	
3	SH3FOSPMPB	Fuel Oil Pump B	OK		OK	OK	
3	SH3FOCDPMP	Fuel Oil CD Pump	OK		OK	OK	
3	SH3SVCPMPA	Service Water Pump A	OK		OK	NR	
3	SH3SVCPMPB	Service Water Pump B	OK		NR	OK	
3	SH3BCWPMP	Bearing Cooling Water Pump 3	3		NR	NR	
3	#1SHAIRJOYMT	#1Joy Air Compressor Motor	OK		OK	OK	
3	SHAIRJOYAC#1	#1Joy Air Compressor	OK		OK	OK	
3	#1SHAIRJOYMT	#2Joy Air Compressor Motor	NT		NR	NR	
3	SHAIRJOYAC#1	#2Joy Air Compressor	NT		NR	NR	
3	SHCIRWMTR1	Circ Water Pump Motor #1	NR		NT	NT	
3	SHCIRWPMP1	Circulating Water Pump #1	NR		NT	NT	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

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Process Management

Machinery Health Condition Matrix

Hill Plant

Unit	Equipment ID	Description	Sep-05	Dec-05	Jan-06	Feb-06	Notes
5	H5B APHMTR	H5B APH Drive Motor	NR	NR	NR	NR	
5	H5B APHGBX	H5B APH Gearbox	NR	NR	NR	NR	
5	H5CIRCMTRA	Circulating Pump Motor 5-A	OK	OK	OK	OK	
5	H5CIRCPMPA	Circulating Pump 5-A	OK	OK	OK	OK	
5	H5CIRCMTRB	Circulating Pump Motor 5-B	OK	OK	OK	OK	
5	H5CIRCPMPB	Circulating Pump 5-B	OK	OK	OK	OK	
5	H5CIRCMTRC	Circulating Pump Motor 5-C	OK	OK	OK	OK	
5	H5CIRCPMPC	Circulating Pump 5-C	OK	OK	OK	OK	
5	H5CASACMTR	Service Air Compressor Motor	NR	NR	NR	NR	
5	H5AIRSAC	Service Air Compressor	NR	NR	NR	NR	
5	H5CAIACMTR	Inst Air Compressor Motor	NR	NR	NR	NR	
5	H5AIRIAC	Instrument Air Compressor	NR	NR	NR	NR	
5	H5CNDMTRA	Condensate Pump Motor A	NR	3	3	OK	
5	H5CNDPMPA	Condensate Pump A	NR	OK	OK	OK	
5	H5CNDMTRB	Condensate Pump Motor B	3	3	3	OK	
5	H5CNDPMPB	Condensate Pump B	OK	OK	OK	OK	
5	H5CNDTPMTR	Condensate Transfer Pump Mtr	NR	NR	NR	NR	
5	H5CNDTFPMP	Condensate Transfer Pump	NR	NR	NR	NR	
5	H5DFFDMTR	FD Fan Motor	OK	OK	OK	OK	
5	H5DFFDFAN	FD Fan	OK	OK	OK	OK	
5	H5EVAPPMP	Evaporator Pump	NR	NR	NR	NR	
5	H5FSFWMTRA	Feed Water Pump Motor 5A	NR	OK	OK	OK	
5	H5FSFWPMPA	Feed Water Pump 5A	NR	OK	OK	OK	
5	H5FSFWMTRB	Feed Water Pump Motor 5B	3	3	3	3	
5	H5FSFWPMPB	Feed Water Pump 5B	OK	OK	OK	OK	
5	H5SECFPMPA	Secondary Fuel Pump A	OK	OK	OK	OK	
5	H5SECFPMPB	Secondary Fuel Pump B	OK	NR	NR	NR	
5	H5SVCWMTRA	Service Water Pump Motor A	NR	OK	NR	NR	
5	H5SVCWPMPA	Service Water Pump A	NR	NT	NR	NR	
5	H5SVCWMTRB	Service Water Pump Motor B	NR	OK	NR	NR	
5	H5SVCWPMPB	Service Water Pump B	NR	NT	NR	NR	
5	HFOPRIPMP6	NR6 Primary Fuel Oil Pump	NR	NR	NR	NR	
5	HFOPRIPMPA	NR5 Primary Fuel Oil Pump A	OK	NR	NR	NR	
5	HFOPRIPMPB	NR5 Primary Fuel Oil Pump B	NR	OK	NR	OK	
5	H5ASLOPTRB	Aux Stm Lube Oil Pmp Turbine	NR	NR	NR	NR	
5	H5TGOILPMP	Turning Gear Oil Pump	NR	NR	NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

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Machinery Health Condition Matrix

Hill Plant (cont)

Unit	Equipment ID	Description	Sep-05	Dec-05	Jan-06	Feb-06	Notes
5	H5DFSDOMTR	#5 Diesel Oil Pump Motor	NR	NR	NR	NR	
5	H5DFSDOPMP	#5 Diesel Oil Pump	NR	NR	NR	NR	
6	H6 APH MTR	H6APH Drive Motor	NR	NR	NR	Unit Down for Turbine Bearing Check.	
6	H6 APH GBX	H6 APH Gearbox	NR	NR	NR		
6	H6CIRCMTRA	Circulating Pump Motor 6-A	OK	OK	OK		
6	H6CIRCPMPA	Circulating Pump 6-A	OK	OK	OK		
6	H6CIRCMTRB	Circulating Pump Motor 6-B	NR	NR	NR		
6	H6CIRCPMPB	Circulating Pump 6-B	NR	NR	NR		
6	H6CIRCMTRC	Circulating Pump Motor 6-C	OK	OK	OK		
6	H6CIRCPMPC	Circulating Pump 6-C	OK	OK	OK		
6	H6CIRCMTRD	Circulating Pump Motor 6-D	OK	OK	OK		
6	H6CIRCPMPD	Circulating Pump 6-D	OK	OK	OK		
6	H6AIRSAMTR	Service Air Compressor Motor	OK	OK	OK		
6	H6AIRSAC	Service Air Compressor	OK	OK	OK		
6	H6AIRIAMTR	Instrument Air Comprsr Motor	OK	OK	OK		
6	H6AIRIAC	Instrument Air Compressor	OK	OK	OK		
6	H6AIRIRMTR	IR Air Compressor Motor	NR	NR	NR		
6	H6AIRIRAC	IR Air Compressor	NR	NR	NR		
6	H6AIRIRCF	IR Air Compressor Clng Fan	NR	NR	NR		
6	H6LHTRDPMP	LP Heater Drip Pump	OK	NT	NR		
6	H6CNDMTRA	Condensate Pump Motor A	OK	OK	OK		
6	H6CNDPMPA	Condensate Pump A	OK	OK	OK		
6	H6CNDMTRB	Condensate Pump Motor B	NR	OK	OK		
6	H6CNDPMPB	Condensate Pump B	NR	OK	OK		
6	H6DFDHSMTR	FD Fan High Speed Motor	NR	OK	OK		
6	H6FDFAN	FD Fan	3	OK	OK		
6	H6DFDLSMTR	FD Fan Low Speed Motor	OK	OK	OK		
6	H6EVPPMPA	Evaporator Pump A	2	OK	OK		
6	H6EVPPMPB	Evaporator Pump B	OK	OK	OK		
6	H6FWBFMTRA	Feed Water Pump Mtr A	OK	OK	OK		
6	H6FWBFPMPA	Feed Water Pump 6A	OK	OK	OK		
6	H6FWBFMTRB	Feed Water Pump Mtr B	NR	OK	OK		
6	H6FWBFPMPB	Feed Water Pump 6B	OK	OK	OK		
6	H6SFOPMPA	Secondary Fuel Oil Pump A	OK	OK	OK		
6	H6SFOPMPB	Secondary Fuel Oil Pump B	NR	NR	NR		

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON Process Management

Machinery Health Condition Matrix

Hill Plant (cont)

Unit	Equipment ID	Description	Sep-05	Dec-05	Jan-06	Feb-06	Notes
6	H6CNDDTKPA	Reblr Cond Drain Tank Pump A	OK	OK	OK	Unit Down for Turbine Bearing Check.	
6	H6CNDDTKPB	Reblr Cond Drain Tank Pump B	NR	NR	NR		
6	H6SVCWPMPA	Service Water Pump A	OK	OK	OK		
6	H6SVCWPMPB	Service Water Pump B	NR	NR	NR		
6	H6SVCBPMP	Booster Pump	OK	NT	OK		
6	H6GLSLPMP	Gland Seal Pump	OK	NT	OK		
6	H6DCLOPMP	DC Lube Oil Pump	NR	NR	NR		
6	H6TGLOPMP	Turning Gear Lube Oil Pump	NR	NR	NR		
6	H6SALOPMP	Aux Lube Oil Pump	NR	NR	NR		
6	H6DFDOMTRA	Diesel Oil Pump Motor A	NR	NR	NR		
6	H6DFDOPMPA	Diesel Oil Pump A	NR	NR	NR		
6	H6DFDOMTRB	Diesel Oil Pump Motor B	NR	NR	NR		
6	H6DFDOPMPB	Diesel Oil Pump B	NR	NR	NR		

Puna Plant

Equipment ID	Description	Sep-05	Dec-05	Jan-06	Feb-06	Notes
PUCWPMTRA	Circ Water Pump Motor A	OK	OK	OK	OK	
PUCWPMTRB	Circ Water Pump Motor B	OK	OK	OK	OK	
PUCWPMTRC	Circ Water Pump Motor C	OK	OK	OK	OK	
PUAIRMTRA	Plant Air Compressor Motor A	NR	OK	OK	NR	
PUAIRCOMPA	Plant Air Compressor A	NR	OK	OK	NR	
PUAIRMTRB	Plant Air Compressor Motor B	OK	NR	OK	OK	
PUAIRCOMPB	Plant Air Compressor B	4	NR	OK	OK	
PUCDNTKPMP	Cond Drain Pmp to MU Tank	NR	NR	NR	NR	
PUCDMUMTRA	Cond Make-up Pump Motor A	NR	OK	OK	OK	
PUCDMUPMPA	Cond Make-up Pump A	NR	OK	OK	OK	
PUCDMUMTRB	Cond Make-up Pump Motor B	NR	OK	OK	OK	
PUCDMUPMPB	Cond Make-up Pump B	NR	OK	OK	OK	
PUCONDMTRA	Condensate Pump Motor A	OK	4	OK	OK	
PUCONDPMPA	Condensate Pump A	OK	OK	OK	OK	
PUCONDMTRB	Condensate Pump Motor B	NR	OK	OK	OK	
PUCONDPMPB	Condensate Pump B	NR	OK	OK	OK	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON
Process Management

Machinery Health Condition Matrix

Puna Plant (cont)

Equipment ID	Description	Sep-05	Dec-05	Jan-06	Feb-06	Notes
PUDFOPMPA	Diesel Oil Pump A	NR	NR	NR	NR	
PUDFOPMPB	Diesel Oil Pump B	OK	NT	NT	NT	
PUIDHSMTR	ID High Speed Motor	NR	OK	OK	OK	
PUDFIDFAN	ID Fan	OK	OK	OK	OK	
PUIDLSMTR	ID Low Speed Motor	OK	OK	OK	NR	
PUFDHSMTR	FD High Speed Motor	OK	OK	OK	OK	
PUDFFDFAN	FD Fan	OK	OK	OK	OK	
PUFDLSMTR	FD Low Speed Motor	NR	OK	OK	NR	
PUFSFWMTRA	Feed Water Pump Motor A	OK	3	NT	NT	
PUFSFWPMPA	Feed Water Pump A	OK	3	NT	NT	
PUFSFWMTRB	Feed Water Pump Motor B	NR	OK	OK	OK	
PUFSFWPMPB	Feed Water Pump B	NR	OK	OK	OK	
PUFOFWDPMP	Fuel Oil Transfer Pump	NR	NR	NR	NR	
PUFOSULPMP	Fuel Oil Unloading Pump	NR	NR	NR	NR	
PUFOFOPMPA	Fuel Oil Pump A	OK	OK	OK		
PUFOFOPMPB	Fuel Oil Pump B	NR	OK	NR	NR	
PUDCBRGPMP	DC Bearing Oil Pump	NR	NR	NR	NR	
PUVPREXPMP	Vapor Extraction Pump	NR	NR	OK	OK	
PULOSPMPA	Lube Oil Pump A	OK	OK	OK	OK	
PULOSPMPB	Lube Oil Pump B	NR	NR	NR	NR	
PUSVCWPMPA	Service Water Pump A	NR	NT	NR	NR	
PUSVCWPMPB	Service Water Pump B	NR	NT	NR	NR	
PUSVCHPPMP	HP Water Pump	3	3	OK	OK	
PUSVCFLPMP	Flush Pump	3	OK	OK	OK	
PUSCCWPMPA	County Water Papaya Pump A	OK	OK	OK	OK	
PUSCCWPMPB	County Water Papaya Pump B	NR	NR	NR	NR	
PUHYDPMTRA	Hydraulic Pump Motor A	OK	OK	OK	OK	
PUHYDPMPA	Hydraulic Pump A	OK	OK	OK	OK	
PUHYDPMTRB	Hydraulic Pump Motor B	NR	NR	NR	NR	
PUHYDPMPAB	Hydraulic Pump B	NR	NR	NR	NR	
PUWTSMPPMP	Sump Pump	NR	NR	NR	NR	
PUTGLESPMP	Gland Exhaust Pump	OK	NT	NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

02/23/06

Machinery Health Summary Report

Administrator/300

Area: H5 Hill Plant 5			
Urgency	Equipment	Problem	Extended Description
Priority-3	H5FSFWMTRB Feed Water Pump Motor 5B	20-Feb-06 - Bearing defect with Electrical - Motor, AC	Analysis: Motor showing high amplitude within the 2 and 1 times running speed parameter. I believe we have several things going on, not only bearing defects but also electrical problems. Yes this does look like misalignment with imbalance being related to bearing defects. While collecting data I noticed a pulsing vibration that resembled an electrical problem. Please note below the spectrum showing a strong 2x line frequency with higher amplitudes farther out. Also please note the increasing trend display. Recommend: Checking motor for electrical problems and when time is available replacing motor bearings. Also confirm alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.

Area: S3 Shipman Plant 3			
Urgency	Equipment	Problem	Extended Description
Priority-3	SH3CNDPMPB Condensate Pump B	17-Feb-06 - Imbalance - Motor, AC Induction	Analysis: Motor showing indication of unbalance at running speed. Please note below the spectrum showing a strong amplitude with-in running speed, @ 1x's peak. Also note the trend display has came down some. Recommend: Checking periodically for progression within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.
Priority-3	SH3FWSMTRA Feed Water Pump Motor A	17-Feb-06 - Antifriction bearing defect - Motor, AC Induction	Analysis: Motor showing high levels of high frequency energy and high levels of impacting in the time waveform. These are normally associated with a late stage bearing defect. Please note tend display Recommend: Checking periodically for increasing. Replacing motor bearings when time is available. Will continue monitoring for increasing vibration.

Machinery Health Detail Report

02/23/06

Administrator/300

Area H5 Hill Plant 5

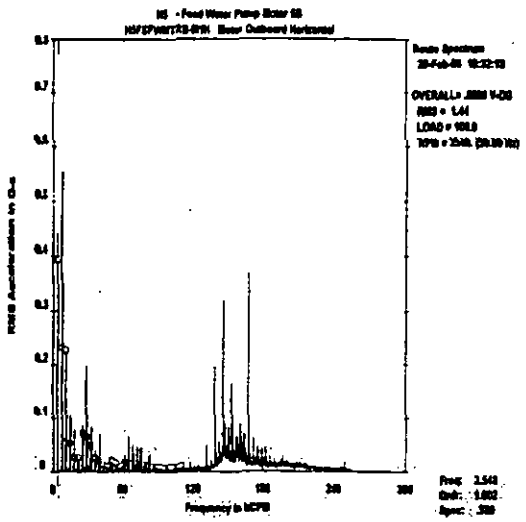
Equipment H5FSFWMTRB Feed Water Pump Motor 5B

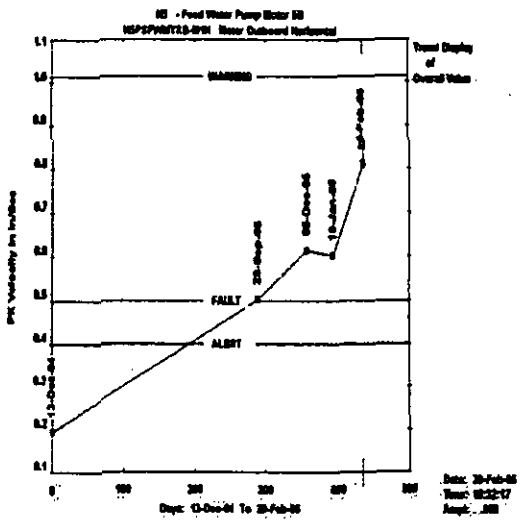
Urgency: Priority-3

Problem: 20-Feb-06 - Bearing defect with Electrical - Motor, AC Induction

Explanation: Analysis: Motor showing high amplitude within the 2 and 1 times running speed parameter. I believe we have several things going on, not only bearing defects but also electrical problems. Yes this does look like misalignment with imbalance being related to bearing defects. While collecting data I noticed a pulsing vibration that resembled an electrical problem. Please note below the spectrum showing a strong 2x line frequency with higher amplitudes farther out. Also please note the increasing trend display.

Recommend: Checking motor for electrical problems and when time is available replacing motor bearings. Also confirm alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.

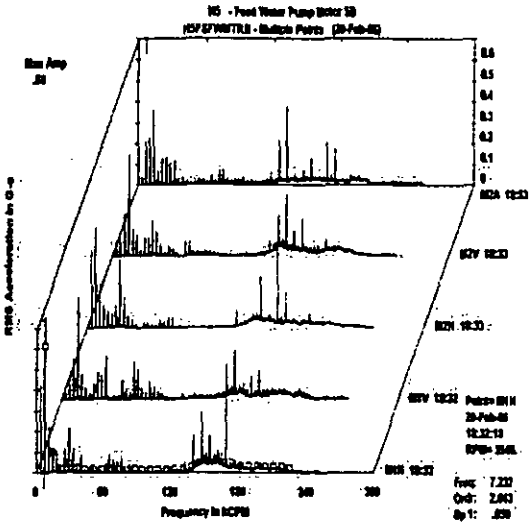




Machinery Health Detail Report

02/23/06

Administrator/300



Machinery Health Detail Report

02/23/06

Administrator/300

Area S3 Shipman Plant 3

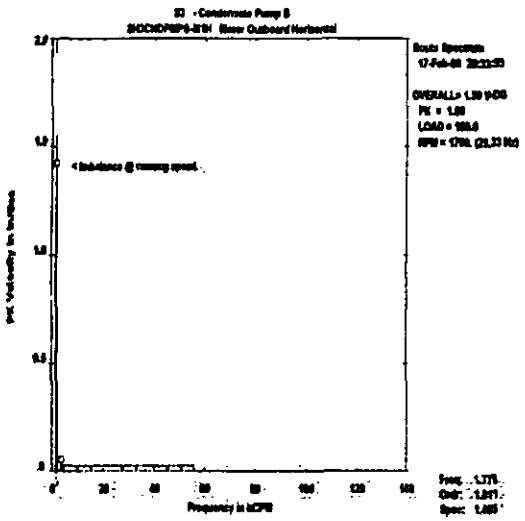
Equipment SH3CNDPMPB Condensate Pump B

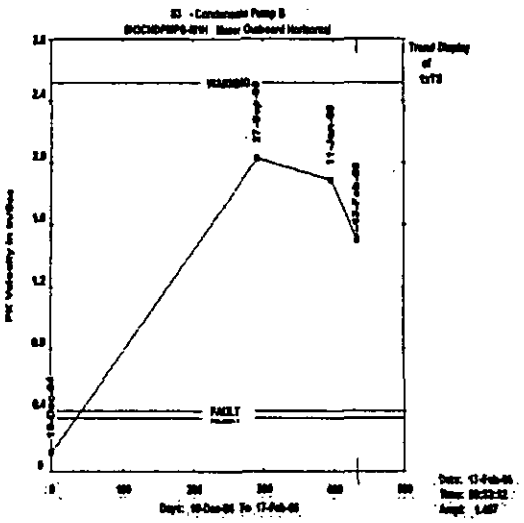
Urgency: Priority-3

Problem: 17-Feb-06 - Imbalance - Motor, AC Induction

Explanation: Analysis: Motor showing indication of unbalance at running speed. Please note below the spectrum showing a strong amplitude with-in running speed, @ 1x's peak. Also note the trend display has came down some.

Recommend: Checking periodically for progression within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.





Machinery Health Detail Report

02/23/06

Administrator/300

Area S3 Shipman Plant 3

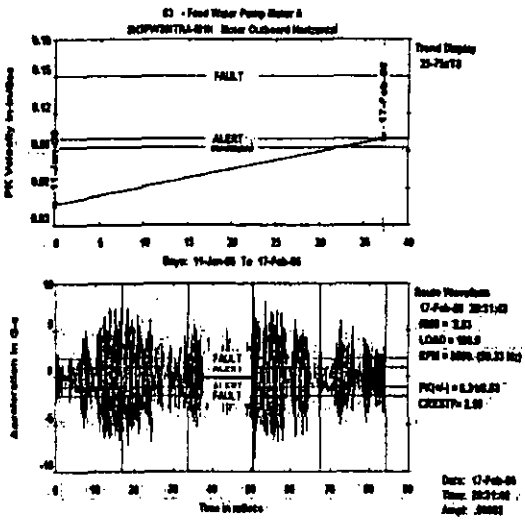
Equipment SH3FWSMTRA Feed Water Pump Motor A

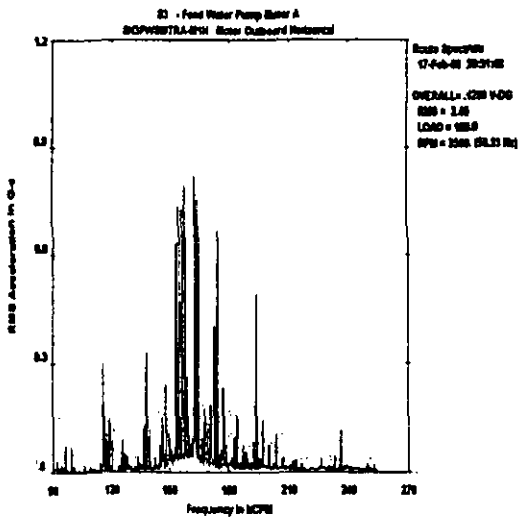
Urgency: Priority-3

Problem: 17-Feb-06 - Antifriction bearing defect - Motor, AC Induction

Explanation: Analysis: Motor showing high levels of high frequency energy and high levels of impacting in the time waveform. These are normally associated with a late stage bearing defect. Please note tend display

Recommend: Checking periodically for increasing. Replacing motor bearings when time is available. Will continue monitoring for increasing vibration.





Machinery Health Follow Up Report

02/23/06

Administrator/300

Area: Hill Plant 5
Equipment: H5FSFWMTRB Feed Water Pump Motor 5B

Title: 20-Feb-06 - Bearing defect with Electrical - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor showing high amplitude within the 2 and 1 times running speed parameter. I believe we have several things going on, not only bearing defects but also electrical problems. Yes this does look like misalignment with imbalance being related to bearing defects. While collecting data I noticed a pulsing vibration that resembled an electrical problem. Please note below the spectrum showing a strong 2x line frequency with higher amplitudes farther out. Also please note the increasing trend display.

Recommend: Checking motor for electrical problems and when time is available replacing motor bearings. Also confirm alignment between components to ensure performance. Will continue monitoring for increasing vibration and confirm corrections on next visit.

Actual Case

Corrective Actions Taken:

Area: Shipman Plant 3
Equipment: SH3CNDPMPB Condensate Pump B

Title: 17-Feb-06 - Imbalance - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor showing indication of unbalance at running speed. Please note below the spectrum showing a strong amplitude with-in running speed, @ 1x's peak. Also note the trend display has came down some.

Recommend: Checking periodically for progression within the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components. Will confirm corrections on next visit.

Actual Case

Corrective Actions Taken:

Machinery Health Follow Up Report

02/23/06

Administrator/300

Area: Shipman Plant

Equipment: SH3FWSMTRA Feed Water Pump Motor A

Title: 17-Feb-06 - Antifriction bearing defect - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor showing high levels of high frequency energy and high levels of impacting in the time waveform. These are normally associated with a late stage bearing defect. Please note tend display

Recommend: Checking periodically for increasing. Replacing motor bearings when time is available. Will continue monitoring for increasing vibration.

Actual Case

Corrective Actions Taken:

ISO 9001

Joe Potter
Senior Machinery Health Analyst

Emerson Process Management
Machinery Health Services
835 Innovation Drive
Knoxville TN 37932

T (316) 708-2279
F (865) 218-1496
Joe.potter@emersonprocess.com

March 28, 2006

Hawaiian Electric Light Company
Attn: Norman Verbanic
Maintenance Superintendent
54 Halekauila St
Hilo, HI 96721

RE: Machinery Health Report

Dear Mr. Verbanic:

Emerson's Machinery Health Services are available to enhance your existing program. As requested, a Vibration survey was conducted at your facility on March 20 - 23, 2006. The attached report is intended to inform you of any significant machinery problems or current machine conditions identified during the analysis of the data for your plant. The items listed in this report have been given a priority of 1 through 5.

As a global leader in providing advanced plant Machinery Health Management, Emerson's dedicated professionals are committed to providing the expertise, processes, and technologies to ensure your satisfaction and deliver machinery availability and optimum asset performance.

If you have any questions concerning any of the information contained in this report, please contact me at (316)708-2279. We look forward to working with you again in the future and adding world class technologies to your Machinery Health Management program.

Sincerely,

Joe Potter
Senior Machinery Health Analyst

CSI

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Machinery Health Report For Vibration Testing Conducted March 20 - 23, 2006 At Hawaii Electric Light Company Hilo, Hawaii

Report Prepared by:
Joe Potter
Sr. Machinery Health Analyst

EMERSON
Process Management

Machinery Health Report
Executive Summary

A vibration survey was conducted at your facility in Hilo on March 20 - 23, 2006. Hill 5 was tested with Puna and Shipman 3 & 4 during this visit. The following pages include a summary of the equipment tested and detailed descriptions of the identified faults and recommended actions.

A total of 4 cases were identified where action is required by Helco, the required actions are summarized below. More details about these faults are provided later in this report.

Recommended Actions, sorted by criticality

Check Electrical, Bearings, Alignment & Balance
- Hill 5 Feed Water Pump 5B – Check Electrical, Balancing rotating components and confirming Alignment between components and replace motor bearings.

Lubrication
- Hill 6 IR Air Compressor Motor – Grease Bearings

Balance
- Shipman 3 Condensate Pump B – Balance rotating components.

Bearings, Alignment
- Shipman 4 Feed Water Pump Motor A – Check Alignment between components to ensure performance and replace motor bearings.

If you have any questions regarding this report, please contact Joe Potter at 316-708-2279 or via e-mail at joe.potter@emersonprocess.com.

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Shipman Plant

Machinery Health Condition Matrix

Unit	Equipment ID	Description	Dec-05	Jan-06	Feb-06	Mar-06	Notes
4	Shipman 4	Turbine #4	Unit Down for Outage	OK	OK	OK	
4	SH4CIRMTRA	Circulating Pump Motor A		OK	OK	OK	
4	SH4CIRPMPA	Circulating Pump A		OK	OK	OK	
4	SH4CIRMTRB	Cirulating Pump Motor B		OK	OK	OK	
4	SH4CIRPMPB	Circulating Pump B		OK	OK	OK	
4	SH4CNDPMPA	Condensate Pump A		OK	OK	OK	
4	SH4CNDPMPB	Condensate Pump B		OK	OK	OK	
4	SH4FDIDMTR	FD/ID Fan Motor		OK	OK	OK	
4	SH4IDFAN	ID Fan		OK	OK	OK	
4	SH4FDFAN	FD Fan		OK	OK	OK	
4	SH4APHMTRA	Air Preheater Motor A		NR	NR	NR	
4	SH4APHMTRB	Air Preheater Motor B		OK	OK	OK	
4	SH4EVPPMPA	Evaporator Pump A		NR	NR	NR	
4	SH4EVPPMPB	Evaporator Pump B		NR	NR	NR	
4	SH4FWSMTRA	Feed Water Pump Motor A		4	OK	OK	
4	SH4FWSPMPA	Feed Water Pump A		4	OK	OK	
4	SH4FWSMTRB	Feed Water Pump Motor B		NT	NT	NT	
4	SH4FWSPMPB	Feed Water Pump B		NT	NT	NT	
4	SCAPH-A	Drip Pump Motor A		OK	NR	NR	
4	SCAPHP-A	Drip Pump A		OK	NR	NR	
4	SCAPH-B	Drip Pump Motor B		NR	NR	NR	
4	SCAPHP-B	Drip Pump B		NR	NR	NR	
4	SH4FOSPMPA	Fuel Oil Pump A		OK	OK	OK	
4	SH4FOSPMPB	Fuel Oil Pump B		NR	NR	NR	
4	SH4FOCDPMP	Fuel Oil CD Pump		OK	OK	OK	
4	SH4SVCPMPA	Service Water Pump A		OK	OK	OK	
4	SH4SVCPMPB	Service Water Pump B		NR	NR	NR	
4	SH4BCWPMP	Bearing Cooling Water Pump 4		NR	NR	NR	
4	SHWTSUMPMP	Water Treatment Sump Pump		NR	NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON. Process Management

Machinery Health Condition Matrix

Shipman Plant (Cont)

Unit	Equipment ID	Description	Dec-05	Jan-06	Feb-06	Mar-06	Notes
3	Shipman 3	Turbine #3	Unit Down for Outage	OK	OK	OK	
3	SH3CIRMTRA	Circulating Pump Motor A		OK	OK	OK	
3	SH3CIRPMPA	Circulating Pump A		OK	OK	OK	
3	SH3CIRMTRB	Cirulating Pump Motor B		OK	OK	OK	
3	SH3CIRPMPB	Circulating Pump B		OK	OK	OK	
3	SH3CNDPMPA	Condensate Pump A		OK	OK	OK	
3	SH3CNDPMPB	Condensate Pump B		3	3	3	
3	SH3FDIDMTR	FD/ID Fan Motor		OK	OK	OK	
3	SH3IDFAN	ID Fan		OK	OK	OK	
3	SH3FDFAN	FD Fan		OK	OK	OK	
3	SH3APHMTRA	Air Preheater Motor A		OK	OK	OK	
3	SH3APHMTRB	Air Preheater Motor B		NR	NR	NR	
3	SH3EVPPMPA	Evaporator Pump A		NR	NR	NR	
3	SH3EVPPMPB	Evaporator Pump B		NR	NR	NR	
3	SH3FWSMTRA	Feed Water Pump Motor A		OK	3	3	
3	SH3FWSPMPA	Feed Water Pump A		OK	OK	OK	
3	SH3FWSMTRB	Feed Water Pump Motor B		OK	OK	OK	
3	SH3FWSPMPB	Feed Water Pump B		OK	OK	OK	
3	SCAPH-A	Drip Pump Motor A		OK	NR	NR	
3	SCAPHP-A	Drip Pump A		OK	NR	NR	
3	SCAPH-B	Drip Pump Motor B		NR	NR	NR	
3	SCAPHP-B	Drip Pump B		NR	NR	NR	
3	SH3FOSPMPA	Fuel Oil Pump A		NR	NR	NR	
3	SH3FOSPMPB	Fuel Oil Pump B		OK	OK	OK	
3	SH3FOCDPMP	Fuel Oil CD Pump		OK	OK	OK	
3	SH3SVCPMPA	Service Water Pump A		OK	NR	NR	
3	SH3SVCPMPB	Service Water Pump B		NR	OK	OK	
3	SH3BCWPMP	Bearing Cooling Water Pump 3		NR	NR	NR	
3	#1SHAIRJOYMT	#1Joy Air Compressor Motor		OK	OK	OK	
3	SHAIRJOYAC#1	#1Joy Air Compressor		OK	OK	OK	
3	#1SHAIRJOYMT	#2Joy Air Compressor Motor		NR	NR	NR	
3	SHAIRJOYAC#1	#2Joy Air Compressor		NR	NR	NR	
3	SHCIRWMTR1	Circ Water Pump Motor #1		NT	NT	NT	
3	SHCIRWPMP1	Circulating Water Pump #1		NT	NT	NT	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

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Machinery Health Condition Matrix

Hill Plant

Unit	Equipment ID	Description	Dec-05	Jan-06	Feb-06	Mar-06	Notes
5	H5B APHMTR	H5B APH Drive Motor	NR	NR	NR	NR	
5	H5B APHGBX	H5B APH Gearbox	NR	NR	NR	NR	
5	H5CIRCMTRA	Circulating Pump Motor 5-A	OK	OK	OK	OK	
5	H5CIRCPMPA	Circulating Pump 5-A	OK	OK	OK	OK	
5	H5CIRCMTRB	Circulating Pump Motor 5-B	OK	OK	OK	OK	
5	H5CIRCPMPB	Circulating Pump 5-B	OK	OK	OK	OK	
5	H5CIRCMTRC	Circulating Pump Motor 5-C	OK	OK	OK	OK	
5	H5CIRCPMPC	Circulating Pump 5-C	OK	OK	OK	OK	
5	H5CASACMTR	Service Air Compressor Motor	NR	NR	NR	NR	
5	H5AIRSAC	Service Air Compressor	NR	NR	NR	NR	
5	H5CAIACMTR	Inst Air Compressor Motor	NR	NR	NR	NR	
5	H5AIRIAC	Instrument Air Compressor	NR	NR	NR	NR	
5	H5CNDMTRA	Condensate Pump Motor A	3	3	OK	OK	
5	H5CNDPMPA	Condensate Pump A	OK	OK	OK	OK	
5	H5CNDMTRB	Condensate Pump Motor B	3	3	OK	OK	
5	H5CNDPMPB	Condensate Pump B	OK	OK	OK	OK	
5	H5CNDTPMTR	Condensate Transfer Pump Mtr	NR	NR	NR	NR	
5	H5CNDTFPMP	Condensate Transfer Pump	NR	NR	NR	NR	
5	H5DFFDMTR	FD Fan Motor	OK	OK	OK	OK	
5	H5DFFDFAN	FD Fan	OK	OK	OK	OK	
5	H5EVAPPMP	Evaporator Pump	NR	NR	NR	NR	
5	H5FSFWMTRA	Feed Water Pump Motor 5A	OK	OK	OK	OK	
5	H5FSFWPMPA	Feed Water Pump 5A	OK	OK	OK	OK	
5	H5FSFWMTRB	Feed Water Pump Motor 5B	3	3	3	3	
5	H5FSFWPMPB	Feed Water Pump 5B	OK	OK	OK	OK	
5	H5SECFPMPA	Secondary Fuel Pump A	OK	OK	OK	OK	
5	H5SECFPMPB	Secondary Fuel Pump B	NR	NR	NR	NR	
5	H5SVCWMTRA	Service Water Pump Motor A	OK	NR	NR	NR	
5	H5SVCWPMPA	Service Water Pump A	NT	NR	NR	NR	
5	H5SVCWMTRB	Service Water Pump Motor B	OK	NR	NR	NR	
5	H5SVCWPMPB	Service Water Pump B	NT	NR	NR	NR	
5	HFOPRIPMP6	NR6 Primary Fuel Oil Pump	NR	NR	NR	NR	
5	HFOPRIPMPA	NR5 Primary Fuel Oil Pump A	NR	NR	NR	NR	
5	HFOPRIPMPB	NR5 Primary Fuel Oil Pump B	OK	NR	OK	OK	
5	H5ASLOPTRB	Aux Stm Lube Oil Pmp Turbine	NR	NR	NR	NR	
5	H5TGOILPMP	Turning Gear Oil Pump	NR	NR	NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

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Machinery Health Condition Matrix

Hill Plant (cont)

Unit	Equipment ID	Description	Dec-05	Jan-06	Feb-06	Mar-06	Notes
5	H5DFSDOMTR	#5 Diesel Oil Pump Motor	NR	NR	NR	NR	
5	H5DFSDOPMP	#5 Diesel Oil Pump	NR	NR	NR	NR	
6	H6 APH MTR	H6APH Drive Motor	NR	NR	Unit Down for Turbine Bearing Check.	NR	
6	H6 APH GBX	H6 APH Gearbox	NR	NR		NR	
6	H6CIRCMTRA	Circulating Pump Motor 6-A	OK	OK		OK	
6	H6CIRCPMPA	Circulating Pump 6-A	OK	OK		OK	
6	H6CIRCMTRB	Circulating Pump Motor 6-B	NR	NR		NR	
6	H6CIRCPMPB	Circulating Pump 6-B	NR	NR		NR	
6	H6CIRCMTRC	Circulating Pump Motor 6-C	OK	OK		OK	
6	H6CIRCPMPC	Circulating Pump 6-C	OK	OK		OK	
6	H6CIRCMTRD	Circulating Pump Motor 6-D	OK	OK		OK	
6	H6CIRCPMPD	Circulating Pump 6-D	OK	OK		OK	
6	H6AIRSAMTR	Service Air Compressor Motor	OK	OK		OK	
6	H6AIRSAC	Service Air Compressor	OK	OK		OK	
6	H6AIRIAMTR	Instrument Air Comprsr Motor	OK	OK		OK	
6	H6AIRIAC	Instrument Air Compressor	OK	OK		OK	
6	H6AIRIRMTR	IR Air Compressor Motor	NR	NR		NR	
6	H6AIRIRAC	IR Air Compressor	NR	NR		NR	
6	H6AIRIRCF	IR Air Compressor Clng Fan	NR	NR		NR	
6	H6LHTRDPMP	LP Heater Drip Pump	NT	NR		NR	
6	H6CNDMTRA	Condensate Pump Motor A	OK	OK		OK	
6	H6CNDPMPA	Condensate Pump A	OK	OK		OK	
6	H6CNDMTRB	Condensate Pump Motor B	OK	OK		OK	
6	H6CNDPMPB	Condensate Pump B	OK	OK		OK	
6	H6DFDHSMTR	FD Fan High Speed Motor	OK	OK		OK	
6	H6FDFAN	FD Fan	OK	OK		OK	
6	H6DFDLSMTR	FD Fan Low Speed Motor	OK	OK		OK	
6	H6EVPPMPA	Evaporator Pump A	OK	OK		OK	
6	H6EVPPMPB	Evaporator Pump B	OK	OK		OK	
6	H6FWBFMTRA	Feed Water Pump Mtr A	OK	OK		OK	
6	H6FWBFPMPA	Feed Water Pump 6A	OK	OK		OK	
6	H6FWBFMTRB	Feed Water Pump Mtr B	OK	OK		OK	
6	H6FWBFPMPB	Feed Water Pump 6B	OK	OK		OK	
6	H6SFOPMPA	Secondary Fuel Oil Pump A	OK	OK		OK	
6	H6SFOPMPB	Secondary Fuel Oil Pump B	NR	NR		NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON Process Management

Machinery Health Condition Matrix

Hill Plant (cont)

Unit	Equipment ID	Description	Dec-05	Jan-06	Feb-06	Mar-06	Notes
6	H6CNDDTKPA	Reblr Cond Drain Tank Pump A	OK	OK	Unit Down for Turbine Bearing Check.	OK	
6	H6CNDDTKPB	Reblr Cond Drain Tank Pump B	NR	NR		NR	
6	H6SVCWPMPA	Service Water Pump A	OK	OK		OK	
6	H6SVCWPMPB	Service Water Pump B	NR	NR		NR	
6	H6SVCBPMP	Booster Pump	NT	OK		OK	
6	H6GLSLPMP	Gland Seal Pump	NT	OK		OK	
6	H6DCLOPMP	DC Lube Oil Pump	NR	NR		NR	
6	H6TGLOPMP	Turning Gear Lube Oil Pump	NR	NR		NR	
6	H6SALOPMP	Aux Lube Oil Pump	NR	NR		NR	
6	H6DFDOMTRA	Diesel Oil Pump Motor A	NR	NR		NR	
6	H6DFDOPMPA	Diesel Oil Pump A	NR	NR		NR	
6	H6DFDOMTRB	Diesel Oil Pump Motor B	NR	NR		NR	
6	H6DFDOPMPB	Diesel Oil Pump B	NR	NR		NR	

Puna Plant

Equipment ID	Description	Dec-05	Jan-06	Feb-06	Mar-06	Notes
PUCWPMTRA	Circ Water Pump Motor A	OK	OK	OK	OK	
PUCWPMTRB	Circ Water Pump Motor B	OK	OK	OK	OK	
PUCWPMTRC	Circ Water Pump Motor C	OK	OK	OK	OK	
PUAIRMTRA	Plant Air Compressor Motor A	OK	OK	NR	NR	
PUAIRCOMPA	Plant Air Compressor A	OK	OK	NR	NR	
PUAIRMTRB	Plant Air Compressor Motor B	NR	OK	OK	OK	
PUAIRCOMPB	Plant Air Compressor B	NR	OK	OK	OK	
PUCDNTKPMP	Cond Drain Pmp to MU Tank	NR	NR	NR	NR	
PUCDMUMTRA	Cond Make-up Pump Motor A	OK	OK	OK	OK	
PUCDMUPMPA	Cond Make-up Pump A	OK	OK	OK	OK	
PUCDMUMTRB	Cond Make-up Pump Motor B	OK	OK	OK	OK	
PUCDMUPMPB	Cond Make-up Pump B	OK	OK	OK	OK	
PUCONDMTRA	Condensate Pump Motor A	4	OK	OK	OK	
PUCONDPMPA	Condensate Pump A	OK	OK	OK	OK	
PUCONDMTRB	Condensate Pump Motor B	OK	OK	OK	OK	
PUCONDPMPB	Condensate Pump B	OK	OK	OK	OK	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

EMERSON.
Process Management

Machinery Health Condition Matrix

Puna Plant (cont)

Equipment ID	Description	Dec-05	Jan-06	Feb-06	Mar-06	Notes
PUDFOPMPA	Diesel Oil Pump A	NR	NR	NR	NR	
PUDFOPMPB	Diesel Oil Pump B	NT	NT	NT	NT	
PUIDHSMTR	ID High Speed Motor	OK	OK	OK	OK	
PUDFIDFAN	ID Fan	OK	OK	OK	OK	
PUIDLSMTR	ID Low Speed Motor	OK	OK	NR	NR	
PUFDHSMTR	FD High Speed Motor	OK	OK	OK	OK	
PUDFFDFAN	FD Fan	OK	OK	OK	OK	
PUFDLSMTR	FD Low Speed Motor	OK	OK	NR	NR	
PUFSFWMTRA	Feed Water Pump Motor A	3	NT	NT	NT	
PUFSFWPMPA	Feed Water Pump A	3	NT	NT	NT	
PUFSFWMTRB	Feed Water Pump Motor B	OK	OK	OK	OK	
PUFSFWPMPB	Feed Water Pump B	OK	OK	OK	OK	
PUFOFWDPMP	Fuel Oil Transfer Pump	NR	NR	NR	NR	
PUFOSULPMP	Fuel Oil Unloading Pump	NR	NR	NR	NR	
PUFOFOPMPA	Fuel Oil Pump A	OK	OK	OK	OK	
PUFOFOPMPB	Fuel Oil Pump B	OK	NR	NR	NR	
PUDCBRGPMP	DC Bearing Oil Pump	NR	NR	NR	NR	
PUVPREXPMP	Vapor Extraction Pump	NR	OK	OK	OK	
PULOSPMPA	Lube Oil Pump A	OK	OK	OK	OK	
PULOSPMPB	Lube Oil Pump B	NR	NR	NR	NR	
PUSVCWPMPA	Service Water Pump A	NT	NR	NR	NR	
PUSVCWPMPB	Service Water Pump B	NT	NR	NR	NR	
PUSVCHPPMP	HP Water Pump	3	OK	OK	OK	
PUSVCFLPMP	Flush Pump	OK	OK	OK	OK	
PUSCCWPMPA	County Water Papaya Pump A	OK	OK	OK	OK	
PUSCCWPMPB	County Water Papaya Pump B	NR	NR	NR	NR	
PUHYDPMTRA	Hydraulic Pump Motor A	OK	OK	OK	OK	
PUHYDPMPA	Hydraulic Pump A	OK	OK	OK	OK	
PUHYDPMTRB	Hydraulic Pump Motor B	NR	NR	NR	NR	
PUHYDPMPAB	Hydraulic Pump B	NR	NR	NR	NR	
PUWTSMPPMP	Sump Pump	NR	NR	NR	NR	
PUTGLESPMP	Gland Exhaust Pump	NT	NR	NR	NR	

1	Emergency	Continue operation may result in machinery damage or personnel injury.
2	High Alarm	Repair at earliest opportunity - Machinery is in advanced stages of failure. Failure is imminent if use is prolonged.
3	Medium Alarm	Schedule for repair - Fault is present requires attention; however, levels do not require immediate attention.
4	Low Alarm	Preventive maintenance initiated - Preventive maintenance should be performed to increase machinery reliability.
5	Watch	No immediate action required (Informational purposes only) - Low level event has been noticed on this machine.
OK	Okay	No problems identified - Equipment is running at acceptible levels.
NR	Not Running	Not running at time of testing.
NT	Unit Pulled	Unit pulled out of service or out for replairs.

03/28/06

Administrator/400

Machinery Health Summary Report

Area	H5	Hill Plant 5	
Urgency	Equipment	Problem	Extended Description
Priority-3	H5FSFWMTRB Feed Water Pump Motor 5B	21-Mar-06 - Bearings and Rotor defects - Motor, AC Induction	Analysis: Motor still showing a high amplitude within the 2 & 1 times at running speed. I still believe we have several things going on, not only bearing defects but also electrical problems. Yes this does look like misalignment with imbalance being related to bearing defects. While collecting data I'm still noticing a pulsing vibration that resembled an electrical problem. Please note below the spectrum showing a strong 2 x line frequency with higher amplitudes farther out. Note the trend has came down some. This may be due to load. Recommend: Checking motor for electrical problems and when time is available replacing motor bearings. Also confirm alignment between components to ensure performance.

Area	S3	Shipman Plant 3	
Urgency	Equipment	Problem	Extended Description
Priority-3	SH3CNDPMPB Condensate Pump B	21-Mar-06 - Imbalance - Motor, AC Induction	Analysis: Motor still showing unbalance at running speed. Please note below the spectrum showing a strong amplitude at running speed. The trend has came down even more than the last visit. Recommend: Checking periodically for progression in the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components.
Priority-3	SH3FWSMTRA Feed Water Pump Motor A	21-Mar-06 - Antifriction bearing defect - Motor, AC Induction	Analysis: Motor bearings are still showing high levels of high frequency energy and high levels of impacting in the time waveform. This is normally associated with a late stage bearing defect. Please note tend display Recommend: Checking periodically for increasing. Replacing motor bearings when time is available.

Machinery Health Detail Report

03/28/06

Administrator/400

Area H5 Hill Plant 5

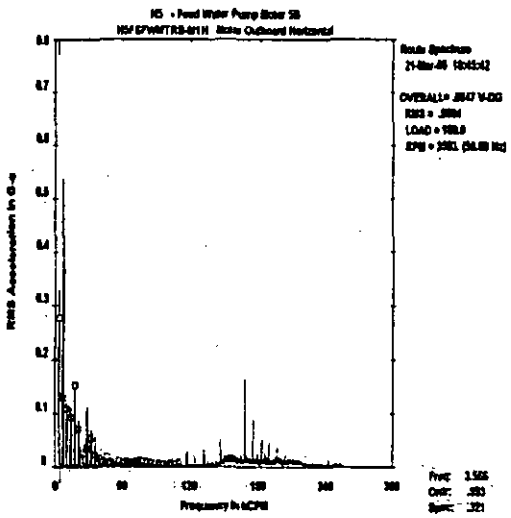
Equipment H5FSFWMTRB Feed Water Pump Motor 5B

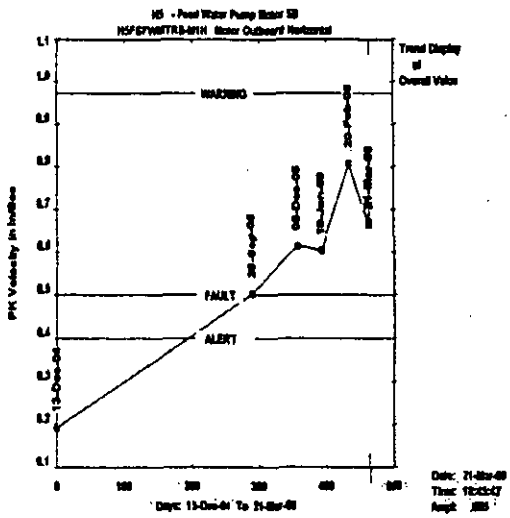
Urgency: Priority-3

Problem: 21-Mar-06 - Bearings and Rotor defects - Motor, AC Induction

Explanation: Analysis: Motor still showing a high amplitude within the 2 & 1 times at running speed. I still believe we have several things going on, not only bearing defects but also electrical problems. Yes this does look like misalignment with imbalance being related to bearing defects. While collecting data I'm still noticing a pulsing vibration that resembled an electrical problem. Please note below the spectrum showing a strong 2 x line frequency with higher amplitudes farther out. Note the trend has came down some. This may be due to load.

Recommend: Checking motor for electrical problems and when time is available replacing motor bearings. Also confirm alignment between components to ensure performance.





Machinery Health Detail Report

03/28/06

Administrator/400

Area S3 Shipman Plant 3

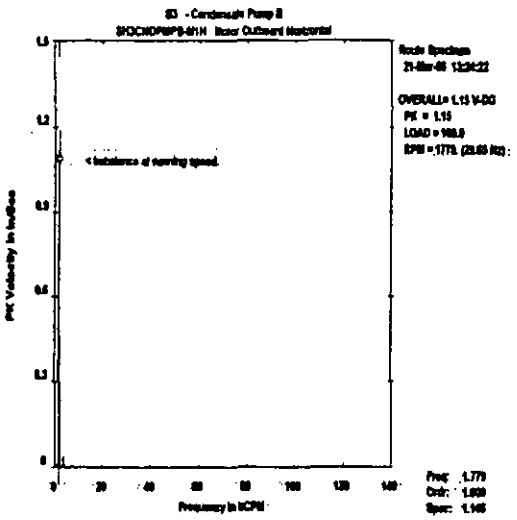
Equipment SH3CNDPMPB Condensate Pump B

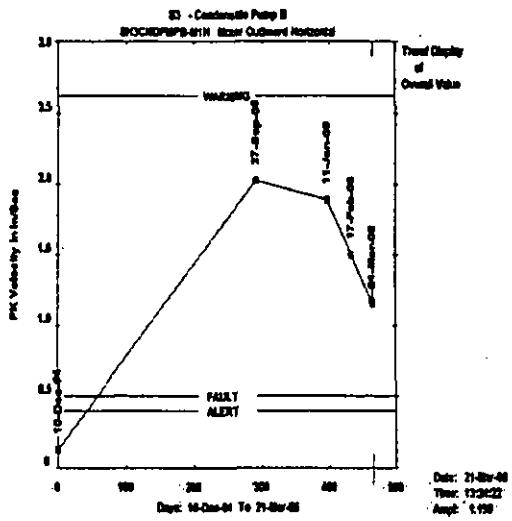
Urgency: Priority-3

Problem: 21-Mar-06 - Imbalance - Motor, AC Induction

Explanation: Analysis: Motor still showing unbalance at running speed. Please note below the spectrum showing a strong amplitude at running speed. The trend has came down even more than the last visit.

Recommend: Checking periodically for progression in the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components.





Machinery Health Detail Report

03/28/06

Administrator/400

Area S3 Shipman Plant 3

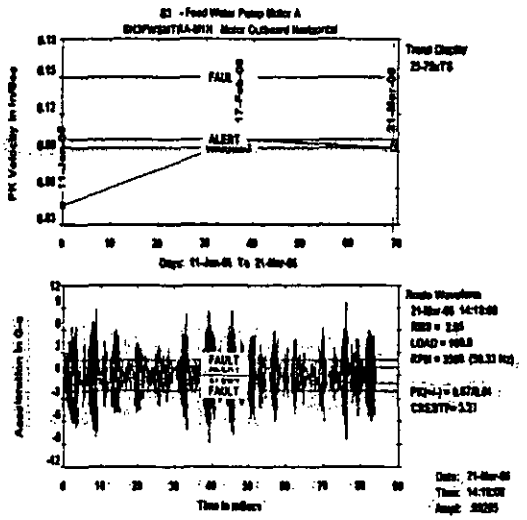
Equipment SH3FWSMTRA Feed Water Pump Motor A

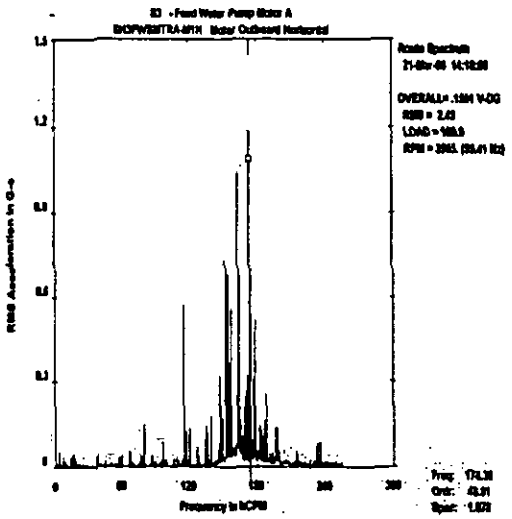
Urgency: Priority-3

Problem: 21-Mar-06 - Antifriction bearing defect - Motor, AC Induction

Explanation: Analysis: Motor bearings are still showing high levels of high frequency energy and high levels of impacting in the time waveform. This is normally associated with a late stage bearing defect. Please note tend display

Recommend: Checking periodically for increasing. Replacing motor bearings when time is available.





Machinery Health Follow Up Report

03/28/06

Administrator/400

Area: Hill Plant 5
Equipment: H5FSFWMTRB Feed Water Pump Motor 5B

Title: 21-Mar-06 - Bearings and Rotor defects - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor still showing a high amplitude within the 2 & 1 times at running speed. I still believe we have several things going on, not only bearing defects but also electrical problems. Yes this does look like misalignment with imbalance being related to bearing defects. While collecting data I'm still noticing a pulsing vibration that resembled an electrical problem. Please note below the spectrum showing a strong 2 x line frequency with higher amplitudes farther out. Note the trend has came down some. This may be due to load.

Recommend: Checking motor for electrical problems and when time is available replacing motor bearings. Also confirm alignment between components to ensure performance.

Actual Case

Corrective Actions Taken:

Area: Shipman Plant 3
Equipment: SH3CNDPMPB Condensate Pump B

Title: 21-Mar-06 - Imbalance - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor still showing unbalance at running speed. Please note below the spectrum showing a strong amplitude at running speed. The trend has came down even more than the last visit.

Recommend: Checking periodically for progression in the 1x RPM parameter. When time is available having unit sent in for routine check with balancing rotating components.

Actual Case

Corrective Actions Taken:

Machinery Health Follow Up Report

03/28/06

Administrator/400

Area: Shipman Plant
Equipment: SH3FWSMTRA Feed Water Pump Motor A

Title: 21-Mar-06 - Antifriction bearing defect - Motor, AC Induction

Urgency: Priority-3

Explanation: Analysis: Motor bearings are still showing high levels of high frequency energy and high levels of impacting in the time waveform. This is normally associated with a late stage bearing defect. Please note tend display

Recommend: Checking periodically for increasing. Replacing motor bearings when time is available.

Actual Case

Corrective Actions Taken:

EMERSON
Process Management

Mickey Harp
Analyst, Analysis Services

Emerson Process Management
Asset Optimization Division
835 Innovation Drive
Knoxville, TN 37932

865.675.2400 X3403
Mickey.Harp@EmersonProcess.com

May 15, 2006

Mr. Andy Ho
Mr. Craig Yamamoto
Boehringer Ingelheim
Hawaiian Electric and Light Co, Inc
54 Halekauila Street
Hilo, HI 96721-1027

Gentlemen,

Vibration data was collected at your facility in April 2006. Analysis was performed on that equipment on May 13-15, 2006. The attached report is intended to inform you of any significant machinery problems identified during this analysis.

CSI is committed to providing World Class Predictive Maintenance technologies and ensuring customer satisfaction. If you have any questions concerning any of the information contained in this report please feel free to contact me. I would like to thank you for allowing CSI Services to assist you in your Reliability Based Maintenance efforts.

If you have any questions or concerns please feel free to contact me at anytime. I did not see any bearings in your current database. If you could email me any bearing ids for the equipment in your database I will add them to your database. This will help strengthen your current database and also help me with the analysis of data.

Mickey Harp,
Analyst, Analysis Services

EMERSON
Process Management

VIBRATION PRIORITY SUMMARY

Priority 5: [redacted]
Continued operation may result in machinery damage or personnel injury.
Immediate action required.

Priority 4: [redacted]
Machinery is in advanced stages of failure.
Failure is imminent if use is prolonged.
Repair at earliest opportunity.

Priority 3: Alarm
Fault is present that requires attention, however, levels do not require immediate attention.
Schedule for repair.

Priority 2: Watch
Low level event has been noticed on this machine.
No immediate action required. Informational purposes only.

Priority 1: Discussion Needed
Discussion is needed on this issue or provided for informational purposes.

EMERSON.
Process Management

Equipment Description	Equipment ID	Condition	Comments
Shipman Plant 3			
Turbine #3	Shipman 3	OK	
Circulating Pump Motor A	SH3CIRMTRA	2	Looseness
Circulating Pump A	SH3CIRPMPA	NT	
Circulating Pump Motor B	SH3CIRMTRB	OK	
Circulating Pump B	SH3CIRPMPB	NT	
Condensate Pump A	SH3CNDPMPA	3	Looseness
Condensate Pump B	SH3CNDPMPB		
FD/ID Fan Motor	SH3FDIDMTR	OK	
ID Fan	SH3IDFAN	OK	
FD Fan	SH3FDFAN	OK	
Air Preheater Motor A	SH3APHMTRA	OK	
Air Preheater Motor B	SH3APHMTRB	OK	
Evaporator Pump A	SH3EVPPMPA	NT	
Evaporator Pump B	SH3EVPPMPB	NT	
Feed Water Pump Motor A	SH3FWSMTRA	3	Bearing Defect
Feed Water Pump A	SH3FWSPMPA	OK	
Feed Water Pump Motor B	SH3FWSMTRB	2	Electrical Energy
Feed Water Pump B	SH3FWSPMPB	OK	
Drip Pump Motor A	SCAPH-A	NT	
Drip Pump A	SCAPHP-A	NT	
Drip Pump Motor B	SCAPH-B	3	Looseness
Drip Pump B	SCAPHP-B		
Fuel Oil Pump A	SH3FOSPMPA	NT	
Fuel Oil Pump B	SH3FOSPMPB	2	Looseness
Fuel Oil CD Pump	SH3FOCDPMP	OK	
Service Water Pump A	SH3SVCPMPA	OK	
Service Water Pump B	SH3SVCPMPB	OK	
Bearing Cooling Water Pump 3	SH3BCWPMP	2	Looseness
#1 Joy Air Compressor Motor	#1SHAIRJOY	OK	
#1Joy Air Compressor	SHAIRJOY#1	OK	
#2 Joy Air Compressor Motor	#2SHAIRJOY	OK	
#2Joy Air Compressor	SHAIRJOY#2	OK	
Circ Water Pump Motor #1	SHCIRWMTR1	NT	
Circulating Water Pump #1	SHCIRWPMP1	NT	
Shipman Plant 4			
Turbine #4	Shipman 4	OK	
Circulating Pump Motor A	SH4CIRMTRA	OK	
Circulating Pump A	SH4CIRPMPA	NT	
Circulating Pump Motor B	SH4CIRMTRB	OK	
Circulating Pump B	SH4CIRPMPB	NT	
Condensate Pump A	SH4CNDPMPA	OK	
Condensate Pump B	SH4CNDPMPB	2	Looseness
FD/ID Fan Motor	SH4FDIDMTR	OK	
ID Fan	SH4IDFAN	3	Imbalance
FD Fan	SH4FDFAN	OK	
Air Preheater Motor A	SH4APHMTRA	OK	
Air Preheater Motor B	SH4APHMTRB	OK	
Evaporator Pump A	SH4EVPPMPA	NT	
Evaporator Pump B	SH4EVPPMPB	NT	
Feed Water Pump Motor A	SH4FWSMTRA	2	Looseness
Feed Water Pump A	SH4FWSPMPA	NT	
Feed Water Pump Motor B	SH4FWSMTRB	NT	
Feed Water Pump B	SH4FWSPMPB	NT	
Drip Pump Motor A	SCAPH-A	NT	
Drip Pump A	SCAPHP-A	NT	
Drip Pump Motor B	SCAPH-B	NT	
Drip Pump B	SCAPHP-B	NT	
Fuel Oil Pump A	SH4FOSPMPA	OK	
Fuel Oil Pump B	SH4FOSPMPB	OK	
Fuel Oil CD Pump	SH4FOCDPMP	OK	
Service Water Pump A	SH4SVCPMPA	OK	
Service Water Pump B	SH4SVCPMPB	OK	
Bearing Cooling Water Pump 4	SH4BCWPMP	OK	
Water Treatment Sump Pump	SHWTSUMPMP	NT	

Hill Plant 5			
H5 Turbine	H5 Turb	NT	
H5A APH Drive Motor	H5A APHMTR	NT	
H5A APH Gearbox	H5A APHGBX	NT	
Circulating Pump Motor 5-A	H5CIRCMTRA	3	Looseness
Circulating Pump 5-A	H5CIRCPMPA	NT	
Circulating Pump Motor 5-B	H5CIRCMTRB	OK	
Circulating Pump 5-B	H5CIRCPMPB	NT	
Circulating Pump Motor 5-C	H5CIRCMTRC	OK	
Circulating Pump 5-C	H5CIRCPMPC	NT	
Service Air Compressor Motor	H5CASACMTR	OK	
Service Air Compressor	H5AIRSAC	OK	
Inst Air Compressor Motor	H5CAIACMTR	OK	
Instrument Air Compressor	H5AIRIAC	OK	
Condensate Pump Motor A	H5CNDMTRA		
Condensate Pump A	H5CNDPMPA	NT	
Condensate Pump Motor B	H5CNDMTRB	3	Looseness
Condensate Pump B	H5CNDPMPB	NT	
Condensate Transfer Pump Mtr	H5CNDTPMTR	OK	
Condensate Transfer Pump	H5CNDTFPMP	OK	
FD Fan Motor	H5DFFDMTR	OK	
FD Fan	H5DFFDFAN	OK	
Evaporator Pump	H5EVAPPMP	NT	
Feed Water Pump Motor 5A	H5FSFWMTRA	OK	
Feed Water Pump 5A	H5FSFWPMPA	OK	
Feed Water Pump Motor 5B	H5FSFWMTRB	3	Looseness and Electrical
Feed Water Pump 5B	H5FSFWPMPB	OK	
Secondary Fuel Pump A	H5SECFPMPA	2@?	Early Bearing Defect
Secondary Fuel Pump B	H5SECFPMPB	NT	
Service Water Pump Motor A	H5SVCWMTRA	OK	
Service Water Pump A	H5SVCWPMPA	OK	
Service Water Pump Motor B	H5SVCWMTRB	2@3	Looseness
Service Water Pump B	H5SVCWPMPB	OK	
NR5 Primary Fuel Oil Pump	HFOPRIPMPB	OK	
NR5 Primary Fuel Oil Pump A	HFOPRIPMPA	OK	
NR5 Primary Fuel Oil Pump B	HFOPRIPMPB	NT	
Aux Stm Lube Oil Pmp Turbine	H5ASLOPTRB	NT	
Turning Gear Oil Pump	H5TGOILPMP	NT	
#5 Diesel Oil Pump Motor	H5DFSDOMTR	NT	
#5 Diesel Oil Pump	H5DFSDOPMP	NT	
Hill Plant 6			
H6 Turbine	H6 TRB	NT	
H6APH Drive Motor	H6 APH MTR	NT	
H6 APH Gearbox	H6 APH GBX	NT	
Circulating Pump Motor 6-A	H6CIRCMTRA	OK	
Circulating Pump 6-A	H6CIRCPMPA	NT	
Circulating Pump Motor 6-B	H6CIRCMTRB	NT	
Circulating Pump 6-B	H6CIRCPMPB	NT	
Circulating Pump Motor 6-C	H6CIRCMTRC	OK	
Circulating Pump 6-C	H6CIRCPMPC	NT	
Circulating Pump Motor 6-D	H6CIRCMTRD	OK	
Circulating Pump 6-D	H6CIRCPMPD	NT	
Service Air Compressor Motor	H6AIRSAMTR	OK	
Service Air Compressor	H6AIRSAC	OK	
Instrument Air Comprsr Motor	H6AIRIAMTR	OK	
Instrument Air Compressor	H6AIRIAC	OK	
IR Air Compressor Motor	H6AIRIRMTR	NT	
IR Air Compressor	H6AIRIRAC	NT	
IR Air Compressor Clng Fan	H6AIRIRCF	NT	
LP Heater Drip Pump	H6LHTRDPMP	OK	
Condensate Pump Motor A	H6CNDMTRA	OK	
Condensate Pump A	H6CNDPMPA	NT	
Condensate Pump Motor B	H6CNDMTRB	OK	
Condensate Pump B	H6CNDPMPB	NT	
FD Fan High Speed Motor	H6DFDHSMTR	OK	
FD Fan	H6FDFAN	OK	
FD Fan Low Speed Motor	H6DFDLSMTR	OK	
Evaporator Pump A	H6EVPPMPA	OK	
Evaporator Pump B	H6EVPPMPB	OK	
Feed Water Pump Mtr A	H6FWBFMTRA	OK	
Feed Water Pump 6A	H6FWBFPMPA	OK	
Feed Water Pump Mtr B	H6FWBFMTRB	OK	
Feed Water Pump 6B	H6FWBFPMPB	OK	
Secondary Fuel Oil Pump A	H6SFOPMPA	OK	
Secondary Fuel Oil Pump B	H6SFOPMPB	OK	
Rebir Cond Drain Tank Pump A	H6CNDDTKPA	OK	
Rebir Cond Drain Tank Pump B	H6CNDDTKPB	OK	
Service Water Pump A	H6SVCWPMPA	OK	
Service Water Pump B	H6SVCWPMPB	OK	
Booster Pump	H6SVCBPMP	NT	
Gland Seal Pump	H6GLSLPMP	OK	
DC Lube Oil Pump	H6DCLOPMP	OK	
Turning Gear Lube Oil Pump	H6TGLOPMP	NT	
Aux Lube Oil Pump	H6SALOPMP	OK	
Diesel Oil Pump Motor A	H6DFDOMTRA	OK	
Diesel Oil Pump A	H6DFDOPMPA	OK	
Diesel Oil Pump Motor B	H6DFDOMTRB	OK	
Diesel Oil Pump B	H6DFDOPMPB	OK	

PUMA			
Puna Turbine	Turbine	NT	
Circ Water Pump Motor A	PUCWPMTRA	OK	
Circ Water Pump Motor B	PUCWPMTRB	OK	
Circ Water Pump Motor C	PUCWPMTRC	OK	
Plant Air Compressor Motor A	PUAIRMTRA	NT	
Plant Air Compressor A	PUAIRCOMPA	NT	
Plant Air Compressor Motor B	PUAIRMTRB	OK	
Plant Air Compressor B	PUAIRCOMPB	OK	
Cond Drain Pmp to MU Tank	PUCDNTKPMP	NT	
Cond Make-up Pump Motor A	PUCDMUMTRA	NT	
Cond Make-up Pump A	PUCDMUPMPA	NT	
Cond Make-up Pump Motor B	PUCDMUMTRB	OK	
Cond Make-up Pump B	PUCDMUPMPB	OK	
Condensate Pump Motor A	PUCONDMTRA	OK	
Condensate Pump A	PUCONDPMPA	OK	
Condensate Pump Motor B	PUCONDMTRB	OK	
Condensate Pump B	PUCONDPMPB	OK	
Diesel Oil Pump A	PUDFOPMPA	OK	
Diesel Oil Pump B	PUDFOPMPB	NT	
ID High Speed Motor	PUIDHSMTR	OK	
ID Fan	PUDFIDFAN	OK	
ID Low Speed Motor	PUIDLSMTR	OK	
FD High Speed Motor	PUFDHSMTR	OK	
FD Fan	PUDFFDFAN	OK	
FD Low Speed Motor	PUFDLSMTR	OK	
Feed Water Pump Motor A	PUFSFWMTRA	OK	
Feed Water Pump A	PUFSFWPMPA	OK	
Feed Water Pump Motor B	PUFSFWMTRB	OK	
Feed Water Pump B	PUFSFWPMPB	OK	
Fuel Oil Transfer Pump	PUFOFWDPMP	OK	
Fuel Oil Unloading Pump	PUFOSULPMP	NT	
Fuel Oil Pump A	PUFOFOPMPA	OK	
Fuel Oil Pump B	PUFOFOPMPB	NT	
DC Bearing Oil Pump	PUDCBRGPMP	OK	
Vapor Extraction Pump	PUVPREXPMP	OK	
Lube Oil Pump A	PULOSPMPA	OK	
Lube Oil Pump B	PULOSPMPB	OK	
Service Water Pump A	PUSVCWPMPA	3	Looseness
Service Water Pump B	PUSVCWPMPB	OK	
HP Water Pump	PUSVCHPPMP	[redacted]	
Flush Pump	PUSVCFLPMP	[redacted]	
County Water Papaya Pump A	PUSCCWPMPA	OK	
County Water Papaya Pump B	PUSCCWPMPB	OK	
Hydraulic Pump Motor A	PUHYDPMTRA	OK	
Hydraulic Pump A	PUHYDPMPA	OK	
Hydraulic Pump Motor B	PUHYDPMTRB	OK	
Hydraulic Pump B	PUHYDPMPAB	OK	
Sump Pump	PUWTSMPPMP	NT	
Gland Exhaust Pump	PUTGLESPMP	OK	

Condition Legend:

Priority 1	Emergency Situation	
Priority 2	High Alarm	
Priority 3	Alarm	3
Priority 4	Watch	[illegible]
Priority 5	Discussion Needed	[illegible]
Not Running	Scheduled for test but not in operation	[illegible]
Not Tested	Not Tested this survey	NT
Machine OK	Condition is acceptable for operation	OK

EMERSON
Process Management

Predictive Maintenance Summary Report

05/15/06
harpm/1

Area H5 Hill Plant 5

Urgency	Equipment	Problem	Extended Description
High Alarm	H5CNDMTRA Condensate Pump Motor A	25-Apr-06 - Looseness	The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am setting the severity of this problem to a high alarm. Please check this motor for any signs of looseness and imbalance.
Alarm	H5CIRCMTRA Circulating Pump Motor 5-A	25-Apr-06 - Looseness	Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine. The trend data is indicating that the amplitude levels are highest that this machine has seen. I would recommend that maintenance be scheduled on this machine in the next 1-2 months.
Alarm	H5CNDMTRB Condensate Pump Motor B	25-Apr-06 - Looseness	The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well. I would recommend that maintenance be scheduled on this machine on the next 2-3 months.
Alarm	H5FSFWMTRB Feed Water Pump Motor 5B	25-Apr-06 - Looseness	The attached plots are indicating looseness and an electrical defect on this motor. The high 2x peak is an electrical defect frequency. I would recommend that maintenance be scheduled on this machine in the next 2-3 months to address the looseness issue. Once the looseness issue is addressed the electrical frequency should decrease.
Watch	H5SECFPMPA Secondary Fuel Pump A	25-Apr-06 - Antifriction bearing defect	The attached peakvue is indicating what appears to be an early bearing defect. There are no bearings defined in this database. If any bearing ids are known about any of the machines please send that information to me. I would only recommend that monthly data be collected on this machine.
Watch	H5SVCWMTRB Service Water Pump Motor B	25-Apr-06 - Looseness	This is the first time that data has been collected on this machine. The attached plot is indicating looseness and an electrical issue. I would only recommend that monthly data be collected on this machine at this time.

Area PUNA Puna

Urgency	Equipment	Problem	Extended Description
High Alarm	PUSVCFLPMP Flush Pump	26-Apr-06 - Stuctural fatigue	The attached plots are displaying a large increase in vibration levels, but only in the horizontal direction. The high amplitude levels are present across the entire machine. This is usually seen when a resonance or structural issue is present. Please inspect the structure for loose feet, cracked or broken welds. The vibration levels starting increasing in February.

EMERSON
Process Management

Predictive Maintenance Summary Report

05/15/06
harpm/1

High Alarm	PUSVCHPPMP HP Water Pump	26-Apr-06 - Looseness	The attached plots are showing a high level of looseness. The pump is also showing a looseness issue, but it is a lot lower. I would recommend that the motor be checked for any signs of looseness mostly in the vertical direction.
Alarm	PUSVCWPMPA Service Water Pump A	26-Apr-06 - Looseness	Data has only been collected on this machine twice. Each time there was a high 1x turning peak present. The horizontal direction is the where the highest amplitude levels are present. It appears that an imbalance function is present on this motor. The pump is showing signs of low level looseness. I would recommend that the pump be checked to verify that it is running on its curve. Please check the motor's mounting bolts and structure to make certain that the motor is secure.

Area: S3 Shipman Plant

Urgency	Equipment	Problem	Extended Description
High Alarm	SCAPHP-B Drip Pump B	27-Apr-06 - Imbalance - Pump	The first thing I would suggest is that the speed for this pump be verified so that is can be set correctly in the database. The second thing I would like to do is combine all the pump points to the motor component. I do not know if this was requested as per the customer, but I will inquire to this. The pump is showing a large 1x peak which I believe is the running speed of the pump. It appears to be an imbalance issue and this could be the source of the looseness showing across on the motor. I would recommend that data be collected on this pump as soon as possible to verify the high levels of vibration. If the levels are still high I would suggest that maintenance be scheduled on this pump within the month to correct the imbalance issue that is currently being shown.
High Alarm	SH3CNDPMPB Condensate Pump B	27-Apr-06 - Looseness - Motor	The motor is showing very high levels of vibration. The past data shows a problem in the horizontal direction. The last few months have seen a large decrease in the horizontal vibration levels, but at the same time all the other points have shown a large increase. What maintenance has been preformed on this machine? The 1x parameter is usually either an imbalance or a looseness issue. I would strongly recommend that maintenance be scheduled on this machine within the month to check for looseness and to make certain the motor is balanced.
Alarm	SCAPH-B Drip Pump Motor B	27-Apr-06 - Looseness - Motor	This is the first time that data has been collected on this machine. The attached plots are indicating a looseness issue for the motor. I am also seeing other peaks that are from an unknown source at this time. I would recommend that the motor be inspected for any looseness causes and to collect monthly data on this machine.
Alarm	SH3CNDPMPA Condensate Pump A	27-Apr-06 - Looseness - Motor	The attached plots are displaying a looseness issue on the motor. The amplitude levels are considered high, but they have been present since data was first collected on this machine. I feel that the .6 in/sec is too high of an amplitude level for this machine. I would recommend that the structure and bolts holding the motor be inspected for any fatigue or looseness. Please continue collecting monthly data on this machine.

EMERSON. Process Management

Predictive Maintenance Summary Report

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Alarm	SH3FWSMTRA Feed Water Pump Motor A	27-Apr-06 - Antifriction bearing defect - Motor	The attached plots are displaying high levels of impacting. When comparing FWP A to FWP B the high levels of impacting are not present. I do not think the vibration is originating for the process of this machine. I believe there is a bearing defect on the inboard side of this motor as this is where all the high impacting is being displayed. If any of the bearings ids are known for this motor or any other motors please email that information to me. I would recommend that maintenance be scheduled on this motor in the next 2-3 months to have the bearings inspected and replaced if needed.
Watch	SH3BCWPMP Bearing Cooling Water Pump 3	27-Apr-06 - Looseness - Motor	The motor is indicating a looseness issue as shown by the harmonics of turning speed. The amplitude levels have decreased slightly, but I would think the levels are still high for this machine. Was any maintenance preformed on the motor since September 2005? Please continue collecting monthly data for this machine.
Watch	SH3CIRMTRA Circulating Pump Motor A	27-Apr-06 - Looseness - Motor	The attached motor plots are displaying a large increase in the 1x parameter band. This is indicating a looseness issue for this machine. I am also seeing electrical energy across the motor due to the looseness. The amplitude levels are low at this time, but they have increase very quickly. I would recommend that the mounting bolts be checked to verify that the bolts are tight and not loose, broken, or stretched. Please continue collecting monthly data on this machine.
Watch	SH3FOSPMPB Fuel Oil Pump B	27-Apr-06 - Looseness	Please verify that the speed is correct for the machine. I am seeing an increase in looseness across this machine. It appears that the looseness has been present for a while on this machine, but the levels have increased. I am setting this problem to a watch call. I would only recommend that monthly data be collected on this machine.
Watch	SH3FWSMTRB Feed Water Pump Motor B	27-Apr-06 - Electrical defect - Motor	The attached axial plots show a large increase in impacting and electrical energy. The common cause of electrical energy is looseness in or around the motor itself. I have made this a watch call so that I can watch it in the future. No action is needed at this time except to collect monthly data on this machine.

Area: S4 Shipman Plant 4

Urgency	Equipment	Problem	Extended Description
Alarm	SH4IDFAN ID Fan	27-Apr-06 - Imbalance	The attached plots are showing an increase in the 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue. The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.

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Process Management

Predictive Maintenance Summary Report

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Watch	SH4CNDPMPB Condensate Pump B	27-Apr-06 - Looseness	The attached PIV plot is displaying low amplitude levels of looseness. The amount of vibration has increased very quickly. The peakvue data is also showing a quick increase in vibration levels. I would only recommend that monthly data be collected on this machine at this time.
Watch	SH4FWSMTRA Feed Water Pump Motor A	27-Apr-06 - Looseness - Motor	Please verify the speed of the machine. The peakvue data is showing a large increase in an electrical defect frequency. The M1V point is showing an increase in waveform impacting. I believe the root cause of the impacting and electrical energy is due to looseness. I would suggest that the machine be inspected for any loose bolts or if the foundation is cracked or broken.

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Process Management

Predictive Maintenance Detail Report

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Area **H5** **Hill Plant 5**

Equipment **H5CNDMTRA Condensate Pump Motor A**

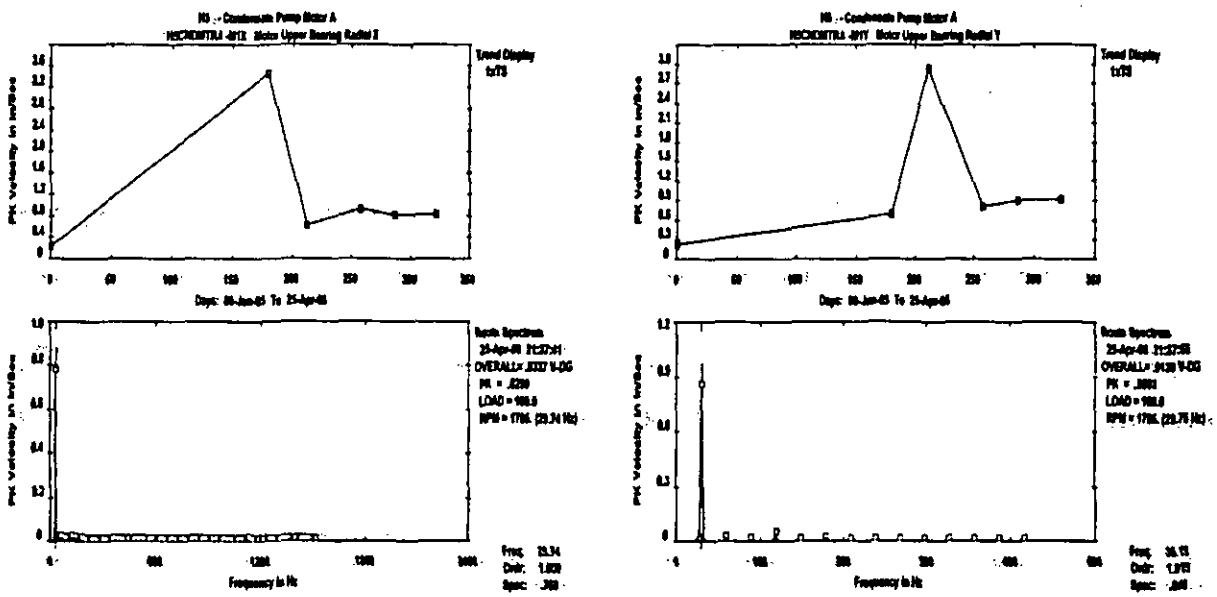
Urgency:

High Alarm

Title: 25-Apr-06 - Looseness

Explanation: The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration.

I am setting the severity of this problem to a high alarm. Please check this motor for any signs of looseness and imbalance.



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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area H5 Hill Plant 5

Equipment H5CIRCMTRA Circulating Pump Motor 5-A

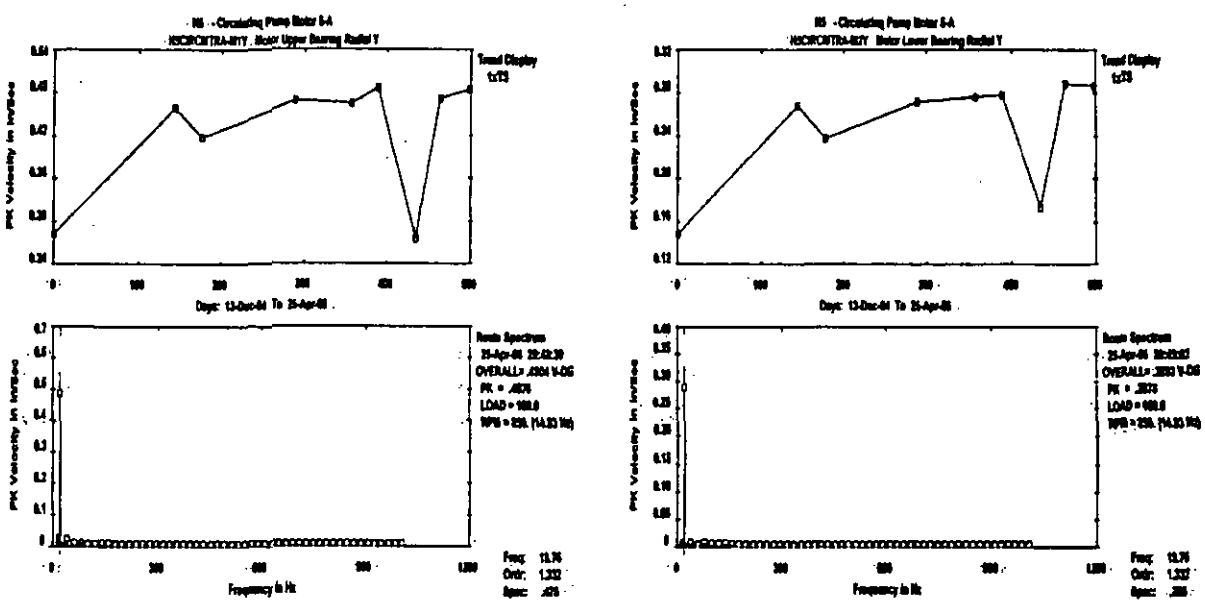
Urgency : Alarm

Title: 25-Apr-06 - Looseness

Explanation: Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine.

The trend data is indicating that the amplitude levels are highest that this machine has seen.

I would recommend that maintenance be scheduled on this machine in the next 1-2 months.



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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area H5 Hill Plant 5

Equipment H5CNDMTRB Condensate Pump Motor B

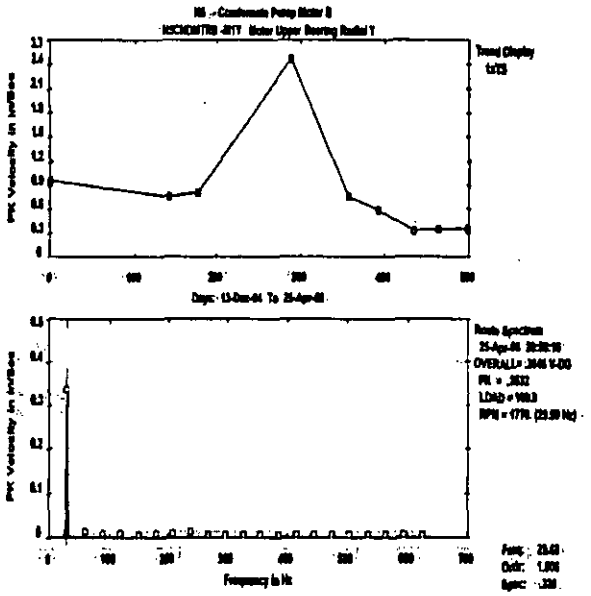
Urgency :

Alarm

Title: 25-Apr-06 - Looseness

Explanation: The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well.

I would recommend that maintenance be scheduled on this machine on the next 2-3 months.



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Predictive Maintenance Detail Report

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harpm/1

Area H5 Hill Plant 5

Equipment H5FSFWMTRB Feed Water Pump Motor 5B

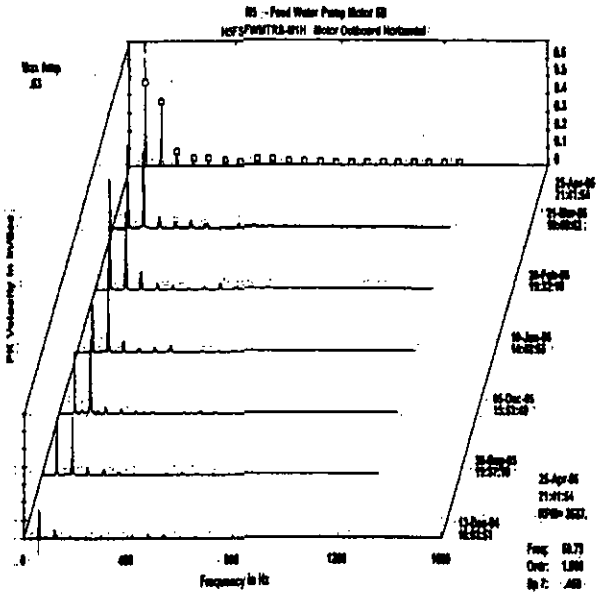
Urgency :

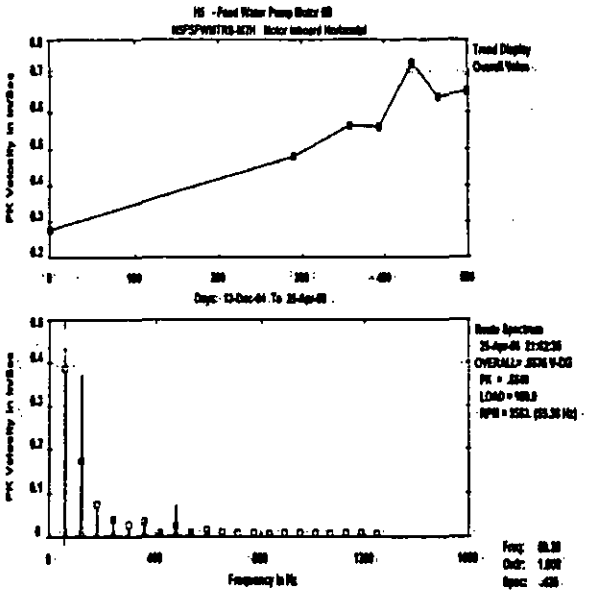
Alarm

Title: 25-Apr-06 - Looseness

Explanation: The attached plots are indicating looseness and an electrical defect on this motor. The high 2x peak is an electrical defect frequency.

I would recommend that maintenance be scheduled on this machine in the next 2-3 months to address the looseness issue. Once the looseness issue is addressed the electrical frequency should decrease.





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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area H5 Hill Plant 5

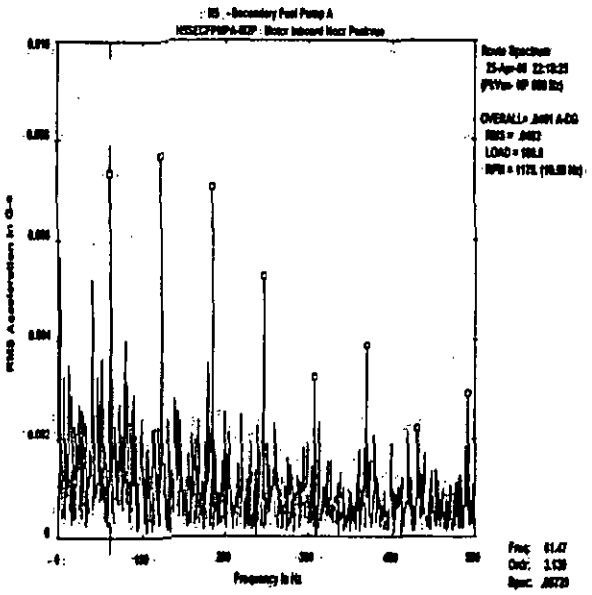
Equipment H5SECFPMPA Secondary Fuel Pump A

Urgency: Watch

Title: 25-Apr-06 - Antifriction bearing defect

Explanation: The attached peakvue is indicating what appears to be an early bearing defect. There are no bearings defined in this database. If any bearing ids are known about any of the machines please send that information to me.

I would only recommend that monthly data be collected on this machine.



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Process Management

Predictive Maintenance Detail Report

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Area H5 Hill Plant 5

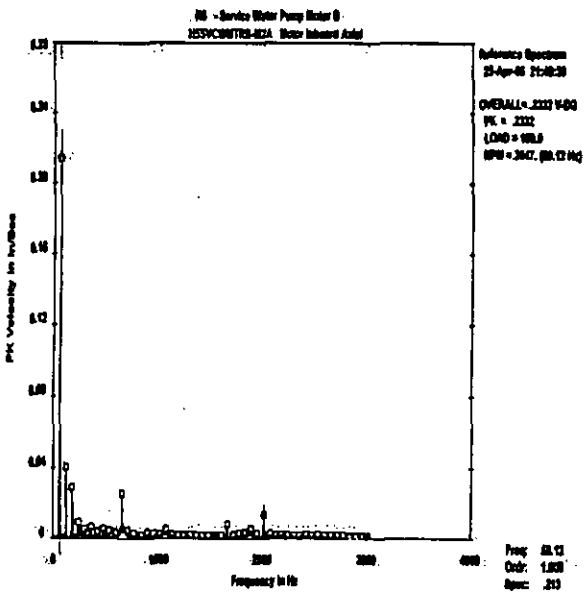
Equipment H5SVCWMTRB Service Water Pump Motor B

Urgency : Watch

Title: 25-Apr-06 - Looseness

Explanation: This is the first time that data has been collected on this machine. The attached plot is indicating looseness and an electrical issue.

I would only recommend that monthly data be collected on this machine at this time.



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Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area PUNA Puna

Equipment PUSVCFLPMP Flush Pump

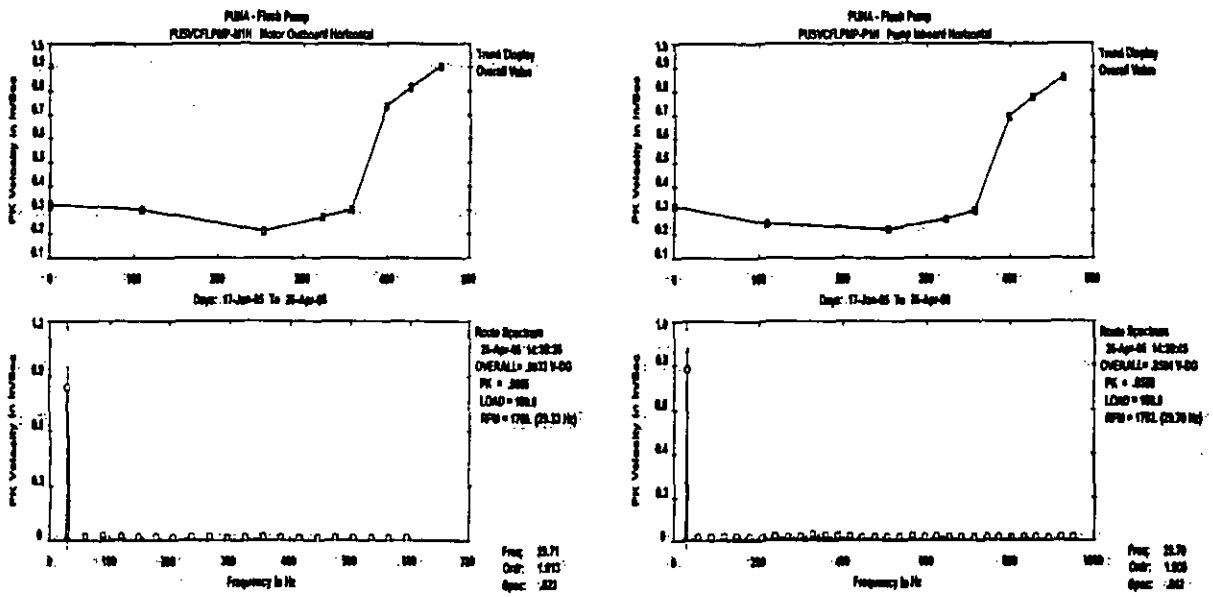
Title: 26-Apr-06 - Stuctural fatigue

Urgency:

High Alarm

Explanation: The attached plots are displaying a large increase in vibration levels, but only in the horizontal direction. The high amplitude levels are present across the entire machine. This is usually seen when a resonance or structural issue is present.

Please inspect the structure for loose feet, cracked or broken welds. The vibration levels starting increasing in February.



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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area PUNA Puna

Equipment PUSVCHPPMP HP Water Pump

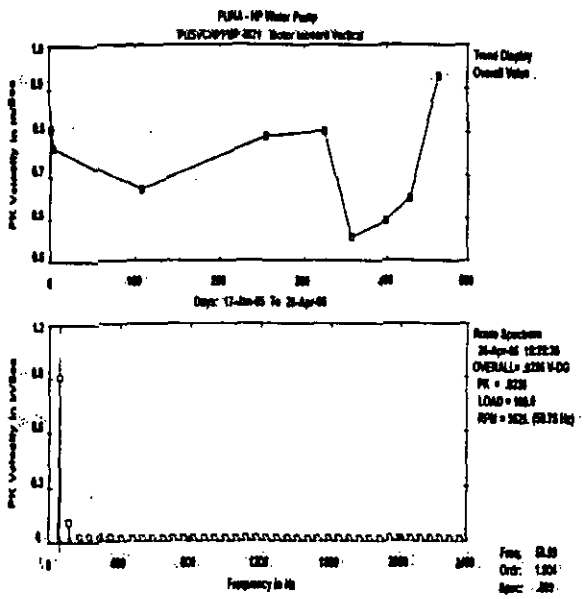
Title: 26-Apr-06 - Looseness

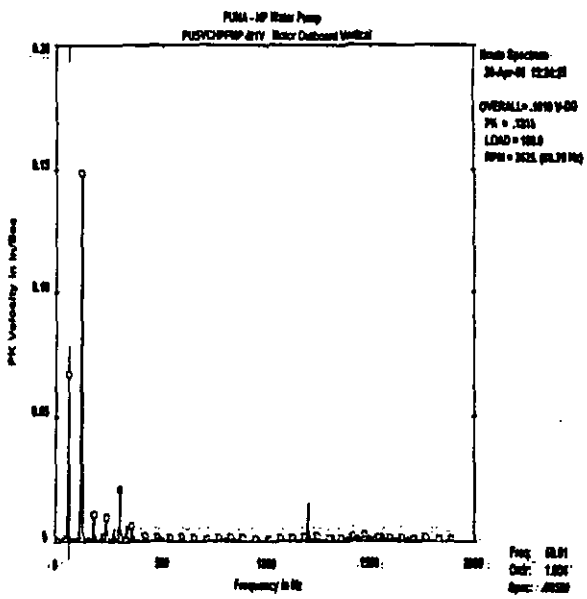
Urgency:

High Alarm

Explanation: The attached plots are showing a high level of looseness. The pump is also showing a looseness issue, but it is a lot lower.

I would recommend that the motor be checked for any signs of looseness mostly in the vertical direction.





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Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area PUNA Puna

Equipment PUSVCWPMPA Service Water Pump A

Title: 26-Apr-06 - Looseness

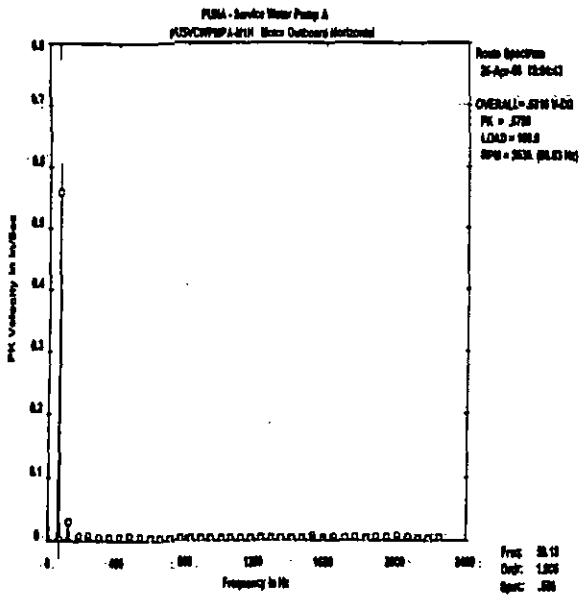
Urgency:

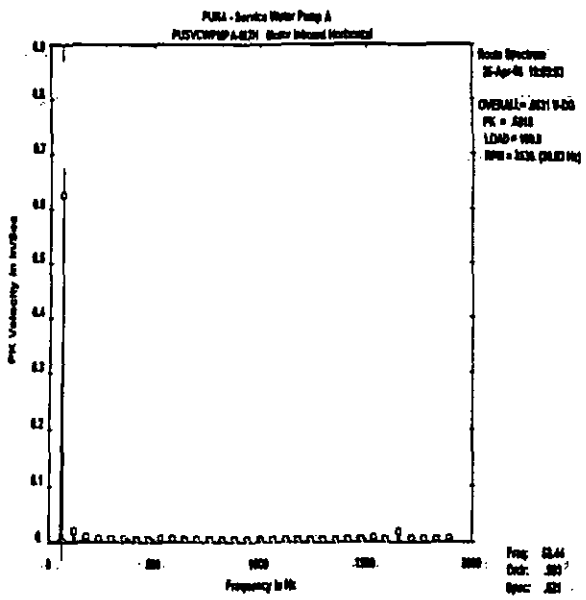
Alarm

Explanation: Data has only been collected on this machine twice. Each time there was a high 1x turning peak present. The horizontal direction is the where the highest amplitude levels are present.

It appears that an imbalance function is present on this motor. The pump is showing signs of low level looseness.

I would recommend that the pump be checked to verify that it is running on its curve. Please check the motor's mounting bolts and structure to make certain that the motor is secure.





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Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S3 Shipman Plant 3

Equipment SCAPHP-B Drip Pump B

Title: 27-Apr-06 - Imbalance - Pump

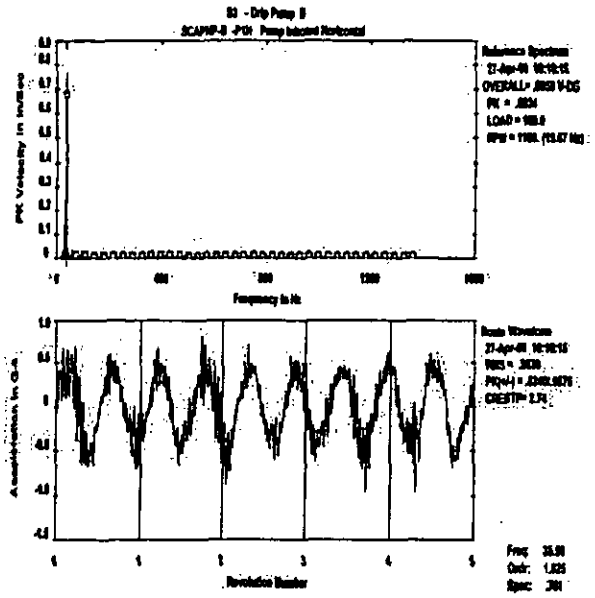
Urgency:

High Alarm

Explanation: The first thing I would suggest is that the speed for this pump be verified so that is can be set correctly in the database. The second thing I would like to do is combine all the pump points to the motor component. I do not know if this was requested as per the customer, but I will inquire to this.

The pump is showing a large 1x peak which I believe is the running speed of the pump. It appears to be an imbalance issue and this could be the source of the looseness showing across on the motor.

I would recommend that data be collected on this pump as soon as possible to verify the high levels of vibration. If the levels are still high I would suggest that maintenance be scheduled on this pump within the month to correct the imbalance issue that is currently being shown.



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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area S3 Shipman Plant 3

Equipment SH3CNDPMPB Condensate Pump B

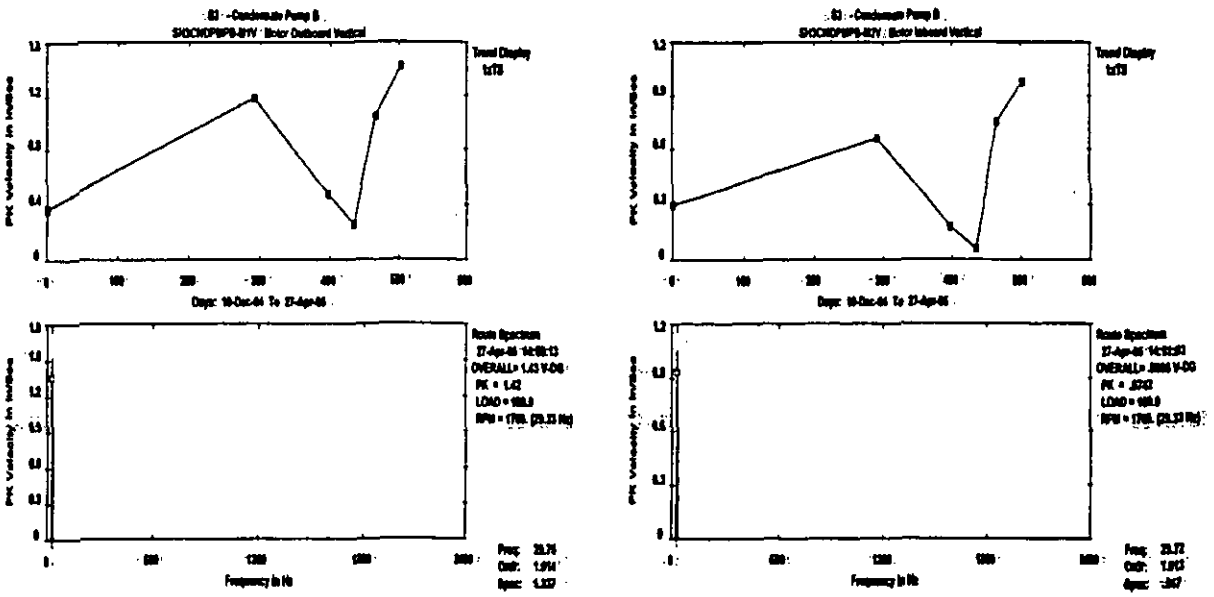
Urgency :

High Alarm

Title: 27-Apr-06 - Looseness - Motor

Explanation: The motor is showing very high levels of vibration. The past data shows a problem in the horizontal direction. The last few months have seen a large decrease in the horizontal vibration levels, but at the same time all the other points have shown a large increase.

What maintenance has been preformed on this machine? The 1x parameter is usually either an imbalance or a looseness issue. I would strongly recommend that maintenance be scheduled on this machine within the month to check for looseness and to make certain the motor is balanced.



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Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S3 Shipman Plant 3

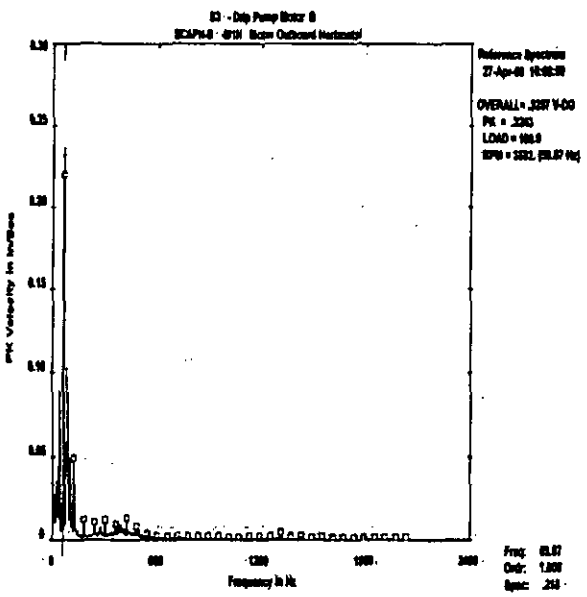
Equipment SCAPH-B Drip Pump Motor B

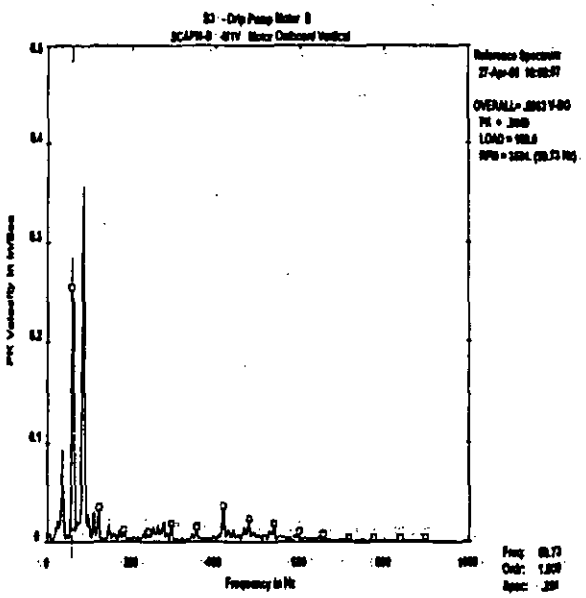
Urgency: Alarm

Title: 27-Apr-06 - Looseness - Motor

Explanation: This is the first time that data has been collected on this machine. The attached plots are indicating a looseness issue for the motor. I am also seeing other peaks that are from an unknown source at this time.

I would recommend that the motor be inspected for any looseness causes and to collect monthly data on this machine.





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Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S3 Shipman Plant 3

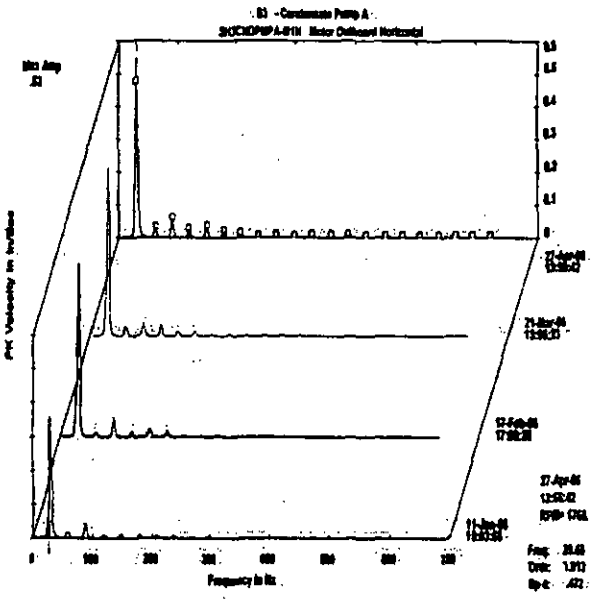
Equipment SH3CNDPMPA Condensate Pump A

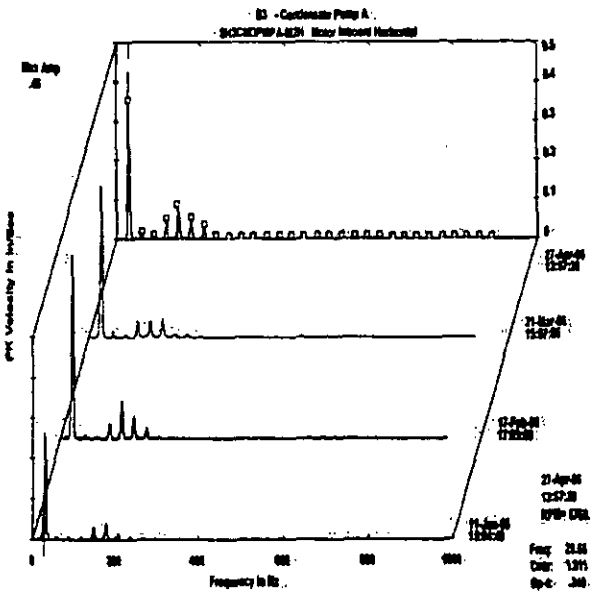
Urgency: Alarm

Title: 27-Apr-06 - Looseness - Motor

Explanation: The attached plots are displaying a looseness issue on the motor. The amplitude levels are considered high, but they have been present since data was first collected on this machine.

I feel that the .6 in/sec is too high of an amplitude level for this machine. I would recommend that the structure and bolts holding the motor be inspected for any fatigue or looseness. Please continue collecting monthly data on this machine.





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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area S3 Shipman Plant 3

Equipment SH3FWSMTRA Feed Water Pump Motor A

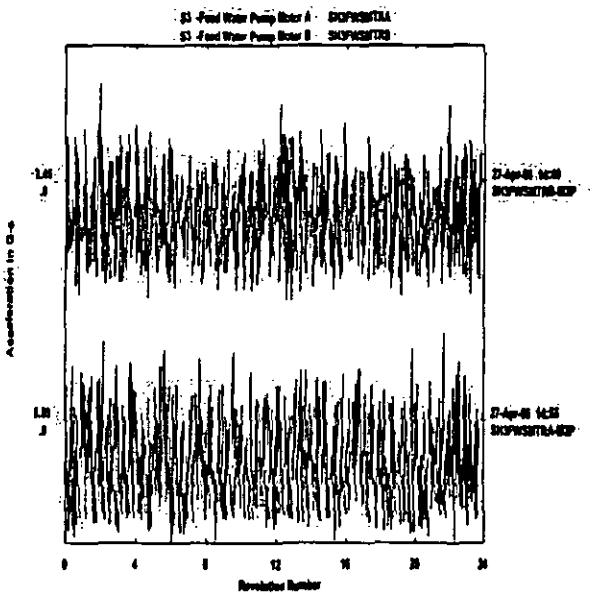
Urgency: Alarm

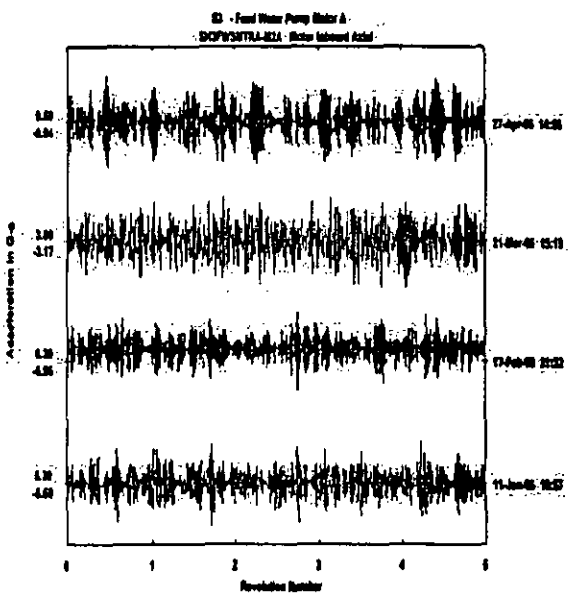
Title: 27-Apr-06 - Antifriction bearing defect - Motor

Explanation: The attached plots are displaying high levels of impacting. When comparing FWP A to FWP B the high levels of impacting are not present. I do not think the vibration is originating for the process of this machine.

I believe there is a bearing defect on the inboard side of this motor as this is where all the high impacting is being displayed.

If any of the bearings ids are known for this motor or any other motors please email that information to me. I would recommend that maintenance be scheduled on this motor in the next 2-3 months to have the bearings inspected and replaced if needed.





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Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area **S3** **Shipman Plant 3**

Equipment **SH3BCWPMP Bearing Cooling Water Pump 3**

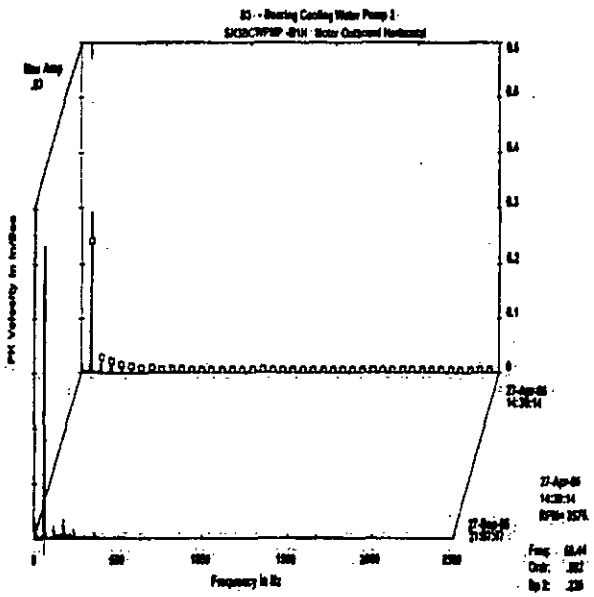
Urgency:

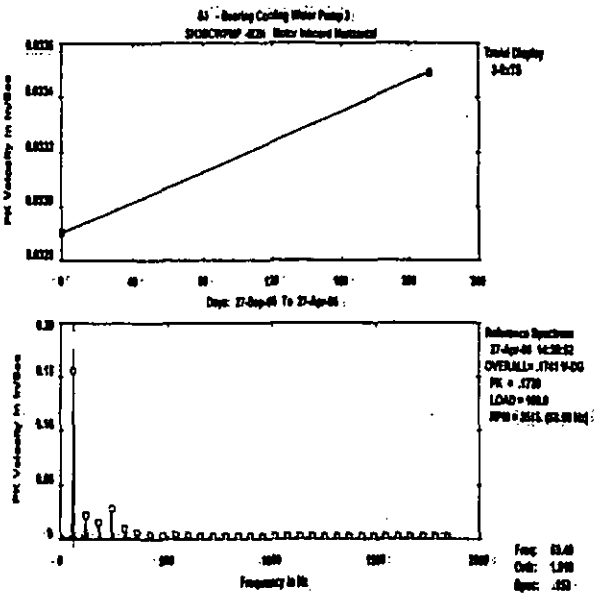
Watch

Title: 27-Apr-06 - Looseness - Motor

Explanation: The motor is indicating a looseness issue as shown by the harmonics of turning speed. The amplitude levels have decreased slightly, but I would think the levels are still high for this machine.

Was any maintenance preformed on the motor since September 2005? Please continue collecting monthly data for this machine.





EMERSON
Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3CIRMTRA Circulating Pump Motor A

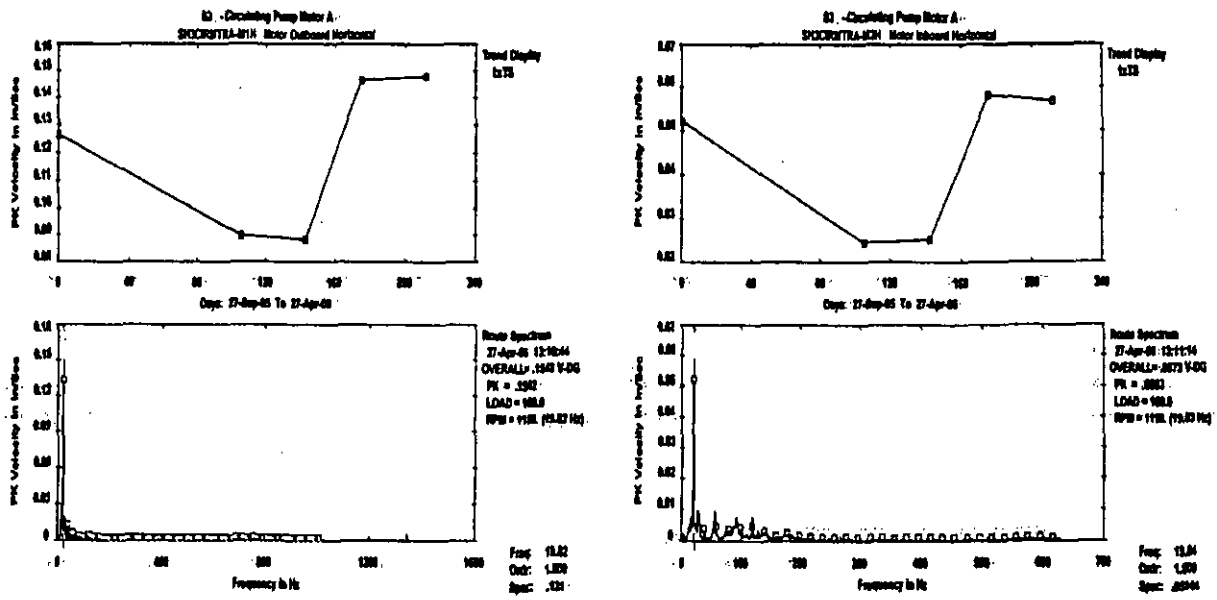
Urgency: Watch

Title: 27-Apr-06 - Looseness - Motor

Explanation: The attached motor plots are displaying a large increase in the 1x parameter band. This is indicating a looseness issue for this machine. I am also seeing electrical energy across the motor due to the looseness.

The amplitude levels are low at this time, but they have increase very quickly.

I would recommend that the mounting bolts be checked to verify that the bolts are tight and not loose, broken, or stretched. Please continue collecting monthly data on this machine.



EMERSON.
Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3FOSPMPB Fuel Oil Pump B

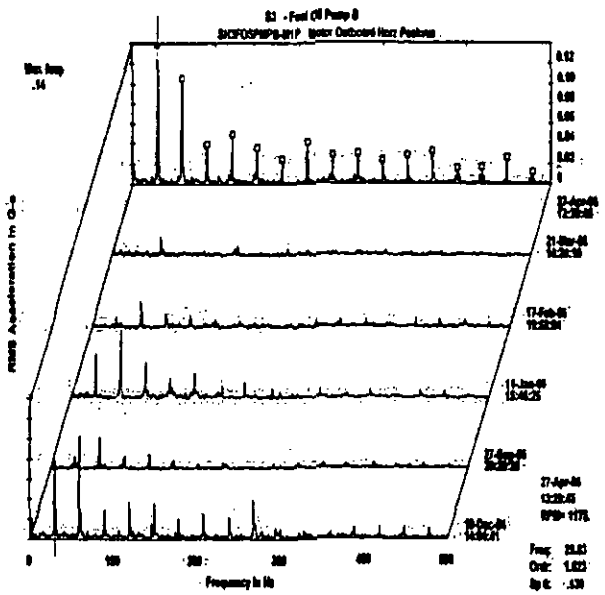
Urgency :

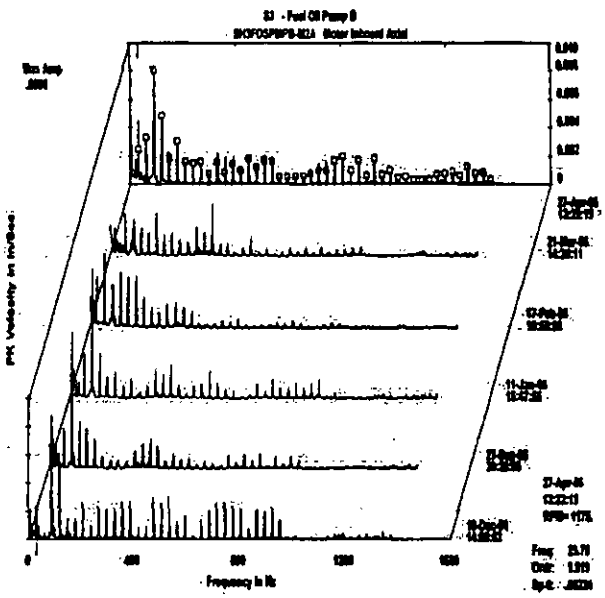
Watch

Title: 27-Apr-06 - Looseness

Explanation: Please verify that the speed is correct for the machine. I am seeing an increase in looseness across this machine. It appears that the looseness has been present for a while on this machine, but the levels have increased.

I am setting this problem to a watch call. I would only recommend that monthly data be collected on this machine.





EMERSON
Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S3 Shipman Plant 3

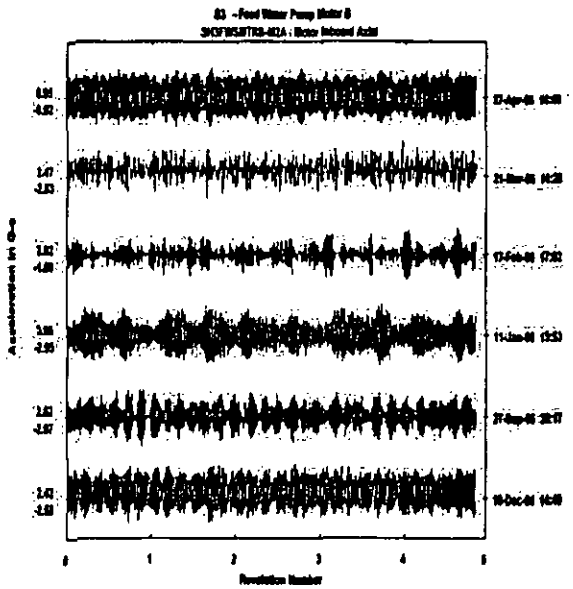
Equipment SH3FWSMTRB Feed Water Pump Motor B

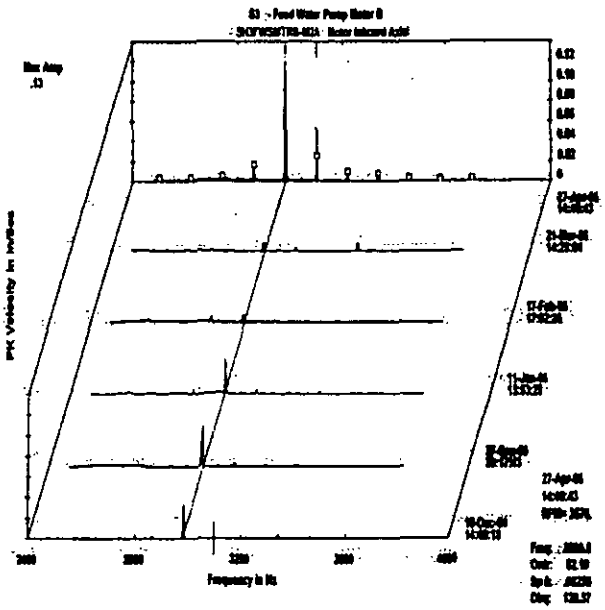
Urgency: Watch

Title: 27-Apr-06 - Electrical defect - Motor

Explanation: The attached axial plots show a large increase in impacting and electrical energy. The common cause of electrical energy is looseness in or around the motor itself.

I have made this a watch call so that I can watch it in the future. No action is needed at this time except to collect monthly data on this machine.





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Process Management

Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4IDFAN ID Fan

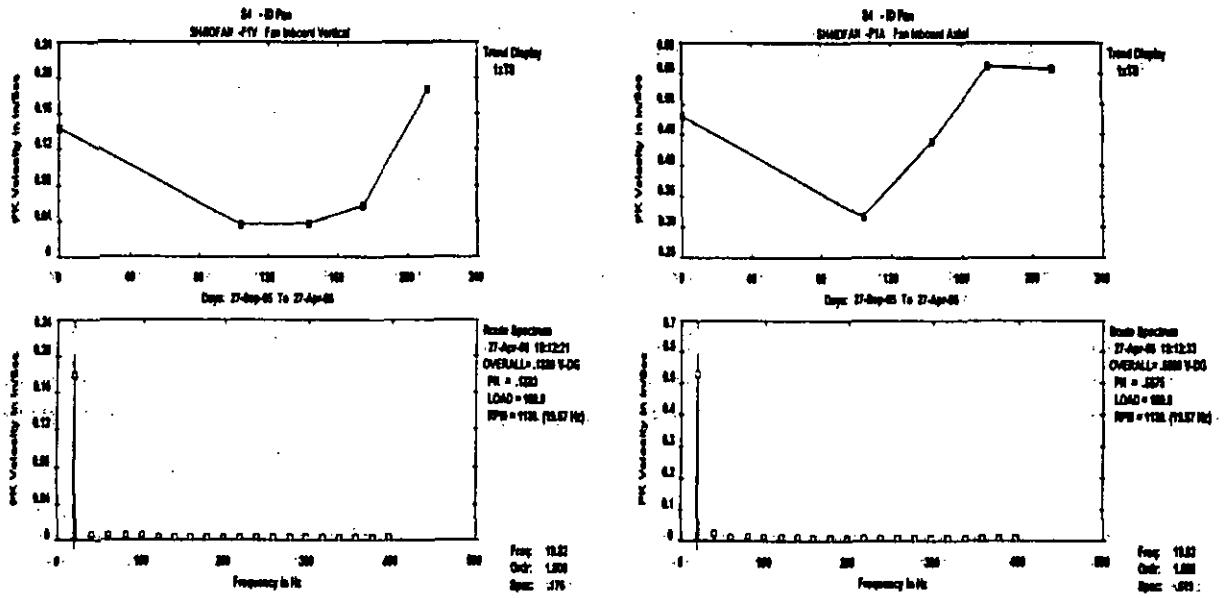
Title: 27-Apr-06 - Imbalance

Urgency:

Alarm

Explanation: The attached plots are showing an increase in the 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue.

The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.



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Predictive Maintenance Detail Report

05/15/06
harpm/1

Area **S4** **Shipman Plant 4**

Equipment **SH4CNDPMPB Condensate Pump B**

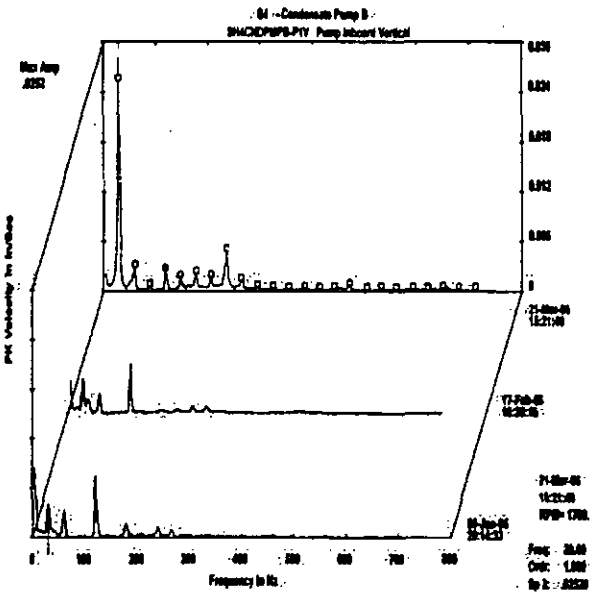
Urgency:

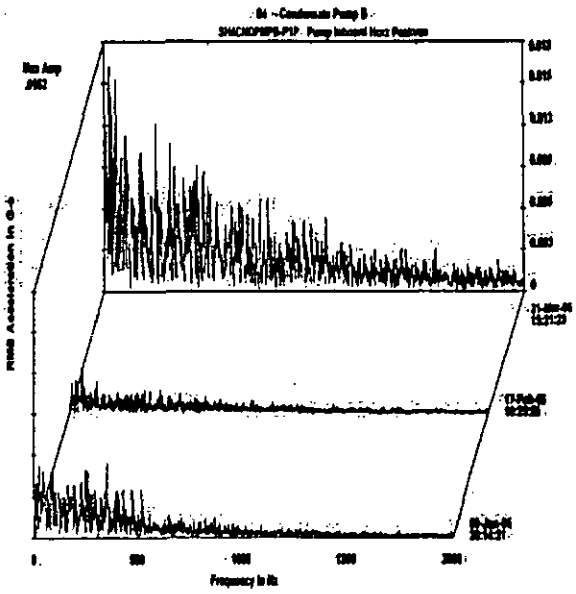
Watch

Title: 27-Apr-06 - Looseness

Explanation: The attached PIV plot is displaying low amplitude levels of looseness. The amount of vibration has increased very quickly. The peakvue data is also showing a quick increase in vibration levels.

I would only recommend that monthly data be collected on this machine at this time.





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Predictive Maintenance Detail Report

05/15/06
harpm/1

Area S4 Shipman Plant 4

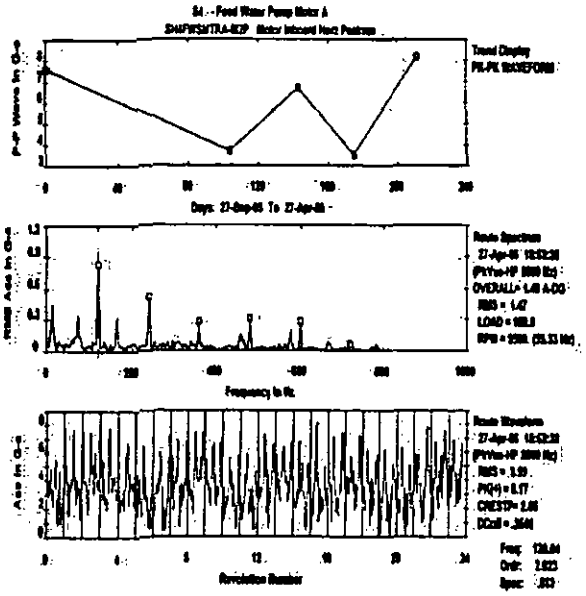
Equipment SH4FWSMTRA Feed Water Pump Motor A

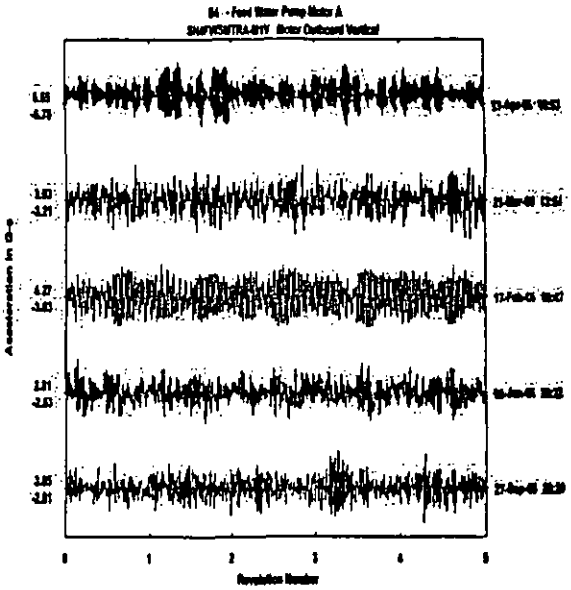
Urgency: Watch

Title: 27-Apr-06 - Looseness - Motor

Explanation: Please verify the speed of the machine. The peakvue data is showing a large increase in an electrical defect frequency. The M1V point is showing an increase in waveform impacting. I believe the root cause of the impacting and electrical energy is due to looseness.

I would suggest that the machine be inspected for any loose bolts or if the foundation is cracked or broken.





EMERSON
Process Management

Mickey Harp
Analyst, Analysis Services

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June 28, 2006

Mr. Andy Ho
Mr. Craig Yamamoto
Mr. Norman Verbanic
Ms. Lisa Dangelmaier
Mr. Norman Uchida
Hawaiian Electric and Light Co, Inc
54 Halekauila Street
Hilo, HI 96721-1027

Gentlemen,

Vibration data was collected at your facility on June 21-23, 2006. Analysis was performed on that equipment on June 28, 2006. The attached report is intended to inform you of any significant machinery problems identified during this analysis.

CSI is committed to providing World Class Predictive Maintenance technologies and ensuring customer satisfaction. If you have any questions concerning any of the information contained in this report please feel free to contact me. I would like to thank you for allowing CSI Services to assist you in your Reliability Based Maintenance efforts.

If you have any questions or concerns please feel free to contact me at anytime.

Mickey Harp,
Analyst, Analysis Services

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Equipment Description	Equipment				
Shipman Plant 3					
Turbine #3	Shipman 3	OK	OK	OK	
Circulating Pump Motor A	SH3CIRMTRA	[illegible]	[illegible]	[illegible]	Continued Call - Looseness
Circulating Pump A	SH3CIRPMPA	NT	NT	NT	
Cirulating Pump Motor B	SH3CIRMTRB	OK	OK	OK	
Circulating Pump B	SH3CIRPMPB	NT	NT	NT	
Condensate Pump A	SH3CNDPMPA	3	3	3	Continued Call - Looseness
Condensate Pump B	SH3CNDPMPB				
FD/ID Fan Motor	SH3FDIDMTR	OK	OK	OK	
ID Fan	SH3IDFAN	OK	OK	OK	
FD Fan	SH3FDFAN	OK	OK	OK	
Air Preheater Motor A	SH3APHMTRA	OK	OK	OK	
Air Preheater Motor B	SH3APHMTRB	OK	OK	OK	
Evaporator Pump A	SH3EVPPMPA	[illegible]	[illegible]	[illegible]	
Evaporator Pump B	SH3EVPPMPB	[illegible]	[illegible]	[illegible]	
Feed Water Pump Motor A	SH3FWSMTRA	3	3	3	Continued Call - Bearing Defect
Feed Water Pump A	SH3FWSPMPA	OK	NT	NT	
Feed Water Pump Motor B	SH3FWSMTRB	[illegible]	[illegible]	[illegible]	Continued Call - Electrical Energy
Feed Water Pump B	SH3FWSPMPB	OK	OK	OK	
Drip Pump Motor A	SCAPH-A	NT	NT	NT	
Drip Pump A	SCAPHP-A	NT	NT	NT	
Drip Pump Motor B	SCAPH-B	3	NT	3	Continued Call - Looseness
Drip Pump B	SCAPHP-B	[illegible]	NT	NT	
Fuel Oil Pump A	SH3FOSPMPA	[illegible]	[illegible]	[illegible]	
Fuel Oil Pump B	SH3FOSPMPB	[illegible]	[illegible]	[illegible]	
Fuel Oil CD Pump	SH3FOCDPMP	OK	OK	OK	
Service Water Pump A	SH3SVCPMPA	OK	OK	OK	
Service Water Pump B	SH3SVCPMPB	OK	OK	OK	
Bearing Cooling Water Pump 3	SH3BCWPMP	[illegible]	3	[illegible]	Continued Call - Looseness
#1 Joy Air Compressor Motor	#1SHAIRJOY	OK	OK	[illegible]	Axial point is high
#1Joy Air Compressor	SHAIRJOY#1	OK	OK	OK	
#2 Joy Air Compressor Motor	#2SHAIRJOY	OK	OK	OK	
#2Joy Air Compressor	SHAIRJOY#2	OK	OK	OK	
Circ Water Pump Motor #1	SHCIRWMTR1	NT	[illegible]	NT	
Circulating Water Pump #1	SHCIRWPMP1	NT	NT	NT	
Shipman Plant 4					
Turbine #4	Shipman 4	[illegible]	OK	OK	
Circulating Pump Motor A	SH4CIRMTRA	OK	OK	OK	
Circulating Pump A	SH4CIRPMPA	NT	NT	OK	
Cirulating Pump Motor B	SH4CIRMTRB	OK	OK	OK	
Circulating Pump B	SH4CIRPMPB	NT	NT	OK	
Condensate Pump A	SH4CNDPMPA	OK	[illegible]	[illegible]	Continued Call - Misalignment
Condensate Pump B	SH4CNDPMPB	[illegible]	OK	OK	
FD/ID Fan Motor	SH4FDIDMTR	OK	OK	OK	
ID Fan	SH4IDFAN	3	3	3	Continued Call - Imbalance
FD Fan	SH4FDFAN	OK	OK	OK	
Air Preheater Motor A	SH4APHMTRA	OK	NT	NT	
Air Preheater Motor B	SH4APHMTRB	OK	OK	OK	
Evaporator Pump A	SH4EVPPMPA	NT	NT	NT	
Evaporator Pump B	SH4EVPPMPB	NT	NT	NT	
Feed Water Pump Motor A	SH4FWSMTRA	[illegible]	OK	OK	
Feed Water Pump A	SH4FWSPMPA	NT	NT	OK	
Feed Water Pump Motor B	SH4FWSMTRB	NT	OK	OK	
Feed Water Pump B	SH4FWSPMPB	NT	OK	OK	
Drip Pump Motor A	SCAPH-A	NT	NT	NT	
Drip Pump A	SCAPHP-A	NT	NT	NT	
Drip Pump Motor B	SCAPH-B	NT	NT	NT	
Drip Pump B	SCAPHP-B	NT	NT	NT	
Fuel Oil Pump A	SH4FOSPMPA	OK	NT	NT	
Fuel Oil Pump B	SH4FOSPMPB	OK	OK	OK	
Fuel Oil CD Pump	SH4FOCDPMP	OK	OK	OK	
Service Water Pump A	SH4SVCPMPA	OK	OK	OK	
Service Water Pump B	SH4SVCPMPB	OK	OK	OK	
Bearing Cooling Water Pump 4	SH4BCWPMP	OK	3	[illegible]	
Water Treatment Sump Pump	SHWTSUMPMP	NT	NT	NT	

Hill Plant 5					
H5 Turbine	H5 Turb	NT	NT	NT	
H5A APH Drive Motor	H5A APHMTR	NT	NT	NT	
H5A APH Gearbox	H5A APHGBX	NT	NT	NT	
Circulating Pump Motor 5-A	H5CIRCMTRA	3	NT	3	Continued Call - Looseness
Circulating Pump 5-A	H5CIRCPMPA	NT	NT	NT	
Circulating Pump Motor 5-B	H5CIRCMTRB	OK	NT	OK	
Circulating Pump 5-B	H5CIRCPMPB	NT	NT	NT	
Circulating Pump Motor 5-C	H5CIRCMTRC	OK	NT	OK	
Circulating Pump 5-C	H5CIRCPMPC	NT	NT	NT	
Service Air Compressor Motor	H5CASACMTR	OK	NT	NT	
Service Air Compressor	H5AIRSAC	OK	NT	NT	
Inst Air Compressor Motor	H5CAIACMTR	OK	NT	NT	
Instrument Air Compressor	H5AIRIAC	OK	NT	NT	
Condensate Pump Motor A	H5CNDMTRA	[illegible]	NT	3	Continued Call - Looseness and Imbalance
Condensate Pump A	H5CNDPMPA	NT	NT	NT	
Condensate Pump Motor B	H5CNDMTRB	3	NT	[illegible]	
Condensate Pump B	H5CNDPMPB	NT	NT	NT	
Condensate Transfer Pump Mtr	H5CNDTPMTR	OK	NT	NT	
Condensate Transfer Pump	H5CNDTFPMP	OK	NT	NT	
FD Fan Motor	H5DFFDMTR	OK	NT	OK	
FD Fan	H5DFFDFAN	OK	NT	OK	
Evaporator Pump	H5EVAPPMP	NT	NT	NT	
Feed Water Pump Motor 5A	H5FSFWMTRA	OK	NT	OK	
Feed Water Pump 5A	H5FSFWPMPA	OK	NT	OK	
Feed Water Pump Motor 5B	H5FSFWMTRB	3	NT	OK	
Feed Water Pump 5B	H5FSFWPMPB	OK	NT	OK	
Secondary Fuel Pump A	H5SECFPMPA	[illegible]	NT	NT	
Secondary Fuel Pump B	H5SECFPMPB	NT	NT	OK	
Service Water Pump Motor A	H5SVCWMTRA	OK	NT	NT	
Service Water Pump A	H5SVCWPMPA	OK	NT	NT	
Service Water Pump Motor B	H5SVCWMTRB	[illegible]	NT	NT	
Service Water Pump B	H5SVCWPMPB	OK	NT	NT	
NR5 Primary Fuel Oil Pump	HFOPRIPMPB	OK	NT	NT	
NR5 Primary Fuel Oil Pump A	HFOPRIPMPA	OK	NT	NT	
NR6 Primary Fuel Oil Pump B	HFOPRIPMPB	NT	NT	NT	
Aux Stm Lube Oil Pmp Turbine	H5ASLOPTRB	NT	NT	NT	
Turning Gear Oil Pump	H5TGOILPMP	NT	NT	NT	
#5 Diesel Oil Pump Motor	H5DFSDOMTR	NT	NT	NT	
#5 Diesel Oil Pump	H5DFSDOPMP	NT	NT	NT	
Hill Plant 6					
H6 Turbine	H6 TRB	NT	NT	NT	
H6APH Drive Motor	H6 APH MTR	NT	NT	NT	
H6 APH Gearbox	H6 APH GBX	NT	NT	NT	
Circulating Pump Motor 6-A	H6CIRCMTRA	OK	OK	OK	
Circulating Pump 6-A	H6CIRCPMPA	NT	NT	NT	
Circulating Pump Motor 6-B	H6CIRCMTRB	NT	NT	NT	
Circulating Pump 6-B	H6CIRCPMPB	NT	NT	NT	
Circulating Pump Motor 6-C	H6CIRCMTRC	OK	OK	OK	
Circulating Pump 6-C	H6CIRCPMPC	NT	NT	NT	
Circulating Pump Motor 6-D	H6CIRCMTRD	OK	OK	OK	
Circulating Pump 6-D	H6CIRCPMPD	NT	NT	NT	
Service Air Compressor Motor	H6AIRSAMTR	OK	OK	OK	
Service Air Compressor	H6AIRSAC	OK	OK	OK	
Instrument Air Compresr Motor	H6AIRIAMTR	OK	OK	OK	
Instrument Air Compressor	H6AIRIAC	OK	OK	OK	
IR Air Compressor Motor	H6AIRIRMTR	NT	NT	NT	
IR Air Compressor	H6AIRIRAC	NT	NT	NT	
IR Air Compresor Clng Fan	H6AIRIRCF	NT	NT	NT	
LP Heater Drip Pump	H6LHTRDPMP	OK	OK	OK	
Condensate Pump Motor A	H6CNDMTRA	OK	OK	OK	
Condensate Pump A	H6CNDPMPA	NT	NT	NT	
Condensate Pump Motor B	H6CNDMTRB	OK	OK	OK	
Condensate Pump B	H6CNDPMPB	NT	NT	NT	
FD Fan High Speed Motor	H6DFDHSMTR	OK	OK	OK	
FD Fan	H6FDFAN	OK	OK	OK	
FD Fan Low Speed Motor	H6DFDLSMTR	OK	OK	OK	
Evaporator Pump A	H6EVPPMPA	OK	OK	OK	
Evaporator Pump B	H6EVPPMPB	OK	OK	OK	
Feed Water Pump Mtr A	H6FWBFMTRA	OK	OK	OK	
Feed Water Pump 6A	H6FWBFPMPA	OK	OK	OK	
Feed Water Pump Mtr B	H6FWBFMTRB	OK	OK	OK	
Feed Water Pump 6B	H6FWBFPMPB	OK	OK	OK	
Secondary Fuel Oil Pump A	H6SFOPMPA	OK	OK	OK	
Secondary Fuel Oil Pump B	H6SFOPMPB	OK	NT	3	Looseness and High Impacting
Rebir Cond Drain Tank Pump A	H6CNDDTKPA	OK	NT	NT	
Rebir Cond Drain Tank Pump B	H6CNDDTKPB	OK	3	[illegible]	
Service Water Pump A	H6SVCWPMPA	OK	OK	OK	
Service Water Pump B	H6SVCWPMPB	OK	OK	OK	
Booster Pump	H6SVCBPMP	NT	NT	NT	
Gland Seal Pump	H6GLSLPMP	OK	NT	NT	
DC Lube Oil Pump	H6DCLOPMP	OK	OK	OK	
Turning Gear Lube Oil Pump	H6TGLOPMP	NT	OK	OK	
Aux Lube Oil Pump	H6SALOPMP	OK	OK	OK	
Diesel Oil Pump Motor A	H6DFDOMTRA	OK	OK	NT	
Diesel Oil Pump A	H6DFDOPMPA	OK	OK	NT	
Diesel Oil Pump Motor B	H6DFDOMTRB	OK	OK	NT	
Diesel Oil Pump B	H6DFDOPMPB	OK	OK	NT	

PUNA					
Puna Turbine	Turbine	NT	NT	NT	
Circ Water Pump Motor A	PUCWPMTRA	OK	OK	OK	
Circ Water Pump Motor B	PUCWPMTRB	OK	OK	OK	
Circ Water Pump Motor C	PUCWPMTRC	OK	OK	OK	
Plant Air Compressor Motor A	PUAIRMTRA	NT	OK	OK	
Plant Air Compressor A	PUAIRCOMPA	NT	OK	OK	
Plant Air Compressor Motor B	PUAIRMTRB	OK	OK	OK	
Plant Air Compressor B	PUAIRCOMPB	OK	OK	OK	
Cond Drain Pmp to MU Tank	PUCDNTKPMP	NT	NT	OK	
Cond Make-up Pump Motor A	PUCDMUMTRA	NT	3	3	Continued Call - Electrical Defect
Cond Make-up Pump A	PUCDMUPMPA	NT	OK	OK	
Cond Make-up Pump Motor B	PUCDMUMTRB	OK	OK	OK	
Cond Make-up Pump B	PUCDMUPMPB	OK	OK	OK	
Condensate Pump Motor A	PUCONDMTRA	OK	OK	OK	
Condensate Pump A	PUCONDPMPA	OK	OK	OK	
Condensate Pump Motor B	PUCONDMTRB	OK	OK	OK	
Condensate Pump B	PUCONDPMPB	OK	NT	OK	
Diesel Oil Pump A	PUDFOPMPA	OK	OK	OK	
Diesel Oil Pump B	PUDFOPMPB	NT	OK	OK	
ID High Speed Motor	PUIDHSMTR	OK	OK	OK	
ID Fan	PUDFIDFAN	OK	OK	OK	
ID Low Speed Motor	PUIDLSMTR	OK	OK	OK	
FD High Speed Motor	PUFDHSMTR	OK	OK	OK	
FD Fan	PUDFFDFAN	OK	OK	OK	
FD Low Speed Motor	PUFDLSMTR	OK	OK	OK	
Feed Water Pump Motor A	PUFSFWMTRA	OK	OK	OK	
Feed Water Pump A	PUFSFWPMPA	OK	OK	OK	
Feed Water Pump Motor B	PUFSFWMTRB	OK	OK	OK	
Feed Water Pump B	PUFSFWPMPB	OK	OK	OK	
Fuel Oil Transfer Pump	PUFOFWOPMP	OK	NT	OK	
Fuel Oil Unloading Pump	PUFOSULPMP	NT	NT	NT	
Fuel Oil Pump A	PUFOFOPMPA	OK	OK	OK	
Fuel Oil Pump B	PUFOFOPMPB	NT	OK	OK	
DC Bearing Oil Pump	PUDCBRGPMP	OK	NT	OK	
Vapor Extraction Pump	PUVPREXPMP	OK	OK	OK	
Lube Oil Pump A	PULOSPMPA	OK	OK	OK	
Lube Oil Pump B	PULOSPMPB	OK	OK	OK	
Service Water Pump A	PUSVCWPMPA	3	NT	NT	
Service Water Pump B	PUSVCWPMPB	OK	NT	NT	
HP Water Pump	PUSVCHPPMP		3	OK	
Flush Pump	PUSVCFLPMP			3	Continued Call - Resonace or Structure Fatigue
County Water Papaya Pump A	PUSCCWPMPA	OK	OK	OK	
County Water Papaya Pump B	PUSCCWPMPB	OK	OK	OK	
Hydraulic Pump Motor A	PUHYDPMTRA	OK	OK	OK	
Hydraulic Pump A	PUHYDPMPA	OK	OK	OK	
Hydraulic Pump Motor B	PUHYDPMTRB	OK	OK	OK	
Hydraulic Pump B	PUHYDPMPAB	OK	OK	OK	
Sump Pump	PUWTSMPPMP	NT	NT	NT	
Gland Exhaust Pump	PUTGLESPMP	OK	OK	OK	

Condition Legend:

Priority 1	Emergency Situation	
Priority 2	High Alarm	
Priority 3	Alarm	3
Priority 4	Watch	4
Priority 5	Discussion Needed	5
Not Running	Scheduled for test but not in operation	
Not Tested	Not Tested this survey	NT
Machine OK	Condition is acceptable for operation	OK

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Predictive Maintenance Summary Report

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Area: H5 Hill Plant 5

Urgency	Equipment	Problem	Extended Description
High Alarm	H5CNDMTRB Condensate Pump Motor B	23-Jun-06 - Looseness	Continued Call: The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well. I would recommend that maintenance be scheduled on this machine on the next 1-2 months.
Alarm	H5CIRCMTRA Circulating Pump Motor 5-A	21-Jun-06 - Looseness	Continued Call: Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine. The trend data is indicating that the amplitude levels are highest that this machine has seen. I would recommend that maintenance be scheduled on this machine in the next 1-2 months.
Alarm	H5CNDMTRA Condensate Pump Motor A	23-Jun-06 - Imbalance	Continued Call: The amplitude levels have decreased on this machine. I have lowered the severity of this problem to an alarm. I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be checked for any internal looseness as well as any internal imbalance.

Area: H6 Hill Plant 6

Urgency	Equipment	Problem	Extended Description
High Alarm	H6CNDDTKPB Reblr Cond Drain Tank Pump B	21-Jun-06 - Looseness	Continued Call: The 1x peak has increased during June's data collection. I have raised the severity of this problem due to the higher vibration levels. The high 1x peak is most likely due to an internal looseness or imbalance issue on this motor. I have seen many looseness and imbalance issues on the motor in this database. Do a lot of the motors have to be sent out for internal balancing and if so is it known why the motors are becoming imbalanced?
Alarm	H6SFOPMPB Secondary Fuel Oil Pump B	23-Jun-06 - Looseness	The attached peakvue plots are showing high levels of impacting and looseness. This could be related to the process that the pump is running. I would recommend that monthly data be collected on this machine.

Area: PUNA Puna

Urgency	Equipment	Problem	Extended Description

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Predictive Maintenance Summary Report

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Alarm	PUCDMUMTRA Cond Make-up Pump Motor A	22-Jun-06 - Electrical defect	Continued Call: The attached plots are showing a high 2x turning speed peak at ~120 Hz. This is most likely due to an electrical issue. The motor us running very close to 60 Hz which of course shows to 2x peak around an electrical defect frequency. I would to have the power cut to this motor while the 2130 is in monitor mode collecting data. If the large 2x peak disappears quickly when the power is turned off then it is an electrical issue. If the peak remains and slowly goes down then it is a misalignment issue. The motor is also indicating signs of imbalance which could explain the electrical energy that is being displayed. I would recommend that maintenance be scheduled on this machine in the next 2-3 months.
Alarm	PUSVCFLPMP Flush Pump	22-Jun-06 - Stuctural fatigue	Continued Call: The attached plots are showing a decrease in the vibration levels for this machine. Was any maintenance preformed on this machine? The amplitude levels are still high, but I have lowered the severity of this problem to an alarm call. Please let me know if any maintenance was preformed on this machine.

Area: S3 Shipman Plant 3

Urgency	Equipment	Problem	Extended Description
High Alarm	SH3CNDPMPB Condensate Pump B	22-Jun-06 - Looseness	Continued Call: The motor and pump are showing very high levels of vibration. The past data shows a problem in the horizontal direction. The 1x parameter is usually either an imbalance or a looseness issue. I would strongly recommend that maintenance be scheduled on this machine within the month to check for looseness and to make certain the motor is balanced.
Alarm	SCAPH-B Drip Pump Motor B	22-Jun-06 - Looseness	Continued Call: Please verify that the speed on this machine is correct. I am seeing a large sub synchronous peak at ~2072 RPM. Is this machine directly coupled? The 1x peak is still present indicating a looseness issue. The amplitude levels have increased during June's data collection. I would recommend that the motor be inspected for any signs of looseness.
Alarm	SH3CNDPMPA Condensate Pump A	22-Jun-06 - Looseness - Motor	Continued Call: The attached plots are displaying a looseness issue on the motor. The amplitude levels are considered high, but they have been present since data was first collected on this machine. I feel that the .5 in/sec is too high of an amplitude level for this machine. I would recommend that the structure and bolts holding the motor be inspected for any fatigue or looseness. Please continue collecting monthly data on this machine.

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Predictive Maintenance Summary Report

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Alarm	SH3FWSMTRA Feed Water Pump Motor A	22-Jun-06 - Antifriction bearing defect	Continued Call: The harmonic family at 5.4 orders is still present on this machine. The peakvue data is not showing any bearing defect patterns at this time, but the Pk-Pk parameter is a little high. I would recommend that the bearing ids be entered into the database. I would also suggest that the AP set for the peakvue points be altered. I would suggest a 500 Hz HP filter instead on 2000 Hz and I would also increase the lines of resolution from 800 to 3200. Please continue collecting monthly data on this machine.
Watch	#1SHAIRJOY #1 Joy Air Compressor Motor	22-Jun-06 - Misc Information - No Fault	The axial point is showing a large increase in vibration levels. The other points are not showing any increase. No action required for this machine. Please make certain that the compressor is fully loaded when collecting data.
Watch	SH3BCWPMP Bearing Cooling Water Pump 3	22-Jun-06 - Looseness	Continued Call: The amplitude levels have decreased on this machine. I have lowered the severity of this problem to a watch call. Was any maintenance preformed on this machine? I would recommend that monthly data be collected on this machine.
Watch	SH3CIRMTRA Circulating Pump Motor A	22-Jun-06 - Looseness - Motor	Continued Call: The attached motor plots are still displaying a higher than normal 1x parameter band. This is indicating that a looseness issue is present on this machine. I am also seeing electrical energy across the motor due to the looseness. The amplitude levels are low at this time, but they are higher than normal. I would recommend that the mounting bolts be checked to verify that the bolts are tight and not loose, broken, or stretched. Please continue collecting monthly data on this machine.
Watch	SH3FWSMTRB Feed Water Pump Motor B	22-Jun-06 - Electrical defect	Continued Call: The attached plots show an electrical energy frequency on the motor. The common cause of electrical energy is looseness in or around the motor itself. I have made this a watch call so that I can watch it in the future. No action is needed at this time except to collect monthly data on this machine.

Area: S4 Shipman Plant 4

Urgency	Equipment	Problem	Extended Description
High Alarm	SH4BCWPMP Bearing Cooling Water Pump 4	22-Jun-06 - Looseness	Continued Call: The 1x peak has increased very quickly during June's data collection. I would recommend that the motor be scheduled for maintenance in the next month.

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Predictive Maintenance Summary Report

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Alarm	SH4IDFAN ID Fan	22-Jun-06 - Imbalance - Air Handler (Fan)	Continued Call: The attached plots are showing a high 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue. The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.
Watch	SH4CNDPMPA Condensate Pump A	22-Jun-06 - Misalignment	Continued Call: The horizontal points have decreased in amplitude levels this month, but the vertical points are not showing an increase. The amplitude levels are the highest that this machine has seen in the vertical direction. I consider the levels to be still low at this time. I would suggest that is there is a coupling connecting the motor and pump that it be visually inspected for any problems.

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Process Management

Predictive Maintenance Detail Report

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Area H5 Hill Plant 5

Equipment H5CNDMTRB Condensate Pump Motor B

Urgency:

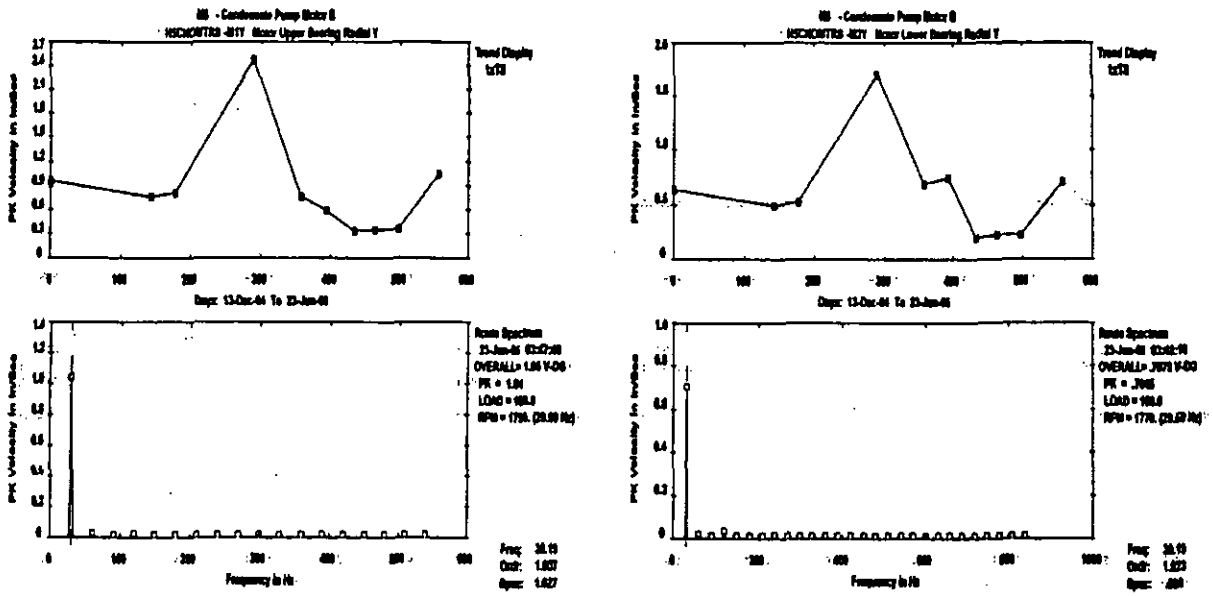
High Alarm

Title: 23-Jun-06 - Looseness

Explanation: Continued Call:

The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well.

I would recommend that maintenance be scheduled on this machine on the next 1-2 months.



EMERSON.
Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area H5 Hill Plant 5

Equipment H5CIRCMTRA Circulating Pump Motor 5-A

Urgency :

Alarm

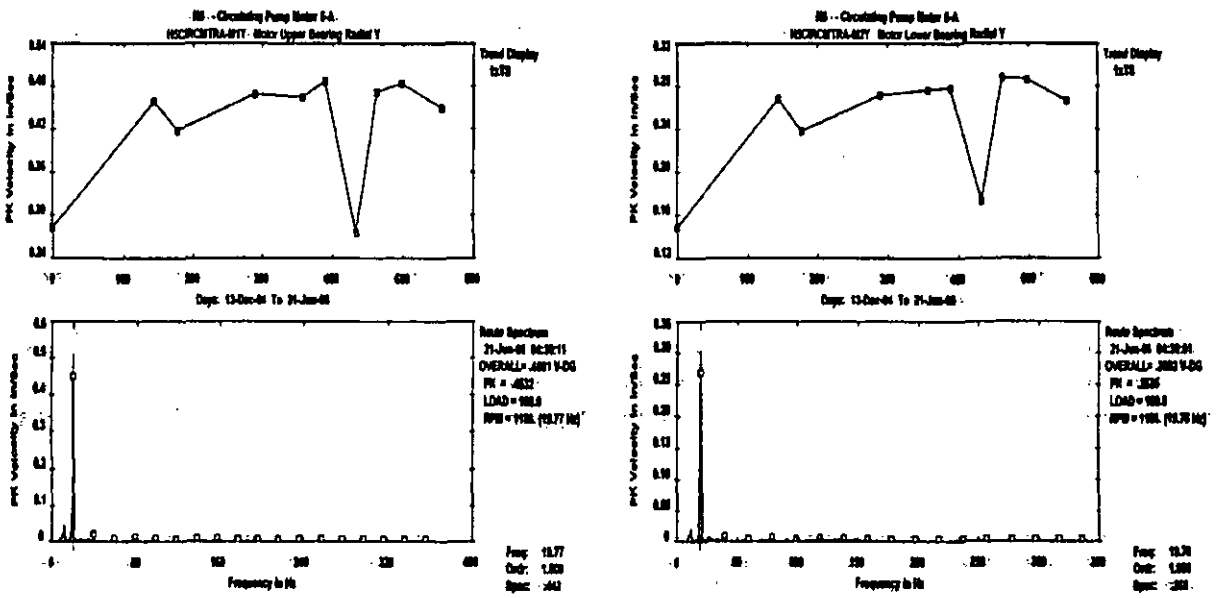
Title: 21-Jun-06 - Looseness

Explanation: Continued Call:

Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine.

The trend data is indicating that the amplitude levels are highest that this machine has seen.

I would recommend that maintenance be scheduled on this machine in the next 1-2 months.



EMERSON
Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area H5 Hill Plant 5

Equipment H5CNDMTRA Condensate Pump Motor A

Urgency :

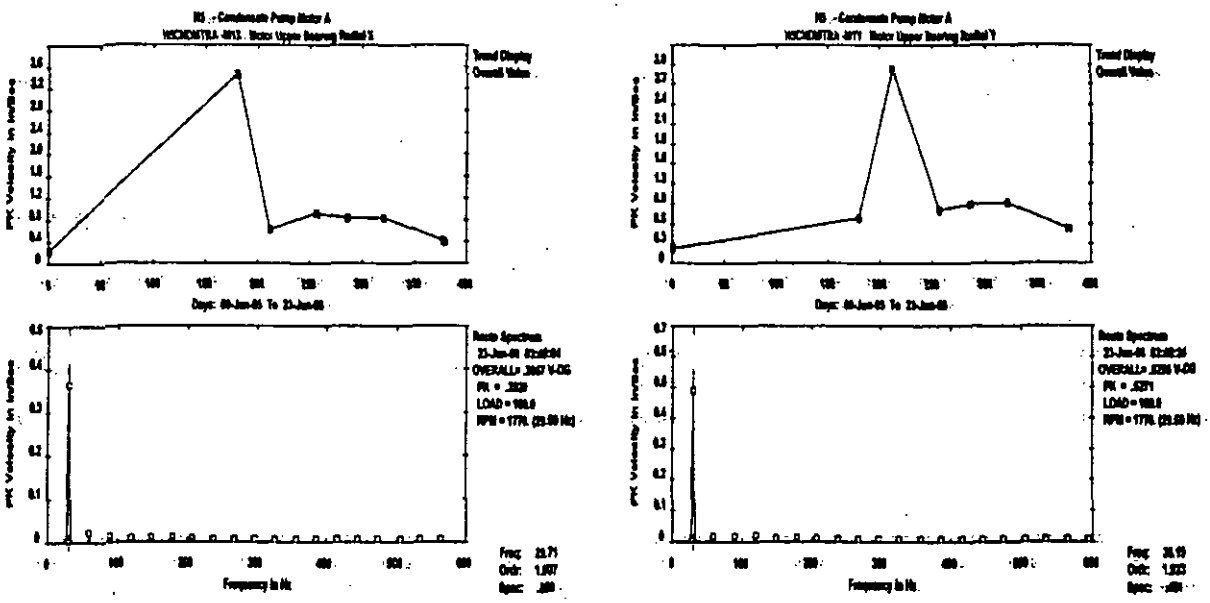
Alarm

Title: 23-Jun-06 - Imbalance

Explanation: Continued Call:

The amplitude levels have decreased on this machine. I have lowered the severity of this problem to an alarm.

I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be checked for any internal looseness as well as any internal imbalance.



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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area H6 Hill Plant 6

Equipment H6CNDDTKPB Reblr Cond Drain Tank Pump B

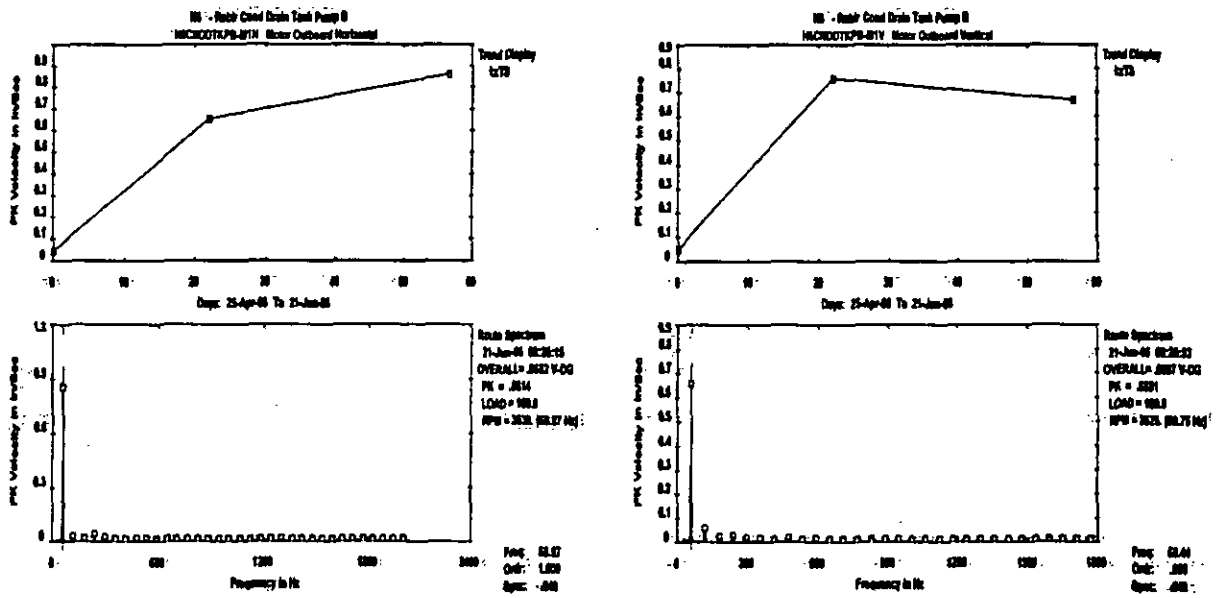
Urgency : High Alarm

Title: 21-Jun-06 - Looseness

Explanation: Continued Call:

The 1x peak has increased during June's data collection. I have raised the severity of this problem due to the higher vibration levels.

The high 1x peak is most likely due to an internal looseness or imbalance issue on this motor. I have seen many looseness and imbalance issues on the motor in this database. Do a lot of the motors have to be sent out for internal balancing and if so is it known why the motors are becoming imbalanced?



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Predictive Maintenance Detail Report

06/28/06
harpm/1

Area H6 Hill Plant 6

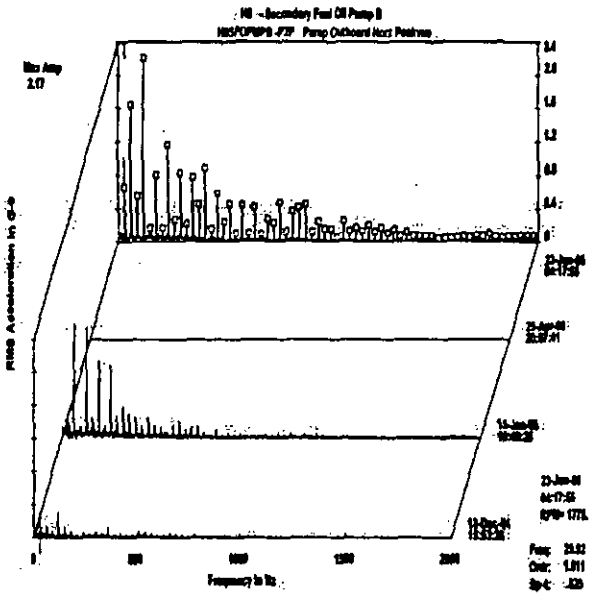
Equipment H6SFOPMPB Secondary Fuel Oil Pump B

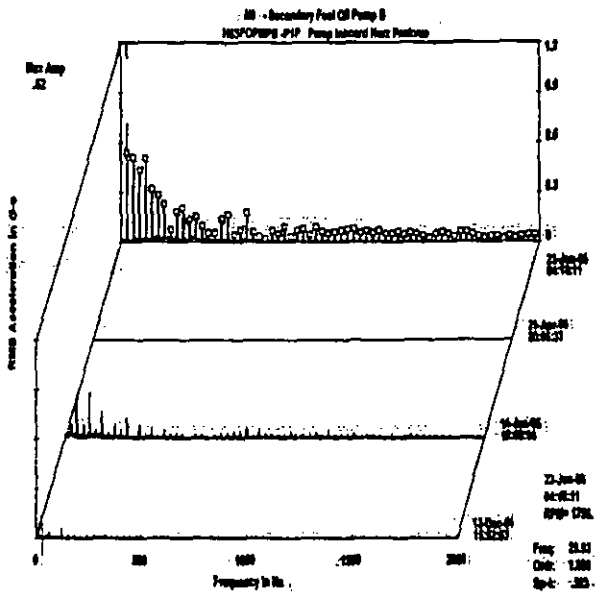
Urgency: Alarm

Title: 23-Jun-06 - Looseness

Explanation: The attached peakvue plots are showing high levels of impacting and looseness.

This could be related to the process that the pump is running. I would recommend that monthly data be collected on this machine.





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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area PUNA Puna

Equipment PUCDMUMTRA Cond Make-up Pump Motor A

Urgency: Alarm

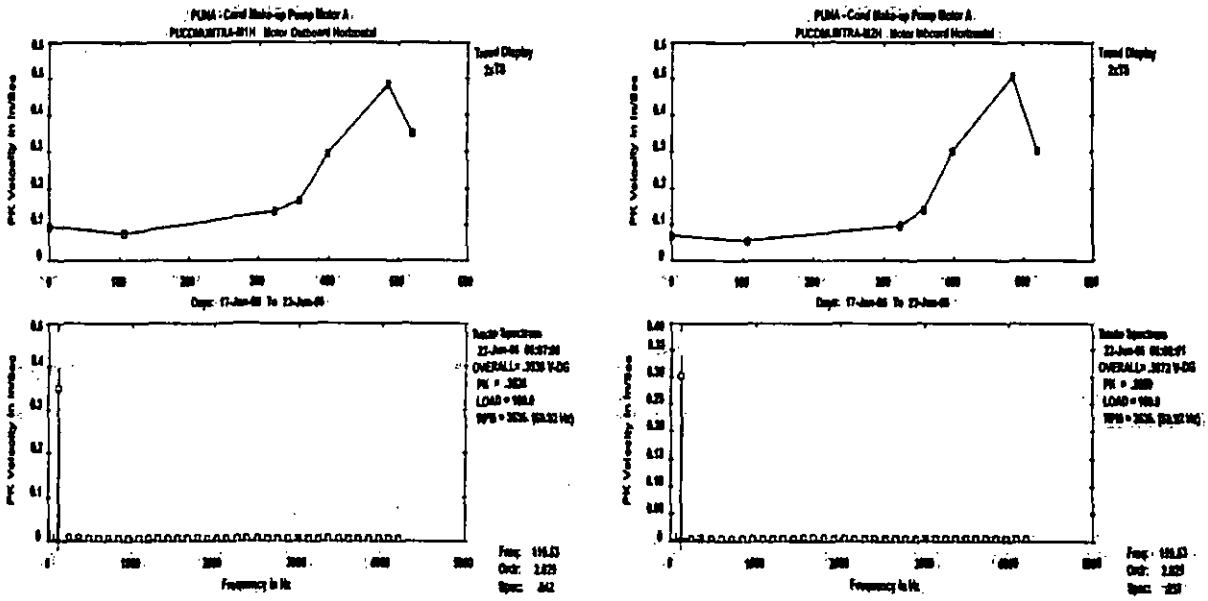
Title: 22-Jun-06 - Electrical defect

Explanation: Continued Call:

The attached plots are showing a high 2x turning speed peak at ~120 Hz. This is most likely due to an electrical issue. The motor us running very close to 60 Hz which of course shows to 2x peak around an electrical defect frequency.

I would to have the power cut to this motor while the 2130 is in monitor mode collecting data. If the large 2x peak disappears quickly when the power is turned off then it is an electrical issue. If the peak remains and slowly goes down then it is a misalignment issue.

The motor is also indicating signs of imbalance which could explain the electrical energy that is being displayed. I would recommend that maintenance be scheduled on this machine in the next 2-3 months.



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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area **PUNA** **Puna**

Equipment **PUSVCFLPMP Flush Pump**

Title: 22-Jun-06 - Stuctural fatigue

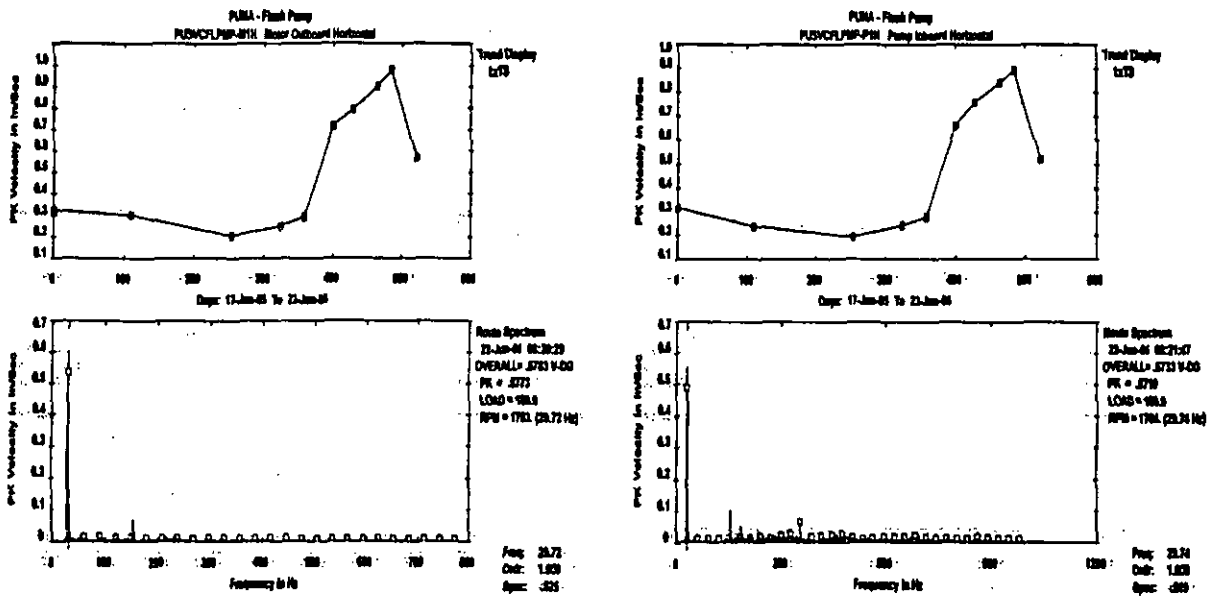
Urgency:

Alarm

Explanation: Continued Call:

The attached plots are showing a decrease in the vibration levels for this machine. Was any maintenance preformed on this machine?

The amplitude levels are still high, but I have lowered the severity of this problem to an alarm call. Please let me know if any maintenance was preformed on this machine.



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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3CNDPMPB Condensate Pump B

Urgency :

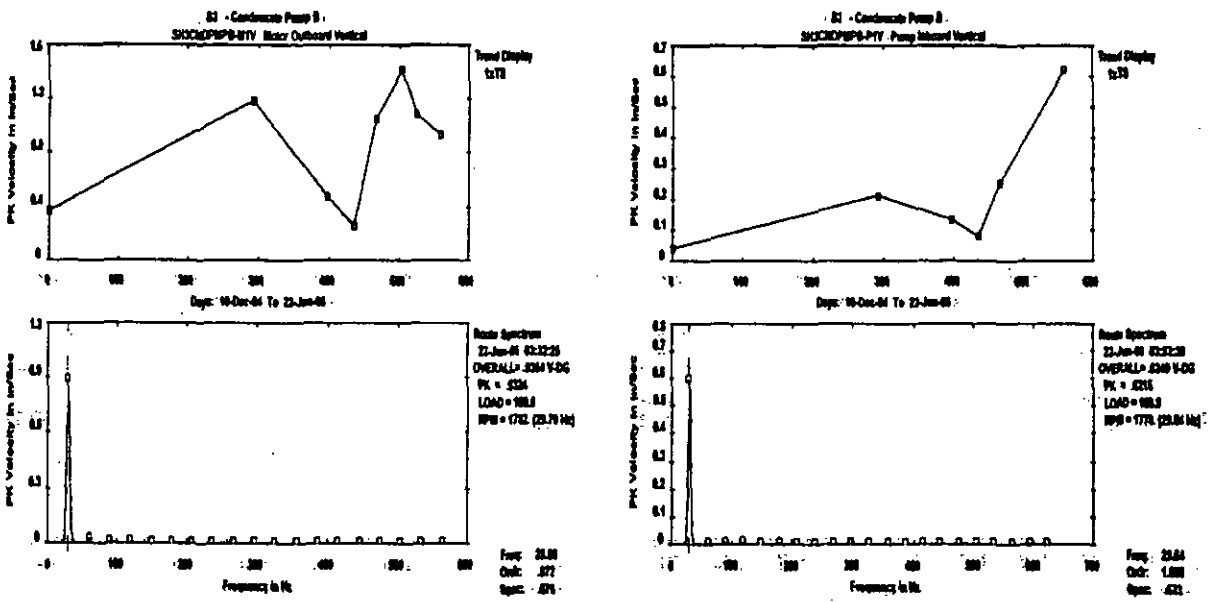
High Alarm

Title: 22-Jun-06 - Looseness

Explanation: Continued Call:

The motor and pump are showing very high levels of vibration. The past data shows a problem in the horizontal direction.

The 1x parameter is usually either an imbalance or a looseness issue. I would strongly recommend that maintenance be scheduled on this machine within the month to check for looseness and to make certain the motor is balanced.



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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S3 Shipman Plant 3

Equipment SCAPH-B Drip Pump Motor B

Title: 22-Jun-06 - Looseness

Urgency:

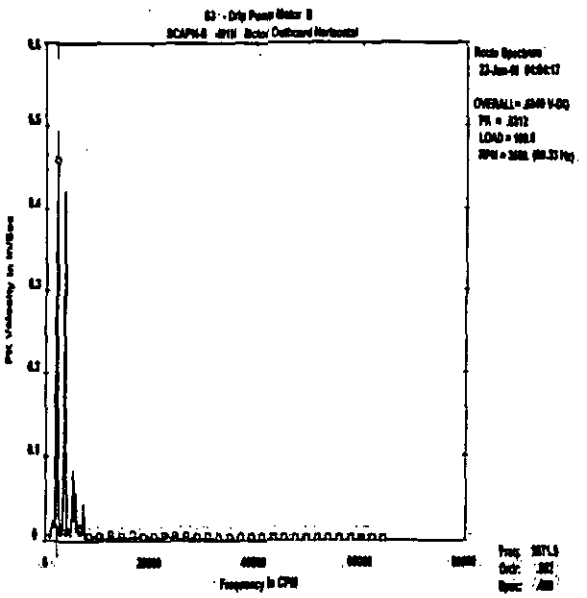
Alarm

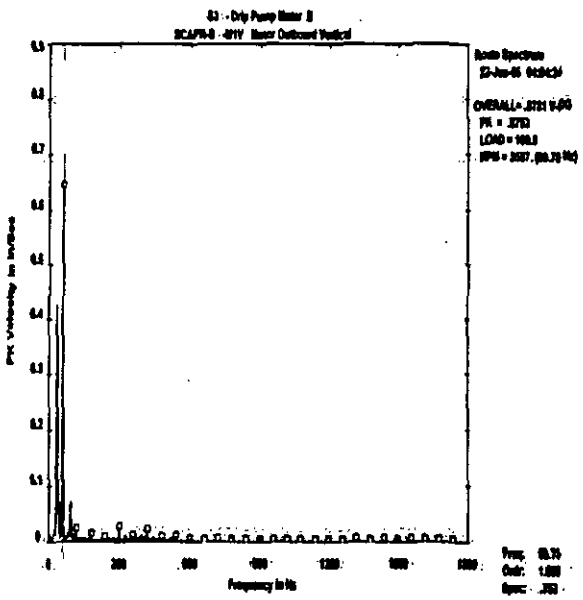
Explanation: Continued Call:

Please verify that the speed on this machine is correct. I am seeing a large sub synchronous peak at ~2072 RPM. Is this machine directly coupled?

The 1x peak is still present indicating a looseness issue. The amplitude levels have increased during June's data collection.

I would recommend that the motor be inspected for any signs of looseness.





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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3CNDPMPA Condensate Pump A

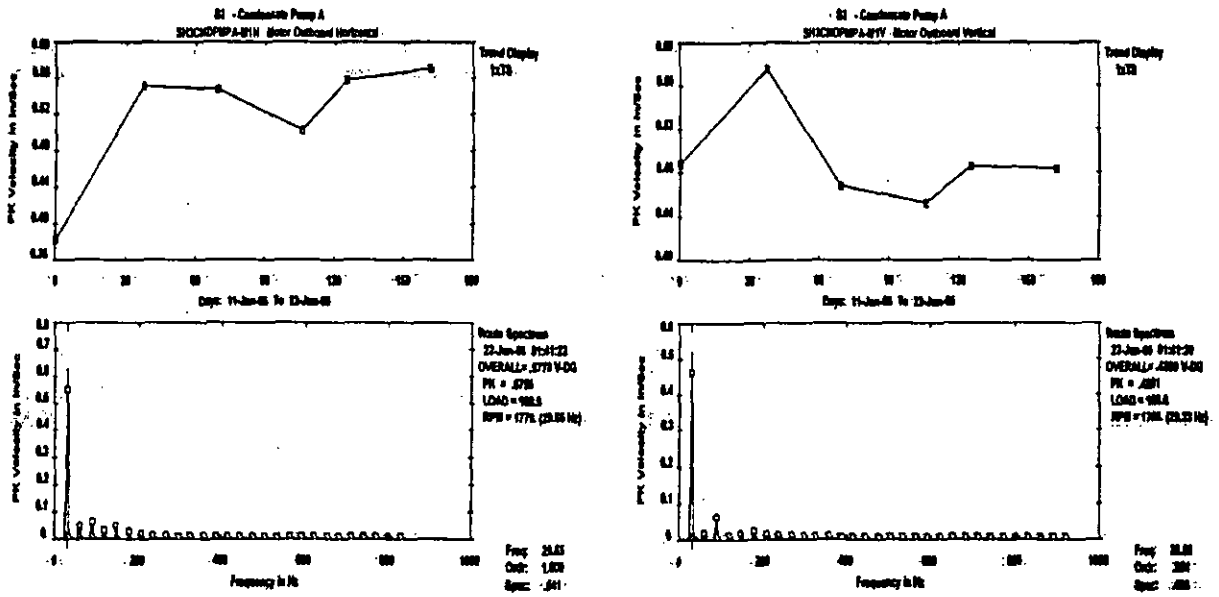
Urgency : Alarm

Title: 22-Jun-06 - Looseness - Motor

Explanation: Continued Call:

The attached plots are displaying a looseness issue on the motor. The amplitude levels are considered high, but they have been present since data was first collected on this machine.

I feel that the .5 in/sec is too high of an amplitude level for this machine. I would recommend that the structure and bolts holding the motor be inspected for any fatigue or looseness. Please continue collecting monthly data on this machine.



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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3FWSMTRA Feed Water Pump Motor A

Urgency :

Alarm

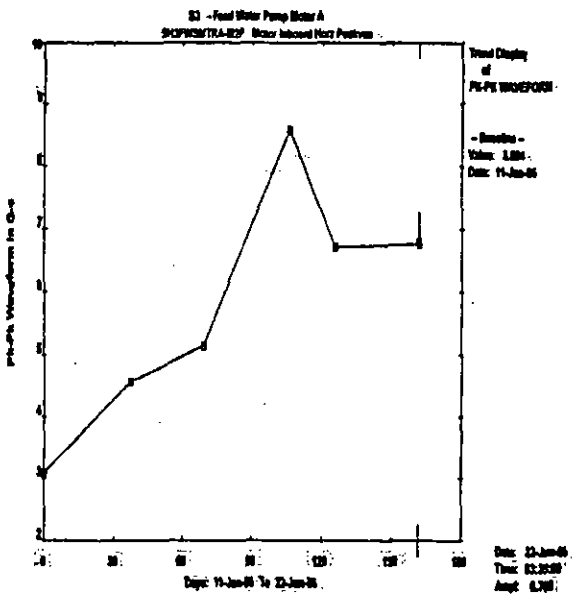
Title: 22-Jun-06 - Antifriction bearing defect

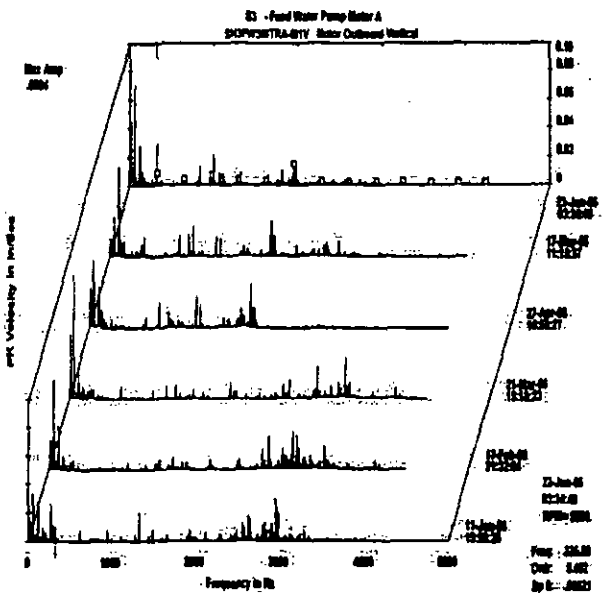
Explanation: Continued Call:

The harmonic family at 5.4 orders is still present on this machine. The peakvue data is not showing any bearing defect patterns at this time, but the Pk-Pk parameter is a little high.

I would recommend that the bearing ids be entered into the database. I would also suggest that the AP set for the peakvue points be altered. I would suggest a 500 Hz HP filter instead on 2000 Hz and I would also increase the lines of resolution from 800 to 3200.

Please continue collecting monthly data on this machine.





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Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S3 Shipman Plant 3

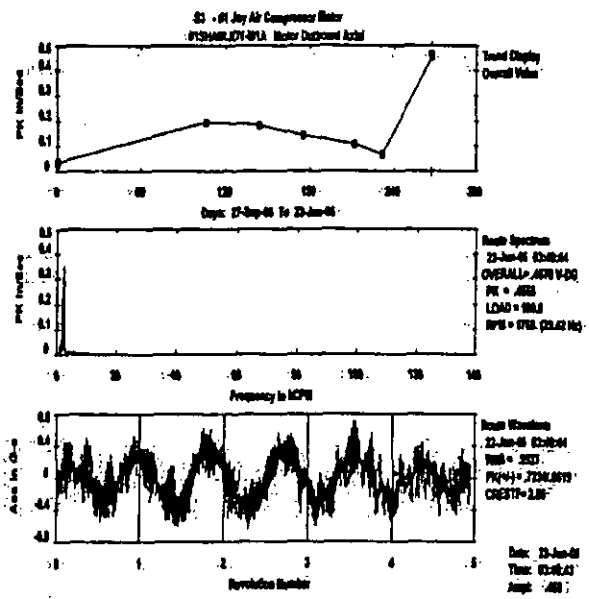
Equipment #1SHAIRJOY #1 Joy Air Compressor Motor

Urgency: Watch

Title: 22-Jun-06 - Misc Information - No Fault

Explanation: The axial point is showing a large increase in vibration levels. The other points are not showing any increase.

No action required for this machine. Please make certain that the compressor is fully loaded when collecting data.



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Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3BCWPMP Bearing Cooling Water Pump 3

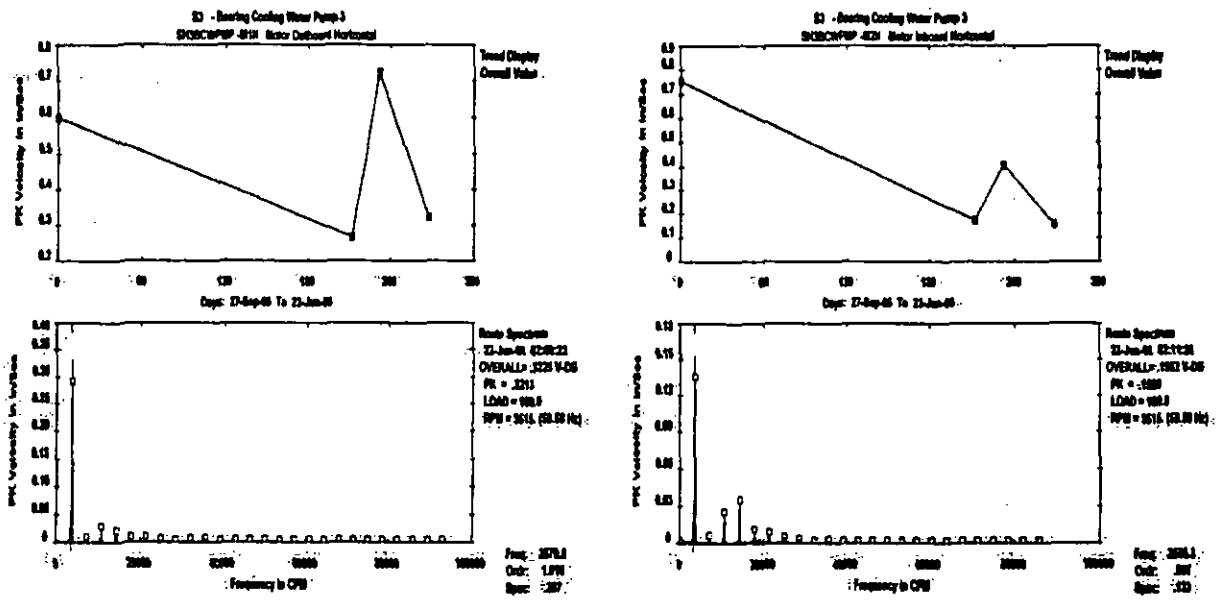
Urgency : Watch

Title: 22-Jun-06 - Looseness

Explanation: Continued Call:

The amplitude levels have decreased on this machine. I have lowered the severity of this problem to a watch call. Was any maintenance preformed on this machine?

I would recommend that monthly data be collected on this machine.



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Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3CIRMTRA Circulating Pump Motor A

Urgency: Watch

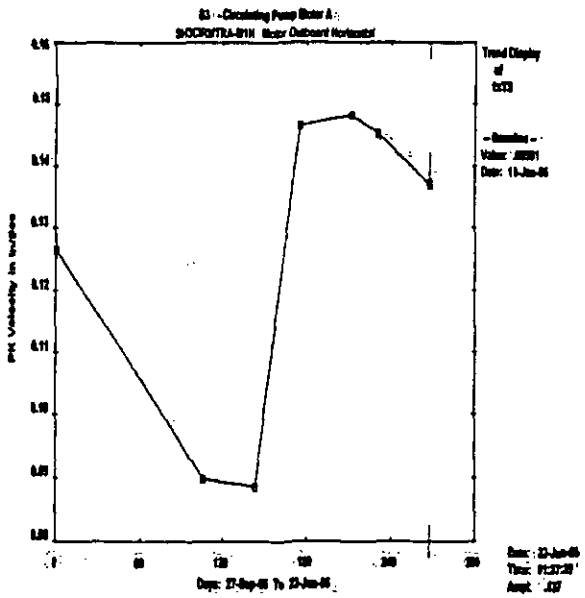
Title: 22-Jun-06 - Looseness - Motor

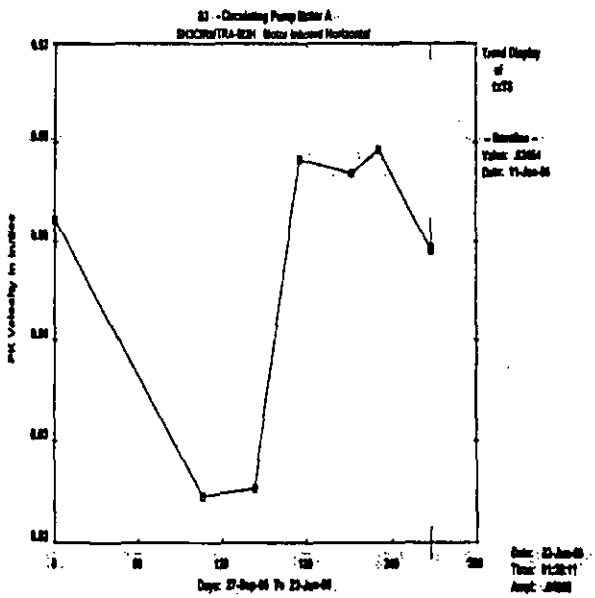
Explanation: Continued Call:

The attached motor plots are still displaying a higher than normal 1x parameter band. This is indicating that a looseness issue is present on this machine. I am also seeing electrical energy across the motor due to the looseness.

The amplitude levels are low at this time, but they are higher than normal.

I would recommend that the mounting bolts be checked to verify that the bolts are tight and not loose, broken, or stretched. Please continue collecting monthly data on this machine.





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Process Management

Predictive Maintenance Detail Report

06/28/06
harprn/1

Area S3 Shipman Plant 3

Equipment SH3FWSMTRB Feed Water Pump Motor B

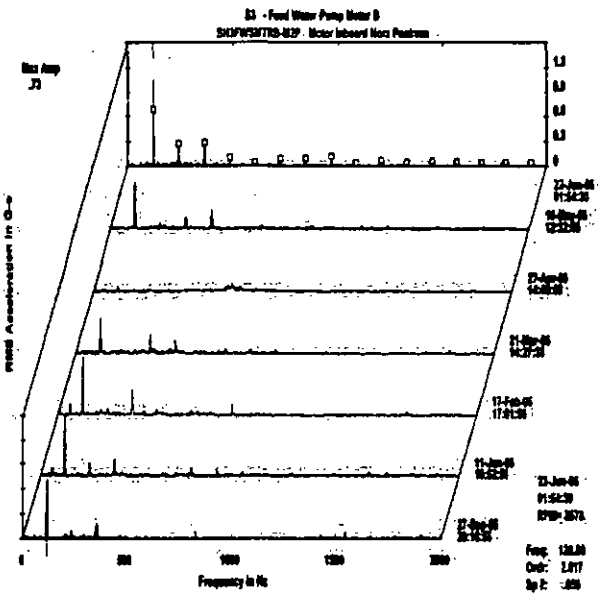
Urgency: Watch

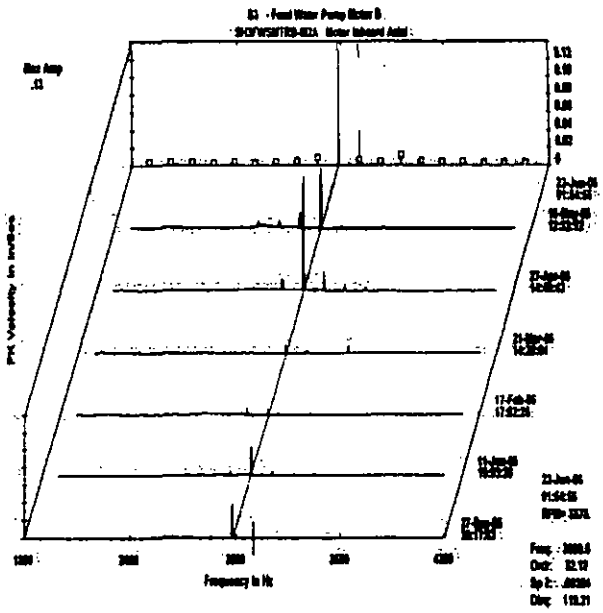
Title: 22-Jun-06 - Electrical defect

Explanation: Continued Call:

The attached plots show an electrical energy frequency on the motor. The common cause of electrical energy is looseness in or around the motor itself.

I have made this a watch call so that I can watch it in the future. No action is needed at this time except to collect monthly data on this machine.





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Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4BCWPMP Bearing Cooling Water Pump 4

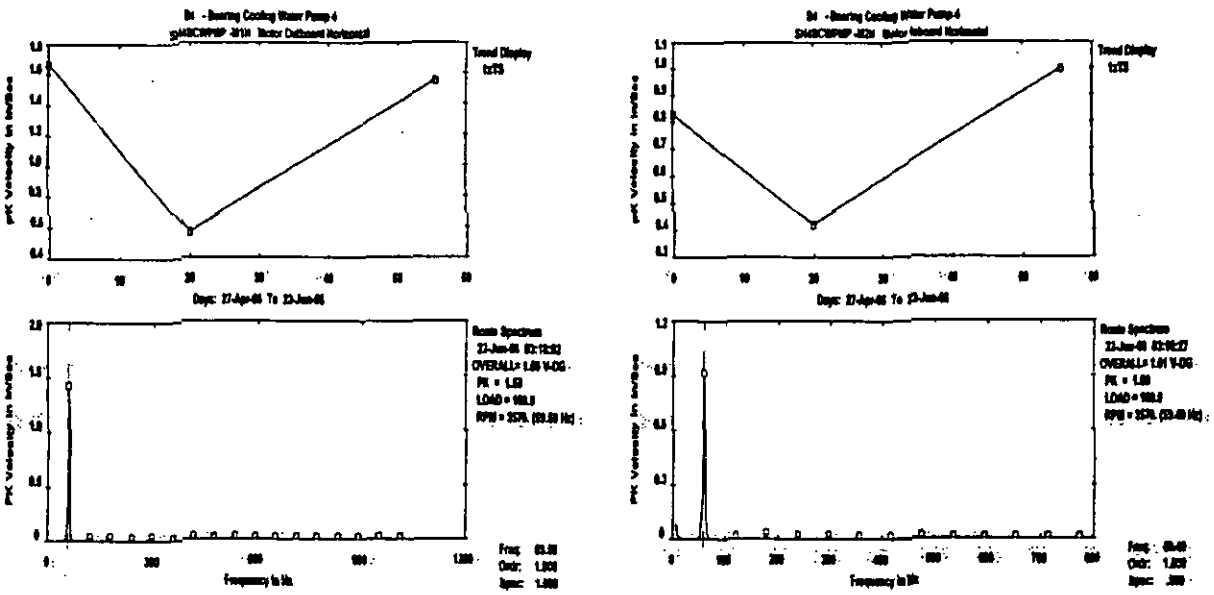
Urgency : High Alarm

Title: 22-Jun-06 - Looseness

Explanation: Continued Call:

The 1x peak has increased very quickly during June's data collection.

I would recommend that the motor be scheduled for maintenance in the next month.



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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4IDFAN ID Fan

Urgency :

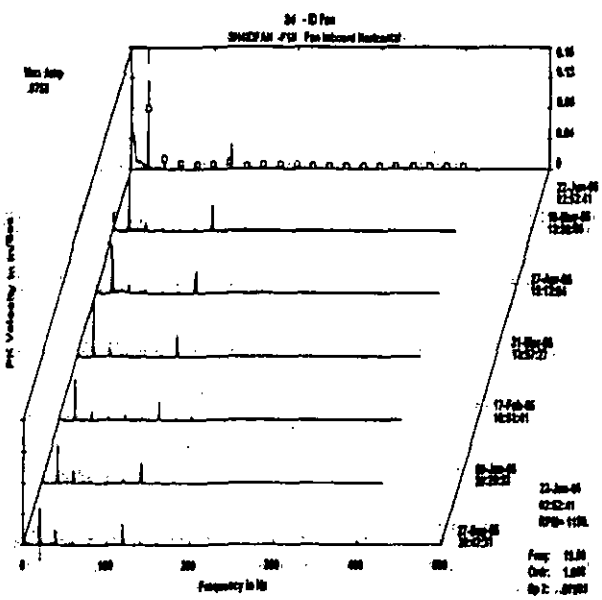
Alarm

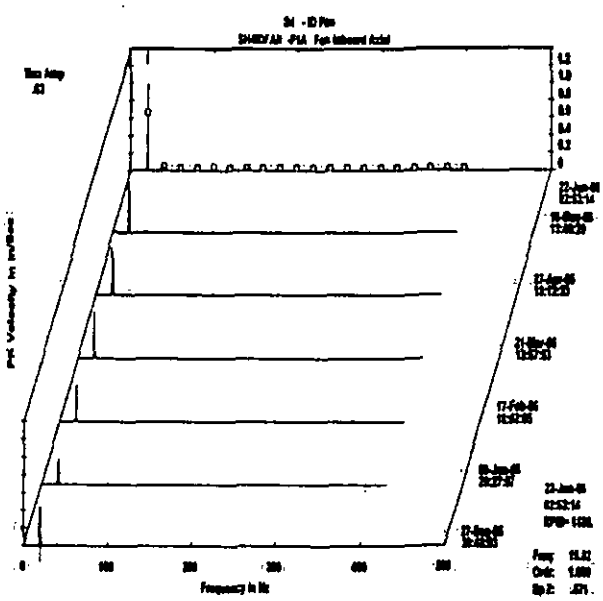
Title: 22-Jun-06 - Imbalance - Air Handler (Fan)

Explanation: Continued Call:

The attached plots are showing a high 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue.

The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.





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Process Management

Predictive Maintenance Detail Report

06/28/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4CNDPMPA Condensate Pump A

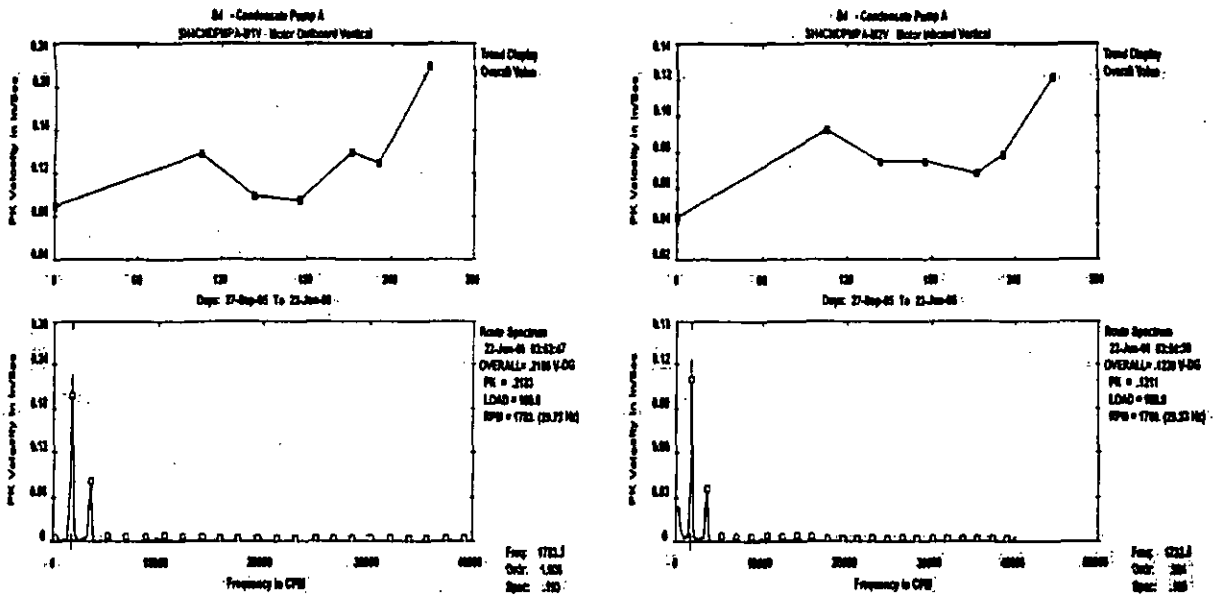
Urgency : Watch

Title: 22-Jun-06 - Misalignment

Explanation: Continued Call:

The horizontal points have decreased in amplitude levels this month, but the vertical points are not showing an increase.

The amplitude levels are the highest that this machine has seen in the vertical direction. I consider the levels to be still low at this time. I would suggest that is there is a coupling connecting the motor and pump that it be visually inspected for any problems.



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Mickey Harp
Analyst, Analysis Services

Emerson Process Management
Asset Optimization Division
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865.675.2400 X3403
Mickey.Harp@EmersonProcess.com

August 2, 2006

Mr. Andy Ho
Mr. Craig Yamamoto
Mr. Norman Verbanic
Ms. Lisa Dangelmaier
Mr. Norman Uchida

Hawaiian Electric and Light Co, Inc
54 Halekauila Street
Hilo, HI 96721-1027

Gentlemen,

Vibration data was collected at your facility on July 18-19, 2006. Analysis was performed on that equipment on August 2, 2006. The attached report is intended to inform you of any significant machinery problems identified during this analysis.

CSI is committed to providing World Class Predictive Maintenance technologies and ensuring customer satisfaction. If you have any questions concerning any of the information contained in this report please feel free to contact me. I would like to thank you for allowing CSI Services to assist you in your Reliability Based Maintenance efforts.

If you have any questions or concerns please feel free to contact me at anytime.

Mickey Harp,
Analyst, Analysis Services

EMERSON
Process Management

Equipment Description	Equipment Tag	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Shipman Plant 3						
Turbine #3	Shipman 3	OK	OK	OK	OK	
Circulating Pump Motor A	SH3CIRMTRA	[illegible]	[illegible]	[illegible]	[illegible]	Continued Call - Looseness
Circulating Pump A	SH3CIRPMPA	NT	NT	NT	NT	
Circulating Pump Motor B	SH3CIRMTRB	OK	OK	OK	OK	
Circulating Pump B	SH3CIRPMPB	NT	NT	NT	NT	
Condensate Pump A	SH3CNDPMPA	3	3	3	3	Continued Call - Looseness
Condensate Pump B	SH3CNDPMPB	[illegible]	[illegible]	[illegible]	[illegible]	Continued Call - Looseness
FD/ID Fan Motor	SH3FDIDMTR	OK	OK	OK	OK	
ID Fan	SH3IDFAN	OK	OK	OK	OK	
FD Fan	SH3FDFAN	OK	OK	OK	OK	
Air Preheater Motor A	SH3APHMTRA	OK	OK	OK	[illegible]	
Air Preheater Motor B	SH3APHMTRB	OK	OK	OK	[illegible]	
Evaporator Pump A	SH3EVPPMPA	NR	NR	NR	[illegible]	
Evaporator Pump B	SH3EVPPMPB	NR	NR	NR	[illegible]	
Feed Water Pump Motor A	SH3FWSMTRA	3	3	3	3	Looseness and possible lubrication issue
Feed Water Pump A	SH3FWSPMPA	OK	NR	NR	[illegible]	
Feed Water Pump Motor B	SH3FWSMTRB	[illegible]	[illegible]	[illegible]	[illegible]	Continued Call - Electrical Energy
Feed Water Pump B	SH3FWSPMPB	OK	OK	OK	OK	
Drip Pump Motor A	SCAPH-A	NR	NR	[illegible]	[illegible]	
Drip Pump A	SCAPHP-A	NR	NR	NR	[illegible]	
Drip Pump Motor B	SCAPH-B	3	NT	3	NT	
Drip Pump B	SCAPHP-B	[illegible]	NT	NT	NT	
Fuel Oil Pump A	SH3FOSPMPA	NR	NR	NR	[illegible]	
Fuel Oil Pump B	SH3FOSPMPB	[illegible]	[illegible]	[illegible]	OK	
Fuel Oil CD Pump	SH3FOCDPMP	OK	OK	OK	OK	
Service Water Pump A	SH3SVCPMPA	OK	OK	OK	OK	
Service Water Pump B	SH3SVCPMPB	OK	OK	OK	OK	
Bearing Cooling Water Pump 3	SH3BCWPMP	[illegible]	3	[illegible]	[illegible]	Continued Call - Imbalance
#1 Joy Air Compressor Motor	#1SHAIRJOY	OK	OK	[illegible]	OK	
#1Joy Air Compressor	SHAIRJOY#1	OK	OK	OK	OK	
#2 Joy Air Compressor Motor	#2SHAIRJOY	OK	OK	OK	[illegible]	
#2Joy Air Compressor	SHAIRJOY#2	OK	OK	OK	[illegible]	
Circ Water Pump Motor #1	SHCIRWMTR1	NT	[illegible]	NT	NT	
Circulating Water Pump #1	SHCIRWPMP1	NT	NT	NT	NT	
Shipman Plant 4						
Turbine #4	Shipman 4	NR	OK	OK	OK	
Circulating Pump Motor A	SH4CIRMTRA	OK	OK	OK	OK	
Circulating Pump A	SH4CIRPMPA	NT	NT	OK	[illegible]	
Circulating Pump Motor B	SH4CIRMTRB	OK	OK	OK	OK	
Circulating Pump B	SH4CIRPMPB	NT	NT	OK	NT	
Condensate Pump A	SH4CNDPMPA	OK	[illegible]	[illegible]	[illegible]	Continued Call - Misalignment
Condensate Pump B	SH4CNDPMPB	[illegible]	OK	OK	OK	
FD/ID Fan Motor	SH4FDIDMTR	OK	OK	OK	OK	
ID Fan	SH4IDFAN	3	3	3	3	Continued Call - Imbalance
FD Fan	SH4FDFAN	OK	OK	OK	OK	
Air Preheater Motor A	SH4APHMTRA	OK	NT	NT	[illegible]	
Air Preheater Motor B	SH4APHMTRB	OK	OK	OK	OK	
Evaporator Pump A	SH4EVPPMPA	NT	NT	NT	[illegible]	
Evaporator Pump B	SH4EVPPMPB	NT	NT	NT	[illegible]	
Feed Water Pump Motor A	SH4FWSMTRA	[illegible]	OK	OK	OK	
Feed Water Pump A	SH4FWSPMPA	NT	NT	OK	NT	
Feed Water Pump Motor B	SH4FWSMTRB	NT	OK	OK	[illegible]	
Feed Water Pump B	SH4FWSPMPB	NT	OK	OK	NT	
Drip Pump Motor A	SCAPH-A	NT	NT	NT	NT	
Drip Pump A	SCAPHP-A	NT	NT	NT	NT	
Drip Pump Motor B	SCAPH-B	NT	NT	NT	NT	
Drip Pump B	SCAPHP-B	NT	NT	NT	NT	
Fuel Oil Pump A	SH4FOSPMPA	OK	NT	NT	[illegible]	
Fuel Oil Pump B	SH4FOSPMPB	OK	OK	OK	OK	
Fuel Oil CD Pump	SH4FOCDPMP	OK	OK	OK	OK	
Service Water Pump A	SH4SVCPMPA	OK	OK	OK	OK	
Service Water Pump B	SH4SVCPMPB	OK	OK	OK	OK	
Bearing Cooling Water Pump 4	SH4BCWPMP	OK	3	[illegible]	3	Continued Call - Looseness
Water Treatment Sump Pump	SHWTSUMPMP	NT	NT	NT	NT	

Hill Plant 5						
H5 Turbine	H5 Turb	NT	NT	NT	NT	
H5A APH Drive Motor	H5A APHMTR	NT	NT	NT	NT	
H5A APH Gearbox	H5A APHGBX	NT	NT	NT	NT	
Circulating Pump Motor 5-A	H5CIRCMTRA	3	NT	3	3	Continued Cell - Looseness
Circulating Pump 5-A	H5CIRCPMPA	NT	NT	NT	NT	
Circulating Pump Motor 5-B	H5CIRCMTRB	OK	NT	OK	OK	
Circulating Pump 5-B	H5CIRCPMPB	NT	NT	NT	NT	
Circulating Pump Motor 5-C	H5CIRCMTRC	OK	NT	OK	OK	
Circulating Pump 5-C	H5CIRCPMPC	NT	NT	NT	NT	
Service Air Compressor Motor	H5CASACMTR	OK	NT	NT	NT	
Service Air Compressor	H5AIRSAC	OK	NT	NT	NT	
Inst Air Compressor Motor	H5CAIACMTR	OK	NT	NT	NT	
Instrument Air Compressor	H5AIRIAC	OK	NT	NT	NT	
Condensate Pump Motor A	H5CNDMTRA	[illegible]	NT	3	3	Continued Cell - Looseness and Imbalance
Condensate Pump A	H5CNDPMPA	NT	NT	NT	NT	
Condensate Pump Motor B	H5CNDMTRB	3	NT	[illegible]	[illegible]	
Condensate Pump B	H5CNDPMPB	NT	NT	NT	NT	
Condensate Transfer Pump Mtr	H5CNDTPMTR	OK	NT	NT	NT	
Condensate Transfer Pump	H5CNDTFPMP	OK	NT	NT	NT	
FD Fan Motor	H5DFFDMTR	OK	NT	OK	OK	
FD Fan	H5DFFDFAN	OK	NT	OK	OK	
Evaporator Pump	H5EVAPPMP	NT	NT	NT	OK	
Feed Water Pump Motor 5A	H5FSFWMTRA	OK	NT	OK	OK	
Feed Water Pump 5A	H5FSFWPMPA	OK	NT	OK	OK	
Feed Water Pump Motor 5B	H5FSFWMTRB	3	NT	OK	OK	
Feed Water Pump 5B	H5FSFWPMPB	OK	NT	OK	OK	
Secondary Fuel Pump A	H5SECFPMPA	[illegible]	NT	NT	NT	
Secondary Fuel Pump B	H5SECFPMPB	NT	NT	OK	OK	
Service Water Pump Motor A	H5SVCWMTRA	OK	NT	NT	OK	
Service Water Pump A	H5SVCWPMPA	OK	NT	NT	OK	
Service Water Pump Motor B	H5SVCWMTRB	[illegible]	NT	NT	NT	
Service Water Pump B	H5SVCWPMPB	OK	NT	NT	NT	
NR5 Primary Fuel Oil Pump	HFOPRIPMPB	OK	NT	NT	OK	
NR5 Primary Fuel Oil Pump A	HFOPRIPMPA	OK	NT	NT	OK	
NR6 Primary Fuel Oil Pump B	HFOPRIPMPB	NT	NT	NT	NT	
Aux Stm Lube Oil Pmp Turbine	H5ASLOPTRB	NT	NT	NT	NT	
Turning Gear Oil Pump	H5TGOILPMP	NT	NT	NT	NT	
#5 Diesel Oil Pump Motor	H5DFSDOMTR	NT	NT	NT	NT	
#5 Diesel Oil Pump	H5DFSDOPMP	NT	NT	NT	NT	
Hill Plant 6						
H6 Turbine	H6 TRB	NT	NT	NT	NT	
H6APH Drive Motor	H6 APH MTR	NT	NT	NT	NT	
H6 APH Gearbox	H6 APH GBX	NT	NT	NT	NT	
Circulating Pump Motor 6-A	H6CIRCMTRA	OK	OK	OK	NT	
Circulating Pump 6-A	H6CIRCPMPA	NT	NT	NT	NT	
Circulating Pump Motor 6-B	H6CIRCMTRB	NT	NT	NT	NT	
Circulating Pump 6-B	H6CIRCPMPB	NT	NT	NT	NT	
Circulating Pump Motor 6-C	H6CIRCMTRC	OK	OK	OK	NT	
Circulating Pump 6-C	H6CIRCPMPC	NT	NT	NT	NT	
Circulating Pump Motor 6-D	H6CIRCMTRD	OK	OK	OK	NT	
Circulating Pump 6-D	H6CIRCPMPD	NT	NT	NT	NT	
Service Air Compressor Motor	H6AIRSAMTR	OK	OK	OK	NT	
Service Air Compressor	H6AIRSAC	OK	OK	OK	NT	
Instrument Air Compsr Motor	H6AIRIAMTR	OK	OK	OK	NT	
Instrument Air Compressor	H6AIRIAC	OK	OK	OK	NT	
IR Air Compressor Motor	H6AIRIRMTR	NT	NT	NT	NT	
IR Air Compressor	H6AIRIRAC	NT	NT	NT	NT	
IR Air Compressor Clng Fan	H6AIRIRCF	NT	NT	NT	NT	
LP Heater Drip Pump	H6LHTRDPMP	OK	OK	OK	NT	
Condensate Pump Motor A	H6CNDMTRA	OK	OK	OK	NT	
Condensate Pump A	H6CNDPMPA	NT	NT	NT	NT	
Condensate Pump Motor B	H6CNDMTRB	OK	OK	OK	NT	
Condensate Pump B	H6CNDPMPB	NT	NT	NT	NT	
FD Fan High Speed Motor	H6DFDHSMTR	OK	OK	OK	NT	
FD Fan	H6FDFAN	OK	OK	OK	NT	
FD Fan Low Speed Motor	H6DFDLSMTR	OK	OK	OK	NT	
Evaporator Pump A	H6EVPPMPA	OK	OK	OK	NT	
Evaporator Pump B	H6EVPPMPB	OK	OK	OK	NT	
Feed Water Pump Mtr A	H6FWBFMTRA	OK	OK	OK	NT	
Feed Water Pump 6A	H6FWBFPMPA	OK	OK	OK	NT	
Feed Water Pump Mtr B	H6FWBFMTRB	OK	OK	OK	NT	
Feed Water Pump 6B	H6FWBFPMPB	OK	OK	OK	NT	
Secondary Fuel Oil Pump A	H6SFOPMPA	OK	OK	OK	NT	
Secondary Fuel Oil Pump B	H6SFOPMPB	OK	NT	3	NT	
Rebir Cond Drain Tank Pump A	H6CNDDTKPA	OK	NT	NT	NT	
Rebir Cond Drain Tank Pump B	H6CNDDTKPB	OK	3	[illegible]	NT	
Service Water Pump A	H6SVCWPMPA	OK	OK	OK	NT	
Service Water Pump B	H6SVCWPMPB	OK	OK	OK	NT	
Booster Pump	H6SVCBPMP	NT	NT	NT	NT	
Gland Seal Pump	H6GLSLPMP	OK	NT	NT	NT	
DC Lube Oil Pump	H6DCLOPMP	OK	OK	OK	NT	
Turning Gear Lube Oil Pump	H6TGLOPMP	NT	OK	OK	NT	
Aux Lube Oil Pump	H6SALOPMP	OK	OK	OK	NT	
Diesel Oil Pump Motor A	H6DFDOMTRA	OK	OK	NT	NT	
Diesel Oil Pump A	H6DFDOPMPA	OK	OK	NT	NT	
Diesel Oil Pump Motor B	H6DFDOMTRB	OK	OK	NT	NT	
Diesel Oil Pump B	H6DFDOPMPB	OK	OK	NT	NT	

PUNA						
Puna Turbine	Turbine	NT	NT	NT	NT	
Circ Water Pump Motor A	PUCWPMTRA	OK	OK	OK	OK	
Circ Water Pump Motor B	PUCWPMTRB	OK	OK	OK	OK	
Circ Water Pump Motor C	PUCWPMTRC	OK	OK	OK	OK	
Plant Air Compressor Motor A	PUAIRMTRA	NT	OK	OK	OK	
Plant Air Compressor A	PUAIRCOMPA	NT	OK	OK	OK	
Plant Air Compressor Motor B	PUAIRMTRB	OK	OK	OK	OK	
Plant Air Compressor B	PUAIRCOMPB	OK	OK	OK	OK	
Cond Drain Pmp to MU Tank	PUCDNTKPMP	NT	NT	OK	NT	
Cond Make-up Pump Motor A	PUCDMUMTRA	NT	3	3	3	Continued Call - Electrical Defect
Cond Make-up Pump A	PUCDMUPMPA	NT	OK	OK	OK	
Cond Make-up Pump Motor B	PUCDMUMTRB	OK	OK	OK	OK	
Cond Make-up Pump B	PUCDMUPMPB	OK	OK	OK	OK	
Condensate Pump Motor A	PUCONDMTRA	OK	OK	OK	OK	
Condensate Pump A	PUCONDPMPA	OK	OK	OK	OK	
Condensate Pump Motor B	PUCONDMTRB	OK	OK	OK	OK	
Condensate Pump B	PUCONDPMPB	OK	2	OK	OK	
Diesel Oil Pump A	PUDFOPMPA	OK	OK	OK	OK	
Diesel Oil Pump B	PUDFOPMPB	NT	OK	OK	OK	
ID High Speed Motor	PUIDHSMTR	OK	OK	OK	OK	
ID Fan	PUDFIDFAN	OK	OK	OK	OK	
ID Low Speed Motor	PUIDLSMTR	OK	OK	OK	OK	
FD High Speed Motor	PUFDHSMTR	OK	OK	OK	OK	
FD Fan	PUDFFDFAN	OK	OK	OK	OK	
FD Low Speed Motor	PUFDLSMTR	OK	OK	OK	OK	
Feed Water Pump Motor A	PUFSFWMTRA	OK	OK	OK	OK	
Feed Water Pump A	PUFSFWPMPA	OK	OK	OK	OK	
Feed Water Pump Motor B	PUFSFWMTRB	OK	OK	OK	OK	
Feed Water Pump B	PUFSFWPMPB	OK	OK	OK	OK	
Fuel Oil Transfer Pump	PUFOFWOPMP	OK	NT	OK	NT	
Fuel Oil Unloading Pump	PUFOSULPMP	NT	NT	NT	NT	
Fuel Oil Pump A	PUFOFOPMPA	OK	OK	OK	OK	
Fuel Oil Pump B	PUFOFOPMPB	NT	OK	OK	OK	
DC Bearing Oil Pump	PUDCBRGPMP	OK	NT	OK	NT	
Vapor Extraction Pump	PUVPREXPMP	OK	OK	OK	OK	
Lube Oil Pump A	PULOSPMPA	OK	OK	OK	OK	
Lube Oil Pump B	PULOSPMPB	OK	OK	OK	NT	
Service Water Pump A	PUSVCWPMPA	3	NT	NT	NR	
Service Water Pump B	PUSVCWPMPB	OK	NT	NT	NR	
HP Water Pump	PUSVCHPPMP		3	OK	OK	
Flush Pump	PUSVCFLPMP			3	3	Continued Call - Resonance or Structure Fatigue
County Water Papaya Pump A	PUSCCWPMPA	OK	OK	OK	OK	
County Water Papaya Pump B	PUSCCWPMPB	OK	OK	OK	OK	
Hydraulic Pump Motor A	PUHYDPMTRA	OK	OK	OK	OK	
Hydraulic Pump A	PUHYDPMPA	OK	OK	OK	OK	
Hydraulic Pump Motor B	PUHYDPMTRB	OK	OK	OK	NT	
Hydraulic Pump B	PUHYDPMPAB	OK	OK	OK	NT	
Sump Pump	PUWTSMPPMP	NT	NT	NT	NT	Access is difficult/dangerous
Gland Exhaust Pump	PUTGLESPMP	OK	OK	OK	OK	

Condition Legend:

Priority 1	Emergency Situation	
Priority 2	High Alarm	
Priority 3	Alarm	3
Priority 4	Watch	
Priority 5	Discussion Needed	
Not Running	Scheduled for test but not in operation	
Not Tested	Not Tested this survey	NT
Machine OK	Condition is acceptable for operation	OK

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Process Management

Predictive Maintenance Summary Report

08/02/06
harpm/1

Area H5 Hill Plant 5

Urgency	Equipment	Problem	Extended Description
High Alarm	H5CNDMTRB Condensate Pump Motor B	19-Jul-06 - Looseness - Motor	Continued Call: The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well. I would recommend that maintenance be scheduled on this machine on the next 1-2 months.
Alarm	H5CIRCMTRA Circulating Pump Motor 5-A	18-Jul-06 - Looseness	Continued Call: Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine. The trend data is indicating that the amplitude levels are the highest that this machine has seen. I would recommend that maintenance be scheduled on this machine in the next 1-2 months.
Alarm	H5CNDMTRA Condensate Pump Motor A	18-Jul-06 - Imbalance - Motor	Continued Call: The amplitude levels have decreased slightly on this machine. The current levels are the lowest that this machine has seen, but this is still normally high levels for a typical motor and pump configuration. I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be checked for any internal looseness as well as any internal imbalance.

Area PUNA Puna

Urgency	Equipment	Problem	Extended Description
Alarm	PUCDMUMTRA Cond Make-up Pump Motor A	19-Jul-06 - Electrical defect - Motor	Continued Call: The attached plots are showing a high 2x turning speed peak at ~120 Hz. This is most likely due to an electrical issue. The motor us running very close to 60 Hz which of course shows to 2x peak around an electrical defect frequency. I would like to have the power cut to this motor while the 2130 is in monitor mode collecting data. If the large 2x peak disappears quickly when the power is turned off then it is an electrical issue. If the peak remains and slowly goes down then it is a misalignment issue. The motor is also indicating signs of imbalance which could explain the electrical energy that is being displayed. I would recommend that maintenance be scheduled on this machine in the next 2-3 months.
Alarm	PUSVCFLPMP Flush Pump	19-Jul-06 - Stuctural fatigue	Continued Call: The attached plots are still displaying a large vibration levels, but only in the horizontal direction. The high amplitude levels are present across the entire machine. This is usually seen when a resonance or structural issue is present. Please inspect the structure for loose feet, cracked or broken welds.

Area S3 Shipman Plant 3

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Process Management

Predictive Maintenance Summary Report

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Urgency	Equipment	Problem	Extended Description
Alarm	SH3CNDPMPA Condensate Pump A	18-Jul-06 - Looseness - Motor	
Alarm	SH3FWSMTRA Feed Water Pump Motor A	18-Jul-06 - Looseness - Motor	Continued Call: The motor is showing indicating a low amplitude level of looseness across the entire machine. The motor inboard peakvue point is displaying an increase in the Pk-Pk parameter. I would recommend that the motor bearings be inspected to verify that they are properly lubricated. Please continue collecting monthly data on this machine.
Watch	SH3BCWPMP Bearing Cooling Water Pump 3	18-Jul-06 - Imbalance - Motor	Continued Call: The attached plots are still showing a strong 1x turning speed peak. This is most likely due to an imbalance issue. Is this a vertical motor? I am wondering why there are no vertical defined on this motor. Please continue month data collection on this machine.
Watch	SH3CIRMTRA Circulating Pump Motor A	18-Jul-06 - Looseness - Motor	Continued Call: The attached motor plots are still displaying a higher than normal 1x parameter band. This is indicating that a looseness issue is present on this machine. I am also seeing electrical energy across the motor due to the looseness. The amplitude levels are low at this time, but they are higher than normal. I would recommend that the mounting bolts be checked to verify that the bolts are tight and not loose, broken, or stretched. Please continue collecting monthly data on this machine.
Watch	SH3CNDPMPB Condensate Pump B	18-Jul-06 - Looseness - Motor	Continued Call: No data was collected on the pump during this data collection. The motor is showing a large decrease in vibration levels. Was any maintenance preformed on this machine? The 1x peak is around ~.3 in/sec but this is down from .8 in/sec. If the vibration levels remain constant during the next data collection I will close off this problem.
Watch	SH3FWSMTRB Feed Water Pump Motor B	18-Jul-06 - Electrical defect - Motor	Continued Call: The attached plots show an electrical energy frequency on the motor. The common cause of electrical energy is looseness in or around the motor itself. I have made this a watch call so that I can watch it in the future. No action is needed at this time except to collect monthly data on this machine.

Area: S4 Shipman Plant 4

Urgency	Equipment	Problem	Extended Description

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Process Management

Predictive Maintenance Summary Report

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Alarm	SH4BCWPMP Bearing Cooling Water Pump 4	18-Jul-06 - Looseness	Continued Call: The 1x turning speed peak is still present, but the amplitude levels have decreased. I am lowering the severity of this problem to an alarm status. The 1x peak could mean that the motor is internally unbalanced and the looseness could be a direct result of this. What are the most common issues or problems that are had with this machine? I would still recommend that the motor be scheduled for maintenance to check for any causes of looseness. This motor has always had high readings since data was first collected.
Alarm	SH4IDFAN ID Fan	18-Jul-06 - Imbalance - Air Handler (Fan)	Continued Call: The attached plots are showing a high 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue. The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.
Watch	SH4CNDPMPA Condensate Pump A	18-Jul-06 - Misalignment - Motor	Continued Call: The misalignment issue is still present. The pump points are beginning to display an increase in vibration levels due to the misalignment. I consider the levels to be still low at this time. I would suggest that if there is a coupling connecting the motor and pump that it be visually inspected for any problems.

EMERSON.
Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area H5 Hill Plant 5

Equipment H5CNDMTRB Condensate Pump Motor B

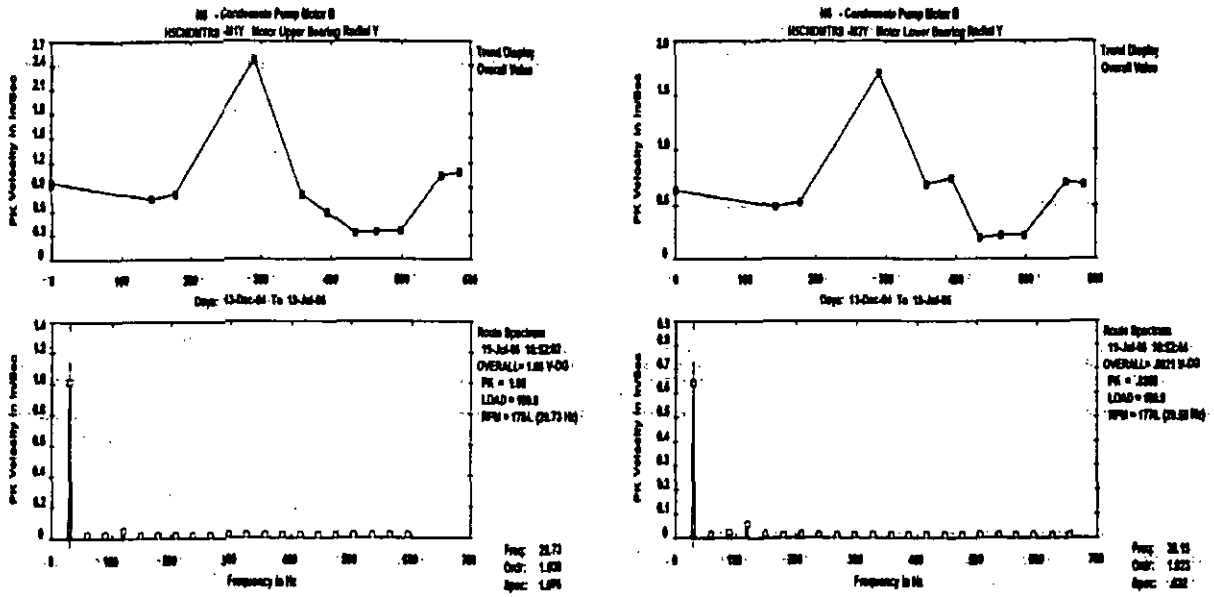
Urgency : High Alarm

Title: 19-Jul-06 - Looseness - Motor

Explanation: Continued Call:

The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well.

I would recommend that maintenance be scheduled on this machine on the next 1-2 months.



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Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area H5 Hill Plant 5

Equipment H5CIRCMTRA Circulating Pump Motor 5-A

Urgency:

Alarm

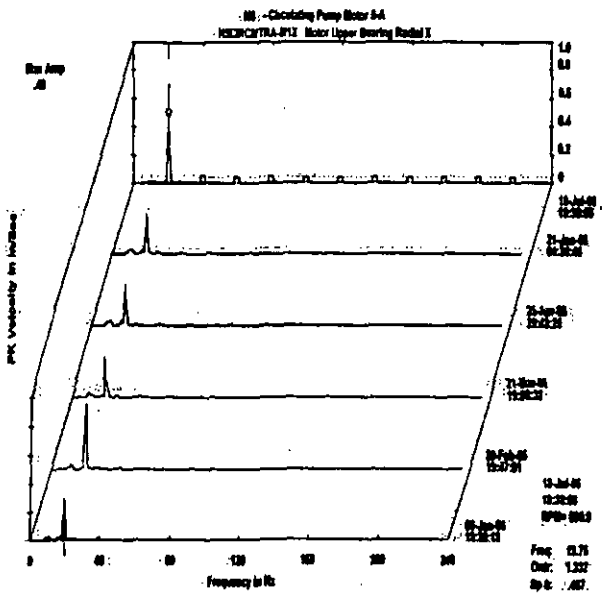
Title: 18-Jul-06 - Looseness

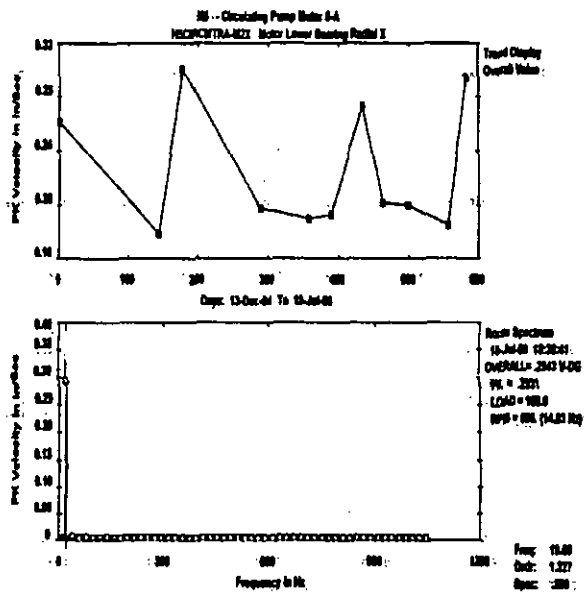
Explanation: Continued Call:

Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine.

The trend data is indicating that the amplitude levels are the highest that this machine has seen.

I would recommend that maintenance be scheduled on this machine in the next 1-2 months.





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Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area H5 Hill Plant 5

Equipment H5CNDMTRA Condensate Pump Motor A

Urgency:

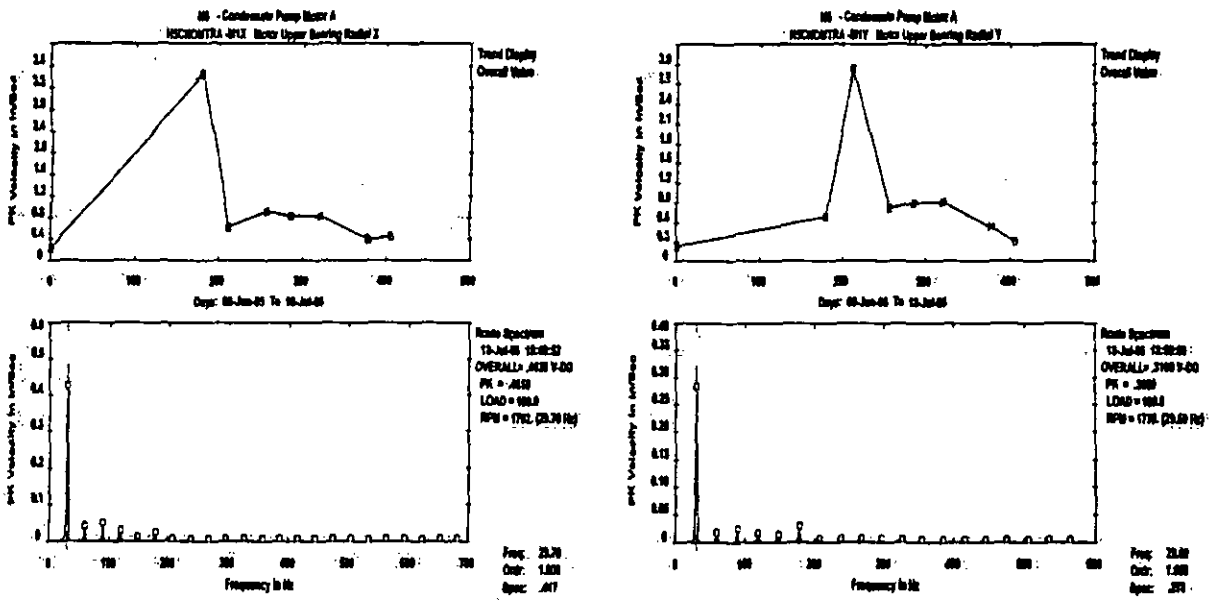
Alarm

Title: 18-Jul-06 - Imbalance - Motor

Explanation: Continued Call:

The amplitude levels have decreased slightly on this machine. The current levels are the lowest that this machine has seen, but this is still normally high levels for a typical motor and pump configuration.

I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be checked for any internal looseness as well as any internal imbalance.



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Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area **PUNA** **Puna**

Equipment **PUCDMUMTRA Cond Make-up Pump Motor A**

Urgency:

Alarm

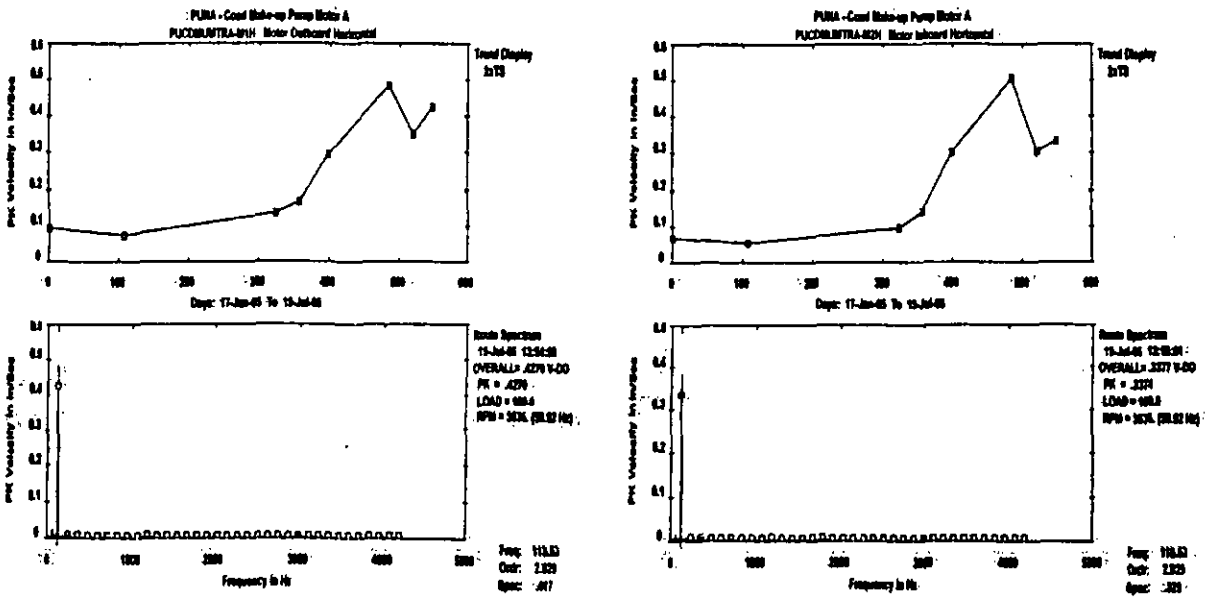
Title: 19-Jul-06 - Electrical defect - Motor

Explanation: Continued Call:

The attached plots are showing a high 2x turning speed peak at ~120 Hz. This is most likely due to an electrical issue. The motor us running very close to 60 Hz which of course shows to 2x peak around an electrical defect frequency.

I would like to have the power cut to this motor while the 2130 is in monitor mode collecting data. If the large 2x peak disappears quickly when the power is turned off then it is an electrical issue. If the peak remains and slowly goes down then it is a misalignment issue.

The motor is also indicating signs of imbalance which could explain the electrical energy that is being displayed. I would recommend that maintenance be scheduled on this machine in the next 2-3 months.



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Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area PUNA Puna

Equipment PUSVCFLPMP Flush Pump

Title: 19-Jul-06 - Stuctural fatigue

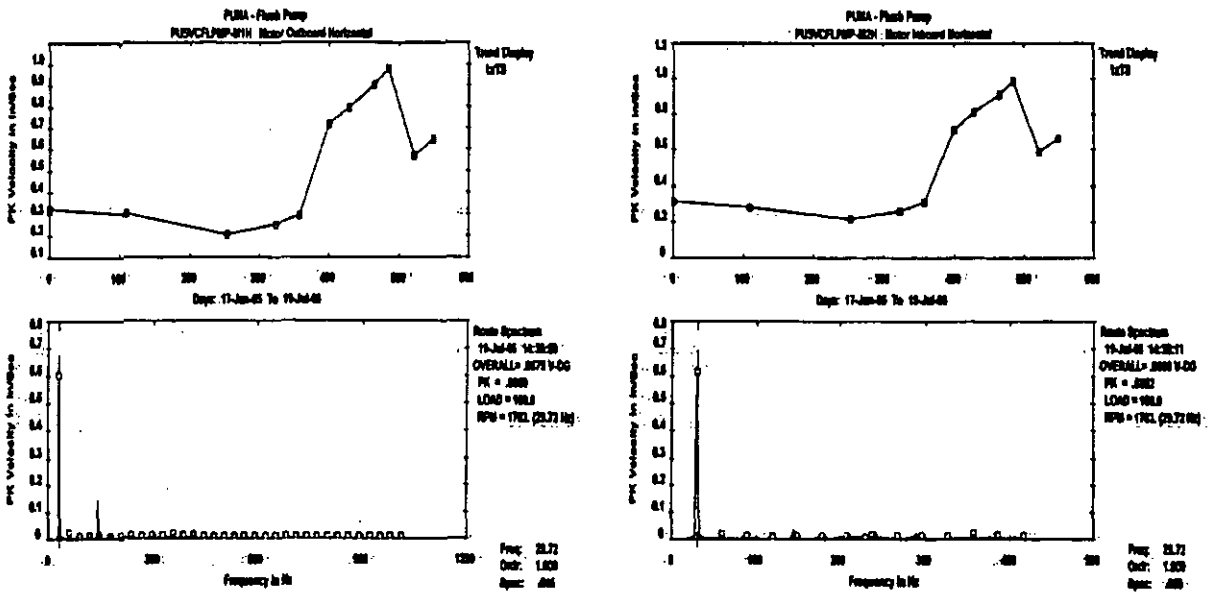
Urgency :

Alarm

Explanation: Continued Call:

The attached plots are still displaying a large vibration levels, but only in the horizontal direction. The high amplitude levels are present across the entire machine. This is usually seen when a resonance or structural issue is present.

Please inspect the structure for loose feet, cracked or broken welds.



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Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S3 Shipman Plant 3

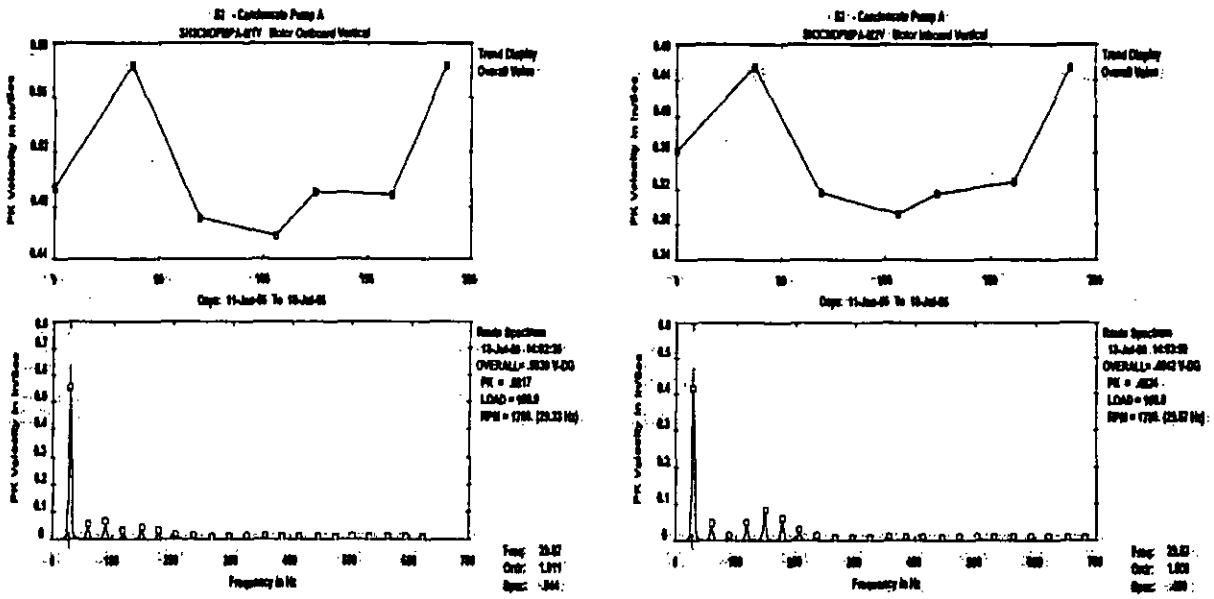
Equipment SH3CNDPMPA Condensate Pump A

Title: 18-Jul-06 - Looseness - Motor

Urgency:

Alarm

Explanation:



EMERSON.
Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3FWSMTRA Feed Water Pump Motor A

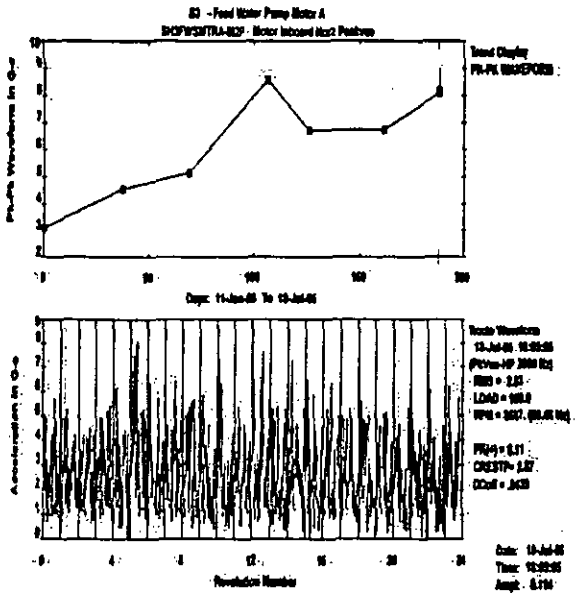
Urgency : Alarm

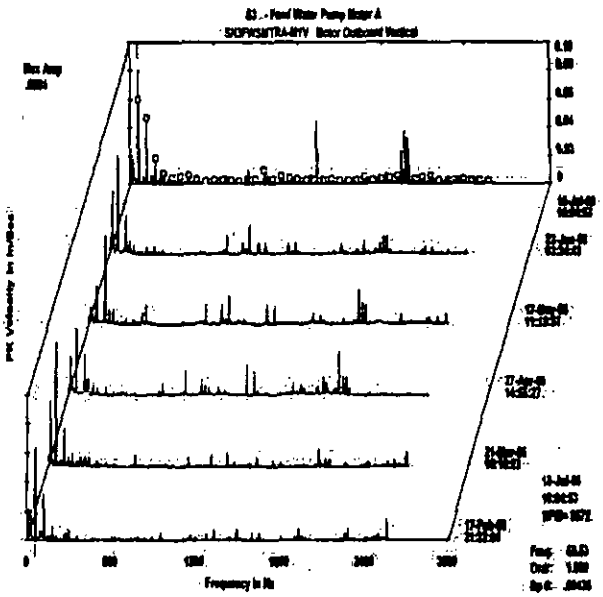
Title: 18-Jul-06 - Looseness - Motor

Explanation: Continued Call:

The motor is showing indicating a low amplitude level of looseness across the entire machine. The motor inboard peakvue point is displaying an increase in the Pk-Pk parameter.

I would recommend that the motor bearings be inspected to verify that they are properly lubricated. Please continue collecting monthly data on this machine.





EMERSON.
Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3BCWPMP Bearing Cooling Water Pump 3

Urgency: Watch

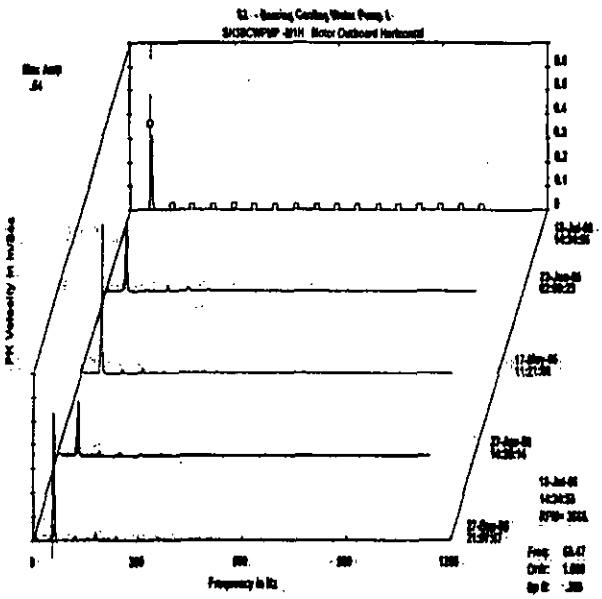
Title: 18-Jul-06 - Imbalance - Motor

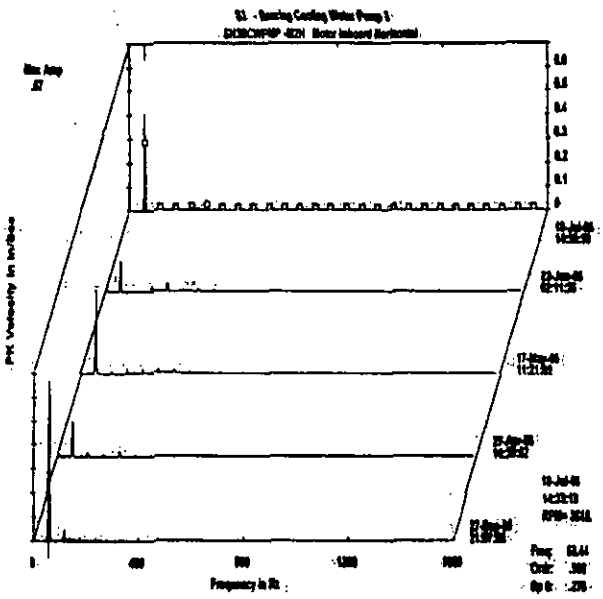
Explanation: Continued Call:

The attached plots are still showing a strong 1x turning speed peak. This is most likely due to an imbalance issue.

Is this a vertical motor? I am wondering why there are no vertical defined on this motor.

Please continue month data collection on this machine.





EMERSON
Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3CIRMTRA Circulating Pump Motor A

Urgency: Watch

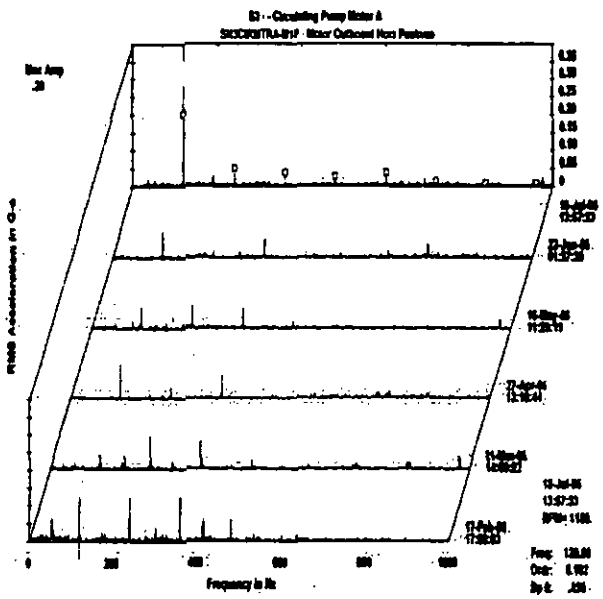
Title: 18-Jul-06 - Looseness - Motor

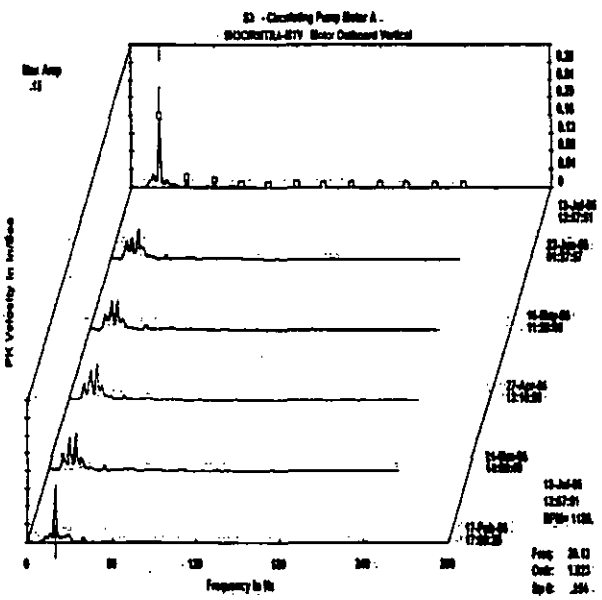
Explanation: Continued Call:

The attached motor plots are still displaying a higher than normal 1x parameter band. This is indicating that a looseness issue is present on this machine. I am also seeing electrical energy across the motor due to the looseness.

The amplitude levels are low at this time, but they are higher than normal.

I would recommend that the mounting bolts be checked to verify that the bolts are tight and not loose, broken, or stretched. Please continue collecting monthly data on this machine.





EMERSON.
Process Management

Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3CNDPMPB Condensate Pump B

Urgency :

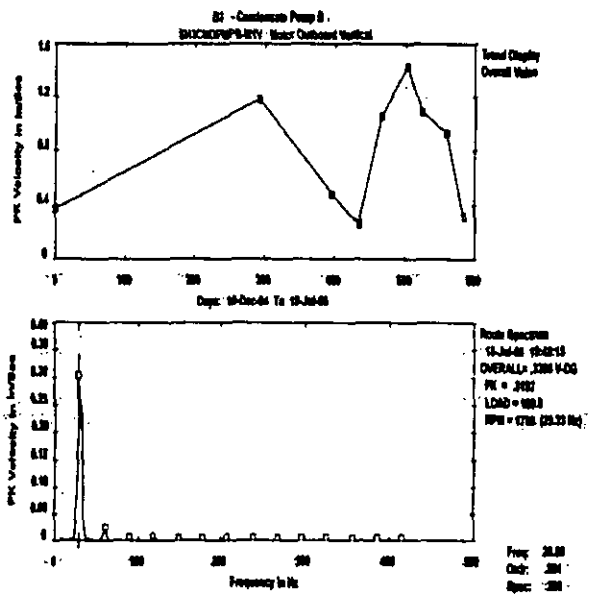
Watch

Title: 18-Jul-06 - Looseness - Motor

Explanation: Continued Call:

No data was collected on the pump during this data collection. The motor is showing a large decrease in vibration levels. Was any maintenance preformed on this machine?

The 1x peak is around ~.3 in/sec but this is down from .8 in/sec. If the vibration levels remain constant during the next data collection I will close off this problem.



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Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S3 Shipman Plant 3

Equipment SH3FWSMTRB Feed Water Pump Motor B

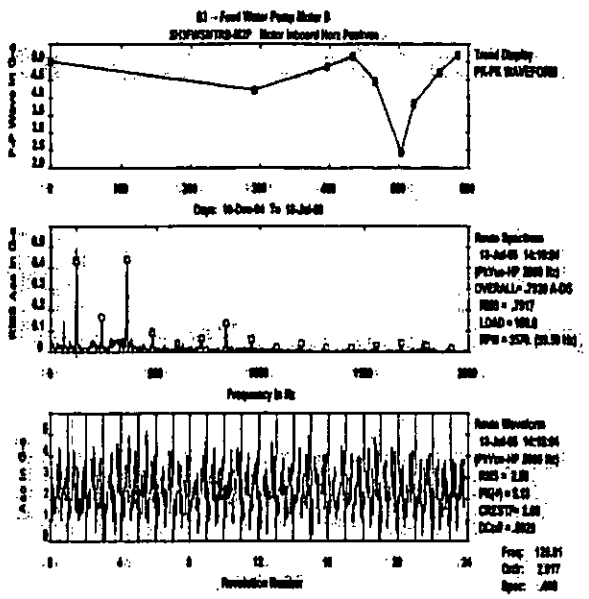
Urgency : Watch

Title: 18-Jul-06 - Electrical defect - Motor

Explanation: Continued Call:

The attached plots show an electrical energy frequency on the motor. The common cause of electrical energy is looseness in or around the motor itself.

I have made this a watch call so that I can watch it in the future. No action is needed at this time except to collect monthly data on this machine.



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Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4BCWPMP Bearing Cooling Water Pump 4

Urgency: Alarm

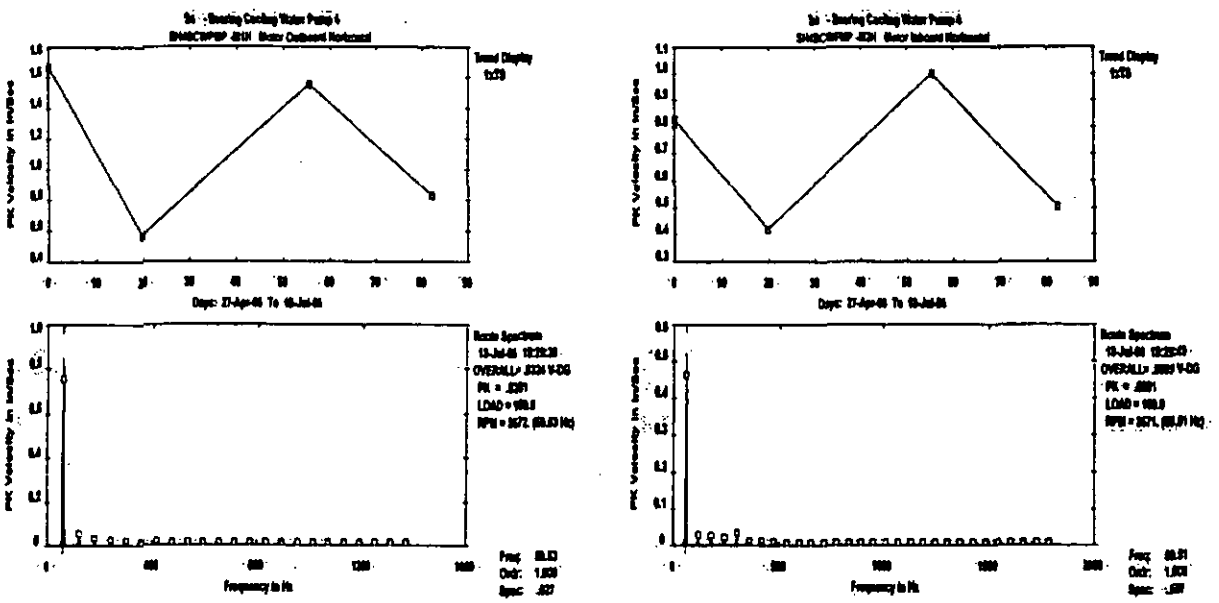
Title: 18-Jul-06 - Looseness

Explanation: Continued Call:

The 1x turning speed peak is still present, but the amplitude levels have decreased. I am lowering the severity of this problem to an alarm status.

The 1x peak could mean that the motor is internally unbalanced and the looseness could be a direct result of this. What are the most common issues or problems that are had with this machine?

I would still recommend that the motor be scheduled for maintenance to check for any causes of looseness. This motor has always had high readings since data was first collected.



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Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4IDFAN ID Fan

Urgency:

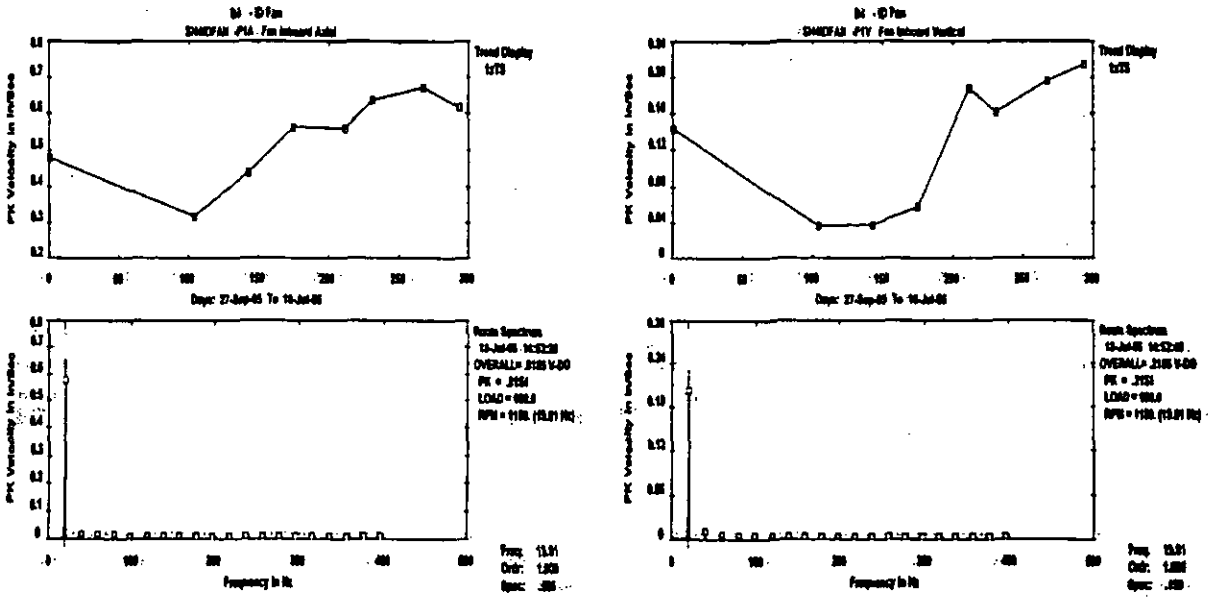
Alarm

Title: 18-Jul-06 - Imbalance - Air Handler (Fan)

Explanation: Continued Call:

The attached plots are showing a high 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue.

The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.



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Predictive Maintenance Detail Report

08/02/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4CNDPMPA Condensate Pump A

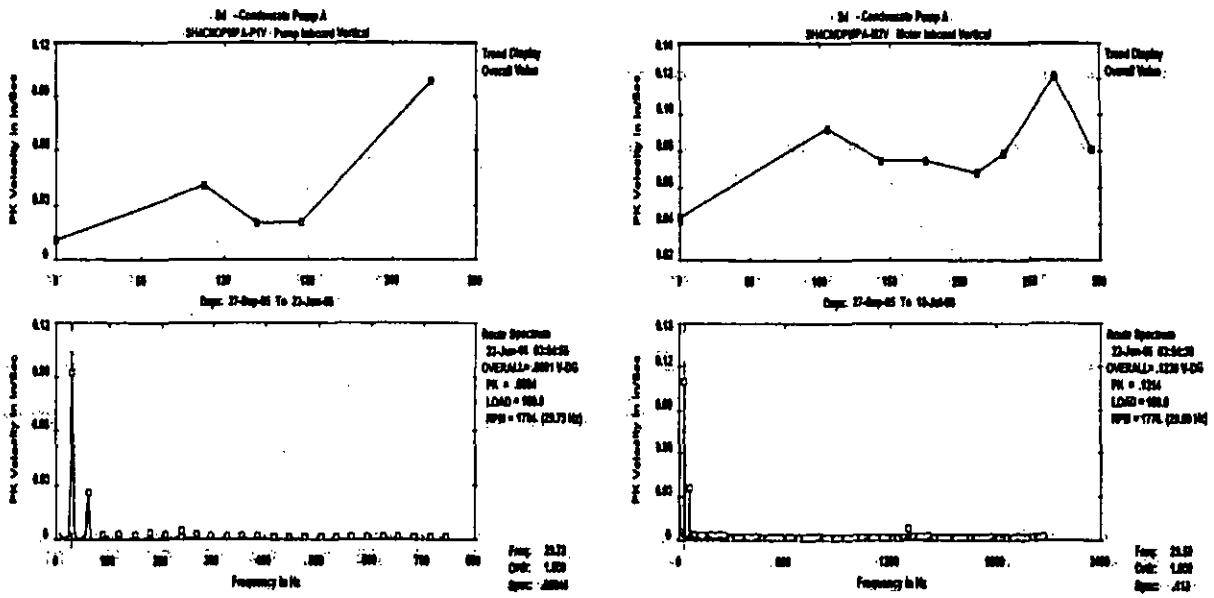
Urgency: Watch

Title: 18-Jul-06 - Misalignment - Motor

Explanation: Continued Call:

The misalignment issue is still present. The pump points are beginning to display an increase in vibration levels due to the misalignment.

I consider the levels to be still low at this time. I would suggest that if there is a coupling connecting the motor and pump that it be visually inspected for any problems.



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Mickey Harp
Analyst, Analysis Services

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September 1, 2006

Mr. Andy Ho
Mr. Craig Yamamoto
Mr. Norman Verbanic
Ms. Lisa Dangelmaier
Mr. Norman Uchida

Hawaiian Electric and Light Co, Inc
54 Halekauila Street
Hilo, HI 96721-1027

Vibration data was collected at your facility on August 28-29, 2006. Analysis was performed on that equipment on September 1, 2006. The attached report is intended to inform you of any significant machinery problems identified during this analysis.

Shipment Plant 3 was down for repairs at the time that data was collected. No data was collected on Shipment Plant 3 due to the schedule maintenance.

CSI is committed to providing World Class Predictive Maintenance technologies and ensuring customer satisfaction. If you have any questions concerning any of the information contained in this report please feel free to contact me. I would like to thank you for allowing CSI Services to assist you in your Reliability Based Maintenance efforts.

If you have any questions or concerns please feel free to contact me at anytime.

Mickey Harp,
Analyst, Analysis Services

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[illegible]		[illegible]					
Shipman Plant 3							
Turbine #3	Shipman 3	OK	OK	OK	OK	NT	
Circulating Pump Motor A	SH3CIRMTRA	[illegible]	[illegible]	[illegible]	[illegible]	NT	
Circulating Pump A	SH3CIRPMPA	NT	NT	NT	NT	NT	
Cirulating Pump Motor B	SH3CIRMTRB	OK	OK	OK	OK	NT	
Circulating Pump B	SH3CIRPMPB	NT	NT	NT	NT	NT	
Condensate Pump A	SH3CNDPMPA	[illegible]	[illegible]	[illegible]	[illegible]	NT	
Condensate Pump B	SH3CNDPMPB	[illegible]	[illegible]	[illegible]	[illegible]	NT	
FD/ID Fan Motor	SH3FDIDMTR	OK	OK	OK	OK	NT	
ID Fan	SH3IDFAN	OK	OK	OK	OK	NT	
FD Fan	SH3FDFAN	OK	OK	OK	OK	NT	
Air Preheater Motor A	SH3APHMTRA	OK	OK	OK	NR	NT	
Air Preheater Motor B	SH3APHMTRB	OK	OK	OK	NR	NT	
Evaporator Pump A	SH3EVPPMPA	NR	NR	NR	NR	NT	
Evaporator Pump B	SH3EVPPMPB	NR	NR	NR	NR	NT	
Feed Water Pump Motor A	SH3FWSMTRA	[illegible]	[illegible]	[illegible]	[illegible]	NT	
Feed Water Pump A	SH3FWSPMPA	OK	NR	NR	NR	NT	
Feed Water Pump Motor B	SH3FWSMTRB	[illegible]	[illegible]	[illegible]	[illegible]	NT	
Feed Water Pump B	SH3FWSPMPB	OK	OK	OK	OK	NT	
Drip Pump Motor A	SCAPH-A	NR	NR	NR	NR	NT	
Drip Pump A	SCAPHP-A	NR	NR	NR	NR	NT	
Drip Pump Motor B	SCAPH-B	[illegible]	NT	[illegible]	NT	NT	
Drip Pump B	SCAPHP-B	[illegible]	NT	NT	NT	NT	
Fuel Oil Pump A	SH3FOSPMPA	NR	NR	NR	NR	NT	
Fuel Oil Pump B	SH3FOSPMPB	[illegible]	[illegible]	NR	OK	NT	
Fuel Oil CD Pump	SH3FOCDPMP	OK	OK	OK	OK	NT	
Service Water Pump A	SH3SVCPMPA	OK	OK	OK	OK	NT	
Service Water Pump B	SH3SVCPMPB	OK	OK	OK	OK	NT	
Bearing Cooling Water Pump 3	SH3BCWPMP	[illegible]	[illegible]	[illegible]	[illegible]	NT	
#1 Joy Air Compressor Motor	#1SHAIRJOY	OK	OK	[illegible]	OK	NT	
#1Joy Air Compressor	SHAIRJOY#1	OK	OK	OK	OK	NT	
#2 Joy Air Compressor Motor	#2SHAIRJOY	OK	OK	OK	NR	NT	
#2Joy Air Compressor	SHAIRJOY#2	OK	OK	OK	NR	NT	
Circ Water Pump Motor #1	SHCIRWMTR1	NT	NT	NT	NT	NT	
Circulating Water Pump #1	SHCIRWPMP1	NT	NT	NT	NT	NT	
Shipman Plant 4							
Turbine #4	Shipman 4	NR	OK	OK	OK	[illegible]	Looseness
Circulating Pump Motor A	SH4CIRMTRA	OK	OK	OK	OK	OK	
Circulating Pump A	SH4CIRPMPA	NT	NT	OK	NT	NT	
Cirulating Pump Motor B	SH4CIRMTRB	OK	OK	OK	OK	OK	
Circulating Pump B	SH4CIRPMPB	NT	NT	OK	NT	NT	
Condensate Pump A	SH4CNDPMPA	OK	[illegible]	[illegible]	[illegible]	[illegible]	Continued Call - Misalignment
Condensate Pump B	SH4CNDPMPB	[illegible]	OK	OK	OK	[illegible]	
FD/ID Fan Motor	SH4FDIDMTR	OK	OK	OK	OK	OK	
ID Fan	SH4IDFAN	3	3	3	3	3	Continued Call - Imbalance
FD Fan	SH4FDFAN	OK	OK	OK	OK	OK	
Air Preheater Motor A	SH4APHMTRA	OK	NT	NT	NR	NT	
Air Preheater Motor B	SH4APHMTRB	OK	OK	OK	OK	OK	
Evaporator Pump A	SH4EVPPMPA	NT	NT	NT	NR	NR	
Evaporator Pump B	SH4EVPPMPB	NT	NT	NT	NR	NR	
Feed Water Pump Motor A	SH4FWSMTRA	[illegible]	OK	OK	OK	OK	
Feed Water Pump A	SH4FWSPMPA	NT	NT	OK	NT	NT	
Feed Water Pump Motor B	SH4FWSMTRB	NT	OK	OK	NR	[illegible]	Electrical Energy
Feed Water Pump B	SH4FWSPMPB	NT	OK	OK	NT	NT	
Drip Pump Motor A	SCAPH-A	NT	NT	NT	NT	NT	
Drip Pump A	SCAPHP-A	NT	NT	NT	NT	NT	
Drip Pump Motor B	SCAPH-B	NT	NT	NT	NT	NT	
Drip Pump B	SCAPHP-B	NT	NT	NT	NT	NT	
Fuel Oil Pump A	SH4FOSPMPA	OK	NT	NT	NR	OK	
Fuel Oil Pump B	SH4FOSPMPB	OK	OK	OK	OK	OK	
Fuel Oil CD Pump	SH4FOCDPMP	OK	OK	OK	OK	OK	
Service Water Pump A	SH4SVCPMPA	OK	OK	OK	OK	OK	
Service Water Pump B	SH4SVCPMPB	OK	OK	OK	OK	OK	
Bearing Cooling Water Pump 4	SH4BCWPMP	OK	3	[illegible]	3	[illegible]	
Water Treatment Sump Pump	SHWTSUMPMP	NT	NT	NT	NT	NT	

Hill Plant 5							
H5 Turbine	H5 Turb	NT	NT	NT	NT	NT	
H5A APH Drive Motor	H5A APHMTR	NT	NT	NT	NT	NT	
H5A APH Gearbox	H5A APHGBX	NT	NT	NT	NT	NT	
Circulating Pump Motor 5-A	H5CIRCMTRA	3	NT	3	3	3	Continued Call - Looseness
Circulating Pump 5-A	H5CIRCPMPA	NT	NT	NT	NT	NT	
Circulating Pump Motor 5-B	H5CIRCMTRB	OK	NT	OK	OK	OK	
Circulating Pump 5-B	H5CIRCPMPB	NT	NT	NT	NT	NT	
Circulating Pump Motor 5-C	H5CIRCMTRC	OK	NT	OK	OK	OK	
Circulating Pump 5-C	H5CIRCPMPC	NT	NT	NT	NT	NT	
Service Air Compressor Motor	H5CASACMTR	OK	NT	NT	NT	NT	
Service Air Compressor	H5AIRSAC	OK	NT	NT	NT	NT	
Inst Air Compressor Motor	H5CAIACMTR	OK	NT	NT	NT	NT	
Instrument Air Compressor	H5AIRIAC	OK	NT	NT	NT	NT	
Condensate Pump Motor A	H5CNDMTRA	[illegible]	NT	3	3	3	Continued Call - Looseness and Imbalance
Condensate Pump A	H5CNDPMPA	NT	NT	NT	NT	NT	
Condensate Pump Motor B	H5CNDMTRB	3	NT	[illegible]			
Condensate Pump B	H5CNDPMPB	NT	NT	NT	NT	NT	
Condensate Transfer Pump Mtr	H5CNDTPMTR	OK	NT	NT	NT	OK	
Condensate Transfer Pump	H5CNDTFPMP	OK	NT	NT	NT	OK	
FD Fan Motor	H5DFFDMTR	OK	NT	OK	OK	OK	
FD Fan	H5DFFDFAN	OK	NT	OK	OK	OK	
Evaporator Pump	H5EVAPPMP	NT	NT	NT	OK	OK	
Feed Water Pump Motor 5A	H5FSFWMTRA	OK	NT	OK	OK	OK	
Feed Water Pump 5A	H5FSFWPMPA	OK	NT	OK	OK	OK	
Feed Water Pump Motor 5B	H5FSFWMTRB	3	NT	OK	OK	OK	
Feed Water Pump 5B	H5FSFWPMPB	OK	NT	OK	OK	OK	
Secondary Fuel Pump A	H5SECFPMPA	12	NT	NT	NT	OK	
Secondary Fuel Pump B	H5SECFPMPB	NT	NT	OK	OK	NT	
Service Water Pump Motor A	H5SVCWMTRA	OK	NT	NT	OK	OK	
Service Water Pump A	H5SVCWPMPA	OK	NT	NT	OK	OK	
Service Water Pump Motor B	H5SVCWMTRB	[illegible]	NT	NT	NT	OK	
Service Water Pump B	H5SVCWPMPB	OK	NT	NT	NT	OK	
NR6 Primary Fuel Oil Pump	HFOPRIPMPB	OK	NT	NT	OK	OK	
NR5 Primary Fuel Oil Pump A	HFOPRIPMPA	OK	NT	NT	OK	OK	
NR6 Primary Fuel Oil Pump B	HFOPRIPMPB	NT	NT	NT	NT	OK	
Aux Stm Lube Oil Pmp Turbine	H5ASLOPTRB	NT	NT	NT	NT	NT	
Turning Gear Oil Pump	H5TGOILPMP	NT	NT	NT	NT	NT	
#5 Diesel Oil Pump Motor	H5DFSDOMTR	NT	NT	NT	NT	NT	
#5 Diesel Oil Pump	H5DFSDOPMP	NT	NT	NT	NT	NT	
Hill Plant 6							
H6 Turbine	H6 TRB	NT	NT	NT	NT	NT	
H6APH Drive Motor	H6 APH MTR	NT	NT	NT	NT	NT	
H6 APH Gearbox	H6 APH GBX	NT	NT	NT	NT	NT	
Circulating Pump Motor 6-A	H6CIRCMTRA	OK	OK	OK	NT	OK	
Circulating Pump 6-A	H6CIRCPMPA	NT	NT	NT	NT	NT	
Circulating Pump Motor 6-B	H6CIRCMTRB	NT	NT	NT	NT	NT	
Circulating Pump 6-B	H6CIRCPMPB	NT	NT	NT	NT	NT	
Circulating Pump Motor 6-C	H6CIRCMTRC	OK	OK	OK	NT	OK	
Circulating Pump 6-C	H6CIRCPMPC	NT	NT	NT	NT	NT	
Circulating Pump Motor 6-D	H6CIRCMTRD	OK	OK	OK	NT	NT	
Circulating Pump 6-D	H6CIRCPMPD	NT	NT	NT	NT	NT	
Service Air Compressor Motor	H6AIRSAMTR	OK	OK	OK	NT	OK	
Service Air Compressor	H6AIRSAC	OK	OK	OK	NT	OK	
Instrument Air Compresr Motor	H6AIRIAMTR	OK	OK	OK	NT	OK	
Instrument Air Compressor	H6AIRIAC	OK	OK	OK	NT	OK	
IR Air Compressor Motor	H6AIRIRMTR	NT	NT	NT	NT	NT	
IR Air Compressor	H6AIRIRAC	NT	NT	NT	NT	NT	
IR Air Compressor Clng Fan	H6AIRIRCF	NT	NT	NT	NT	NT	
LP Heater Drip Pump	H6LHTRDPMP	OK	OK	OK	NT	OK	
Condensate Pump Motor A	H6CNDMTRA	OK	OK	OK	NT	OK	
Condensate Pump A	H6CNDPMPA	NT	NT	NT	NT	NT	
Condensate Pump Motor B	H6CNDMTRB	OK	OK	OK	NT	OK	
Condensate Pump B	H6CNDPMPB	NT	NT	NT	NT	NT	
FD Fan High Speed Motor	H6DFDHSMTR	OK	OK	OK	NT	OK	
FD Fan	H6FDFAN	OK	OK	OK	NT	NT	Looseness
FD Fan Low Speed Motor	H6DFDLSMTR	OK	OK	OK	NT	OK	
Evaporator Pump A	H6EVPPMPA	OK	OK	OK	NT	OK	
Evaporator Pump B	H6EVPPMPB	OK	OK	OK	NT	OK	
Feed Water Pump Mtr A	H6FWBFMTRA	OK	OK	OK	NT	OK	
Feed Water Pump 6A	H6FWBFPMPA	OK	OK	OK	NT	OK	
Feed Water Pump Mtr B	H6FWBFMTRB	OK	OK	OK	NT	NT	
Feed Water Pump 6B	H6FWBFPMPB	OK	OK	OK	NT	NT	
Secondary Fuel Oil Pump A	H6SFOPMPA	OK	OK	OK	NT	OK	
Secondary Fuel Oil Pump B	H6SFOPMPB	OK	NT	3	NT	NT	
Rebir Cond Drain Tank Pump A	H6CNDDTKPA	OK	NT	NT	NT	OK	
Rebir Cond Drain Tank Pump B	H6CNDDTKPB	OK	3	[illegible]	NT	3	Continued Call - Looseness
Service Water Pump A	H6SVCWPMPA	OK	OK	OK	NT	OK	
Service Water Pump B	H6SVCWPMPB	OK	OK	OK	NT	OK	
Booster Pump	H6SVCBPMP	NT	NT	NT	NT	NT	
Gland Seal Pump	H6GLSLPMP	OK	NT	NT	NT	NT	
DC Lube Oil Pump	H6DCLOPMP	OK	OK	OK	NT	NT	
Turning Gear Lube Oil Pump	H6TGLOPMP	NT	OK	OK	NT	NT	
Aux Lube Oil Pump	H6SALOPMP	OK	OK	OK	NT	OK	
Diesel Oil Pump Motor A	H6DFDOMTRA	OK	OK	NT	NT	OK	
Diesel Oil Pump A	H6DFDOPMPA	OK	OK	NT	NT	OK	
Diesel Oil Pump Motor B	H6DFDOMTRB	OK	OK	NT	NT	OK	
Diesel Oil Pump B	H6DFDOPMPB	OK	OK	NT	NT	OK	

PUMA							
Puma Turbine	Turbine	NT	NT	NT	NT	NT	
Circ Water Pump Motor A	PUCWPMTRA	OK	OK	OK	OK	OK	
Circ Water Pump Motor B	PUCWPMTRB	OK	OK	OK	OK	OK	
Circ Water Pump Motor C	PUCWPMTRC	OK	OK	OK	OK	OK	
Plant Air Compressor Motor A	PUAIRMTRA	NT	OK	OK	OK	OK	
Plant Air Compressor A	PUAIRCOMPA	NT	OK	OK	OK	OK	
Plant Air Compressor Motor B	PUAIRMTRB	OK	OK	OK	OK	OK	
Plant Air Compressor B	PUAIRCOMPB	OK	OK	OK	OK	OK	
Cond Drain Pmp to MU Tank	PUCDNTKPMP	NT	NT	OK	NT	NT	
Cond Make-up Pump Motor A	PUCDMUMTRA	NT	3	3	3	3	Continued Call - Electrical Defect
Cond Make-up Pump A	PUCDMUPMPA	NT	OK	OK	OK	OK	
Cond Make-up Pump Motor B	PUCDMUMTRB	OK	OK	OK	OK	OK	
Cond Make-up Pump B	PUCDMUPMPB	OK	OK	OK	OK	OK	
Condensate Pump Motor A	PUCONDMTRA	OK	OK	OK	OK	OK	
Condensate Pump A	PUCONDPMPA	OK	OK	OK	OK	OK	
Condensate Pump Motor B	PUCONDMTRB	OK	OK	OK	OK	OK	
Condensate Pump B	PUCONDPMPB	OK	2	OK	OK	OK	
Diesel Oil Pump A	PUDFOPMPA	OK	OK	OK	OK	OK	
Diesel Oil Pump B	PUDFOPMPB	NT	OK	OK	OK	OK	
ID High Speed Motor	PUIDHSMTR	OK	OK	OK	OK	OK	
ID Fan	PUDFIDFAN	OK	OK	OK	OK	OK	
ID Low Speed Motor	PUIDLSMTR	OK	OK	OK	OK	OK	
FD High Speed Motor	PUFDHSMTR	OK	OK	OK	OK	OK	
FD Fan	PUDFFDFAN	OK	OK	OK	OK	OK	
FD Low Speed Motor	PUFDLSMTR	OK	OK	OK	OK	OK	
Feed Water Pump Motor A	PUFSFWMTRA	OK	OK	OK	OK	OK	
Feed Water Pump A	PUFSFWPMPA	OK	OK	OK	OK	OK	
Feed Water Pump Motor B	PUFSFWMTRB	OK	OK	OK	OK	NT	
Feed Water Pump B	PUFSFWPMPB	OK	OK	OK	OK	NT	
Fuel Oil Transfer Pump	PUFOFWDPMP	OK	NT	OK	NT	2	Early Bearing Defect
Fuel Oil Unloading Pump	PUFOSULPMP	NT	NT	NT	NT	OK	
Fuel Oil Pump A	PUFOFOPMPA	OK	OK	OK	OK	OK	
Fuel Oil Pump B	PUFOFOPMPB	NT	OK	OK	OK	NT	
DC Bearing Oil Pump	PUDCBRGPMP	OK	NT	OK	NT	OK	
Vapor Extraction Pump	PUVPREXPMP	OK	OK	OK	OK	OK	
Lube Oil Pump A	PULOSPMPA	OK	OK	OK	OK	OK	
Lube Oil Pump B	PULOSPMPB	OK	OK	OK	NT	OK	
Service Water Pump A	PUSVCWPMPA	3	NT	NT	NR	3	Continued Call - Looseness
Service Water Pump B	PUSVCWPMPB	OK	NT	NT	NR	3	Looseness
HP Water Pump	PUSVCHPPMP		3	OK	OK	OK	
Flush Pump	PUSVCFLPMP			3	3	3	Continued Call - Resonance or Structure Fatigue
County Water Papaya Pump A	PUSCCWPMPA	OK	OK	OK	OK	NT	
County Water Papaya Pump B	PUSCCWPMPB	OK	OK	OK	OK	OK	
Hydraulic Pump Motor A	PUHYDPMTRA	OK	OK	OK	OK	OK	
Hydraulic Pump A	PUHYDPMPA	OK	OK	OK	OK	OK	
Hydraulic Pump Motor B	PUHYDPMTRB	OK	OK	OK	NT	OK	
Hydraulic Pump B	PUHYDPMPAB	OK	OK	OK	NT	OK	
Sump Pump	PUWTSMPPMP	NT	NT	NT	NT	NT	Access is difficult/dangerous
Gland Exhaust Pump	PUTGLESPMP	OK	OK	OK	OK	OK	

Condition Legend:

Priority 1	Emergency Situation	
Priority 2	High Alarm	
Priority 3	Alarm	3
Priority 4	Watch	2
Priority 5	Discussion Needed	
Not Running	Scheduled for test but not in operation	
Not Tested	Not Tested this survey	NT
Machine OK	Condition is acceptable for operation	OK

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Process Management

Predictive Maintenance Summary Report

09/01/06
harpm/1

Area: H5 Hill Plant 5

Urgency	Equipment	Problem	Extended Description
High Alarm	H5CNDMTRB Condensate Pump Motor B	29-Aug-06 - Looseness - Motor	Continued Call: The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well. I would recommend that maintenance be scheduled on this machine on the next 1-2 months.
Alarm	H5CIRCMTRA Circulating Pump Motor 5-A	29-Aug-06 - Looseness	Continued Call: Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine. An electrical frequency is also being displayed now due to the looseness issue. The trend data is indicating that the amplitude levels are the highest that this machine has seen. I would recommend that maintenance be scheduled on this machine in the next 1-2 months.
Alarm	H5CNDMTRA Condensate Pump Motor A	29-Aug-06 - Looseness	Continued Call: The amplitude levels have decreased slightly on this machine. The current levels are remaining constant for this machine, but this is still normally high levels for a typical motor and pump configuration. I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be checked for any internal looseness as well as any internal imbalance.

Area: H6 Hill Plant 6

Urgency	Equipment	Problem	Extended Description
Alarm	H6CNDDTKPB Rebir Cond Drain Tank Pump B	29-Aug-06 - Looseness - Motor	Continued Call: The looseness issue is still present, but the amplitude levels have decreased during this data collection readings. I have lowered the severity of this problem to an alarm status at this time. I would recommend that maintenance be scheduled in the next 1-2 months to check for causes of looseness on this machine.
Watch	H6FDFAN FD Fan	29-Aug-06 - Looseness	The attached plots are showing an increase in vibration levels due to a looseness issue. I would only recommend that monthly data be collected on this machine. If the amplitude levels continue to increase I will suggest that maintenance be scheduled for this machine.

Area: PUNA Puna

Urgency	Equipment	Problem	Extended Description

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Process Management

Predictive Maintenance Summary Report

09/01/06
harpm/1

Alarm	PUCDMUMTRA Cond Make-up Pump Motor A	30-Aug-06 - Electrical defect - Motor	Continued Call: The attached plots are showing a high 2x turning speed peak at ~120 Hz. This is most likely due to an electrical issue. The motor us running very close to 60 Hz which of course shows to 2x peak around an electrical defect frequency. I would like to have the power cut to this motor while the 2130 is in monitor mode collecting data. If the large 2x peak disappears quickly when the power is turned off then it is an electrical issue. If the peak remains and slowly goes down then it is a misalignment issue. The motor is also indicating signs of imbalance which could explain the electrical energy that is being displayed. I would recommend that maintenance be scheduled on this machine in the next 2-3 months.
Alarm	PUSVCFLPMP Flush Pump	30-Aug-06 - Stuctural fatigue	Continued Call: The attached plots are still displaying a large vibration levels, but only in the horizontal direction. The high amplitude levels are present across the entire machine. This is usually seen when a resonance or structural issue is present. Please inspect the structure for loose feet, cracked or broken welds.
Alarm	PUSVCWPMPA Service Water Pump A	30-Aug-06 - Looseness	Continued Call: Data has only been collected on this machine twice. Each time there was a high 1x turning peak present. The horizontal direction is where the highest amplitude levels are present. It appears that an imbalance function is present on this motor. The pump is showing signs of low level looseness. I would recommend that the pump be checked to verify that it is running on its curve. Please check the motor's mounting bolts and structure to make certain that the motor is secure.
Watch	PUFOFWDPMP Fuel Oil Transfer Pump	30-Aug-06 - Antifriction bearing defect	The attached peakvue plots are showing an unknown harmonic family. This appears to be an early bearing defect frequency. There are currently no bearings associated with this machine or any other machine in the database. I would request that the bearing information be email to be for the machines in the database. This will help create a stronger database once the bearing information is entered.
Watch	PUSVCWPMPB Service Water Pump B	30-Aug-06 - Looseness	The attached plots are displaying a low level looseness issue. The amplitude levels have increased quickly from the last time that data was collected. I would only recommend that monthly data be collected on this machine.

Area: S4 Shipman Plant 4
Urgency | Equipment | Problem | Extended Description

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Predictive Maintenance Summary Report

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High Alarm	SH4BCWPMP Bearing Cooling Water Pump 4	30-Aug-06 - Looseness	Continued Call: The 1x turning speed peak is still present, but the amplitude levels have decreased. I am lowering the severity of this problem to an alarm status. The 1x peak could mean that the motor is internally unbalanced and the looseness could be a direct result of this. What are the most common issues or problems that are had with this machine? I would still recommend that the motor be scheduled for maintenance to check for any causes of looseness. This motor has always had high readings since data was first collected.
Alarm	SH4IDFAN ID Fan	30-Aug-06 - Imbalance - Air Handler (Fan)	Continued Call: The attached plots are showing a high 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue. The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.
Watch	SH4CNDPMPA Condensate Pump A	30-Aug-06 - Misalignment	Continued Call: The misalignment issue is still present on this machine. No pump points were collecting during this data collection. I consider the levels to be still low at this time. I would suggest that if there is a coupling connecting the motor and pump that it be visually inspected for any problems.
Watch	SH4FWSMTRB Feed Water Pump Motor B	30-Aug-06 - Electrical defect - Motor	The attached plots are showing an increase in a known electrical defect frequency. I am only seeing it on the inboard of the motor at this time. The amplitude levels are still low. I would recommend that in the next few months that the mounting bolts on the motor be inspected to verify that they are properly tightened and that the motor feet are not cracked or damaged.
Watch	Shipman 4 Turbine #4	30-Aug-06 - Looseness	The attached plots are showing an increase of vibration levels in the vertical direction. They are the highest readings that have been recorded for this machine. The other points are also showing a slight increase in vibration levels. The looseness issue is present mostly in the vertical direction. The looseness could be originating for the sleeve bearings. I would recommend that this machine be closely watched. If the turbine has displacement probes mounted I would suggest that the readings be looked over to see if they are within specifications.

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Predictive Maintenance Detail Report

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Area H5 Hill Plant 5

Equipment H5CNDMTRB Condensate Pump Motor B

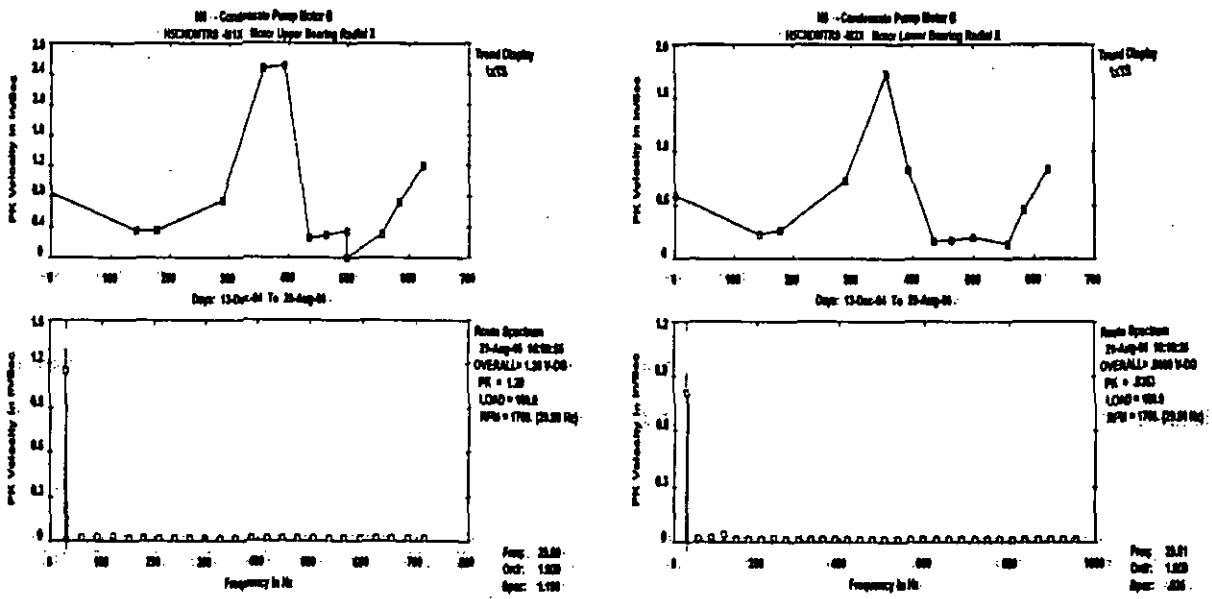
Urgency: High Alarm

Title: 29-Aug-06 - Looseness - Motor

Explanation: Continued Call:

The attached plots are indicating a high 1x turning speed peak which could be related to an imbalance or a looseness issue. It appears that this machine has always had high amplitude levels of vibration. I am also seeing electrical energy in the upper fmax which is usually indicates a looseness issue as well.

I would recommend that maintenance be scheduled on this machine on the next 1-2 months.



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Process Management

Predictive Maintenance Detail Report

09/01/06
harpm/1

Area H5 Hill Plant 5

Equipment H5CIRCMTRA Circulating Pump Motor 5-A

Urgency :

Alarm

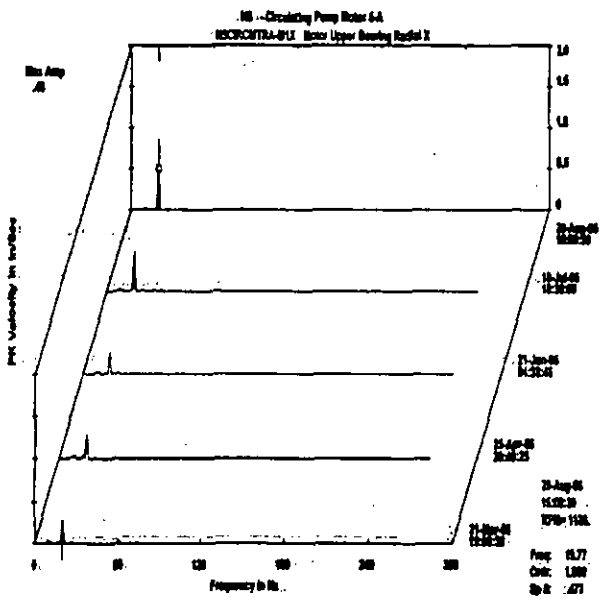
Title: 29-Aug-06 - Looseness

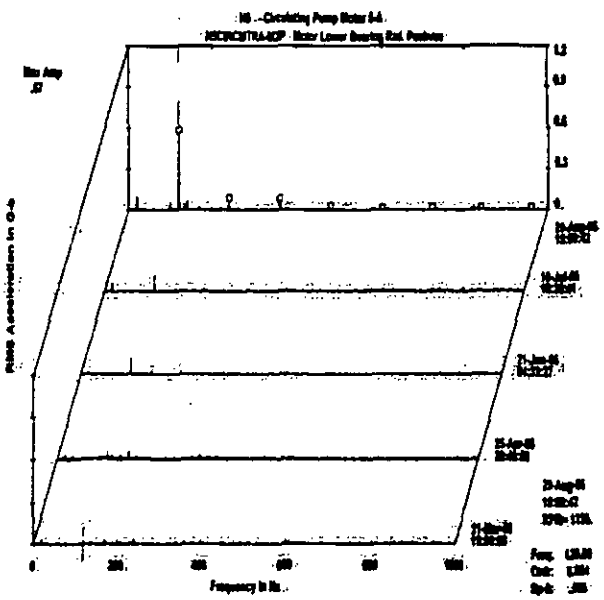
Explanation: Continued Call:

Please verify the speed of this machine. If the attached plots are true 1x turning speed peaks then a looseness issue is present on this machine. An electrical frequency is also being displayed now due to the looseness issue.

The trend data is indicating that the amplitude levels are the highest that this machine has seen.

I would recommend that maintenance be scheduled on this machine in the next 1-2 months.





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Process Management

Predictive Maintenance Detail Report

09/01/06
harpm/1

Area H5 Hill Plant 5

Equipment H5CNDMTRA Condensate Pump Motor A

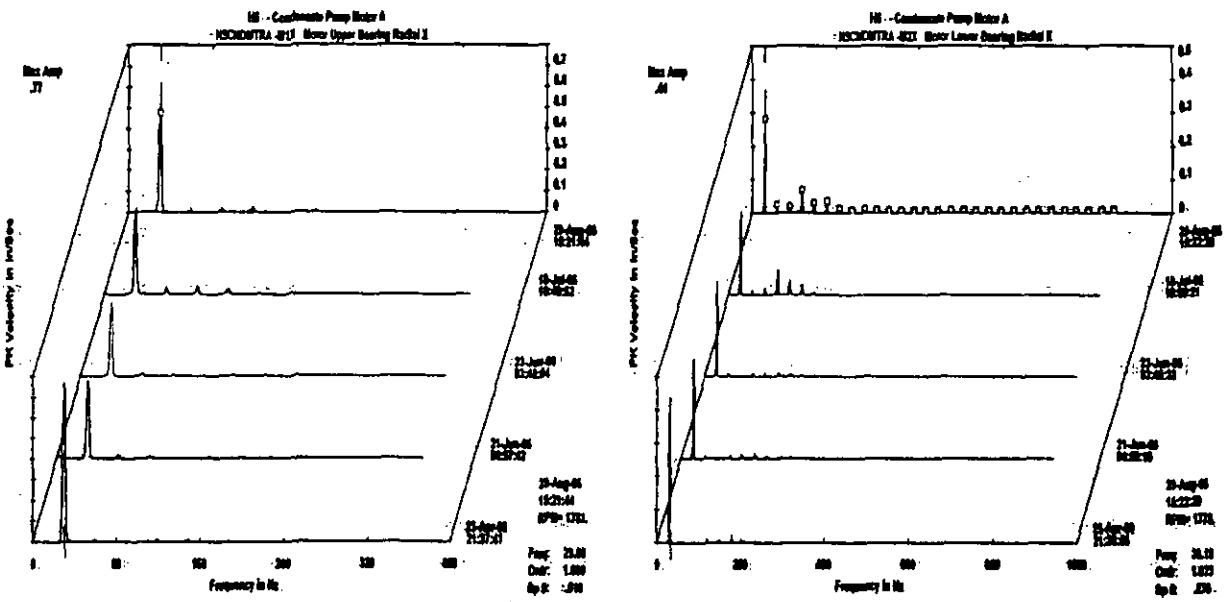
Urgency : Alarm

Title: 29-Aug-06 - Looseness

Explanation: Continued Call:

The amplitude levels have decreased slightly on this machine. The current levels are remaining constant for this machine, but this is still normally high levels for a typical motor and pump configuration.

I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be checked for any internal looseness as well as any internal imbalance.



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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area H6 Hill Plant 6

Equipment H6CNDDTKPB Rebir Cond Drain Tank Pump B

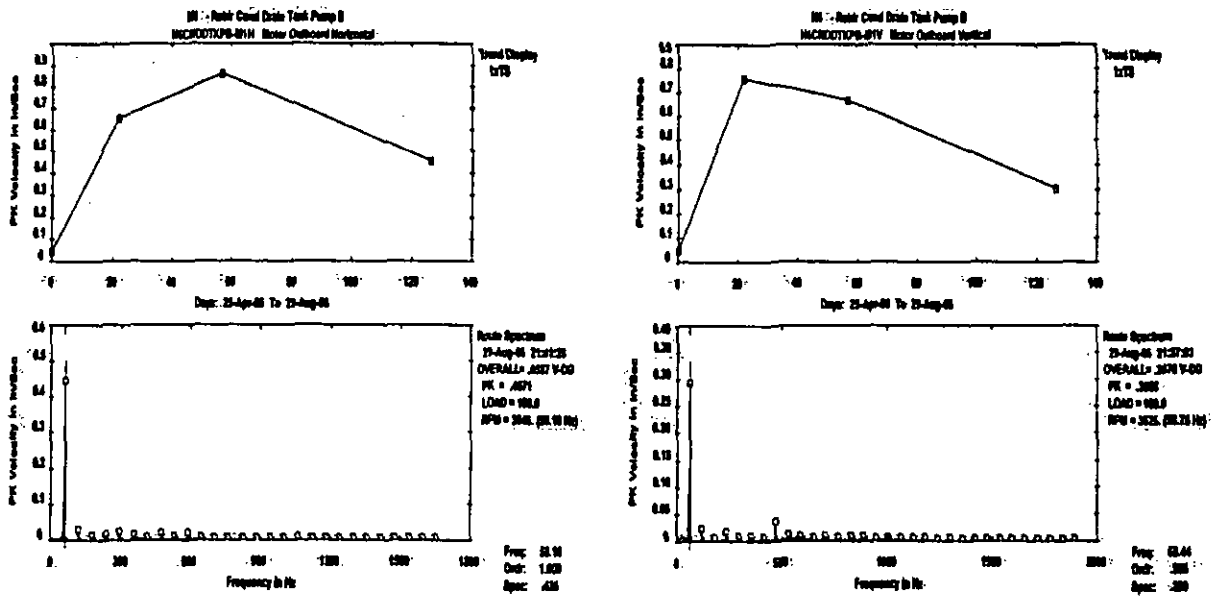
Urgency: Alarm

Title: 29-Aug-06 - Looseness - Motor

Explanation: Continued Call:

The looseness issue is still present, but the amplitude levels have decreased during this data collection readings. I have lowered the severity of this problem to an alarm status at this time.

I would recommend that maintenance be scheduled in the next 1-2 months to check for causes of looseness on this machine.



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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area H6 Hill Plant 6

Equipment H6FDFAN FD Fan

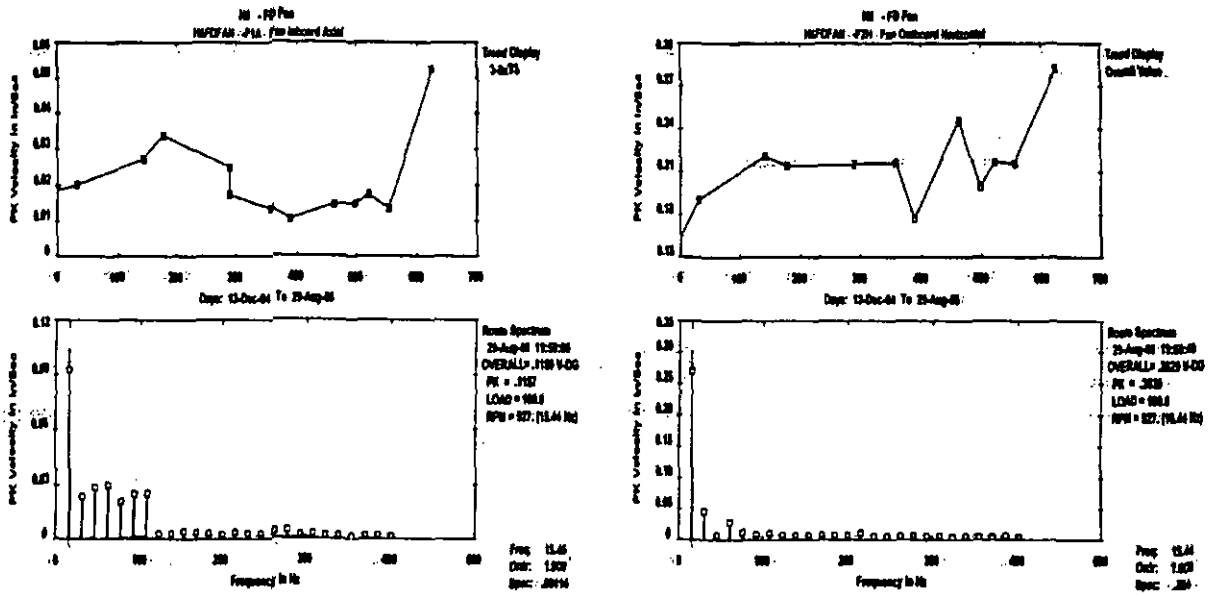
Urgency:

Watch

Title: 29-Aug-06 - Looseness

Explanation: The attached plots are showing an increase in vibration levels due to a looseness issue.

I would only recommend that monthly data be collected on this machine. If the amplitude levels continue to increase I will suggest that maintenance be scheduled for this machine.



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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area PUNA Puna

Equipment PUCDMUMTRA Cond Make-up Pump Motor A

Urgency : Alarm

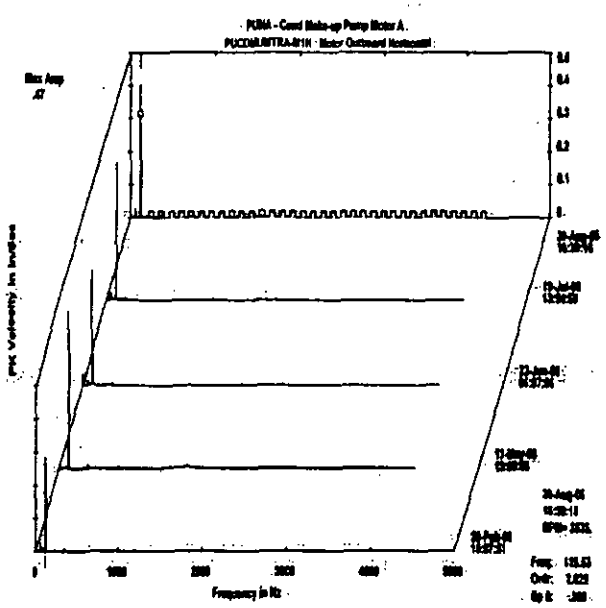
Title: 30-Aug-06 - Electrical defect - Motor

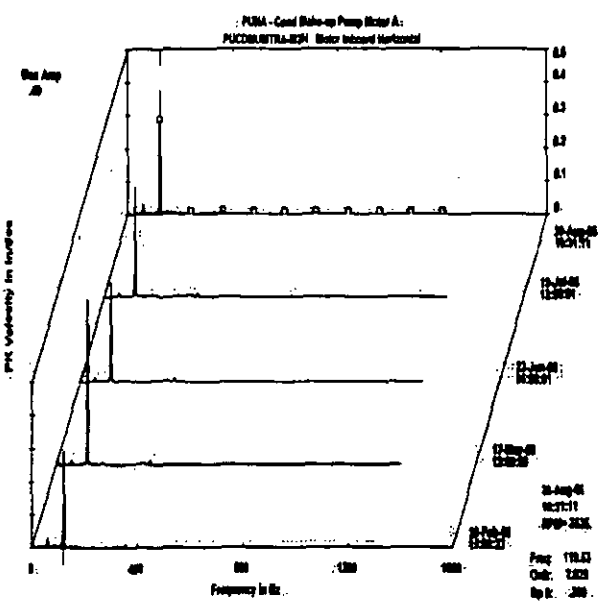
Explanation: Continued Call:

The attached plots are showing a high 2x turning speed peak at ~120 Hz. This is most likely due to an electrical issue. The motor us running very close to 60 Hz which of course shows to 2x peak around an electrical defect frequency.

I would like to have the power cut to this motor while the 2130 is in monitor mode collecting data. If the large 2x peak disappears quickly when the power is turned off then it is an electrical issue. If the peak remains and slowly goes down then it is a misalignment issue.

The motor is also indicating signs of imbalance which could explain the electrical energy that is being displayed. I would recommend that maintenance be scheduled on this machine in the next 2-3 months.





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Process Management

Predictive Maintenance Detail Report

09/01/06
harpm/1

Area PUNA Puna

Equipment PUSVCFLPMP Flush Pump

Title: 30-Aug-06 - Stuctural fatigue

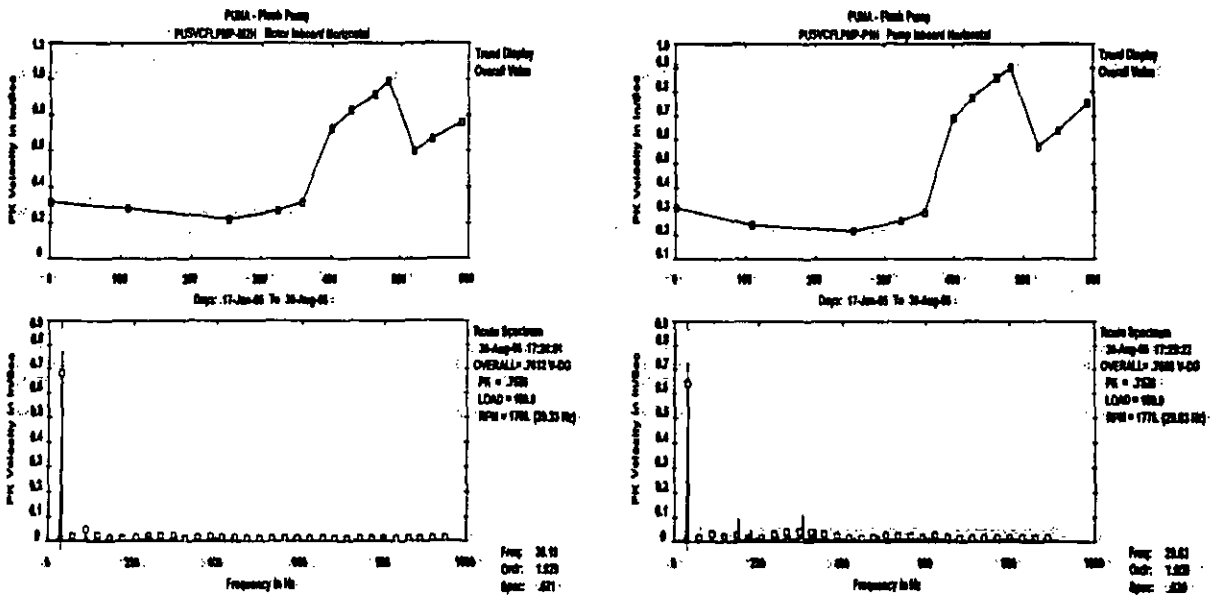
Urgency :

Alarm

Explanation: Continued Call:

The attached plots are still displaying a large vibration levels, but only in the horizontal direction. The high amplitude levels are present across the entire machine. This is usually seen when a resonance or structural issue is present.

Please inspect the structure for loose feet, cracked or broken welds.



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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area PUNA Puna

Equipment PUSVCWPMPA Service Water Pump A

Urgency:

Alarm

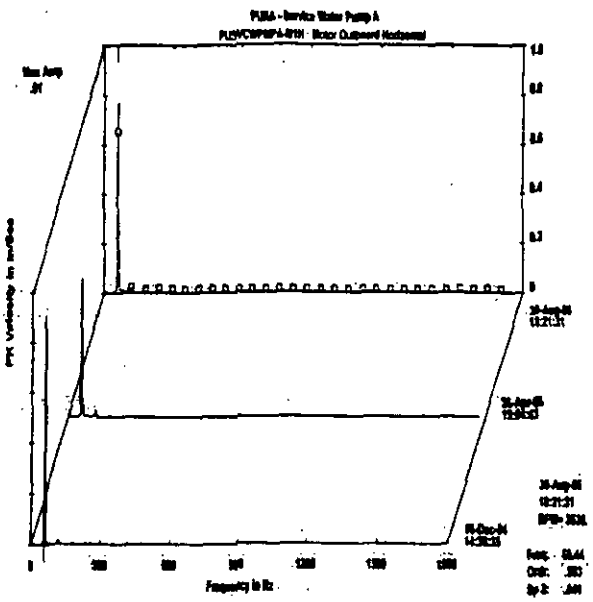
Title: 30-Aug-06 - Looseness

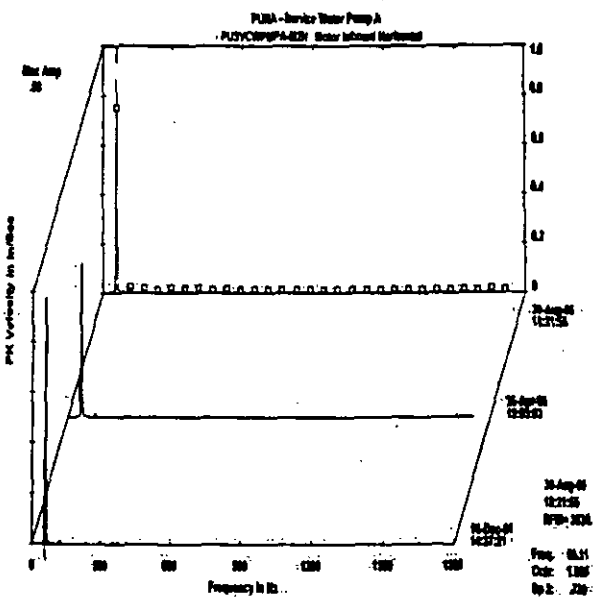
Explanation: Continued Call:

Data has only been collected on this machine twice. Each time there was a high 1x turning peak present. The horizontal direction is where the highest amplitude levels are present.

It appears that an imbalance function is present on this motor. The pump is showing signs of low level looseness.

I would recommend that the pump be checked to verify that it is running on its curve. Please check the motor's mounting bolts and structure to make certain that the motor is secure.





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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area PUNA Puna

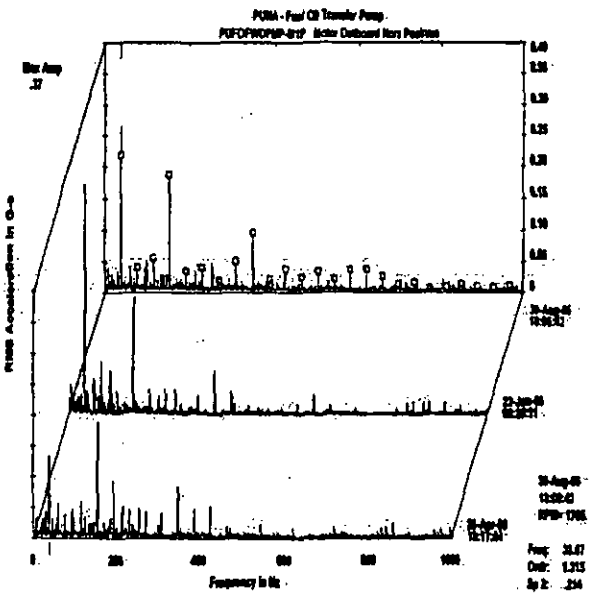
Equipment PUFOFWDPMP Fuel Oil Transfer Pump

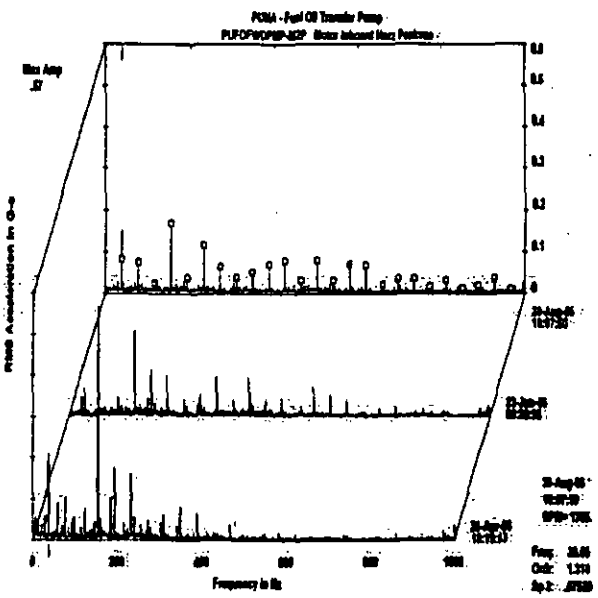
Urgency: Watch

Title: 30-Aug-06 - Antifriction bearing defect

Explanation: The attached peakvue plots are showing an unknown harmonic family. This appears to be an early bearing defect frequency. There are currently no bearings associated with this machine or any other machine in the database.

I would request that the bearing information be email to be for the machines in the database. This will help create a stronger database once the bearing information is entered.





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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area PUNA Puna

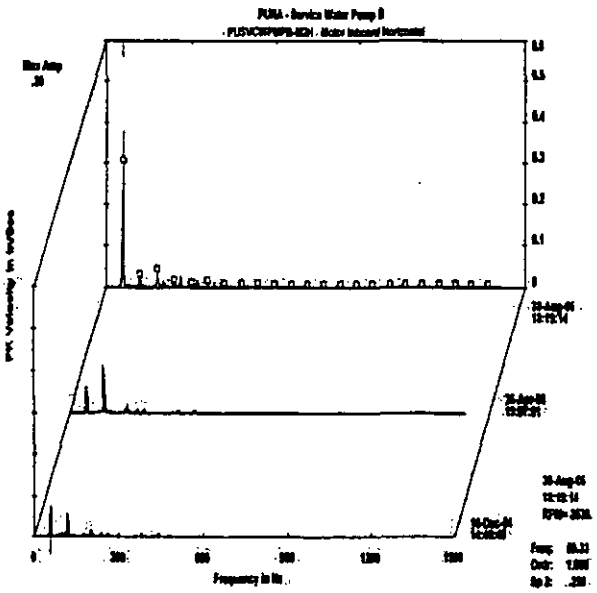
Equipment PUSVCWPMPB Service Water Pump B

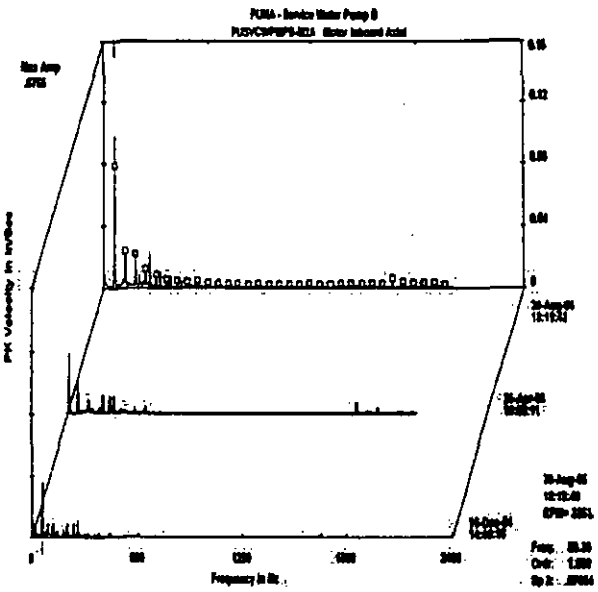
Urgency : Watch

Title: 30-Aug-06 - Looseness

Explanation: The attached plots are displaying a low level looseness issue. The amplitude levels have increased quickly from the last time that data was collected.

I would only recommend that monthly data be collected on this machine.





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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4BCWPMP Bearing Cooling Water Pump 4

Urgency : High Alarm

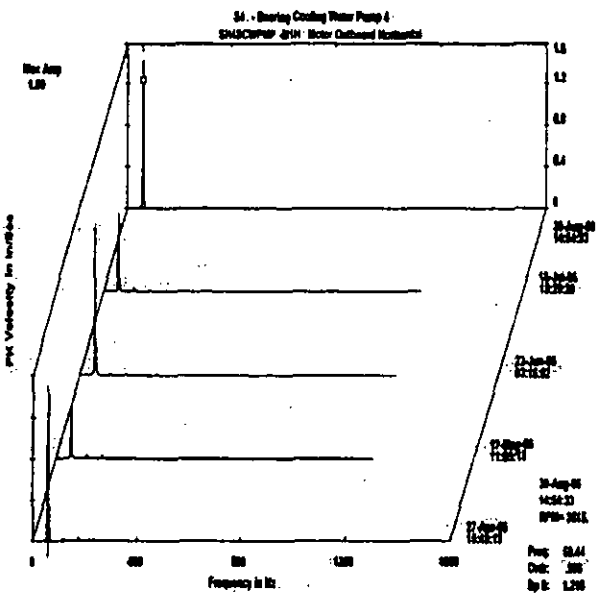
Title: 30-Aug-06 - Looseness

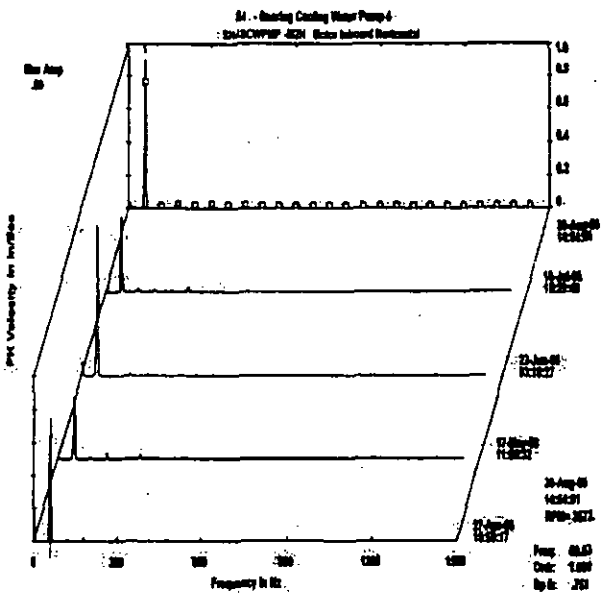
Explanation: Continued Call:

The 1x turning speed peak is still present, but the amplitude levels have decreased. I am lowering the severity of this problem to an alarm status.

The 1x peak could mean that the motor is internally unbalanced and the looseness could be a direct result of this. What are the most common issues or problems that are had with this machine?

I would still recommend that the motor be scheduled for maintenance to check for any causes of looseness. This motor has always had high readings since data was first collected.





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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4IDFAN ID Fan

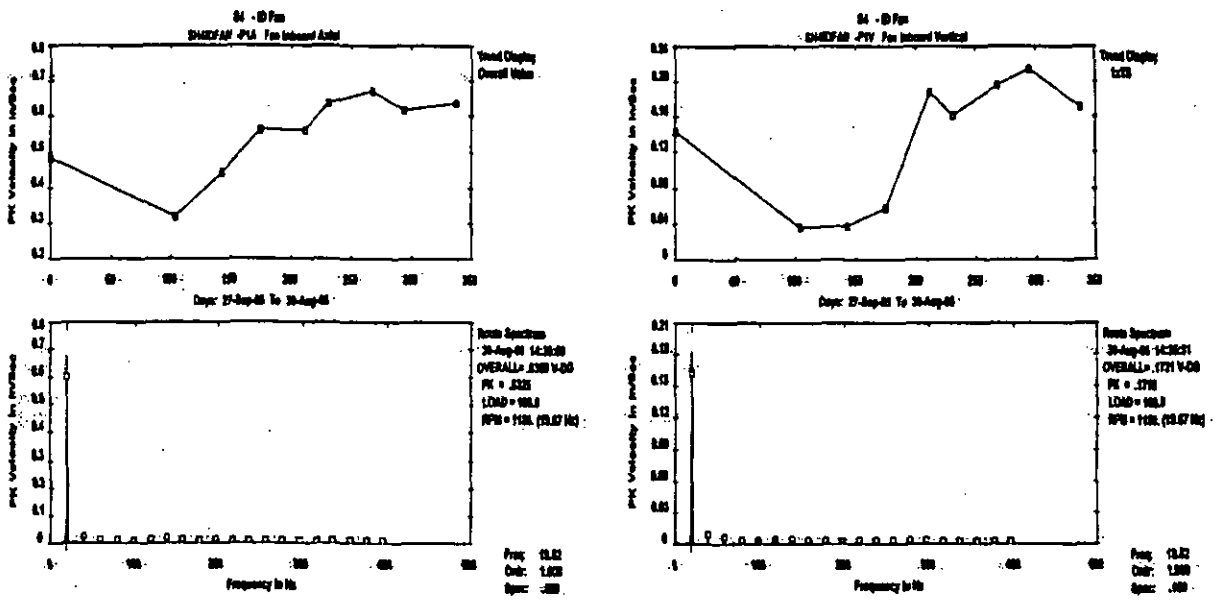
Urgency: Alarm

Title: 30-Aug-06 - Imbalance - Air Handler (Fan)

Explanation: Continued Call:

The attached plots are showing a high 1x turning speed peak. The 1x peak can be caused by either an imbalance or looseness issue.

The axial direction point is showing the highest level of energy. How is this fan mounted? I would recommend that the fan be inspected and see what is allowing movement in the axial direction. I believe this is an imbalance issue. Please have the fan cleaned out and recollect data. If the high 1x peak is still present I will recommend that the fan be balanced.



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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4CNDPMPA Condensate Pump A

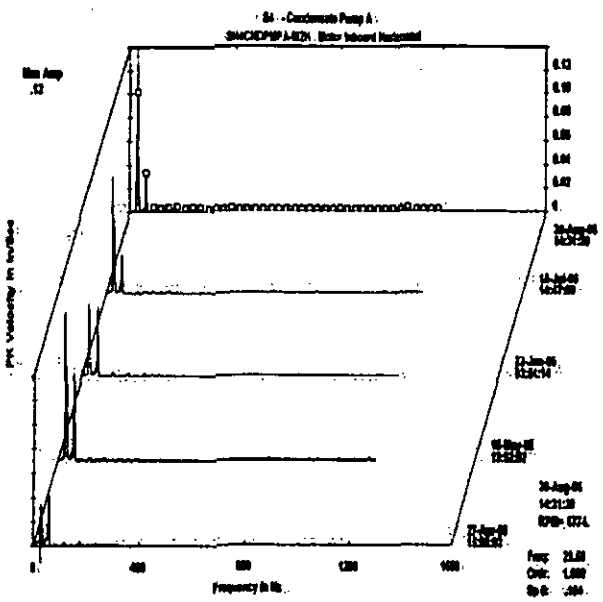
Urgency : Watch

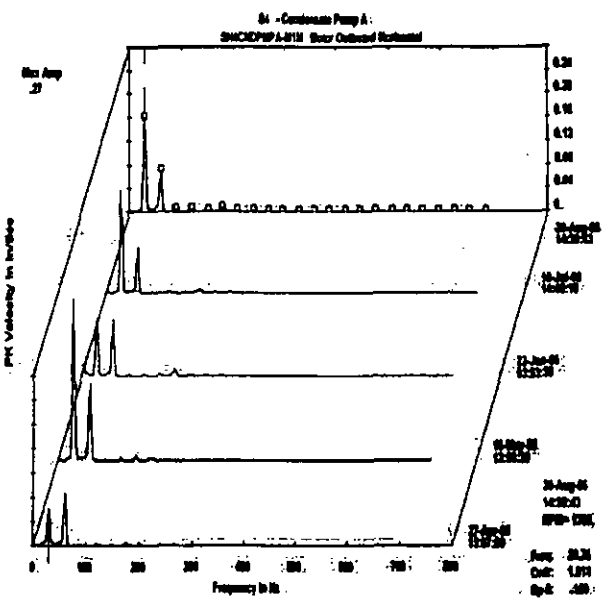
Title: 30-Aug-06 - Misalignment

Explanation: Continued Call:

The misalignment issue is still present on this machine. No pump points were collecting during this data collection.

I consider the levels to be still low at this time. I would suggest that if there is a coupling connecting the motor and pump that it be visually inspected for any problems.





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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area **S4** **Shipman Plant 4**

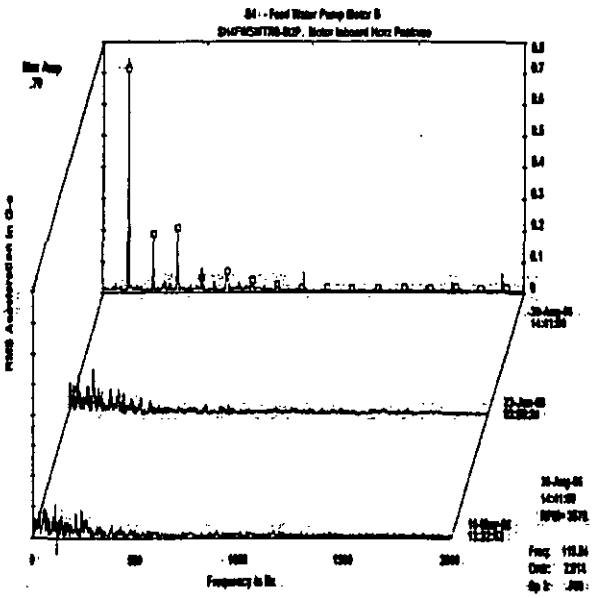
Equipment **SH4FWSMTRB Feed Water Pump Motor B**

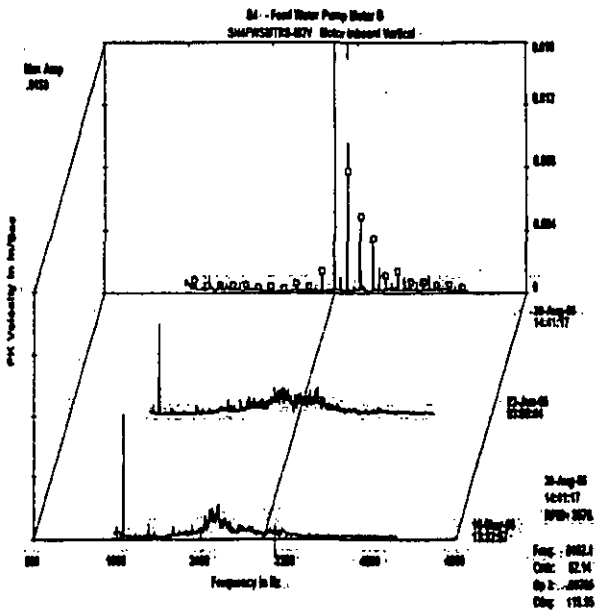
Urgency: Watch

Title: 30-Aug-06 - Electrical defect - Motor

Explanation: The attached plots are showing an increase in a known electrical defect frequency. I am only seeing it on the inboard of the motor at this time. The amplitude levels are still low.

I would recommend that in the next few months that the mounting bolts on the motor be inspected to verify that they are properly tightened and that the motor feet are not cracked or damaged.





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Predictive Maintenance Detail Report

09/01/06
harpm/1

Area S4 Shipman Plant 4

Equipment Shipman 4 Turbine #4

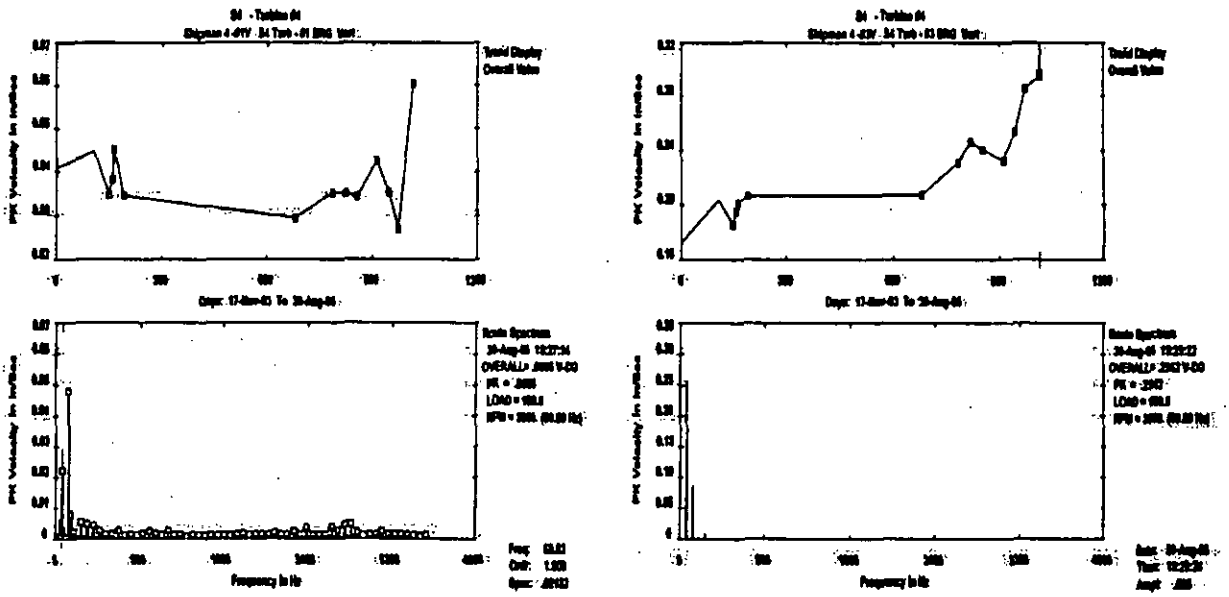
Title: 30-Aug-06 - Looseness

Urgency :

Watch

Explanation: The attached plots are showing an increase of vibration levels in the vertical direction. They are the highest readings that have been recorded for this machine. The other points are also showing a slight increase in vibration levels. The looseness issue is present mostly in the vertical direction. The looseness could be originating for the sleeve bearings.

I would recommend that this machine be closely watched. If the turbine has displacement probes mounted I would suggest that the readings be looked over to see if they are within specifications.



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Process Management

Mickey Harp
Analyst, Analysis Services

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Mickey.Harp@EmersonProcess.com

September 21, 2006

Mr. Andy Ho
Mr. Craig Yamamoto
Mr. Norman Verbanic
Ms. Lisa Dangelmaier
Mr. Norman Uchida

Hawaiian Electric and Light Co, Inc
54 Halekauila Street
Hilo, HI 96721-1027

Vibration data was collected at your facility on September 12-13, 2006. Analysis was performed on that equipment on September 21, 2006. The attached report is intended to inform you of any significant machinery problems identified during this analysis.

Shipment Plant 3 was down for repairs at the time that data was collected. No data was collected on Shipment Plant 3 due to the scheduled maintenance.

CSI is committed to providing World Class Predictive Maintenance technologies and ensuring customer satisfaction. If you have any questions concerning any of the information contained in this report please feel free to contact me. I would like to thank you for allowing CSI Services to assist you in your Reliability Based Maintenance efforts.

If you have any questions or concerns please feel free to contact me at anytime.

Mickey Harp,
Analyst, Analysis Services

Executive Summary

Shipman Plant 3

No data collected during the last two months due to scheduled maintenance. No recommendations for this plant at this time.

Shipman Plant 4

Recommend that the Bearing Cooling Water Pump 4 be scheduled for maintenance within the next few months. The motor needs to be balanced.

Hill Plant 5

Recommend that the Condensate Pump B be scheduled for maintenance as soon as possible. The motor needs to be balanced.

Hill Plant 6

Recommend that the Reblr Cond Drain Tank Pump B be scheduled for maintenance within the next few months. The motor needs to be balanced.

Puna

Recommend that the Service Water Pump A be scheduled for maintenance within the next few months. The motor needs to be balanced. The Flush Pump needs to be evaluated as to how it is currently being used. Due to the current configuration of the pump, it is producing a lot of vibration levels. This can be corrected if the pump is allowed to operate on its curve.

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Equipment Description	Equipment ID	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Comments
Shipman Plant 3								
Turbine #3	Shipman 3	OK	OK	OK	OK	NT	NT	
Circulating Pump A	SH3CIRMTRA	[illegible]	[illegible]	[illegible]	[illegible]	NT	NT	
Circulating Pump B	SH3CIRMTRB	OK	OK	OK	OK	NT	NT	
Condensate Pump A	SH3CNDPMPA	[illegible]	[illegible]	[illegible]	[illegible]	NT	NT	
Condensate Pump B	SH3CNDPMPB	[illegible]	[illegible]	[illegible]	[illegible]	NT	NT	
ID/FD Fan	SH3FDIDMTR	OK	OK	OK	OK	NT	NT	
Air Preheater A	SH3APHMTRA	OK	OK	OK	NR	NT	NT	
Air Preheater B	SH3APHMTRB	OK	OK	OK	NR	NT	NT	
Evaporator Pump A	SH3EVPPMPA	NR	NR	NR	NR	NT	NT	
Evaporator Pump B	SH3EVPPMPB	NR	NR	NR	NR	NT	NT	
Feed Water Pump A	SH3FWSMTRA	[illegible]	[illegible]	[illegible]	[illegible]	NT	NT	
Feed Water Pump B	SH3FWSMTRB	[illegible]	[illegible]	[illegible]	[illegible]	NT	NT	
Drip Pump A	SCAPH-A	NR	NR	NR	NR	NT	NT	
Drip Pump B	SCAPH-B	[illegible]	NT	[illegible]	NT	NT	NT	
Fuel Oil Pump A	SH3FOSPMPA	NR	NR	NR	NR	NT	NT	
Fuel Oil Pump B	SH3FOSPMPB	[illegible]	[illegible]	NR	OK	NT	NT	
Fuel Oil CD Pump	SH3FOCDPMP	OK	OK	OK	OK	NT	NT	
Service Water Pump A	SH3SVCPMPA	OK	OK	OK	OK	NT	NT	
Service Water Pump B	SH3SVCPMPB	OK	OK	OK	OK	NT	NT	
Bearing Cooling Water Pump 3	SH3BCWPMP	[illegible]	[illegible]	[illegible]	[illegible]	NT	NT	
#1 Joy Air Compressor	#1SHAIRJOY	OK	OK	[illegible]	OK	NT	NT	
#2 Joy Air Compressor	#2SHAIRJOY	OK	OK	OK	NR	NT	NT	
Circ Water Pump #1	SHCIRWMTR1	NT	[illegible]	NT	NT	NT	NT	
Shipman Plant 4								
Turbine #4	Shipman 4	NR	OK	OK	OK	[illegible]	OK	
Circulating Pump A	SH4CIRMTRA	OK	OK	OK	OK	OK	OK	
Circulating Pump B	SH4CIRMTRB	OK	OK	OK	OK	OK	OK	
Condensate Pump A	SH4CNDPMPA	OK	[illegible]	[illegible]	[illegible]	[illegible]	OK	
Condensate Pump B	SH4CNDPMPB	[illegible]	OK	OK	OK	NR	[illegible]	
ID/FD Fan	SH4FDIDMTR	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Continued Call - Imbalance
Air Preheater Motor A	SH4APHMTRA	OK	NR	NR	NR	NR	NR	
Air Preheater Motor B	SH4APHMTRB	OK	OK	OK	OK	OK	OK	
Evaporator Pump A	SH4EVPPMPA	NR	NR	NR	NR	NR	NR	
Evaporator Pump B	SH4EVPPMPB	NR	NR	NR	NR	NR	NR	
Feed Water Pump A	SH4FWSMTRA	[illegible]	OK	OK	OK	OK	OK	
Feed Water Pump B	SH4FWSMTRB	NT	OK	OK	NR	[illegible]	[illegible]	Continued Call - Electrical Energy
Drip Pump A	SCAPH-A	NT	NT	NT	NT	NT	NT	
Drip Pump B	SCAPH-B	NT	NT	NT	NT	NT	NT	
Fuel Oil Pump A	SH4FOSPMPA	OK	NT	NT	NR	OK	OK	
Fuel Oil Pump B	SH4FOSPMPB	OK	OK	OK	OK	OK	OK	
Fuel Oil CD Pump	SH4FOCDPMP	OK	OK	OK	OK	OK	OK	
Service Water Pump A	SH4SVCPMPA	OK	OK	OK	OK	OK	OK	
Service Water Pump B	SH4SVCPMPB	OK	OK	OK	OK	OK	OK	
Bearing Cooling Water Pump 4	SH4BCWPMP	OK	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Water Treatment Sump Pump	SHWTSUMPMP	NT	NT	NT	NT	NT	NT	

Hill Plant 5								
H5 Turbine	H5 Turb	NT	NT	NT	NT	NT	NT	
H5A APH Drive	H5A APHMTR	NT	NT	NT	NT	NT	NT	
Circulating Pump Motor 5-A	H5CIRCMTRA	3	NT	3	3	3	3	Continued Call - Imbalance
Circulating Pump Motor 5-B	H5CIRCMTRB	OK	NT	OK	OK	OK	OK	
Circulating Pump Motor 5-C	H5CIRCMTRC	OK	NT	OK	OK	OK	OK	
Service Air Compressor	H5CASACMTR	OK	NT	NT	NT	NT	NT	
Inst Air Compressor	H5CAIACMTR	OK	NT	NT	NT	NT	NT	
Condensate Pump A	H5CNDMTRA	[illegible]	NT	3	3	3	3	Continued Call - Looseness and Imbalance
Condensate Pump B	H5CNDMTRB	3	NT	[illegible]				
Condensate Transfer Pump	H5CNDTPMTR	OK	NT	NT	NT	OK	NT	
FD Fan	H5DFFDMTR	OK	NT	OK	OK	OK	OK	
Evaporator Pump	H5EVAPPMP	NT	NT	NT	OK	OK	OK	
Feed Water Pump 5A	H5FSFWMTRA	OK	NT	OK	OK	OK	OK	
Feed Water Pump 5B	H5FSFWMTRB	3	NT	OK	OK	OK	OK	
Secondary Fuel Pump A	H5SECFPMPA	[illegible]	NT	NT	NT	OK	OK	
Secondary Fuel Pump B	H5SECFPMPB	NT	NT	OK	OK	NT	NT	
Service Water Pump A	H5SVCWMTRA	OK	NT	NT	OK	OK	OK	
Service Water Pump B	H5SVCWMTRB	[illegible]	NT	NT	NT	OK	OK	
NR6 Primary Fuel Oil Pump	HFOPRIPMP6	OK	NT	NT	OK	OK	OK	
NR5 Primary Fuel Oil Pump A	HFOPRIPMPA	OK	NT	NT	OK	OK	OK	
NR5 Primary Fuel Oil Pump B	HFOPRIPMPB	NT	NT	NT	NT	OK	OK	
Aux Stm Lube Oil Pmp Turbine	H5ASLOPTRB	NT	NT	NT	NT	NT	NT	
Turning Gear Oil Pump	H5TGOILPMP	NT	NT	NT	NT	NT	NT	
#5 Diesel Oil Pump	H5DFSDOMTR	NT	NT	NT	NT	NT	NT	
Hill Plant 6								
H6 Turbine	H6 TRB	NT	NT	NT	NT	NT	NT	
H6APH Drive	H6 APH MTR	NT	NT	NT	NT	NT	NT	
Circulating Pump 6-A	H6CIRCMTRA	OK	OK	OK	NT	OK	OK	
Circulating Pump 6-B	H6CIRCMTRB	NT	NT	NT	NT	NT	NT	
Circulating Pump 6-C	H6CIRCMTRC	OK	OK	OK	NT	OK	OK	
Circulating Pump 6-D	H6CIRCMTRD	OK	OK	OK	NT	NT	OK	
Service Air Compressor	H6AIRSAMTR	OK	OK	OK	NT	OK	OK	
Instrument Air Compresr	H6AIRIAMTR	OK	OK	OK	NT	OK	OK	
IR Air Compressor	H6AIRIRMTR	NT	NT	NT	NT	NT	NT	
IR Air Compressor Clng Fan	H6AIRIRCF	NT	NT	NT	NT	NT	NT	
LP Heater Drip Pump	H6LHTRDPMP	OK	OK	OK	NT	OK	OK	
Condensate Pump A	H6CNDMTRA	OK	OK	OK	NT	OK	OK	
Condensate Pump B	H6CNDMTRB	OK	OK	OK	NT	OK	OK	
FD Fan High Speed	H6DFDHSMTR	OK	OK	OK	NT	[illegible]	[illegible]	Continued Call - Looseness
FD Fan Low Speed	H6DFDLSMTR	OK	OK	OK	NT	OK	OK	
Evaporator Pump A	H6EVPPMPA	OK	OK	OK	NT	OK	OK	
Evaporator Pump B	H6EVPPMPB	OK	OK	OK	NT	OK	OK	
Feed Water Pump A	H6FWBFMTRA	OK	OK	OK	NT	OK	OK	
Feed Water Pump B	H6FWBFMTRB	OK	OK	OK	NT	NT	OK	
Secondary Fuel Oil Pump A	H6SFOPMPA	OK	OK	OK	NT	OK	NT	
Secondary Fuel Oil Pump B	H6SFOPMPB	OK	NT	3	NT	NT	3	Continued Call - Looseness
Rebir Cond Drain Tank Pump A	H6CNDDTKPA	OK	NT	NT	NT	OK	[illegible]	
Rebir Cond Drain Tank Pump B	H6CNDDTKPB	OK	3	[illegible]	NT	3	[illegible]	
Service Water Pump A	H6SVCWPMPA	OK	OK	OK	NT	OK	OK	
Service Water Pump B	H6SVCWPMPB	OK	OK	OK	NT	OK	OK	
Booster Pump	H6SVCBPMP	NT	NT	NT	NT	NT	NT	
Gland Seal Pump	H6GLSLPMP	OK	NT	NT	NT	NT	NT	
DC Lube Oil Pump	H6DCLOPMP	OK	OK	OK	NT	NT	OK	
Turning Gear Lube Oil Pump	H6TGLOPMP	NT	OK	OK	NT	NT	NT	
Aux Lube Oil Pump	H6SALOPMP	OK	OK	OK	NT	OK	OK	
Diesel Oil Pump A	H6DFDOMTRA	OK	OK	NT	NT	OK	NT	
Diesel Oil Pump B	H6DFDOMTRB	OK	OK	NT	NT	OK	NT	

PUNA								
Puna Turbine	Turbine	NT	NT	NT	NT	NT	NT	
Circ Water Pump Motor A	PUCWPMTRA	OK	OK	OK	OK	OK	OK	
Circ Water Pump Motor B	PUCWPMTRB	OK	OK	OK	OK	OK	OK	
Circ Water Pump Motor C	PUCWPMTRC	OK	OK	OK	OK	OK	OK	
Plant Air Compressor A	PUAIRMTRA	NT	OK	OK	OK	OK	[illegible]	Possible Bearing Defect
Plant Air Compressor B	PUAIRMTRB	OK	OK	OK	OK	OK	OK	
Cond Drain Pmp to MU Tank	PUCDNTKPMP	NT	NT	OK	NT	NT	OK	
Cond Make-up Pump A	PUCDMUMTRA	NT	3	3	3	3	3	Continued Call - Electrical Defect or Misalignment
Cond Make-up Pump B	PUCDMUMTRB	OK	OK	OK	OK	OK	OK	
Condensate Pump A	PUCONDMTRA	OK	OK	OK	OK	OK	OK	
Condensate Pump B	PUCONDMTRB	OK	[illegible]	OK	OK	OK	OK	
Diesel Oil Pump A	PUDFOPMPA	OK	OK	OK	OK	OK	OK	
Diesel Oil Pump B	PUDFOPMPB	NT	OK	OK	OK	OK	OK	
ID High Speed	PUIDHSMTR	OK	OK	OK	OK	OK	OK	
ID Low Speed	PUIDLSMTR	OK	OK	OK	OK	OK	OK	
FD High Speed	PUFDHSMTR	OK	OK	OK	OK	OK	OK	
FD Low Speed	PUFDLSMTR	OK	OK	OK	OK	OK	OK	
Feed Water Pump A	PUFSFWMTRA	OK	OK	OK	OK	OK	OK	
Feed Water Pump B	PUFSFWMTRB	OK	OK	OK	OK	NT	NT	
Fuel Oil Transfer Pump	PUFOFWDPMP	OK	NT	OK	NT	[illegible]	[illegible]	Continued Call - Early Bearing Defect
Fuel Oil Unloading Pump	PUFOSULPMP	NT	NT	NT	NT	OK	NT	
Fuel Oil Pump A	PUFOFOPMPA	OK	OK	OK	OK	OK	OK	
Fuel Oil Pump B	PUFOFOPMPB	NT	OK	OK	OK	NT	OK	
DC Bearing Oil Pump	PUDCBRGPMP	OK	NT	OK	NT	OK	NT	
Vapor Extraction Pump	PUVPREXPMP	OK	OK	OK	OK	OK	OK	
Lube Oil Pump A	PULOSPMPA	OK	OK	OK	OK	OK	OK	
Lube Oil Pump B	PULOSPMPB	OK	OK	OK	NT	OK	NT	
Service Water Pump A	PUSVCWPMPA	3	NT	NT	NR	3	[illegible]	
Service Water Pump B	PUSVCWPMPB	OK	NT	NT	NR	[illegible]	[illegible]	Continued Call - Looseness
HP Water Pump	PUSVCHPPMP	[illegible]	3	OK	OK	OK	OK	
Flush Pump	PUSVCFLPMP	[illegible]	[illegible]	3	3	3	[illegible]	
County Water Papaya Pump A	PUSCCWPMPA	OK	OK	OK	OK	NT	NT	
County Water Papaya Pump B	PUSCCWPMPB	OK	OK	OK	OK	OK	OK	
Hydraulic Pump A	PUHYDPMTRA	OK	OK	OK	OK	OK	OK	
Hydraulic Pump B	PUHYDPMTRB	OK	OK	OK	NT	OK	OK	
Sump Pump	PUWTSMPPMP	NT	NT	NT	NT	NT	NT	Access is difficult/dangerous
Gland Exhaust Pump	PUTGLESPMP	OK	OK	OK	OK	OK	OK	
Puna Permanent Magnet Ger	Puna PMG						OK	

Condition Legend:

Priority 1	Emergency Situation	
Priority 2	High Alarm	
Priority 3	Alarm	3
Priority 4	Watch	[illegible]
Priority 5	Discussion Needed	[illegible]
Not Running	Scheduled for test but not in operation	[illegible]
Not Tested	Not Tested this survey	NT
Machine OK	Condition is acceptable for operation	OK

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Predictive Maintenance Summary Report

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Area H5 Hill Plant 5

Urgency	Equipment	Problem	Extended Description
Emergency	H5CNDMTRB Condensate Pump B	12-Sep-06 - Imbalance	Continued Call: The amplitude levels are continuing to increase. The current levels are over 1 in/sec which is very destructive for a machine. I would recommend that this machine be scheduled for maintenance within the month. Please have the motor balanced during the maintenance.
Alarm	H5CIRCMTRA Circulating Pump Motor 5-A	12-Sep-06 - Imbalance	Continued Call: The imbalance issue, shown by the high 1x turning speed peak, has been progressively getting worse. I would recommend that the motor be balanced in the next 1-3 months.
Alarm	H5CNDMTRA Condensate Pump A	12-Sep-06 - Imbalance - Motor	Continued Call: The current vibration levels are remaining constant for this machine, but this is still normally high levels for a typical motor and pump configuration. I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be balanced.

Area H6 Hill Plant 6

Urgency	Equipment	Problem	Extended Description
High Alarm	H6CNDDTKPB Rebir Cond Drain Tank Pump B	12-Sep-06 - Imbalance	Continued Call: The amplitude levels have increased on this machine. I have raised the severity of this problem due to the increase in vibration levels. I would recommend that this motor be balanced in the next 1-2 months.
Alarm	H6SFOPMPB Secondary Fuel Oil Pump B	12-Sep-06 - Looseness	Continued Call: The attached plots are showing high levels of impacting and looseness. This could be related to the process that the pump is running. I would recommend that the pump be inspected to verify that it is running on its curve.
Watch	H6DFDHSMTR FD Fan High Speed	12-Sep-06 - Looseness	Continued Call: The attached plots are showing a low level looseness issue. The amplitude levels have remained low for this machine. If the amplitude levels remain the same during the next data collection readings I will close off this problem.

Area PUNA Puna

Urgency	Equipment	Problem	Extended Description

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Process Management

Predictive Maintenance Summary Report

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High Alarm	PUSVCFLPMP Flush Pump	13-Sep-06 - Not operating on design curve	Continued Call: It was observed during data collection that this pump is not running on its curve. This has been done on purpose. The amount of vibration being shown is due to the way the pump is being operated. I would suggest that the pump be ran on its curve or that the pump be evaluated if it really needs to be running. The pump is currently running to failure due to the setting of the pump. If nothing is going to be done to correct this pump then I would recommend that it be removed for the vibration route.
High Alarm	PUSVCWPMPA Service Water Pump A	13-Sep-06 - Imbalance	Continued Call: The motor is still displaying an imbalance issue. The amplitude levels have increased slightly from this motor. I would recommend that maintenance be scheduled on the motor in the next 2-3 months to have the imbalance issue corrected.
Alarm	PUCDMUMTRA Cond Make-up Pump A	13-Sep-06 - Misalignment	Continued Call: The 2x turning peak is still present. This appears to be an electrical issue, but is could also be a misalignment issue. I would recommend that the 2130 be placed in monitored mode while collecting data on this machine. While collecting the data I would have the power cut off to the machine. If the 2x peak goes away very quickly then it is an electrical issue. If the peak slowly goes away then it is a misalignment issue. If you need help setting the 2130 up in monitor mode please contact me.
Watch	PUAIRMTRA Plant Air Compressor A	13-Sep-06 - Antifriction bearing defect	The attached M2P plot is showing an unknown harmonic family at ~4.1 orders. This could be a bearing defect frequency, but I can not verify that without the bearing ids for this motor. If the bearings ids are known for this machine please email that information to me. Please continue collecting monthly data on this machine.
Watch	PUFOFWDPMP Fuel Oil Transfer Pump	13-Sep-06 - Antifriction bearing defect - Motor	Continued Call: The attached peakvue plots are showing an unknown harmonic family. This appears to be an early bearing defect frequency. There are currently no bearings associated with this machine. I would request that the bearing information be email to be for the machines in the database. This will help create a stronger database once the bearing information is entered.
Watch	PUSVCWPMPB Service Water Pump B	13-Sep-06 - Looseness	Continued Call: The attached plots are displaying a low level looseness issue. The amplitude levels have increased quickly from the last time that data was collected. I would only recommend that monthly data be collected on this machine.

Area: S4 Shipman Plant 4

Urgency	Equipment	Problem	Extended Description
High Alarm	SH4BCWPMP Bearing Cooling Water Pump 4	13-Sep-06 - Imbalance - Motor	Continued Call: The motor is still experiencing high levels of imbalance. I would recommend that the motor be balanced in the next month.

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Process Management

Predictive Maintenance Summary Report

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Alarm	SH4FDIDMTR ID/FD Fan	13-Sep-06 - Imbalance	Continued Call: Both the ID and the FD fans are showing movement in the axial direction. The fans are still showing signs of imbalance and looseness. The amplitude levels did not change a lot during this data collection. I would recommend that monthly data be collected on this machine. If the amplitude levels increase I will suggest that both fans be cleaned and balanced.
Watch	SH4FWSMTRB Feed Water Pump B	13-Sep-06 - Electrical defect - Motor	Continued Call: The attached plots are showing an increase in a known electrical defect frequency. I am only seeing it on the inboard of the motor at this time. The amplitude levels are still low. I would recommend that in the next few months that the mounting bolts on the motor be inspected to verify that they are properly tightened and that the motor feet are not cracked or damaged.

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Process Management

Predictive Maintenance Detail Report

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Area H5 Hill Plant 5

Equipment H5CNDMTRB Condensate Pump B

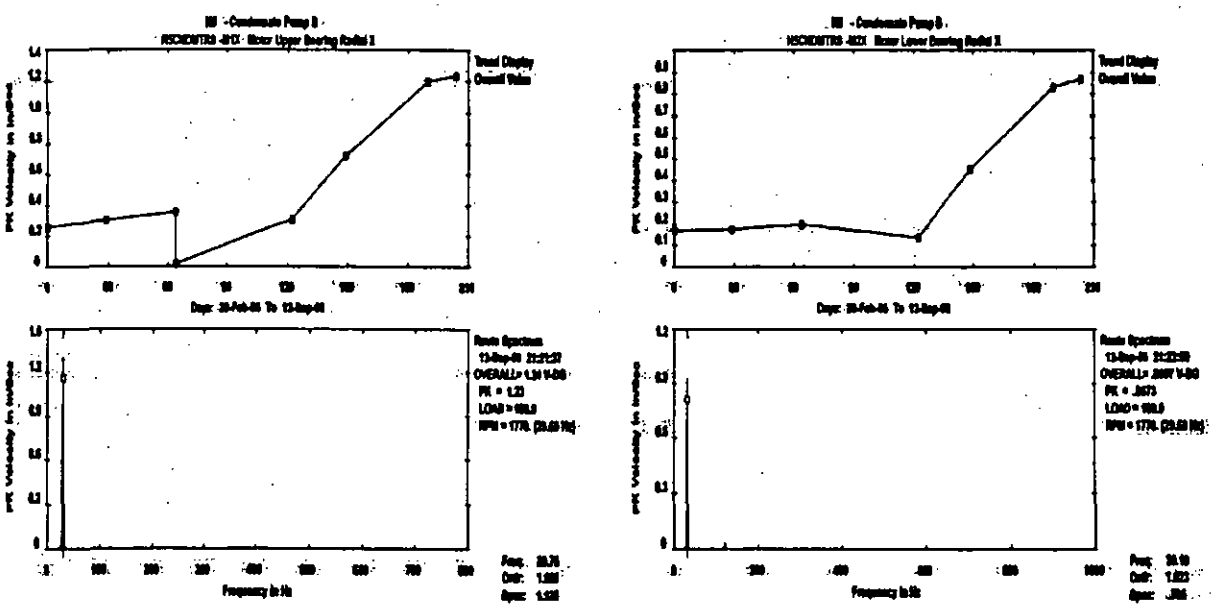
Urgency: Emergency

Title: 12-Sep-06 - Imbalance

Explanation: Continued Call:

The amplitude levels are continuing to increase. The current levels are over 1 in/sec which is very destructive for a machine.

I would recommend that this machine be scheduled for maintenance within the month. Please have the motor balanced during the maintenance.



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Predictive Maintenance Detail Report

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Area H5 Hill Plant 5

Equipment H5CIRCMTRA Circulating Pump Motor 5-A

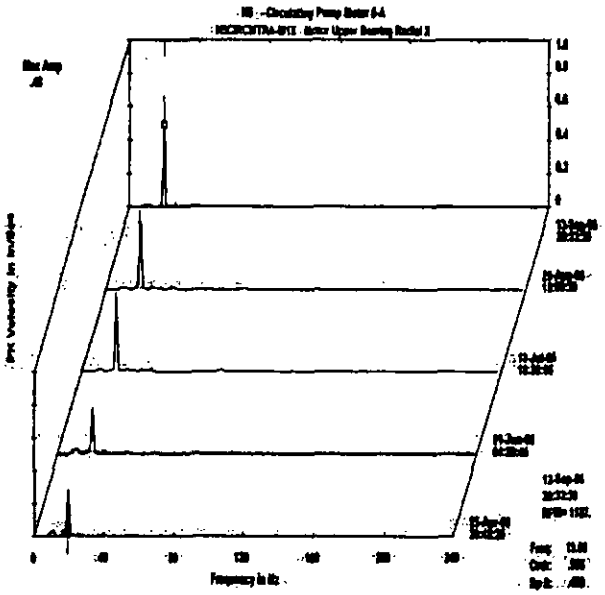
Urgency : Alarm

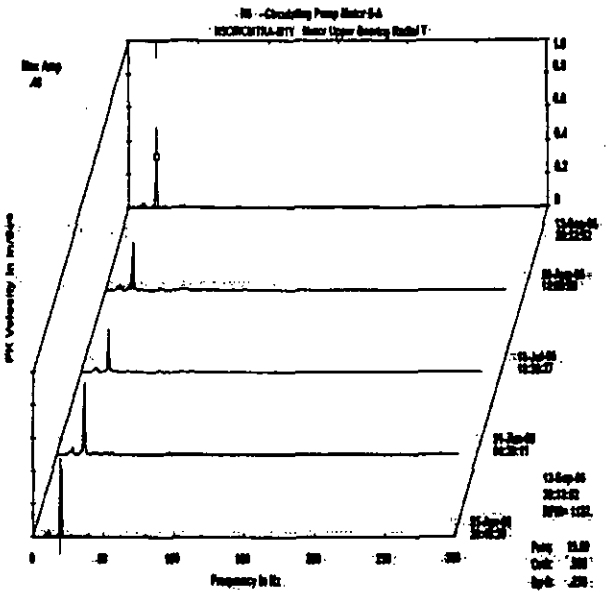
Title: 12-Sep-06 - Imbalance

Explanation: Continued Call:

The imbalance issue, shown by the high 1x turning speed peak, has been progressively getting worse.

I would recommend that the motor be balanced in the next 1-3 months.





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Predictive Maintenance Detail Report

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Area H5 Hill Plant 5

Equipment H5CNDMTRA Condensate Pump A

Title: 12-Sep-06 - Imbalance - Motor

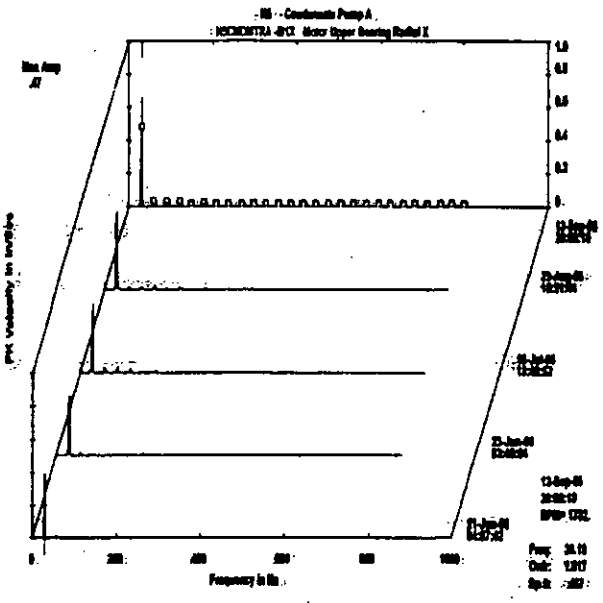
Urgency:

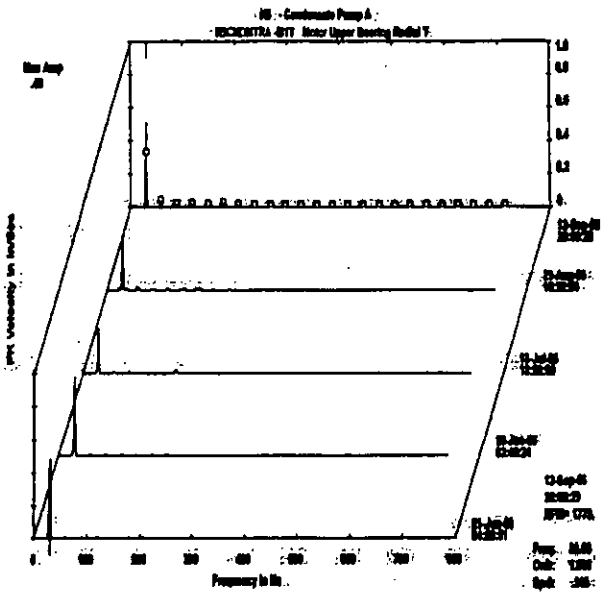
Alarm

Explanation: Continued Call:

The current vibration levels are remaining constant for this machine, but this is still normally high levels for a typical motor and pump configuration.

I would recommend that the motor be scheduled for maintenance in the next 2-3 months. I would suggest that the motor be balanced.





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Process Management

Predictive Maintenance Detail Report

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Area H6 Hill Plant 6

Equipment H6CNDDTKPB Reblr Cond Drain Tank Pump B

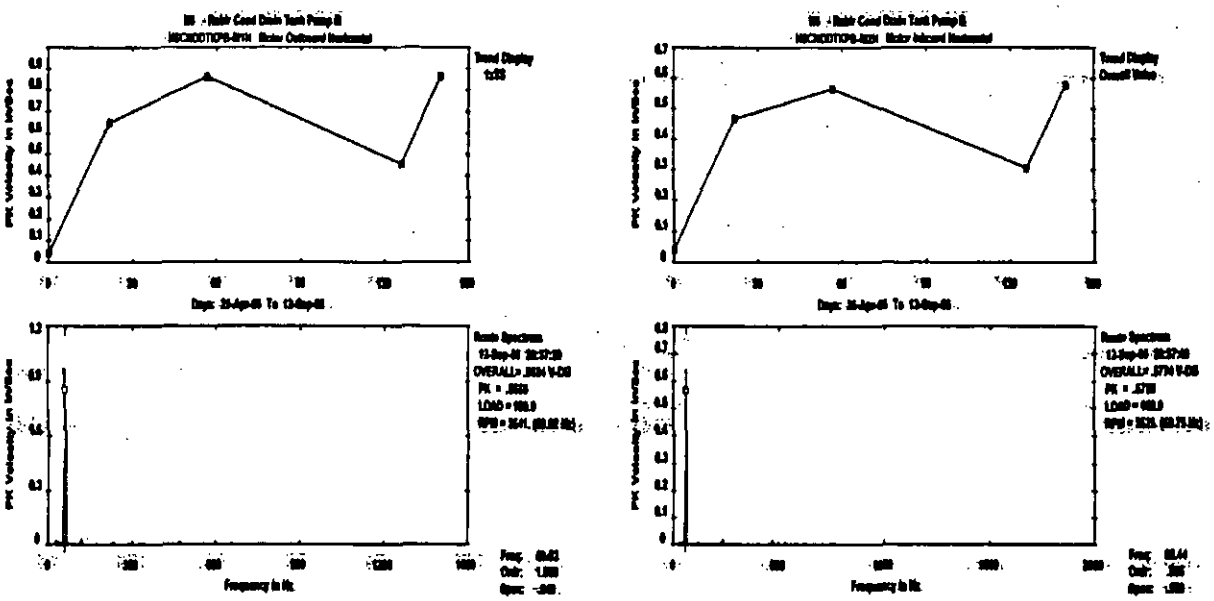
Urgency: High Alarm

Title: 12-Sep-06 - Imbalance

Explanation: Continued Call:

The amplitude levels have increased on this machine. I have raised the severity of this problem due to the increase in vibration levels.

I would recommend that this motor be balanced in the next 1-2 months.



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Predictive Maintenance Detail Report

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Area H6 Hill Plant 6

Equipment H6SFOPMPB Secondary Fuel Oil Pump B

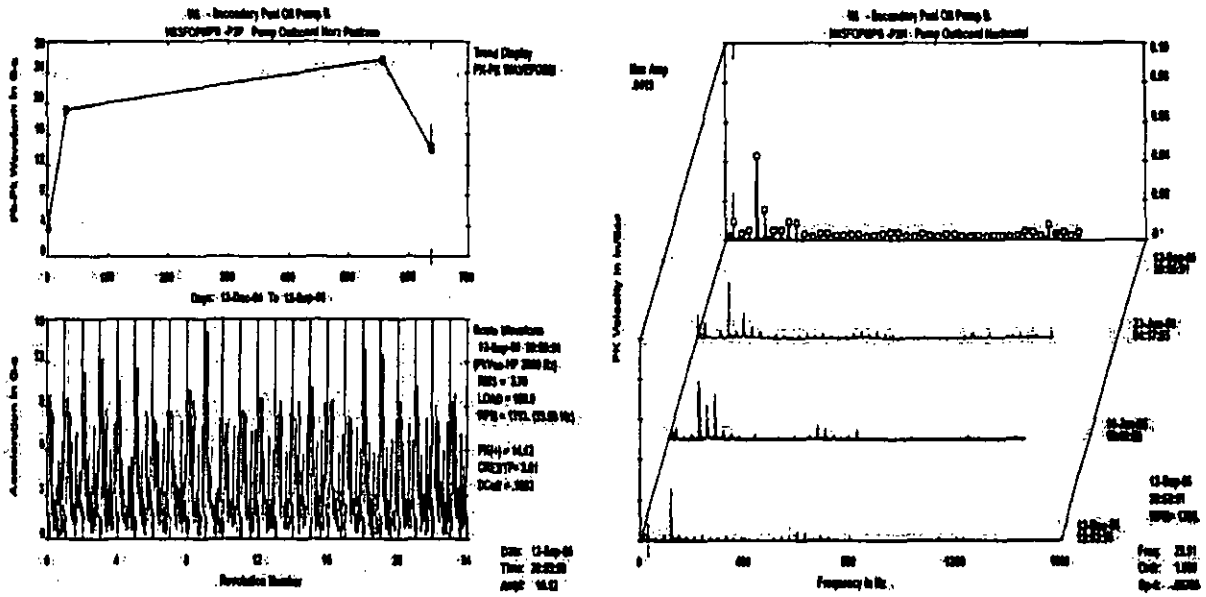
Urgency: Alarm

Title: 12-Sep-06 - Looseness

Explanation: Continued Call:

The attached plots are showing high levels of impacting and looseness.

This could be related to the process that the pump is running. I would recommend that the pump be inspected to verify that it is running on its curve.



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Area H6 Hill Plant 6

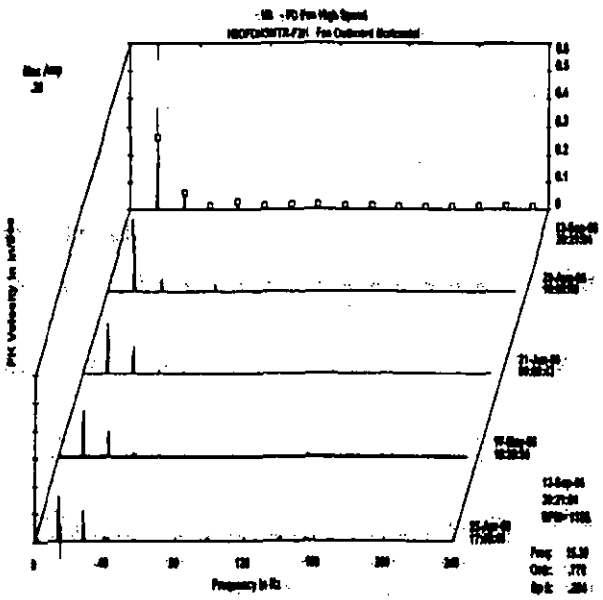
Equipment H6DFDHSMTR FD Fan High Speed

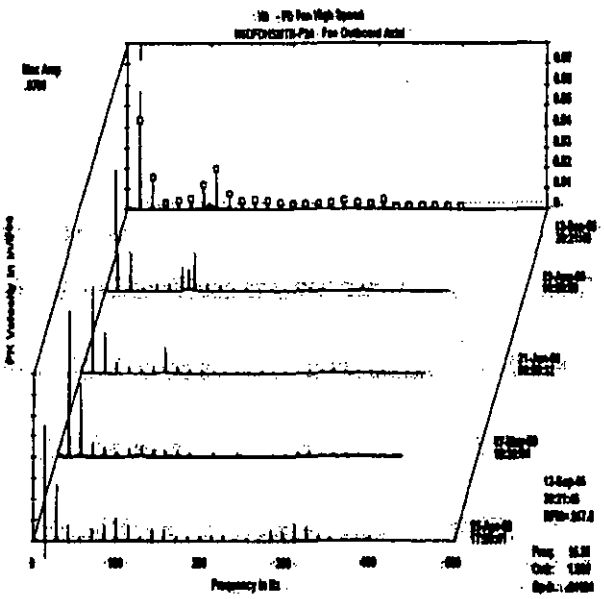
Urgency : **Watch**

Title: 12-Sep-06 - Looseness

Explanation: Continued Call:

The attached plots are showing a low level looseness issue. The amplitude levels have remained low for this machine. If the amplitude levels remain the same during the next data collection readings I will close off this problem.





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Process Management

Predictive Maintenance Detail Report

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Area **PUNA** **Puna**

Equipment **PUSVCFLPMP Flush Pump**

Urgency:

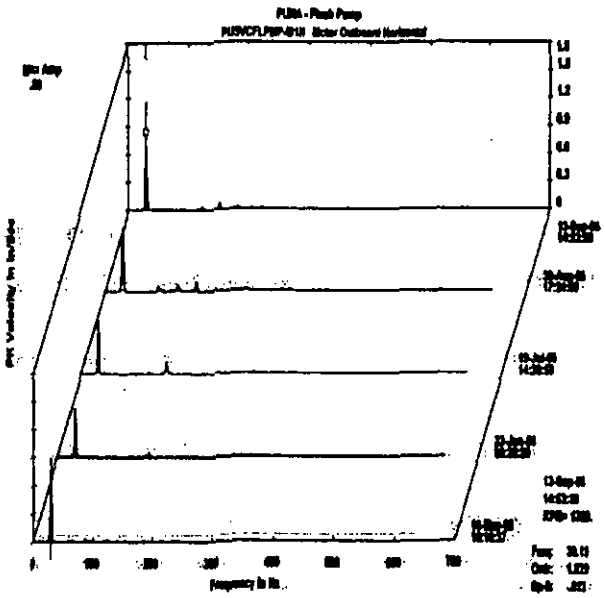
High Alarm

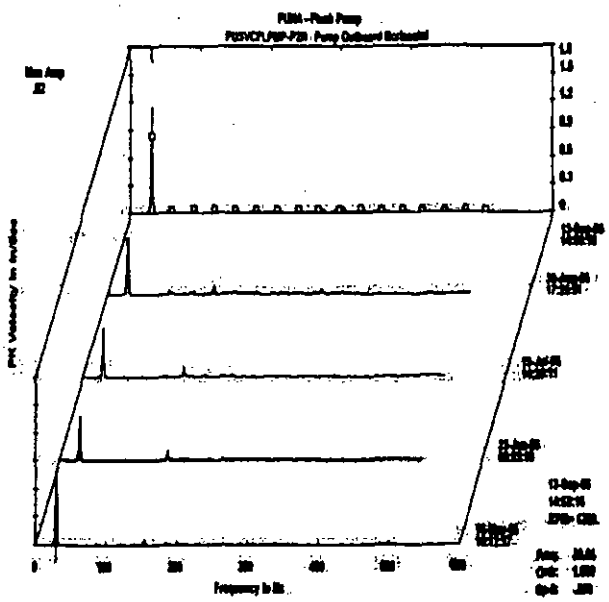
Title: 13-Sep-06 - Not operating on design curve

Explanation: Continued Call:

It was observed during data collection that this pump is not running on its curve. This has been done on purpose. The amount of vibration being shown is due to the way the pump is being operated.

I would suggest that the pump be ran on its curve or that the pump be evaluated if it really needs to be running. The pump is currently running to failure due to the setting of the pump. If nothing is going to be done to correct this pump then I would recommend that it be removed for the vibration route.





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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area PUNA Puna

Equipment PUSVCWPMPA Service Water Pump A

Urgency:

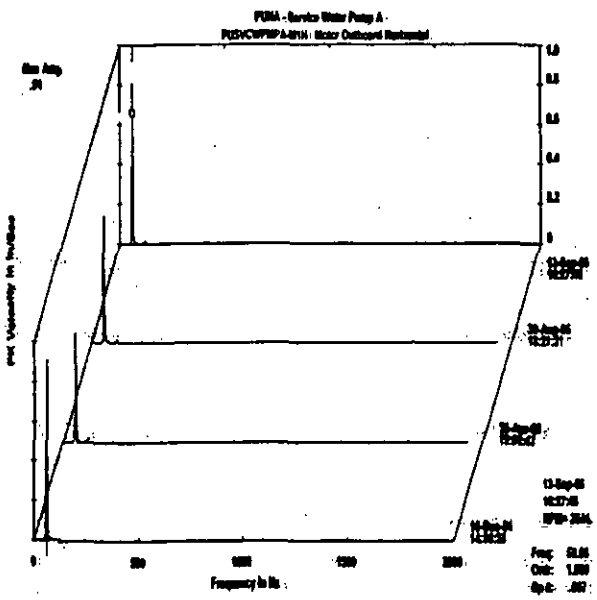
High Alarm

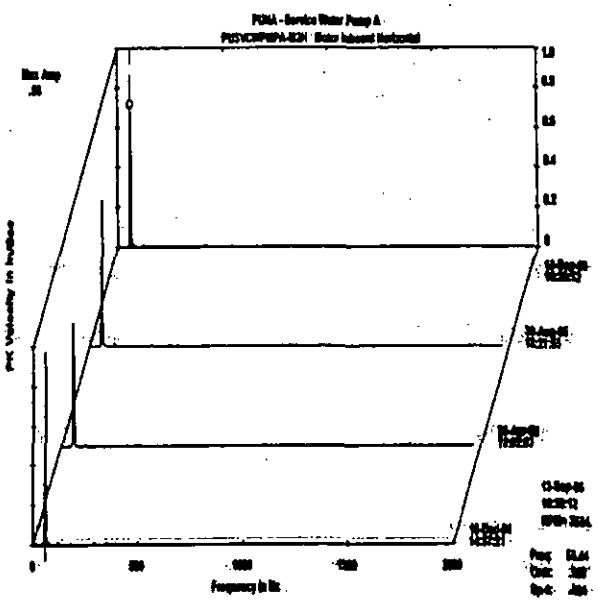
Title: 13-Sep-06 - Imbalance

Explanation: Continued Call:

The motor is still displaying an imbalance issue. The amplitude levels have increased slightly from this motor.

I would recommend that maintenance be scheduled on the motor in the next 2-3 months to have the imbalance issue corrected.





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Process Management

Predictive Maintenance Detail Report

09/21/06
harpm/1

Area PUNA Puna

Equipment PUCDMUMTRA Cond Make-up Pump A

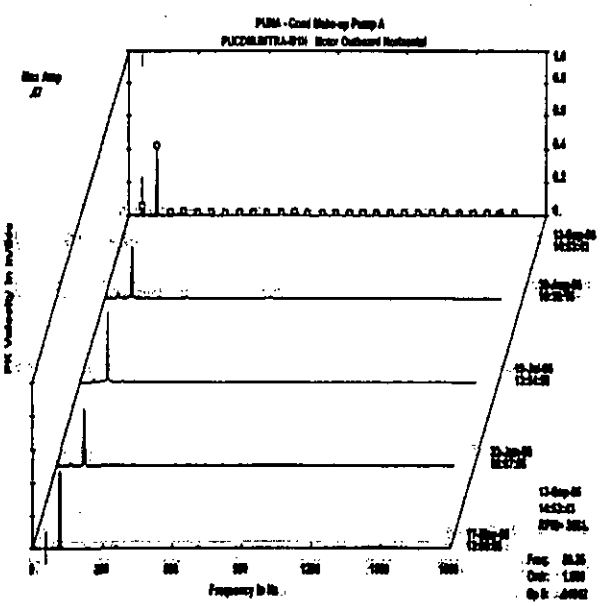
Urgency : Alarm

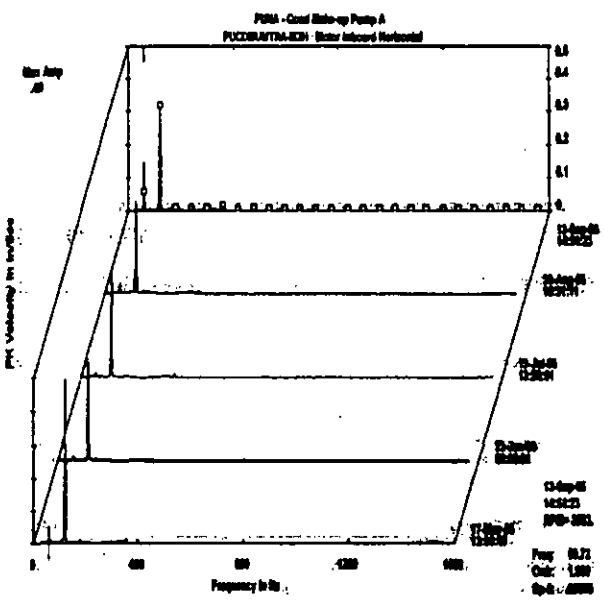
Title: 13-Sep-06 - Misalignment

Explanation: Continued Call:

The 2x turning peak is still present. This appears to be an electrical issue, but is could also be a misalignment issue.

I would recommend that the 2130 be placed in monitored mode while collecting data on this machine. While collecting the data I would have the power cut off to the machine. If the 2x peak goes away very quickly then it is an electrical issue. If the peak slowly goes away then it is a misalignment issue. If you need help setting the 2130 up in monitor mode please contact me.





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Process Management

Predictive Maintenance Detail Report

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harpm/1

Area **PUNA** **Puna**

Equipment **PUAIRMTRA Plant Air Compressor A**

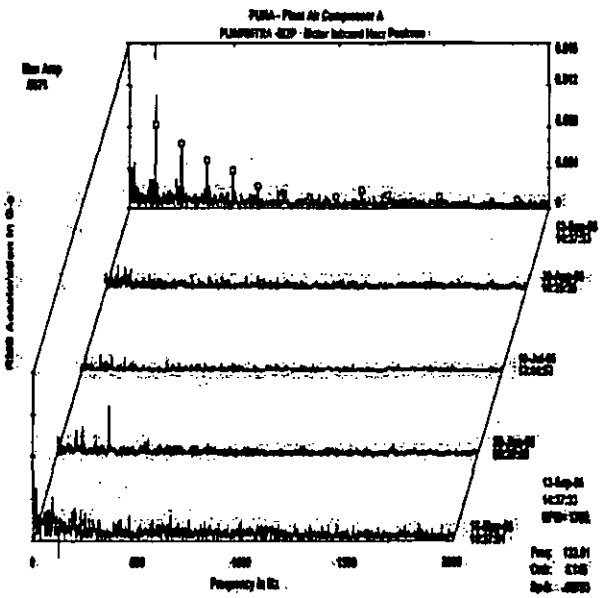
Urgency:

Watch

Title: 13-Sep-06 - Antifriction bearing defect

Explanation: The attached M2P plot is showing an unknown harmonic family at ~4.1 orders. This could be a bearing defect frequency, but I can not verify that without the bearing ids for this motor.

If the bearings ids are known for this machine please email that information to me. Please continue collecting monthly data on this machine.



EMERSON
Process Management

Predictive Maintenance Detail Report

09/21/06
harpm/1

Area PUNA Puna

Equipment PUFOFWDPMP Fuel Oil Transfer Pump

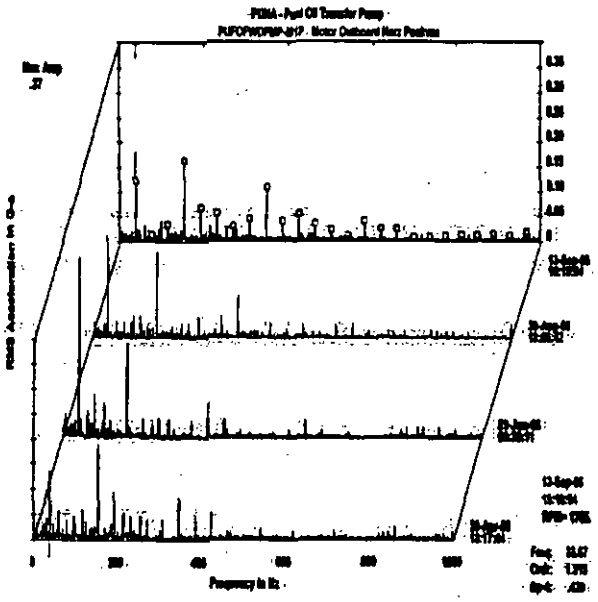
Urgency: Watch

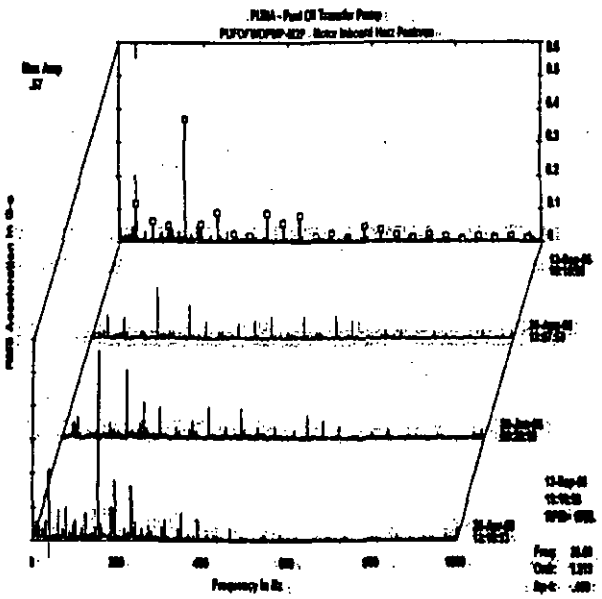
Title: 13-Sep-06 - Antifriction bearing defect - Motor

Explanation: Continued Call:

The attached peakvue plots are showing an unknown harmonic family. This appears to be an early bearing defect frequency. There are currently no bearings associated with this machine.

I would request that the bearing information be email to be for the machines in the database. This will help create a stronger database once the bearing information is entered.





EMERSON.
Process Management

Predictive Maintenance Detail Report

09/21/06
harpm/1

Area PUNA Puna

Equipment PUSVCWPMPB Service Water Pump B

Urgency:

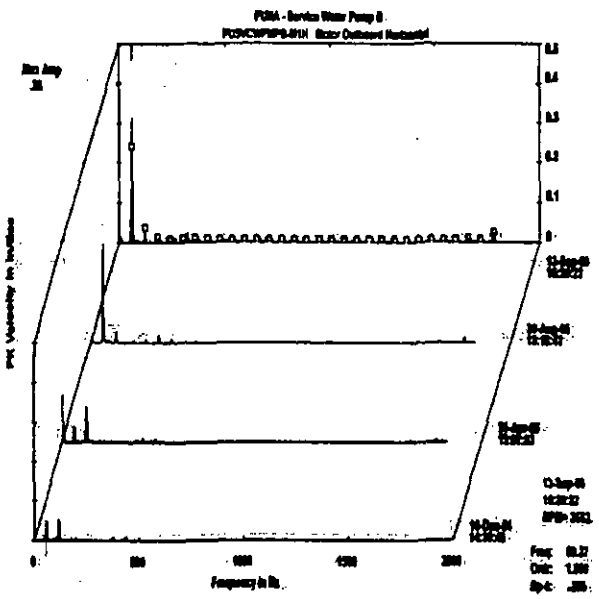
Watch

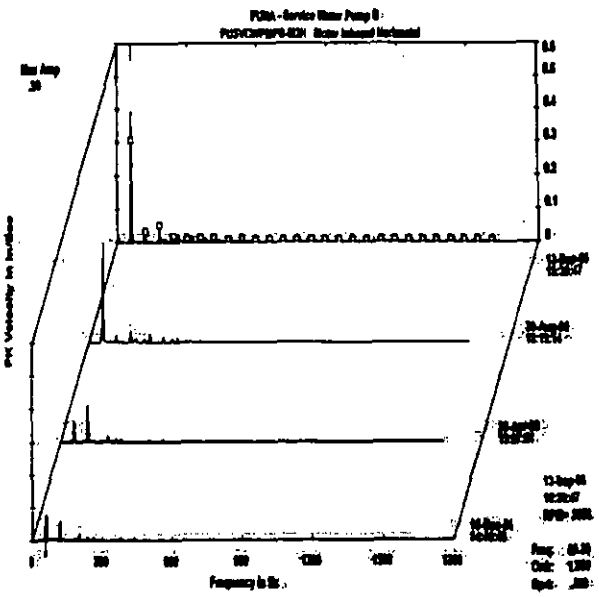
Title: 13-Sep-06 - Looseness

Explanation: Continued Call:

The attached plots are displaying a low level looseness issue. The amplitude levels have increased quickly from the last time that data was collected.

I would only recommend that monthly data be collected on this machine.





EMERSON
Process Management

Predictive Maintenance Detail Report

09/21/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4BCWPMP Bearing Cooling Water Pump 4

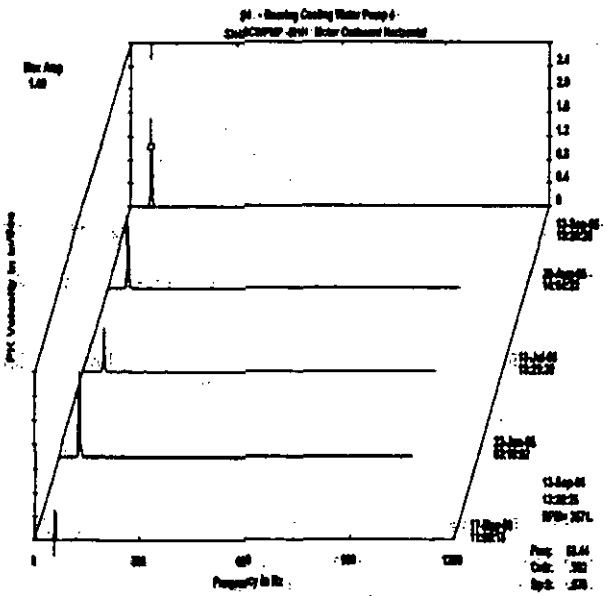
Urgency: High Alarm

Title: 13-Sep-06 - Imbalance - Motor

Explanation: Continued Call:

The motor is still experiencing high levels of imbalance.

I would recommend that the motor be balanced in the next month.



EMERSON
Process Management

Predictive Maintenance Detail Report

09/21/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4FDIDMTR ID/FD Fan

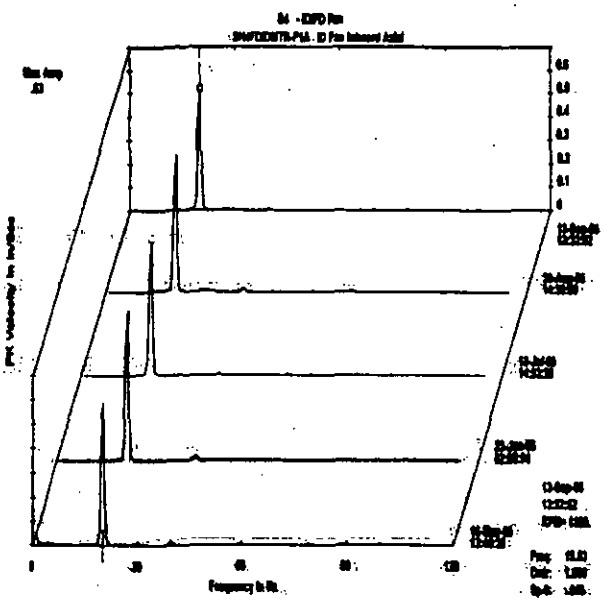
Urgency: Alarm

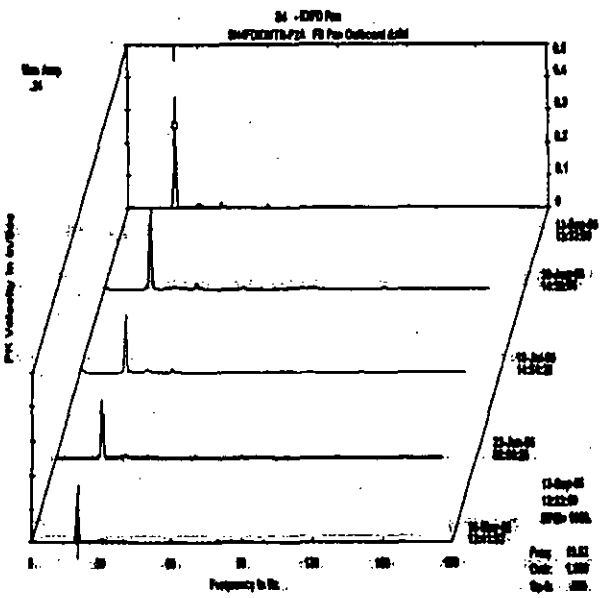
Title: 13-Sep-06 - Imbalance

Explanation: Continued Call:

Both the ID and the FD fans are showing movement in the axial direction. The fans are still showing signs of imbalance and looseness.

The amplitude levels did not change a lot during this data collection. I would recommend that monthly data be collected on this machine. If the amplitude levels increase I will suggest that both fans be cleaned and balanced.





EMERSON
Process Management

Predictive Maintenance Detail Report

09/21/06
harpm/1

Area S4 Shipman Plant 4

Equipment SH4FWSMTRB Feed Water Pump B

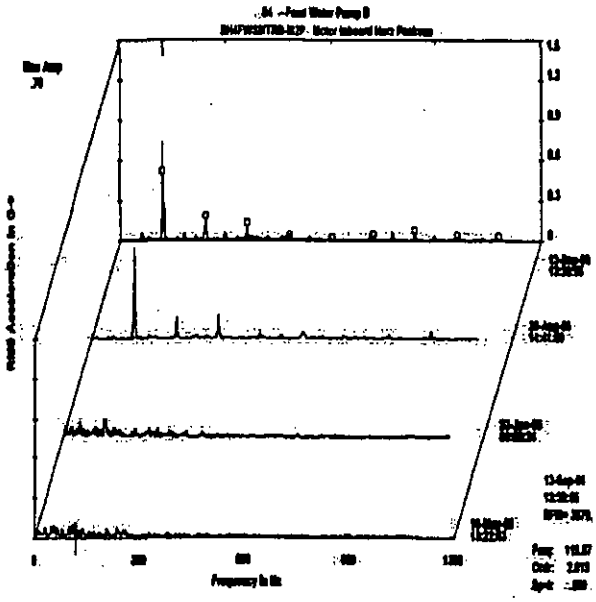
Urgency: Watch

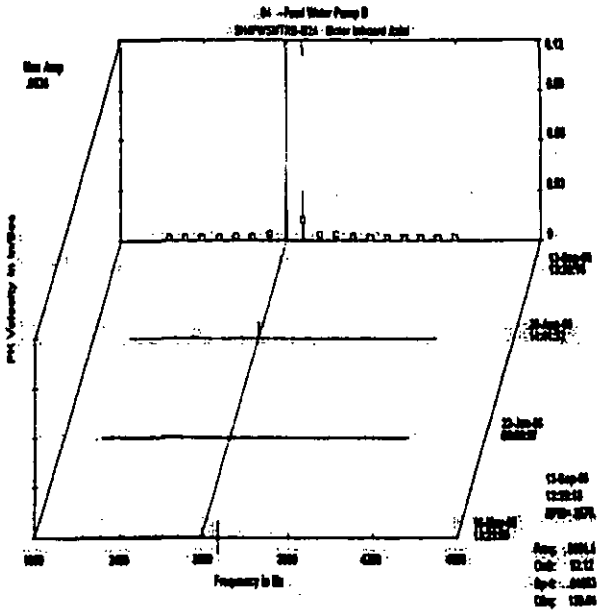
Title: 13-Sep-06 - Electrical defect - Motor

Explanation: Continued Call:

The attached plots are showing an increase in a known electrical defect frequency. I am only seeing it on the inboard of the motor at this time. The amplitude levels are still low.

I would recommend that in the next few months that the mounting bolts on the motor be inspected to verify that they are properly tightened and that the motor feet are not cracked or damaged.





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CA-IR-51
Docket No. 05-0315
Attachment 9

Confidential Information Deleted
Pursuant to Protective Order No. 22593.

Projects:						
Asset Optimization	Phase 1 Consultant Cost	[redacted]	[redacted]			
Asset Optimization	Phase II Consultant Cost			[redacted]		
Shipman Plant	Shipman 3 LO Purifier				27,525	
Shipman Plant	Shipman 4 LO Purifier				19,343	
Hill Plant	Hydrazine System - Hill				27,141	
Puna Plant	Hydrazine System - Puna				12,880	
Shipman Plant	Hydrazine System - Shipman				12,364	
Hill Plant	Hill 5B Boiler Feed Motor				14,755	
Hill Plant	System (3) SEL 300G Relays				30,000	
Hill Plant	Hill Duplex Brodie Strainer				26,687	
Shipman Plant	Shipman Oil/Water Separator				19,702	
Puna Plant	Puna Fuel Unloading Station Extension				54,987	
Hill 5	Hill 5 Battery Bank				47,961	
Shipman Plant	Ignitor Upgrade: set up all 4 burners with ignitors, move control panel to burner front area, set up so port inspection & viewing of throat so it can be done from existing ports.				50,000	
Hill Plant	Walkways between boilers to facilitate safety egress and quick access to equipment. operators and maint presently need to climb over H5 boiler penthouse to reach south side.				50,000	
Hill Plant	Stairway from Control Room to mauka side for emergency escape. Presently there is no escape from Control Room from steam turbine deck issues.					50,000
Puna Plant	Stairway from Control Room to Hamakua side for emergency escape. presently there is no escape from Control Room from steam turbine deck issues.					50,000
Hill Plant	Operations office and training room					75,000
Puna Plant	Operations office and training room				75,000	
Hill Plant	Delta V controls need upgrade for multiple heads (keep dual control). Unit unable to leave trending up all the time due to space constraints on monitors.			25,000		
Hill Plant	Three (3) Feed Water Heaters				300,000	
Shipman Plant	CSI Vibration monitoring and 4500 for steam turbines				100,000	
Shipman Plant	Shipman Plant: Remove old hoist and trolley, install one 15-ton and one 7.5-ton hoist and trolley, replace bridge drive motor and install new drive panel and radio control for all motions. Remove and replace old banjo wire open conductors on runway with fixed power conductors				154,000	
Puna Plant	Puna Plant: - Build new 10-ton bridge, take existing 25-ton hoist, re-reeve for proper lift, de-rate to 10 ton and put on new bridge.				57,000	
Puna Plant	Puna Plant: Install new 25-ton hoist and trolley with proper lift on existing bridge.				48,000	

CA-IR-51
DOCKET NO. 05-0315
ATTACHMENT 9
PAGE 1 OF 1

CA-IR-53

Ref: HELCO T-5, page 43, Infrastructure Maintenance.

Please provide the information related to infrastructure maintenance:

a. Describe the systems used to track and manage infrastructure maintenance work.

b. Provide specimen copies of reports and other documents used in the processes described in your response to part (a) of this information request.

c. Explain how HELCO prioritizes infrastructure maintenance and provide a current reporting of such prioritized work at the current time.

d. Provide all available measures of backlog of infrastructure maintenance as of 12/31/2004 and 12/31/2005.

e. Explain whether the information provided in response to part (d) of this information request indicates progress in reducing infrastructure work backlog during 2005.

HELCO Response:

a. A portion of HELCO's infrastructure is regulated by the Department of Transportation ("DOT") or the State Department of Health ("DOH"). Much of HELCO's fuel delivery systems (pipelines and associated equipment) are under the jurisdiction of the DOT and have set intervals for testing or inspection. Hardcopy maintenance and inspection files are required to document compliance with the federal regulations. These files are centralized and inspected annually. Also regulated are the various injection wells that are permitted by the State under the DOH's Underground Injection Control program. These wells require self reporting by HELCO for all maintenance and discharge activities. Records are centralized and the wells are subject to annual inspection by the State. For infrastructure that is not regulated by the DOT or DOH, the section responsible for the maintenance of the specific structure or facility will keep hardcopy files. In general, work on HELCO power plant infrastructures will be condition-based.

b. Refer to CA-IR-53 Attachment 1 to this response for a copy of the most recent maintenance work on the (regulated) fuel pipeline. Attachment 1 is voluminous and is available for inspection at HECO's Regulatory Affairs Division office, Suite 1301, Central Pacific Plaza, 220 South King Street, Honolulu, Hawaii. Please contact Dean Matsuura at 543-4622 to make arrangements to inspect the requested information. Refer to CA-IR-53 Attachment 2 for the most recent tank inspection report for the (non-regulated) Puna fuel tank.

c. Infrastructure priorities are determined by the potential impact to safety and generation facilities (reliability), as well as the potential for economic loss. In the case of the fuel delivery system, the potential negative impact to safety and environment in the event of a large release is great. A HELCO fuel release has the potential to impact a large section of coastline, as well as shipping activities, because of the proximity of the pipeline to navigable waters. A release could also endanger people and wild life and could potentially disrupt electrical production. Additionally, fines could be imposed on HELCO for any accidental release. For that reason, the fuel delivery system has the highest priority for maintenance. HELCO undergoes an annual inspection by the Federal government during which the facilities are inspected and maintenance records are reviewed. The second priority is for the fuel storage facilities (to include fire protection monitors, hydrants etc.) because of the potential for environmental damage, economic loss, and effect on generation. HELCO personnel review the storage facilities on an annual basis with a Loss Control Specialist from our insurer. Priorities for each noted maintenance task are assigned by the specialist. The third priority for HELCO infrastructure is the various injection wells that are permitted by the State under the DOH's Underground Injection Control program. These wells are regulated and require self reporting by HELCO for all maintenance and discharge activities.

Because of the potential impact to the environment and also economic impact (fines for unauthorized discharge or improper record keeping), this is a high priority for routine (monthly) inspection and accurate recordkeeping. In general, other infrastructure (roads, security fencing, water lines, etc.) is maintained on an as-required basis.

d. All heavy fuel (No. 6) tanks and the entire fuel line have been inspected recently (i.e., within the past 5 years) except for Hill Tank No. 6. Hill Plant Tank No. 6 will require inspection per the DOT guideline that requires an API 653 inspection every 5 years (starting 2004 for this tank). The tank must be emptied and inspected before 2009. With regard to diesel storage, Kanoelehua diesel Tanks No. 1 and No. 2 were both inspected in 2005, and Waimea diesel fuel Tank No. 1 was cleaned and inspected during the week of August 14, 2006. Once Waimea diesel Tank No. 1 is returned to service (during the week of August 21, 2006), the Waimea diesel Tank No. 2 product will be transferred to Waimea diesel Tank No. 1. Once Waimea diesel Tank No. 2 is emptied, it will be cleaned and inspected. This is expected to be completed by mid September 2006.

e. Per "d." above, there are no major infrastructure maintenance items that are considered to be backlogged.

RECEIVED
SEP 24 2004
TIME

Hawaii Electric Light Company

Internal Pipeline Inspection Report

8" Pipeline

Chevron Terminal

to

Hill Plant

Wednesday, September 15, 2004

MAGPIE SYSTEMS, INC. a T.D. Williamson, Inc., company

4085 South 300 West, Salt Lake City, UT 84107 (801) 281-2226 FAX (801) 269-1516 www.magpiesystems.com
TDW 6801 S. 65th West Ave., Tulsa, OK 74131-2444 (800) 571-7447 www.tdwilliamson.com

Executive Summary

Run Information

Hawaii Electric Light Company — *Chevron Terminal to Hill Plant*

Don Heinzen — *8in. Bunker Fuel Oil*

	Launcher	Receiver
Location	Chevron Terminal	Hill Plant
Date / Time	7/14/2004	7/14/2004 1:42:40 PM
Stationing	0+00	108+41
GPS - LAT	19.716666667	19.7046394348145
GPS - LONG	-155.051763889	-155.059326171875

Duration of run - Hours 3.27 — Average Velocity: 0.92 Ft/sec

Distance 10,841.00 ft — Maximum Velocity: 41.93 Ft/sec

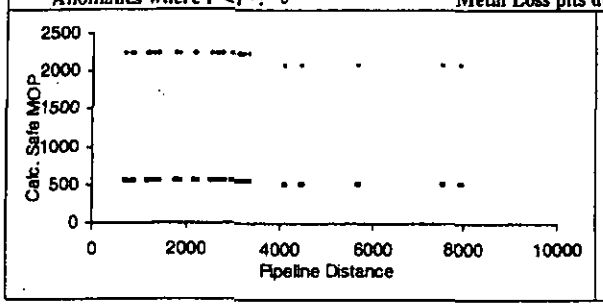
Magpie On-site Representative: Joe Naso — Magpie Data Analyst: Mike Raisbeck — Tool Tracking by: Hawaii Electric

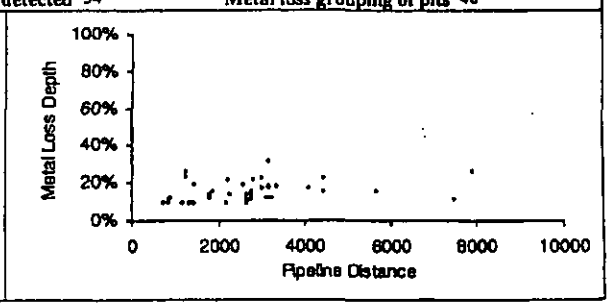
Inspection Findings

Current Established Maximum Operating Pressure of Pipeline: Multiple *(design psi used if Zero)* — Criteria Used: Modified ASME B31G — Defect Interaction Rule: 6X wall (cir.); 1 inch (axial)

Welds detected	451	Valves detected	3	Fittings detected	31	Markers detected	2	Gains detected	17
Casings detected	0	Tees detected	5	Flanges detected	9	Repairs detected	2	Possible Dents detected	0

Anomalies where P'<P*: 0 — Metal Loss pits detected 54 — Metal loss grouping of pits 48





** The number of anomalies where P'(calculated safe max. pressure for an anomaly) is less than P (current established maximum pressure of pipeline) - see ASME B31G*

Inspection Details

A total of 48 metal loss groups (54 pits) were detected on the inspection survey, of which the deepest is reported at 32%. Using an established maximum operating pressure of multiple psi, none of the metal loss features appear to be pressure reducing.

Inspection data was obtained for the full length (10,841 feet / 2.05 miles) of the survey. The quality of the inspection data is satisfactory for a comprehensive assessment of this pipeline segment.

TDW's Electronic Clock-KALIPER® Pig inspected this line for reductions on July 01, 2004, prior to the MFL inspection. No reductions were identified or located which exceeded the 0.25 inch specifications. A TDW summary of this inspection is included in this report.

Due to a restrictive bend in the pipeline at 7049.77 secs / 3862.421 ft. two sensors (#13 & 14) were damaged for the remainder of the run. Again at 8905.08 secs / 8073.75 ft. two more sensors were damaged (#41 & 42) through the remainder of the run. This resulted in less than 4% data loss for the run. Detailed analyses of the data from the adjacent sensors show minimal possibility of metal loss in these areas.

Using the GPS data provided for markers and valves, including launch and receive, approximate GPS coordinates are provided for each weld, group (metal loss), and any other feature along the pipeline route. Included on the report CD is a map file which graphically shows the position of Valves, Markers, and certain Metal Loss points. GPS accuracy is determined by the accuracy of the GPS data provided as well as the accuracy of the gyroscopes and accelerometers on-board the inspection tool. Coordinates are provided to assist in determining the general location of features, and are not intended to provide exact coordinates for locating defects.

TDW PIPELINE SURVEYS P O BOX 1286 | TULSA, OKLAHOMA 74101 | (918) 447-5500 1-888-839-6766 FAX (918) 582-1423
A Division of TDW Services, Inc

ELECTRONIC KALIPER® SURVEY REPORT

Prepared for: HELCO
Prepared on: July 21, 2004
Chevron (Sec. 1A) to Hill Plant (Sec. 1C)

This section will contain a chronology of significant actions and events that occurred during a TDW Electronic KALIPER® Surveyor inspection for HELCO's 8 inch bunker fuel pipeline on July 1, 2004. The pipeline is located in Hawaii and measures approximately 10,000 feet.

- *TIME OF LAUNCH: 13:19:00 on July 1, 2004.*
- *TIME OF RECEIVE: 15:24:00 on July 1, 2004*
- *LENGTH OF LINE QUOTED BY CUSTOMER: 10,000 Feet*
- *ELECTRONIC KALIPER® DISTANCE RECORDED: 9,540 Feet*
- *NUMBER OF RUNS PERFORMED: 2*
- *ANY SIGNIFICANT COMMENTS REGARDING JOB: None*

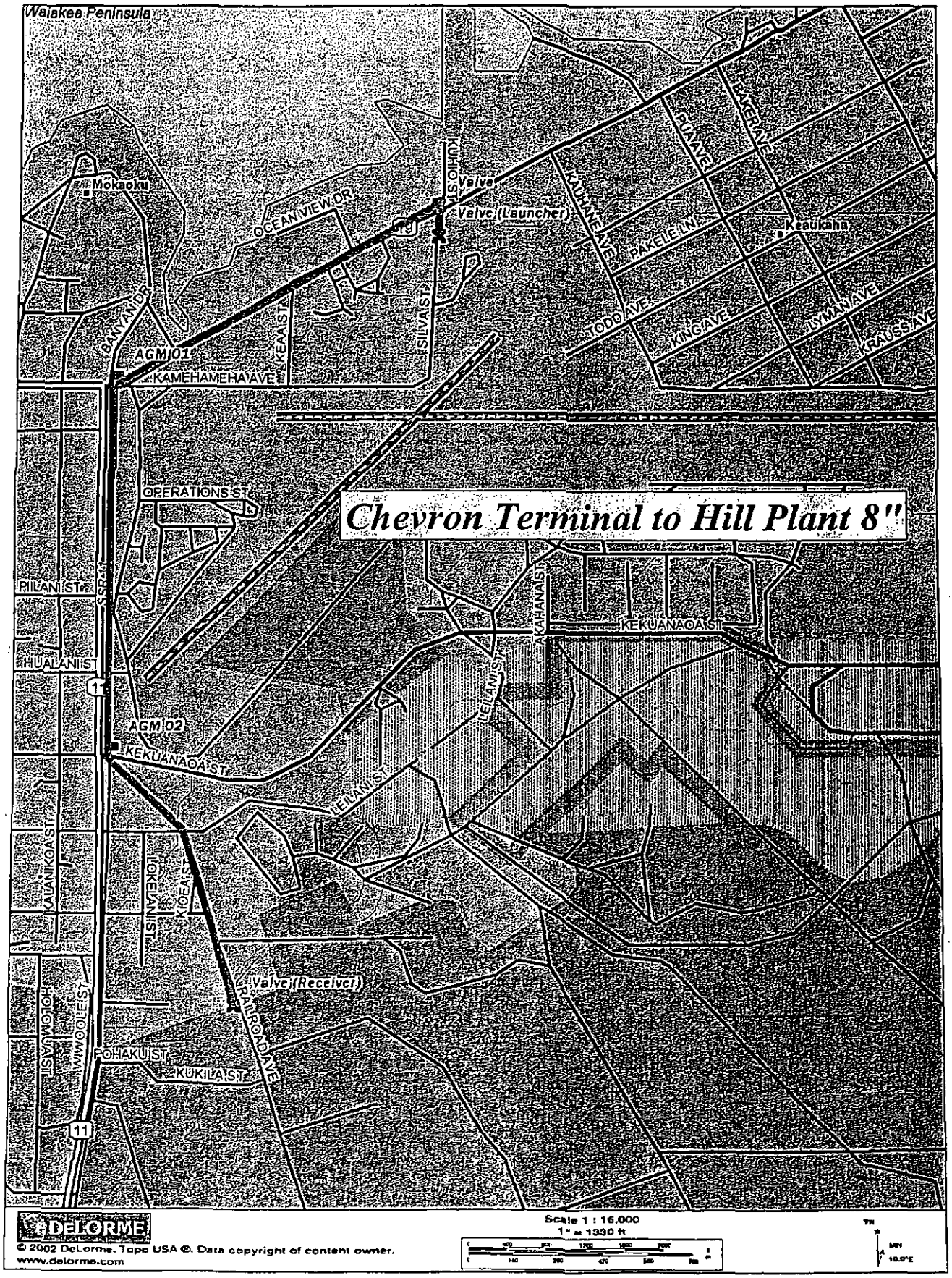
No reductions were identified or located which exceeded the 0.25 inch specifications. The KALIPER® Pig measures a reduction as it exists in the buried pipeline. Once a pipeline is uncovered and the overburden is removed, the pipe will have a tendency to return to its normal round shape and some of the reduction may be alleviated.

Nang Hun

Nang Hun
Survey Analyst

Joseph Bartlett

Joseph L. Bartlett
Manager, KALIPER® Services


Waiakea Peninsula
Mokaoku
Keaukaha
Valve
Valve (Launcher)
Valve (Receiver)
AGM 01
AGM 02
OCEAN VIEW DR
KUHIO ST
KAUHANE AVE
PUA AVE
BAKER AVE
PAKELE LN
TODD AVE
KING AVE
LYMAN AVE
KRAUSS AVE
BANYAN DR
KEAA ST
SILVA ST
KAMEHAMEHA AVE
OPERATIONS ST
PILANI ST
HUALANI ST
KEKUANAOA ST
AKAHANA ST
LEILANI ST
KALANIKOA ST
LOKELANI ST
KIOEA ST
HOLOMUA ST
WIWOOLE ST
POHAKU ST
KUKILA ST
RAILROAD AVE
11
Chevron Terminal to Hill Plant 8"
DELORME
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www.delorme.com
Scale 1 : 16,000
1" = 1330 ft

Metal Loss Summary Report

This ***Metal Loss Summary Report*** provides information regarding indicated anomalies found in this inspection. Anomalies detected during the inspection are sized and assigned a length, width, and depth. The specified formula for determining remaining-strength of the anomaly is then applied to the predicted sizes. The predicted size accuracy is described in the contract specifications (found in Appendix C).

The ***Metal Loss Summary Report*** is a listing of metal loss indications in the pipeline, sorted first by the calculated safe maximum operating pressure (***PSI (P')***), then by depth. As an aid in locating these anomalies, the upstream and downstream references are included, as well as distances from the defect to the reference.

Column Heading Definitions:

Column 1	*ID*	Each defect is automatically assigned a number in the software. This number is provided to assist the user of ***PIGTRAP ™*** software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the ***PIGTRAP ™*** software.
Column 3	*Dist. ( )*	Given in either feet or meters, based on contractual agreements, this is the absolute distance from launch.
Column 4	*Depth*	Predicted depth of the defect as a percentage of nominal wall.
Column 5	*Length*	Predicted length of the defect, reported in either inches or millimeters.
Column 6	*Width*	Predicted width of the defect, reported in either inches or millimeters.
Column 7	*Orient.*	Orientation is reported in degrees (0 degrees at top of pipe) as viewed looking downstream.
Column 8	*PSI (P')*	Based on the specified formula for determining remaining-strength, it is the predicted safe maximum allowable pressure for the defect (P').
Column 9	*% Est. psi (P'/P)*	Percent of maximum established pressure, this is calculated by dividing the calculated safe pressure of the defect (P') by the current established maximum operating pressure of the pipeline (P). For Magpie reporting, P is *either* established MOP provided by the customer or the calculated pressure rating for the pipe (P). Percentages less than 100% are considered pressure reducing.
Column 10	*Aboveground References*	The name of the closest upstream and downstream references, usually either an AGM or a valve.
Column 11	*Distance from Defect*	The distance to the upstream and downstream reference listed in the previous column. Used for locating defects in the field.

Dig Sheet Preparation –

Dig sheets can be prepared for any feature in the pipeline, except welds. This not only includes Grouped Pits, but Locations, Gains, Wall thickness changes, etc.

To create your own Dig Sheet, open the Access Database. The *Switchboard* should appear – choose **Dig Site Information**. In the entry form, enter the ID number for the item you wish to locate. Click Add to include the item on the list. Continue entering ID numbers for other sites. When you are finished, click the OK button. The PC will begin to generate Dig Sheets. This may take a few minutes, depending on the number of ID numbers entered. When they are complete, the first Dig Sheet will appear on your screen. You can review them by clicking the arrow buttons in the lower left corner of the screen. To print, select Print from the File menu, or click the printer icon on the tool bar. All Dig Sheets will be printed unless otherwise directed by you.

MAGPIE™ SYSTEMS, INC. a T.D. Williamson, Inc., company
4085 South 300 West, Salt Lake City, UT 84107 (801) 281-2226 FAX (801) 269-1516 www.magpiesystems.com
TDW 6801 S. 65th West Ave., Tulsa, OK 74131-2444 (800) 571-7447 www.tdwilliamson.com

Metal Loss

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Sorted by PSI (P'), then depth

Criteria Modified ASME B31G

ID	*Time*	*Dist. (ft)*	*Depth*	*Length*	*Width*	*Orientation Deg*	*/ Clock*	*PSI (P')*	*% Est. psi (P'/P)*	*Above-Ground References*	*Distance from Defect*
40000045	7,872.9	5,664.8	16.2%	0.82	1.57	255	8:30	2091	100.0	Upstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1472.61
										Downstream: AGM 02, Southeast Corner of Kanoelehua Ave. and	2415.20
40000047	8,852.9	7,928.2	26.1%	1.06	3.66	248	8:15	2093	100.0	Upstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	3736.01
										Downstream: AGM 02, Southeast Corner of Kanoelehua Ave. and	151.80
40000043	7,320.1	4,427.3	22.8%	1.65	2.61	345	11:30	2093	100.0	Upstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	235.11
										Downstream: AGM 02, Southeast Corner of Kanoelehua Ave. and	3652.70
40000042	7,146.3	4,047.2	17.9%	0.94	3.66	52	1:30	2093	100.0	Upstream: Valve	3533.44
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	144.96
40000044	7,320.2	4,427.6	15.4%	1.06	2.61	345	11:30	2093	100.0	Upstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	235.37
										Downstream: AGM 02, Southeast Corner of Kanoelehua Ave. and	3652.44
40000039	6,723.3	3,138.3	32.0%	1.53	2.09	165	5:30	2250	100.0	Upstream: Valve	2624.45
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1053.95
40000006	4,821.7	1,195.9	26.0%	1.30	6.27	157	5:00	2250	100.0	Upstream: Valve	682.08
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	2996.31
40000007	4,822.9	1,197.2	24.0%	0.82	4.18	165	5:30	2250	100.0	Upstream: Valve	683.43
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	2994.96
40000033	6,636.3	2,954.3	23.0%	0.82	1.57	323	10:45	2250	100.0	Upstream: Valve	2440.56
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1237.84
40000020	6,273.7	2,196.5	22.0%	0.82	2.09	240	8:00	2250	100.0	Upstream: Valve	1682.69
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1995.71
40000032	6,543.8	2,759.0	22.0%	0.71	1.57	210	7:00	2250	100.0	Upstream: Valve	2245.26
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1433.14
40000022	6,435.9	2,534.0	19.2%	0.59	1.57	135	4:30	2250	100.0	Upstream: Valve	2020.18
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1658.21
40000013	5,015.7	1,411.1	19.0%	0.82	5.75	135	4:30	2250	100.0	Upstream: Valve	897.35
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	2781.05
40000037	6,723.1	3,137.8	18.8%	1.41	2.61	165	5:30	2250	100.0	Upstream: Valve	2623.96
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1054.44
40000036	6,722.9	3,137.4	18.6%	1.06	3.13	165	5:30	2250	100.0	Upstream: Valve	2623.61
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1054.78
40000041	6,803.0	3,306.1	18.0%	0.71	1.57	165	5:30	2250	100.0	Upstream: Valve	2792.33
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	886.07
40000038	6,723.2	3,138.0	17.9%	1.53	4.70	180	6:00	2250	100.0	Upstream: Valve	2624.17
										Downstream: AGM 01, Corner of Kanoelehua and Kalanianaole H	1054.22

Metal Loss

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Sorted by PSI (P'), then depth

Criteria Modified ASME B31G

ID	Time	Dist. (ft)	Depth	Length	Width	Orientation Deg	/ Clock	PSI (P')	% Est. psi (P'/P)	Above-Ground References		Distance from Defect
40000034	6,639.5	2,961.3	17.8%	0.94	1.57	180	6:00	2250	100.0	Upstream:	Valve	2447.50
										Downstream:	AGM 01, Corner of Kanoelehua and Kalanianaole H	1230.90
40000018	6,099.8	1,834.6	16.0%	1.30	4.70	90	3:00	2250	100.0	Upstream:	Valve	1320.76
										Downstream:	AGM 01, Corner of Kanoelehua and Kalanianaole H	2357.63
40000029	6,523.7	2,716.9	15.9%	0.71	7.84	293	9:45	2250	100.0	Upstream:	Valve	2203.15
										Downstream:	AGM 01, Corner of Kanoelehua and Kalanianaole H	1475.24

Dig Site Information Report

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurements on this sheet are in ft

All numbers in italics are Distance from Launch

Direction of tool travel

Upstream Reference

Valve

513.75

Downstream Reference

AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186

4192.14

2624.51 | 1053.88

Joint Length:	22.9	21.2	22.6	24.8	20.0	22.57	24.3	20.6	19.3	20.0	23.3
# Groups / Joint:	0	0	0	1	0	4	0	0	1	0	0
Deepest Defect:	0%	0%	0%	12%	0%	32%	0%	0%	12%	0%	0%

Distance from US weld 2.80

19.77 Distance from DS weld

Upstream Weld *3135.46*

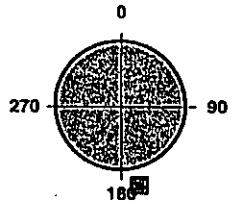
Feature Centerline *3138.26*

Downstream Weld *3158.03*

Feature Information

ID:	40000039	Distance from Launcher:	3138.26	*Feature Description:*	
Time:	6723.31	Orientation on Pipe Wall:	165 *deg.*	Metal Loss	
Latitude:	19.7239		Longitude:	-155.0616	

Feature Orientation
as looking downstream



0 is top of pipe

Five Upstream and Downstream Locations (relative distance from Feature Centerline)

Upstream		Downstream	
2528.22	Bend left	171.38	Bend right
2529.41	Bend left	207.90	Bend left
2614.46	Bend up	211.92	Bend right
2622.09	Bend down	255.69	Bend right
2622.41	Flange	259.25	Pigable "Y" at 90 deg.

Depth:	32%
Length:	1.532 in
Width:	2.089 in
Safe Operating Pressure:	2250 psi

Dig Site Information Report

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurements on this sheet are in ft

All numbers in italics are Distance from Launch

Direction of tool travel

Upstream Reference

AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186

[redacted]

Downstream Reference

AGM 02, Southeast Corner of Kanoelehua Ave. and Kekuanaoa St. -- Ref# 320

8079.95

3736.06 | 151.75

Joint Length:	40.1	40.3	10.6	18.5	11.2	13.43	20.9	7.1	28.3	41.7	22.2
# Groups / Joint:	0	0	0	0	0	1	0	0	0	0	0
Deepest Defect:	0%	0%	0%	0%	0%	26%	0%	0%	0%	0%	0%

[redacted]

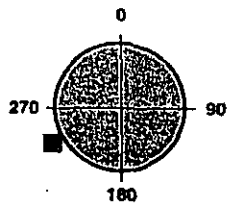
Distance from US weld 13.31 → | ← 0.12 Distance from DS weld

Upstream Weld	Feature Centerline	Downstream Weld
7914.89	*7928.20*	*7928.32*

Feature Information

ID:	40000047	Distance from Launcher:	7928.20	*Feature Description:*	
Time:	8852.93	Orientation on Pipe Wall:	248 *deg.*	Metal Loss	
Latitude:	19.7121			Longitude:	-155.0643

Feature Orientation
as looking downstream



0 is top of pipe

Five Upstream and Downstream Locations (relative distance from Feature Centerline)

Upstream		Downstream	
701.01	Pipeline clean-out top of pipe	120.35	Bend left
702.11	Pipeline clean-out top of pipe	149.88	Pipeline clean-out top of pipe
896.25	Pipeline clean-out top of pipe	151.47	Pipeline clean-out top of pipe
897.02	Pipeline clean-out top of pipe	888.03	Fitting on top of pipe
1413.52	Pipeline clean-out top of pipe	999.43	Pipeline clean-out top of pipe

Depth:	26%
Length:	1.060 in
Width:	3.656 in
Safe Operating Pressure:	2093 psi

Dig Site Information Report

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurements on this sheet are in ft

All numbers in italics are Distance from Launch

Direction of tool travel

Upstream Reference

Valve

513.75

Downstream Reference

AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186

4192.14

682.13 | 2996.26

Joint Length:	23.2	21.3	17.7	22.6	23.9	18.80	20.3	23.6	23.6	23.3	22.1
# Groups / Joint:	0	0	0	2	0	1	1	0	0	0	3
Deepest Defect:	0%	0%	0%	10%	0%	26%	24%	0%	0%	0%	10%

Distance from US weld 18.13

0.67 Distance from DS weld

Upstream Weld *1177.75*

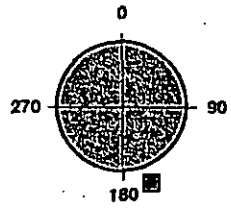
Feature Centerline *1195.88*

Downstream Weld *1196.55*

Feature Information

ID:	40000006	Distance from Launcher:	1195.88	*Feature Description:*	
Time:	4821.72	Orientation on Pipe Wall:	157 *deg.*	Metal Loss	
Latitude:	19.7267	Longitude:	-155.0562		

Feature Orientation
as looking downstream



0 is top of pipe

Five Upstream and Downstream Locations (relative distance from Feature Centerline)

Upstream		Downstream	
585.84	Bend left	2113.76	Bend right
587.03	Bend left	2150.28	Bend left
672.08	Bend up	2154.29	Bend right
679.71	Bend down	2198.07	Bend right
680.03	Flange	2201.62	Pigable "Y" at 90 deg.

Depth:	26%
Length:	1.296 in
Width:	6.268 in
Safe Operating Pressure:	2250 psi

Dig Site Information Report

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurements on this sheet are in ft

All numbers in italics are Distance from Launch

Direction of tool travel

Upstream Reference

Valve

513.75

Downstream Reference

AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186

4192.14

683.47

2994.92

Joint Length:	21.3	17.7	22.6	23.9	18.8	20.32	23.6	23.6	23.3	22.1	20.5
# Groups / Joint:	0	0	2	0	1	1	0	0	0	3	0
Deepest Defect:	0%	0%	10%	0%	26%	24%	0%	0%	0%	10%	0%

Distance from US weld 0.66

19.66 Distance from DS weld

Upstream Weld *1196.55*

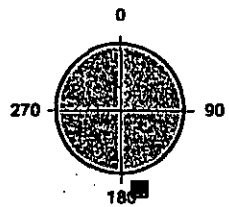
Feature Centerline *1197.22*

Downstream Weld *1216.88*

Feature Information

ID:	40000007	Distance from Launcher:	1197.22	***Feature Description:***	
Time:	4822.94	Orientation on Pipe Wall:	165 *deg.*	Metal Loss	
Latitude:	19.7267			Longitude:	-155.0562

Feature Orientation
as looking downstream



0 is top of pipe

Five Upstream and Downstream Locations (relative distance from Feature Centerline)

Upstream		Downstream	
587.18	Bend left	2112.42	Bend right
588.37	Bend left	2148.94	Bend left
673.42	Bend up	2152.86	Bend right
681.04	Bend down	2196.73	Bend right
681.37	Flange	2200.29	Pigable "Y" at 90 deg.

Depth:	24%
Length:	0.825 in
Width:	4.179 in
Safe Operating Pressure:	2250 psi

Dig Site Information Report

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurements on this sheet are in ft

All numbers in italics are Distance from Launch

Direction of tool travel

Upstream Reference

Valve

513.75

Downstream Reference

AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186

4192.14

2440.59

1237.80

Joint Length:	23.1	24.0	22.0	22.3	23.4	21.21	20.5	22.5	25.5	22.9	21.2
# Groups / Joint:	0	0	0	0	0	1	1	0	0	0	0
Deepest Defect:	0%	0%	0%	0%	0%	23%	18%	0%	0%	0%	0%

Distance from US weld 19.95

1.25 Distance from DS weld

Upstream Weld *2934.38*

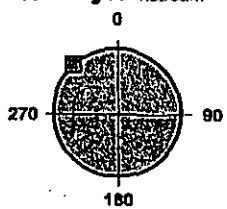
Feature Centerline *2954.34*

Downstream Weld *2955.59*

Feature Information

ID:	40000033	Distance from Launcher:	2954.34	*Feature Description:*	
Time:	6636.28	Orientation on Pipe Wall:	323 *deg.*	Metal Loss	
Latitude:	19.7242		Longitude:	-155.0610	

Feature Orientation
as looking downstream



0 is top of pipe

Five Upstream and Downstream Locations (relative distance from Feature Centerline)

Upstream		Downstream	
2344.30	Bend left	355.30	Bend right
2345.49	Bend left	391.82	Bend left
2430.54	Bend up	395.84	Bend right
2438.17	Bend down	439.61	Bend right
2438.49	Flange	443.17	Pigable "Y" at 90 deg.

Depth:	23%
Length:	0.825 in
Width:	1.567 in
Safe Operating Pressure:	2250 psi

Pipeline Summary

The Pipeline Summary report provides and overview of the pipeline condition.

Charts

The following charts are utilized in this report:

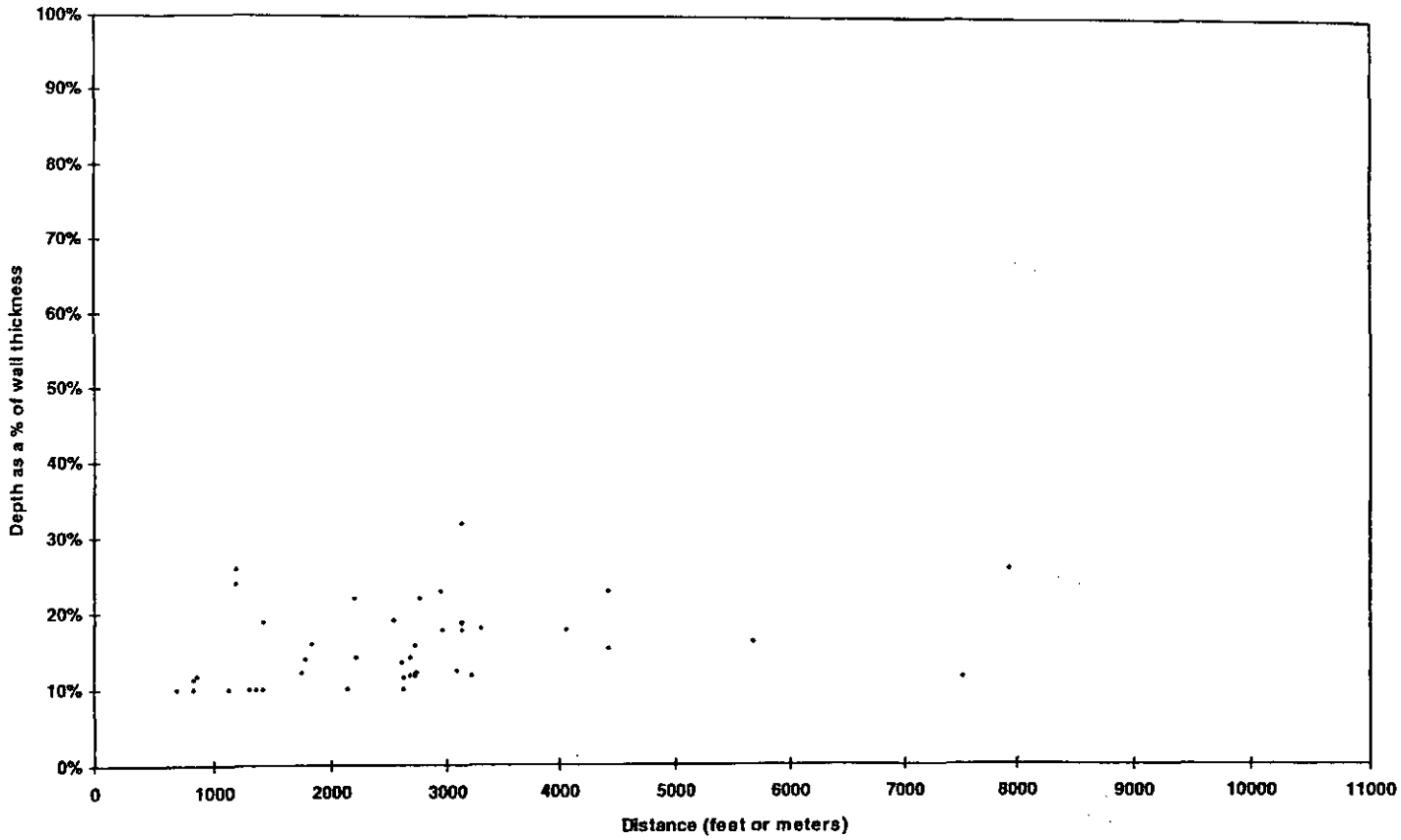
Metal Loss Depth	This chart highlights the predicted depths of defects as a percentage of wall thickness compared to distance. Areas of concentrated metal loss are easily detected as defects group.
Metal Loss Orientation	The distance from launch is plotted against the orientation of the defect. Orientation is based on 360° in a circle, with 0°or 360° marking the top of the pipe (180° the bottom). Displaying the orientation of defects around the circumference of the pipeline may aid in determining the type of corrosion mechanism present. For example, the majority of defects along the bottom of the pipe might indicate internal channel corrosion.
Metal Loss – Calculated Safe Max. Operating Pressure	The calculated safe maximum operating pressure of each defect is plotted compared to distance.
Velocity	Displays the speed of the tool relative to distance during the inspection. The specified contractual velocity of the inspection tool is 8 feet per second. If the tool exceeds this speed, the data collected by the tool may be degraded.
Defect Depth Histogram	Displays the total number of defects (pressure reducing groups/defects and non-pressure reducing groups /defects (where P'<P)) by predicted depth of the defect as a percentage of nominal wall.

Metal Loss Depth Graph

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurements on this graph are in ft

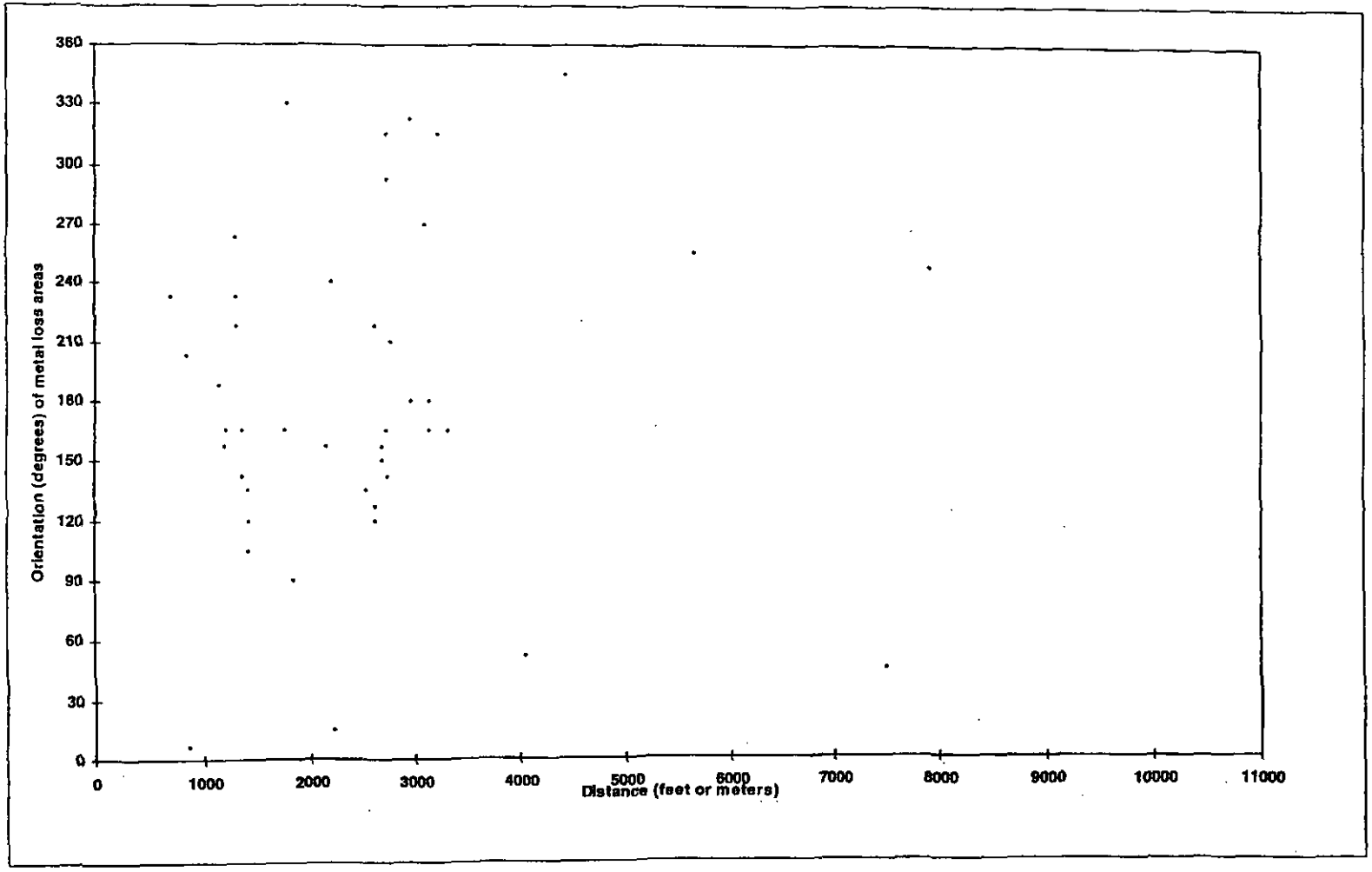


Metal Loss Orientation Graph

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurement on this graph are in ft

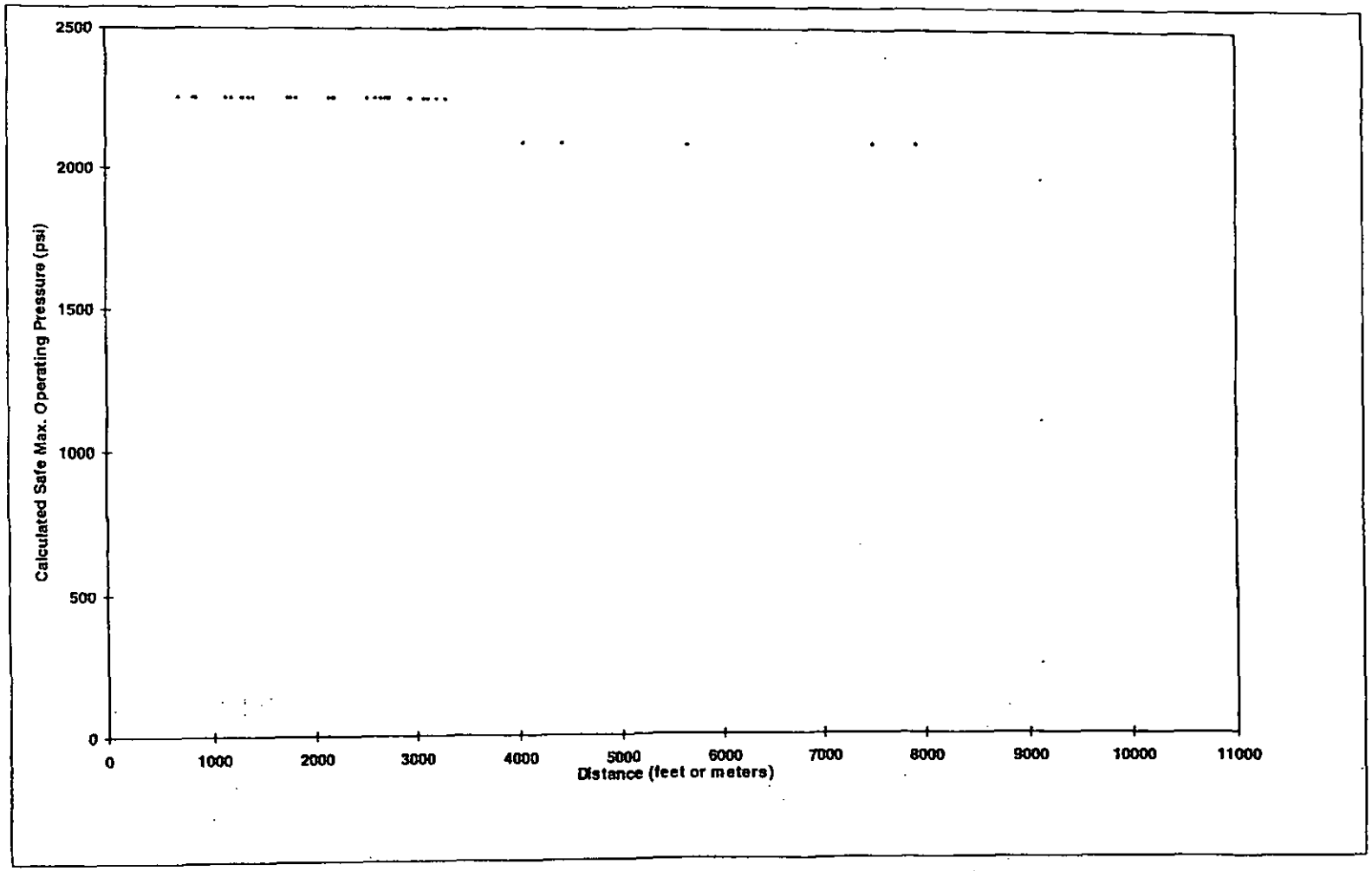


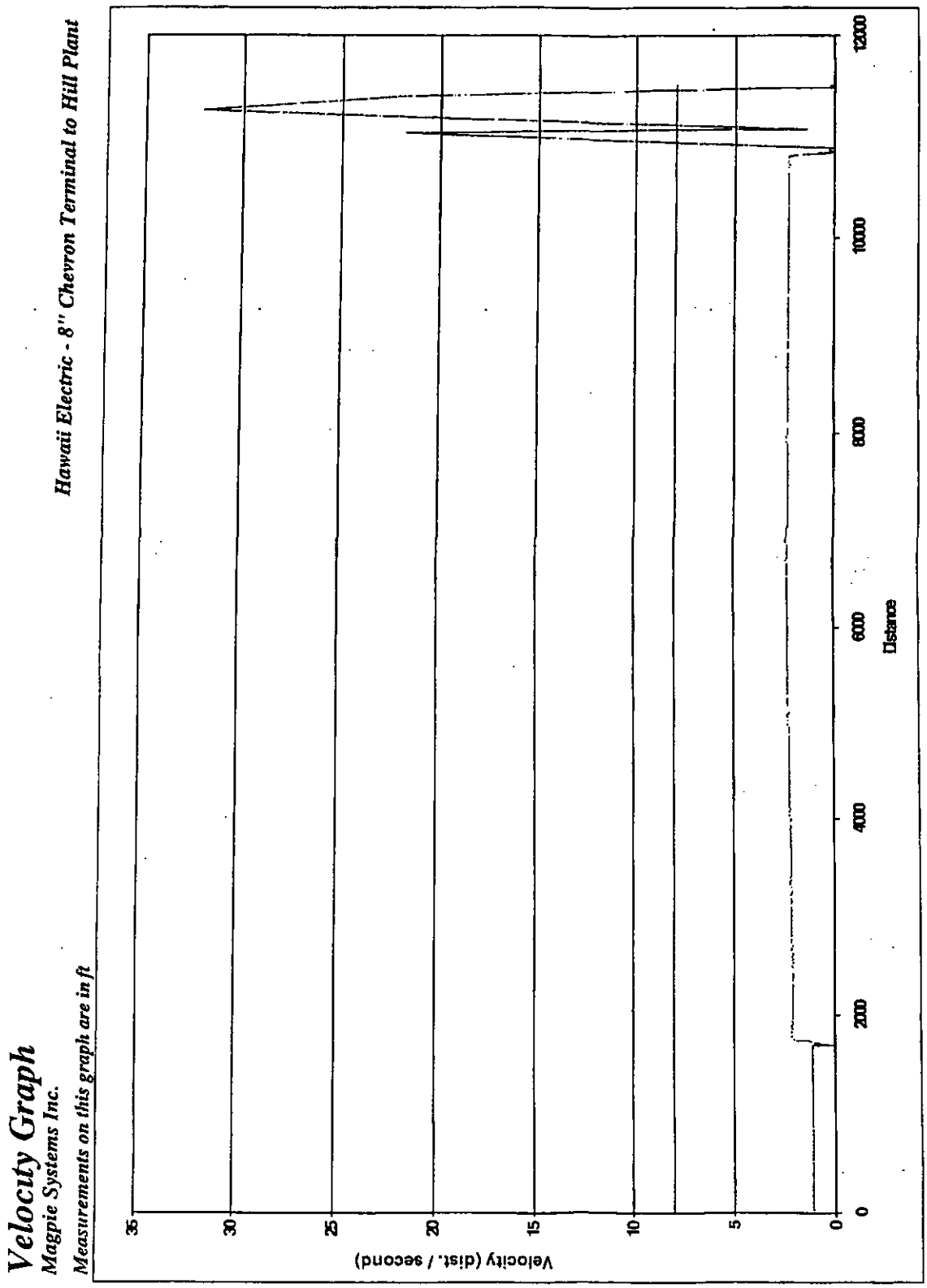
Metal Loss - Calculated Safe Max. Operating Pressure Graph

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

Measurements on this graph are in ft

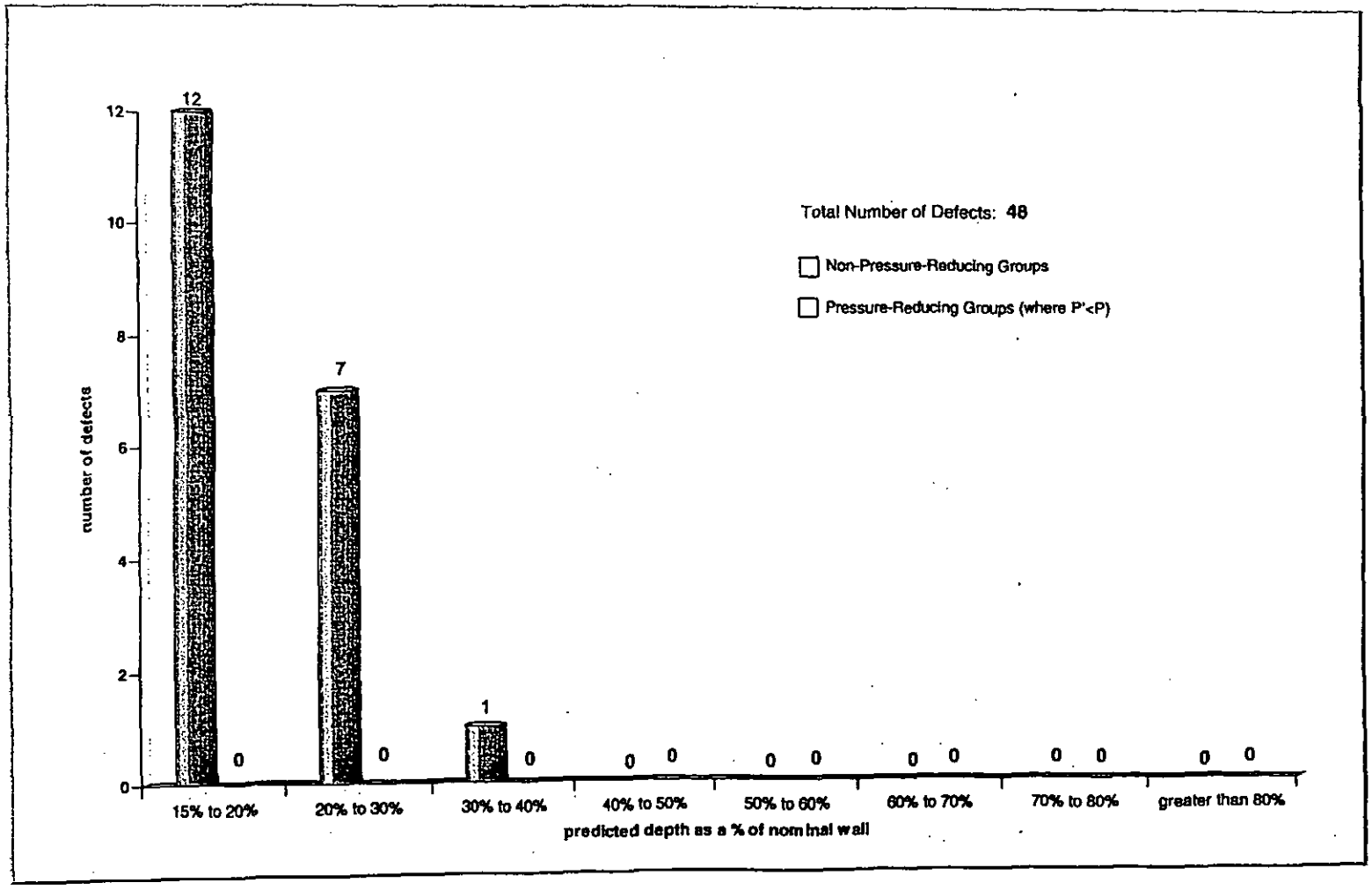



Velocity Graph
Magpie Systems Inc.
Measurements on this graph are in ft
Hawaii Electric - 8" Chevron Terminal to Hill Plant
Velocity (dist. / second)
35
30
25
20
15
10
5
0
0
2000
4000
6000
8000
10000
12000
Distance

Defect Depth Histogram

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant



Pipeline Summary

Tables

Locations

A *location* is a feature in the pipeline that can be used to correlate the inspection tool data to aboveground references. Common location features include valves, fittings, flanges, tees, casings, repairs and aboveground markers (AGMs).

For example, a metal loss area could be referenced as being 200 feet down stream from a valve. Not all locations can be easily found from aboveground. Some locations might not be useful if they are not aboveground.

Column Heading Definitions:

Column 1	*ID#*	Each *location* is automatically assigned a number in the software. This number is provided to assist the user of *PIGTRAP ™* software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the *PIGTRAP ™* software.
Column 3	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Column 4	*Joint #: U/S weld dist, D/S weld dist*	This unique number identifies the girth weld number, the distance to the upstream (U/S) weld (in feet or meters), and the distance to the downstream weld (in feet or meters).
Column 5	*Description*	Describes the location in greater detail. Possible entries include valves, flanges, fittings, tees, markers, etc.
Column 6	*Latitude*	If GPS coordinates were provided, this provides the Latitude (north/south) reading of the AGM or valve as recorded during the run. Predicted GPS for all other features is provided in the Pipeline Listing section.
Column 7	*Longitude*	If GPS coordinates were provided, this provides the Longitude (east/west) reading of the AGM or valve as recorded during the run. Predicted GPS for all other features is provided in the Pipeline Listing section.

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Locations

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID#	Time	Distance (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Description	Latitude	Longitude
10000036	7,049.62	3,837.7	1940:0.1,0.2	Bend right	0.00000	0.00000
10000037	7,072.26	3,886.5	1970:0.0,0.4	Bend right	0.00000	0.00000
10000038	7,149.20	4,053.4	2040:6.2,0.6	Pipeline clean-out top of pipe	0.00000	0.00000
10000039	7,149.84	4,054.7	2050:0.2,1.4	Bend left	0.00000	0.00000
10000040	7,150.36	4,055.7	2060:0.1,7.1	Pipeline clean-out top of pipe	0.00000	0.00000
10000041	7,212.75	4,192.1	2140:1.5,39.0	AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186	19.72250	-155.06427
10000042	7,517.55	4,862.8	2320:11.3,9.3	Pipeline clean-out top of pipe	0.00000	0.00000
10000043	7,517.95	4,863.7	2320:12.2,8.4	Pipeline clean-out top of pipe	0.00000	0.00000
10000044	7,876.44	5,673.0	2680:17.5,4.4	Pipeline clean-out top of pipe	0.00000	0.00000
10000045	7,876.83	5,673.8	2680:18.3,3.6	Pipeline clean-out top of pipe	0.00000	0.00000
10000046	8,243.15	6,514.0	3070:8.3,11.8	Pipeline clean-out top of pipe	0.00000	0.00000
10000047	8,243.52	6,514.9	3070:9.2,10.9	Pipeline clean-out top of pipe	0.00000	0.00000
10000048	8,465.45	7,031.4	3310:10.8,10.9	Pipeline clean-out top of pipe	0.00000	0.00000
10000049	8,465.78	7,032.2	3310:11.6,10.1	Pipeline clean-out top of pipe	0.00000	0.00000
10000050	8,549.74	7,226.3	3400:14.6,27.1	Pipeline clean-out top of pipe	0.00000	0.00000
10000051	8,550.22	7,227.4	3400:15.7,26.0	Pipeline clean-out top of pipe	0.00000	0.00000
10000052	8,904.92	8,048.8	3650:0.0,0.6	Bend left	0.00000	0.00000
10000053	8,917.58	8,078.3	3670:16.5,1.0	Pipeline clean-out top of pipe	0.00000	0.00000
10000054	8,918.29	8,079.9	3680:0.5,19.6	Pipeline clean-out top of pipe	0.00000	0.00000
10000055	8,918.30	8,080.0	3680:0.8,19.4	AGM 02, Southeast Corner of Kanoelehua Ave. and Kekuanaoa St. -- Ref#	19.71162	-155.06428
10000056	9,236.27	8,816.3	3860:14.1,0.3	Fitting on top of pipe	0.00000	0.00000
10000057	9,284.60	8,927.9	3920:4.6,1.2	Pipeline clean-out top of pipe	0.00000	0.00000
10000058	9,285.22	8,929.2	3930:0.1,0.8	Bend right	19.70953	-155.06193
10000059	9,285.79	8,930.5	3940:0.6,5.5	Pipeline clean-out top of pipe	0.00000	0.00000
10000060	9,389.13	9,168.6	4020:0.0,0.4	Bend left	0.00000	0.00000
10000061	9,447.18	9,302.2	4060:13.0,1.1	Patch	0.00000	0.00000
10000062	9,482.23	9,383.4	4110:0.0,0.7	Bend up	0.00000	0.00000
10000063	9,484.11	9,387.4	4130:0.0,0.8	Bend down	0.00000	0.00000
10000064	9,528.20	9,489.1	4160:30.5,11.1	Pipeline clean-out top of pipe	0.00000	0.00000
10000065	9,528.78	9,490.4	4160:31.8,9.8	Pipeline clean-out top of pipe	0.00000	0.00000
10000066	9,872.27	10,274.0	4350:31.4,9.9	Pipeline clean-out top of pipe	0.00000	0.00000
10000067	9,872.86	10,275.4	4350:32.8,8.5	Pipeline clean-out top of pipe	0.00000	0.00000
10000068	10,073.32	10,729.8	4480:3.3,0.6	Pipeline clean-out top of pipe	0.00000	0.00000
10000069	10,073.95	10,730.9	4490:0.1,1.4	Bend right	0.00000	0.00000
10000070	10,074.54	10,732.1	4500:0.2,41.7	Pipeline clean-out top of pipe	0.00000	0.00000
10000071	10,104.42	10,800.3	4520:0.3,0.8	Tee on top of pipe	0.00000	0.00000

Zeros in Lat. and Long. means that no data was provided by the Customer. Estimated Lat. and Long. can be viewed in the Pipe Listing report.

Pipeline Summary

Tables

Casings

A *casing* is a section of larger diameter pipe through which the pipeline passes. Usually installed to protect a pipeline from excessive external loading, casings can also shield pipelines from protective cathodic protection currents. Therefore, the condition of a pipeline inside a casing can provide valuable information.

Magpie tools detect when a casing is not centered around the pipeline. These casings are referred to as being eccentric. The closer the casing is to the pipeline, the stronger the signal seen by the inspection tool. The tool will not detect if the casing is shorted to the pipe wall. The tool might see evidence of a short, such as metal loss.

This information may be useful in updating pipeline databases and alignment sheets.

Sometimes spacers are identified inside casings. These are mechanical devices used to center the pipeline inside the casing, and are not considered harmful.

Column Heading Definitions:

Column 1	*ID#*	Each *casing* is automatically assigned a number in the software. This number is provided to assist the user of ***PIGTRAP*** ™ software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the ***PIGTRAP*** ™ software.
Columns 3 & 4	*Distance Start, End*	Given in either feet or meters, this is the absolute distance measured by the tool from launch to the beginning and ending of the casing.
Column 5	*Length*	The total predicted casing length (in feet or meters).
Column 6	*Eccentric (side)*	Identifies one of four conditions associated with the casing: 1- no eccentricity (blank); 2- eccentric on upstream side (upstream); 3- eccentric on downstream side (downstream); 4- eccentric on both ends (both)
Column 7	*# of Metal Loss in Casing*	Provides the number of metal loss *groups* identified inside the casing.
Column 8	*Max. Depth of Metal Loss*	If metal loss is identified inside the casing, this column provides the maximum predicted depth of all metal loss features.
Column 9	*Aboveground References*	The name of the closest upstream and downstream references, usually an Aboveground Marker or a valve.
Column 10	*Distance from Defect*	The distance from the Aboveground reference (AGM or Valve) to the start (upstream) side of the casing.

Casings

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID#	Time	Distance (ft)	Description	Casing Length (ft)

No Casings appear in this pipeline inspection

Pipeline Summary

Tables

Dents

This table lists all the dents detected during the inspection.

A dent in the pipeline is usually detected by the inspection tool only if it alters the path or speed of the inspection tool. The tool has 3 accelerometers and 2 Gyros onboard. These sensors allow the tool to detect severe dents. Light dents that do not alter the speed or direction of the tool are usually not detected.

Dents may affect the integrity of the pipeline and are considered harmful. A dent with associated metal loss is potentially more significant than a dent alone.

Column Heading Definitions:

Column 1	*ID#*	Each *dent* is automatically assigned a number in the software. This number is provided to assist the user of *PIGTRAP™* software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the *PIGTRAP™* software.
Column 3	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Column 4	*Description*	Describes the dent in greater detail. Any special conditions are also noted, such as a dent with associate metal loss.
Column 5	*Aboveground References*	The name of the closest upstream and downstream references, usually either an AGM or a valve.
Column 6	*Distance from Defect*	The distance to the upstream and downstream reference listed in the previous column. Useful in locating dents in the field.

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Dents

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID#	Type	Time	Distance (ft)	Description

No Dents have been detected on this pipeline inspection

Pipeline Summary

Tables

Gains (Metal in close proximity)

The inspection tool may detect ferrous metal objects located close to or touching the pipeline. They appear as additional metal added to the pipe, and are referred to as *gains*. This table identifies *gains* detected during the inspection.

Clamps or anchors around the pipeline are considered *gains*. Some metal objects can be potentially harmful to the pipeline. They can damage the pipeline's protective coating, or over time may dent or cause damage to the pipeline.

Column Heading Definitions:

Column 1	*ID#*	Each *gain* is automatically assigned a number in the software. This number is provided to assist the user of *PIGTRAP™* software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the *PIGTRAP™* software.
Column 3	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Column 4	*Length*	The measured length of the gain measured in feet or meters.
Column 5	*Depth in gauss*	The difference in gauss reading (magnetic strength) at the gain. The greater the number, the greater the mass of the object, or the closer the proximity to the pipeline, or both. This table is sorted with highest depth in gauss listed in a descending order.
Column 6	*Number of sensors*	The number of sensors detecting the gain. When all sensors detect a gain, this is usually typical of a clamp or banding around the circumference of the pipeline.
Column 7	*Orientation*	The distance from launch is plotted against the orientation of the defect. Orientation is based on 360 degrees in a circle, with 0 / 360 degrees marking the top of the pipe (180 degrees the bottom). Displaying the orientation of defects around the circumference of the pipeline may aid in determining the type of corrosion mechanism present. For example, the majority of defects along the bottom of the pipe might indicate internal channel corrosion.
Column 8	*Joint #: U/S weld dist, D/S weld dist*	This unique number identifies the girth weld number, the distance to the upstream (U/S) weld (in feet or meters), and the distance to the downstream (D/S) weld (in feet or meters).

Gains

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID	Time	Distance (ft)	Length (in)	Depth in gauss	Gain width (in)	Orientation Degrees	Orientation Clock	Joint #, U/S Weld Dist., D/S Weld Dist.
13000016	10053.01	10683.84	0.82	60	2.26	55 to 85	1:45 to 2:45	4450:31.7,6.7
13000015	6860.69	3431.57	0.94	46	2.26	70 to 100	2:15 to 3:15	1840:14.3,28.2
13000010	4120.36	425.90	3.42	38	5.65	130 to 205	4:15 to 6:45	300:20.9,23.6
13000011	4164.24	474.53	5.07	34	6.77	115 to 205	3:45 to 6:45	310:25.0,19.7
13000012	4177.86	489.72	3.65	30	5.08	140 to 205	4:30 to 6:45	310:40.2,4.5
13000006	3909.23	191.85	4.59	29	5.08	40 to 110	1:15 to 3:30	250:9.3,35.5
13000008	4051.98	349.91	3.65	28	6.77	125 to 215	4:00 to 7:00	280:33.8,11.6
13000014	6803.22	3306.62	1.06	27	2.82	5 to 40	12:00 to 1:15	1700:17.7,2.8
13000009	4096.02	398.91	5.42	24	5.65	115 to 190	3:45 to 6:15	290:37.3,6.1
13000005	3895.41	176.58	1.88	20	2.82	160 to 200	5:15 to 6:30	240:37.8,5.9
13000004	3872.87	151.75	0.94	19	2.82	160 to 200	5:15 to 6:30	240:13.0,30.7
13000000	3781.84	51.93	0.94	18	2.82	160 to 200	5:15 to 6:30	200:13.7,2.1
13000013	6178.64	1999.58	41.70	17	27.10	Full Circumference	Full circumference	1120:2.2,15.7
13000007	4030.87	326.52	1.41	17	3.39	145 to 190	4:45 to 6:15	280:10.5,34.9
13000001	3805.14	77.52	2.12	16	2.26	170 to 200	5:30 to 6:30	210:23.4,6.0
13000003	3850.79	127.46	1.18	13	2.26	160 to 190	5:15 to 6:15	230:1.2,11.3
13000002	3827.69	102.21	1.53	10	2.26	170 to 200	5:30 to 6:30	220:18.8,24.1

Gains Summary

Total Number of Gains	17

Pipeline Summary

Tables

Nominal Wall Thickness Listing

The following list provides locations along the pipeline where changes in wall thickness occur. While the MAGPIE inspection tool can easily detect changes in wall thickness, it cannot take direct thickness measurements. Therefore, where wall thicknesses are known, the tool can identify the locations where the thickness changes. Where wall thicknesses are not known, best efforts will be made to estimate thicknesses based on best available data.

Column Heading Definitions:

Column 1	*ID#*	Each *wall thickness change ID* is automatically assigned a number in the software. This number is provided to assist the user of *PIGTRAP™* software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the *PIGTRAP™* software.
Column 3	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Column 4	*Wall Thickness*	The predicted wall thickness in inches.
Column 5	*Pipetype*	Type of pipe construction. Electric Resistance Weld (ERW), Seamless (SMLS), Lap Weld (LW).
Column 6	*Yield Strength (SMYS)*	Specified Minimum Yield Strength – A required strength level that measured yield stress of a pipe material must exceed, which is a function of pipe grade. The measured yield stress is the tensile stress required to produce a total elongation of 0.5 percent of a gage length as determined by an extensometer during a tensile test.
Column 7	*Safety Factor*	(or design factor) Typically 0.72 per ASME B31. In setting the safety factor, due consideration has been given to and allowances made for the manufacturing tolerance and maximum allowable depth of imperfections provided for in the specifications.
Column 8	*Length of Segment*	The length of the pipe for the specified wall thickness, measured in feet or meters.

Nominal Wall Thickness Listing

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID	Time	Distance	Wall Thickness	Pipetype	Yield Strength (SMYS)	Safety Factor	Length of Segment
11000000	3729.90	0.00	0.322	ERW	37667	0.8	3,399.80
11000001	6846.00	3399.80	0.322	ERW	35040	0.8	1,451.35
11000002	7512.32	4851.15	0.322	ERW	35000	0.8	2,190.88
11000003	8470.01	7042.03	0.322	ERW	35040	0.8	3,774.05

Wall Thickness Summary

Wall Thickness	Pipetype	Total Length (ft)	Total Length (miles)	Percent of Total Distance
0.322	ERW	10,816	2.049	100.0%

Pipeline Summary

Tables

Repair Report

This table lists all the repairs to the pipeline detected during the inspection.

Pipeline repairs that are typically detected include:

- Sleeves
- Half sole
- Patches
- Stopples
- Clamps
- Weld + End
- Clock Spring

Any metal loss detected under a repair is not graded and is not included in the metal loss report.

Column Heading Definitions:

Column 1	*ID#*	Each *Repair* is automatically assigned a number in the software. This number is provided to assist the user of ***PIGTRAP*** ™ software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the ***PIGTRAP*** ™ software.
Column 3	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Column 4	*Length*	Gives the linear length of the repair.
Column 5	*Type of Repair*	Describes the type of repair detected during the inspection.

Repair Report

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID	*Time*	*Distance (ft)*	*Length (ft)*	*Type of Repair*
10000015	3783.74	53.95	0.60	Weld + End
10000061	9447.16	9302.17	0.97	Patch

Repair Summary

Type of Repair	*Number*
Patch	1
Type of Repair	*Number*
Weld + End	1

Pipeline Summary

Tables

AGM Information

This table includes all values and Aboveground marker sites in the inspection run.

Column Heading Definitions:

Column 1	*ID#*	Each *AGM ID* is automatically assigned a number in the software. This number is provided to assist the user of *PIGTRAP ™* software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the *PIGTRAP ™* software.
Column 3	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Column 4	*Description*	Describes the AGM in greater detail. Generally includes only valves and markers.
Column 5	*Latitude*	If GPS coordinates were provided, this provides the Latitude (north/south) reading of the AGM or valve as recorded during the run. Predicted GPS for all other features is provided in the Pipeline Listing section.
Column 6	*Longitude*	If GPS coordinates were provided, this provides the Longitude (east/west) reading of the AGM or valve as recorded during the run. Predicted GPS for all other features is provided in the Pipeline Listing section.

AGM Information

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID	Time	Distance	Description	Latitude	Longitude
10000004	3732.70	0.00	Valve (Launcher), Chevron Terminal	19.726820	-155.054320
10000022	4199.59	513.75	Valve	0.000000	0.000000
10000041	7212.75	4192.14	AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186	19.722500	-155.064267
10000055	8918.30	8079.95	AGM 02, Southeast Corner of Kanoelehua Ave. and Kekuanaoa St. -- Ref# 320	19.711817	-155.064283
10000079	10111.31	10816.08	Valve (Receiver), Hill Plant	19.704500	-155.060280

AGM Summary

Number of Valves 3 ***Number of Markers*** 2

Pipeline Summary

Tables

Miscellaneous

There are occasions when special notations or circumstances require the addition of a note. These notes are included in this table for your reference.

Column Heading Definitions:

Column 1	*ID#*	Each *misc.* is automatically assigned a number in the software. This number is provided to assist the user of *PIGTRAP™* software to more easily find any given defect.
Column 2	*Time*	A reference time from the inspection tool. May also be used to locate features in the *PIGTRAP™* software.
Column 3	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance measured by the tool from launch.
Column 4	*Memo*	A description of the entry.

Examples of Miscellaneous Entries:

Gap or dent in casing When the casing is not welded, or when a gap occurs in the weld, this signature is detected by the tool, and identified with a Misc. remark.

Inclusion An anomaly in the cross section of the pipeline. Inclusions may be detrimental if they protrude through the pipe wall.

Mill anomaly The process of manufacturing pipe can often leave indications in the pipe wall. Typically these anomalies are not detrimental, and are identified for the benefit of the client.

Sensor problems Noting locations where anomalous sensor readings occurred.

Tool stops/starts All tools are setup on a time-based system. When the tool stops, it continues to record, although not moving. When the tool moves very slowly, it is possible that its movement is not detected, and therefore, reported distances may appear shorter than actual. Many stops and starts may affect the overall distance accuracy of the tool.

Miscellaneous

Magpie Systems Inc.

Hawaii Electric - 8" Chevron Terminal to Hill Plant

ID	TIME	DISTANCE (ft)	MEMO
12000000	137.86	-24.08	Begin Run Tickle
12000001	5,013.73	1,408.98	Mill Anomaly @ 11:00
12000002	5,292.12	1,693.28	Tool stopped
12000003	5,995.40	1,693.28	Tool started
12000004	6,304.10	2,259.19	Inclusion @ 6:00
12000005	7,049.73	3,837.89	Sensors #13 & 14 damaged in heavy wall bend - both sensors fail 3862.12 through end of run
12000006	7,269.03	4,315.31	Inclusion @ 12:00
12000007	8,834.48	7,885.16	Weld anomaly - Lack of metal from 8:00 to 1:00
12000008	8,905.11	8,049.27	Sensor #41 & 42 damaged on section of heavy wall - both fail 8073.75 through end of run
12000009	9,632.48	9,727.61	Internal mill anomaly @ 4:00, 9 feet long
12000010	17,778.01	11,512.31	End Run Tickle

Miscellaneous Summary

Total	11

Pipeline Listing Report

The Pipeline Listing Report presents all detected pipeline data in sequential order, beginning at launcher and ending at the receiver. The table includes welds, locations, metal loss defects, AGMs, wall thickness changes, etc.

Column Heading Definitions:

Column 1	*ID*	Each item is automatically assigned a number in the software. This number is provided to assist the user of *PIGTRAP ™* software to more easily find any given defect.
Column 2	*Description*	Describes the event at the particular location. Identifies the type of the descriptive, being a weld, location, pipe thickness change, etc.
Column 3	*Time*	A reference time from the inspection tool. May also be used to locate features in the *PIGTRAP ™* software.
Column 4	*Distance*	Given in either feet or meters, based on contractual agreements, this is the absolute distance from launch.
Column 5	*Joint #: U/S weld dist, D/S weld dist*	This unique number identifies the girth weld number, the distance to the upstream (U/S) weld (in feet or meters), and the distance to the downstream weld (in feet or meters).
Column 6	*Latitude*	If GPS coordinates were provided for launch, receive and AGMs, this provides the predicted Latitude reading of the *location* from the first GPS reading based on INS readings obtained by the tool during the inspection.
Column 7	*Longitude*	If GPS coordinates were provided for launch, receive and AGMs, this provides the predicted Longitude reading of the *location* from the first GPS reading based on INS readings obtained by the tool during the inspection.
Column 8	*Orientation*	The distance from launch is plotted against the orientation of the defect. Orientation is based on 360° in a circle, with 0° or 360° marking the top of the pipe (180° the bottom). Displaying the orientation of defects around the circumference of the pipeline may aid in determining the type of corrosion mechanism present. For example, the majority of defects along the bottom of the pipe might indicate internal channel corrosion.
Column 9	*% Depth*	Predicted depth of the defect as a percentage of nominal wall.
Column 10	*Length or pipe thickness*	Predicted length of the defect, reported in either inches or millimeters – or if a wall thickness change, the new wall thickness beginning at this point.
Column 11	*Width or Yield Strength*	Predicted width of the defect, reported in either inches or millimeters – or if a wall thickness change, the new SMYS beginning at this point.
Column 12	*P' (Calc. safe max. operating pressure)*	Calculated safe maximum operating pressure for the pipeline segment as calculated based on information provided by the Customer. Magpie software uses either ASME B31G, MODIFIED ASME B31G or Z662-99 to calculate the calculated safe maximum allowable operating pressure (P') of the pipeline at a metal loss area.
Column 13	*% Est. psi (P'/P)*	Percent of maximum established pressure, this is calculated by dividing the calculated safe pressure of the defect (P') by the current established maximum operating pressure of the pipeline (P). For Magpie reporting, P is *either* established MOP provided by the customer or the calculated pressure rating for the pipe (P). Percentages less than 100% are considered pressure reducing.

Pipeline Listing

Magpie Systems Inc.

ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)		Depth (%)	Length or pipe thickness	Width or Yield Strength	P' (max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor
12000000	Begin Run Tickle	137.86	-24.1	0:-24.1,24.1	0.000000	0.000000	0	12:00					
10000000	Fitting on top of pipe	3,727.94	-3.1	0:-3.2,3.2	0.000000	0.000000	338	11:15					
10000001	Fitting on bottom of pipe	3,727.93	-3.1	0:-3.2,3.2	0.000000	0.000000	157	5:00					
11000000	WT CHANGE	3,729.90	-2.0	0:-2.0,2.0	0.000000	0.000000	0	12:00		0.322	37.667	0.80	1
110	Weld	3,729.91	-2.0	110:0.0,0.7	0.000000	0.000000	0	12:00					
10000002	Flange	3,730.62	-1.6	110:0.4,0.4	0.000000	0.000000	0	12:00					
120	Weld	3,731.06	-1.3	120:0.0,2.4	0.000000	0.000000	0	12:00					
10000003	Flange	3,731.61	-0.9	120:0.4,2.0	0.000000	0.000000	0	12:00					
10000004	Valve (Launcher), Chevron Terminal	3,732.70	0.0	120:1.3,1.1	19.726820	-155.054320	0	12:00					
10000005	Flange	3,733.64	0.8	120:2.0,0.4	19.726818	-155.054320	0	12:00					
130	Weld	3,734.11	1.1	130:0.0,0.8	19.726801	-155.054320	0	12:00					
10000006	Fitting on top of pipe	3,734.66	1.6	130:0.3,0.6	19.726800	-155.054320	345	11:30					
140	Weld	3,735.18	2.0	140:0.0,1.2	19.726785	-155.054321	0	12:00					
10000007	Tee at 90 deg.	3,735.76	2.6	140:0.2,1.0	19.726784	-155.054321	75	2:30					
150	Weld	3,736.33	3.2	150:0.0,20.7	19.726768	-155.054321	0	12:00					
10000008	Fitting on top of pipe - Pig-sig	3,737.14	4.1	150:0.8,19.9	19.726766	-155.054321	345	11:30					
10000009	Fitting on top of pipe	3,738.02	5.0	150:1.8,18.9	19.726763	-155.054321	353	11:45					
10000010	Pipe Support	3,741.82	9.0	150:5.6,15.1	19.726752	-155.054322	0	12:00					
10000011	Fitting on top of pipe	3,746.48	14.0	150:10.7,9.9	19.726738	-155.054322	345	11:30					
160	Weld	3,755.67	23.8	160:0.0,7.8	19.726752	-155.054322	0	12:00					
10000012	Pipe Support	3,761.31	29.9	160:5.8,2.0	19.726768	-155.054321	0	12:00					
170	Weld	3,762.98	31.6	170:0.0,3.1	19.726789	-155.054321	0	12:00					
10000013	Bend right	3,764.50	33.2	170:0.1,3.0	19.726789	-155.054321	0	12:00					
180	Weld	3,766.01	34.7	180:0.0,2.7	19.726791	-155.054321	0	12:00					
190	Weld	3,768.50	37.4	190:0.0,0.8	19.726780	-155.054321	0	12:00					
10000014	Flange	3,768.84	37.8	190:0.4,0.4	19.726779	-155.054321	0	12:00					
200	Weld	3,769.15	38.2	200:0.0,15.8	19.726769	-155.054321	0	12:00					
13000000	Gain	3,781.84	51.9	200:13.7,2.1	19.726731	-155.054322	180	6:00					
10000015	Weld + End	3,783.74	54.0	200:15.5,0.4	19.726726	-155.054322	0	12:00		0.60			
210	Weld	3,783.83	54.0	210:0.0,29.4	19.726752	-155.054322	0	12:00					
13000001	Gain	3,805.14	77.5	210:23.4,6.0	19.726816	-155.054320	183	6:00					
220	Weld	3,810.51	83.4	220:0.0,42.8	19.726776	-155.054321	0	12:00					
13000002	Gain	3,827.69	102.2	220:18.8,24.1	19.726827	-155.054320	183	6:00					
230	Weld	3,849.69	126.2	230:0.0,12.4	19.726837	-155.054320	0	12:00					
13000003	Gain	3,850.79	127.5	230:1.2,11.3	19.726840	-155.054320	176	5:45					
240	Weld	3,861.03	138.7	240:0.0,43.7	19.726935	-155.054317	0	12:00					
13000004	Gain	3,872.87	151.7	240:13.0,30.7	19.726971	-155.054317	180	6:00					
13000005	Gain	3,895.41	176.6	240:37.8,5.9	19.727039	-155.054315	180	6:00					
250	Weld	3,900.68	182.4	250:0.0,44.7	19.726950	-155.054317	0	12:00					

Pipeline Listing

Magpie Systems Inc.

ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)		Depth (%)	Length or pipe thickness	Width or Yield Strength	P' (sage max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor
13000006	Gain	3,909.23	191.8	250:9.3,35.5	19.726976	-155.054316	75	2:30					
260	Weld	3,941.19	227.1	260:0.0,45.6	19.727051	-155.054315	0	12:00					
270	Weld	3,982.35	272.7	270:0.0,43.3	19.727154	-155.054312	0	12:00					
280	Weld	4,021.39	316.0	280:0.0,45.4	19.727260	-155.054310	0	12:00					
13000007	Gain	4,030.87	326.5	280:10.5,34.9	19.727289	-155.054309	168	5:30					
13000008	Gain	4,051.98	349.9	280:33.8,11.6	19.727353	-155.054308	168	5:30					
290	Weld	4,062.33	361.4	290:0.0,43.4	19.727360	-155.054308	0	12:00					
13000009	Gain	4,096.02	398.9	290:37.3,6.1	19.727462	-155.054305	153	5:00					
300	Weld	4,101.34	404.8	300:0.0,44.5	19.727465	-155.054305	0	12:00					
13000010	Gain	4,120.36	425.9	300:20.9,23.6	19.727522	-155.054304	168	5:30					
310	Weld	4,141.56	449.3	310:0.0,44.7	19.727565	-155.054303	0	12:00					
10000016	Pipe Support	4,141.85	449.7	310:0.3,44.5	19.727565	-155.054303	0	12:00					
10000017	Pipe Support	4,142.21	450.1	310:0.6,44.1	19.727566	-155.054303	0	12:00					
13000011	Gain	4,164.24	474.5	310:25.0,19.7	19.727633	-155.054302	161	5:15					
13000012	Gain	4,177.86	489.7	310:40.2,4.5	19.727675	-155.054301	172	5:30					
320	Weld	4,181.76	494.1	320:0.0,1.3	19.727668	-155.054301	0	12:00					
330	Weld	4,183.11	495.4	330:0.0,0.7	19.727771	-155.054298	0	12:00					
10000018	Bend right	4,183.48	495.8	330:0.1,0.7	19.727771	-155.054298	0	12:00					
340	Weld	4,183.79	496.1	340:0.0,7.2	19.727755	-155.054299	0	12:00					
350	Weld	4,190.27	503.3	350:0.0,0.7	19.727738	-155.054299	0	12:00					
10000019	Bend left	4,190.60	503.6	350:0.0,0.7	19.727700	-155.054300	0	12:00					
360	Weld	4,190.94	504.0	360:0.0,8.6	19.727698	-155.054305	0	12:00					
10000020	Fitting on top of pipe	4,197.13	511.0	360:7.0,1.6	19.727688	-155.054322	353	11:45					
370	Weld	4,198.50	512.6	370:0.0,2.4	19.727694	-155.054311	0	12:00					
10000021	Flange	4,198.84	512.9	370:0.4,2.0	19.727694	-155.054312	0	12:00					
10000022	Valve	4,199.59	513.7	370:1.2,1.2	19.727693	-155.054314	0	12:00					
10000023	Flange	4,200.35	514.6	370:2.0,0.4	19.727692	-155.054316	0	12:00					
380	Weld	4,200.68	514.9	380:0.0,0.5	19.727680	-155.054338	0	12:00					
10000024	Fitting on bottom of pipe	4,200.92	515.2	380:0.2,0.4	19.727680	-155.054338	165	5:30					
390	Weld	4,201.19	515.5	390:0.0,0.6	19.727675	-155.054348	0	12:00					
10000025	Flange	4,201.61	515.8	390:0.4,0.3	19.727674	-155.054349	0	12:00					
400	Weld	4,201.94	516.1	400:0.0,0.7	19.727672	-155.054354	0	12:00					
10000026	Bend down	4,202.28	516.5	400:0.0,0.7	19.727672	-155.054354	0	12:00					
410	Weld	4,202.60	516.9	410:0.0,6.9	19.727668	-155.054361	0	12:00					
420	Weld	4,208.71	523.8	420:0.0,0.8	19.727665	-155.054367	0	12:00					
10000027	Bend up	4,209.08	524.2	420:0.0,0.8	19.727665	-155.054367	0	12:00					
430	Weld	4,209.43	524.6	430:0.0,42.3	19.727653	-155.054390	0	12:00					
440	Weld	4,247.62	566.9	440:0.0,41.9	19.727650	-155.054396	0	12:00					
450	Weld	4,285.85	608.8	450:0.0,0.5	19.727591	-155.054509	0	12:00					

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Magpie Systems Inc.

ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)		Depth (%)	Length or pipe thickness	Width or Yield Strength	P'1--,e max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor
10000028	Bend left	4,286.07	609.1	450:0.0,0.4	19.727591	-155.054509	0	12:00					
460	Weld	4,286.28	609.3	460:0.0,0.7	19.727533	-155.054620	0	12:00					
470	Weld	4,286.87	610.0	470:0.0,3.1	19.727530	-155.054626	0	12:00					
10000029	Bend left	4,288.29	611.5	470:0.1,3.0	19.727530	-155.054626	0	12:00					
480	Weld	4,289.74	613.1	480:0.0,3.7	19.727527	-155.054633	0	12:00					
490	Weld	4,293.14	616.8	490:0.0,24.4	19.727520	-155.054645	0	12:00					
500	Weld	4,315.52	641.2	500:0.0,21.6	19.727513	-155.054659	0	12:00					
510	Weld	4,335.39	662.8	510:0.0,20.7	19.727478	-155.054726	0	12:00					
520	Weld	4,354.40	683.5	520:0.0,23.8	19.727447	-155.054786	0	12:00					
40000000	Metal Loss	4,366.10	696.3	520:12.7,11.1	19.727430	-155.054819	233	7:45	10%	0.71	1.57	2.250	100%
530	Weld	4,376.22	707.3	530:0.0,23.8	19.727417	-155.054844	0	12:00					
540	Weld	4,398.05	731.1	540:0.0,23.7	19.727383	-155.054909	0	12:00					
550	Weld	4,419.75	754.8	550:0.0,20.7	19.727349	-155.054974	0	12:00					
560	Weld	4,438.87	775.5	560:0.0,0.4	19.727315	-155.055039	0	12:00					
570	Weld	4,439.24	775.9	570:0.0,23.0	19.727285	-155.055097	0	12:00					
580	Weld	4,460.32	799.0	580:0.0,20.6	19.727282	-155.055103	0	12:00					
590	Weld	4,479.09	819.5	590:0.0,24.2	19.727249	-155.055166	0	12:00					
40000001	Metal Loss	4,492.46	834.2	590:14.6,9.6	19.727230	-155.055203	203	6:45	10%	0.47	2.61	2.250	100%
40000002	Metal Loss	4,492.77	834.5	590:14.9,9.3	19.727230	-155.055204	203	6:45	11%	1.77	2.61	2.250	100%
600	Weld	4,501.23	843.7	600:0.0,20.6	19.727220	-155.055223	0	12:00					
610	Weld	4,520.11	864.3	610:0.0,19.0	19.727185	-155.055289	0	12:00					
40000003	Metal Loss	4,520.72	865.0	610:0.6,18.4	19.727184	-155.055291	7	12:00	12%	0.47	2.09	2.250	100%
620	Weld	4,537.52	883.4	620:0.0,21.5	19.727155	-155.055347	0	12:00					
630	Weld	4,557.09	904.9	630:0.0,24.0	19.727128	-155.055400	0	12:00					
640	Weld	4,578.96	928.9	640:0.0,21.6	19.727097	-155.055460	0	12:00					
650	Weld	4,598.78	950.6	650:0.0,23.5	19.727062	-155.055525	0	12:00					
660	Weld	4,620.30	974.1	660:0.0,23.9	19.727031	-155.055585	0	12:00					
670	Weld	4,642.13	998.0	670:0.0,23.0	19.726997	-155.055650	0	12:00					
680	Weld	4,663.12	1,021.1	680:0.0,24.0	19.726963	-155.055716	0	12:00					
690	Weld	4,684.93	1,045.0	690:0.0,24.1	19.726930	-155.055779	0	12:00					
700	Weld	4,706.75	1,069.1	700:0.0,23.2	19.726896	-155.055845	0	12:00					
710	Weld	4,727.77	1,092.3	710:0.0,21.3	19.726862	-155.055911	0	12:00					
720	Weld	4,747.10	1,113.6	720:0.0,17.7	19.726828	-155.055975	0	12:00					
730	Weld	4,763.12	1,131.3	730:0.0,22.6	19.726798	-155.056034	0	12:00					
40000004	Metal Loss	4,767.82	1,136.5	730:5.2,17.4	19.726791	-155.056047	188	6:15	10%	0.47	1.57	2.250	100%
40000005	Metal Loss	4,767.92	1,136.6	730:5.3,17.3	19.726791	-155.056047	188	6:15	10%	0.35	1.57	2.250	100%
740	Weld	4,783.63	1,153.9	740:0.0,23.9	19.726772	-155.056083	0	12:00					
750	Weld	4,805.32	1,177.8	750:0.0,18.8	19.726739	-155.056146	0	12:00					
40000006	Metal Loss	4,821.72	1,195.9	750:18.1,0.7	19.726715	-155.056192	157	5:00	26%	1.30	6.27	2.250	100%

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760	Weld	4,822.32	1,196.6	760:0.0,20.3	19.726705	-155.056211	0	12:00					
40000007	Metal Loss	4,822.94	1,197.2	760:0.6,19.7	19.726704	-155.056213	165	5:30	24%	0.82	4.18	2.250	100%
770	Weld	4,840.52	1,216.9	770:0.0,23.6	19.726678	-155.056264	0	12:00					
780	Weld	4,861.66	1,240.4	780:0.0,23.6	19.726649	-155.056320	0	12:00					
790	Weld	4,882.97	1,264.0	790:0.0,23.3	19.726615	-155.056385	0	12:00					
800	Weld	4,903.99	1,287.3	800:0.0,22.1	19.726581	-155.056450	0	12:00					
40000008	Metal Loss	4,914.78	1,299.3	800:11.9,10.1	19.726565	-155.056480	263	8:45	10%	0.35	1.57	2.250	100%
40000009	Metal Loss	4,915.43	1,300.0	800:12.6,9.4	19.726564	-155.056482	233	7:45	10%	0.47	1.57	2.250	100%
40000010	Metal Loss	4,918.50	1,303.4	800:16.0,6.0	19.726560	-155.056491	218	7:15	10%	0.24	1.57	2.250	100%
810	Weld	4,923.94	1,309.4	810:0.0,20.5	19.726548	-155.056514	0	12:00					
820	Weld	4,942.44	1,329.8	820:0.0,22.0	19.726516	-155.056575	0	12:00					
830	Weld	4,962.26	1,351.8	830:0.0,23.9	19.726486	-155.056632	0	12:00					
40000011	Metal Loss	4,969.03	1,359.4	830:7.5,16.3	19.726476	-155.056651	165	5:30	10%	0.35	2.09	2.250	100%
40000012	Metal Loss	4,969.16	1,359.5	830:7.7,16.2	19.726476	-155.056651	142	4:30	10%	0.94	3.13	2.250	100%
840	Weld	4,983.76	1,375.7	840:0.0,24.2	19.726455	-155.056692	0	12:00					
850	Weld	5,005.55	1,399.9	850:0.0,22.8	19.726421	-155.056758	0	12:00					
12000001	Mill Anomaly @ 11:00	5,013.73	1,409.0	850:9.1,13.7	19.726409	-155.056781	0	12:00					
40000013	Metal Loss	5,015.69	1,411.1	850:11.2,11.6	19.726406	-155.056787	135	4:30	19%	0.82	5.75	2.250	100%
40000014	Metal Loss	5,016.34	1,411.8	850:11.9,10.9	19.726405	-155.056788	105	3:30	10%	0.35	2.09	2.250	100%
40000015	Metal Loss	5,016.46	1,412.0	850:12.1,10.8	19.726405	-155.056789	120	4:00	10%	0.71	5.22	2.250	100%
860	Weld	5,026.16	1,422.7	860:0.0,24.0	19.726386	-155.056824	0	12:00					
870	Weld	5,047.71	1,446.7	870:0.0,17.7	19.726353	-155.056887	0	12:00					
880	Weld	5,063.77	1,464.5	880:0.0,24.3	19.726319	-155.056953	0	12:00					
890	Weld	5,085.64	1,488.7	890:0.0,21.7	19.726293	-155.057003	0	12:00					
900	Weld	5,105.29	1,510.4	900:0.0,23.8	19.726259	-155.057070	0	12:00					
910	Weld	5,126.72	1,534.2	910:0.0,24.4	19.726227	-155.057130	0	12:00					
920	Weld	5,148.79	1,558.6	920:0.0,23.6	19.726193	-155.057195	0	12:00					
930	Weld	5,170.03	1,582.2	930:0.0,18.2	19.726159	-155.057262	0	12:00					
940	Weld	5,186.46	1,600.4	940:0.0,24.0	19.726125	-155.057327	0	12:00					
950	Weld	5,208.00	1,624.4	950:0.0,18.9	19.726098	-155.057378	0	12:00					
960	Weld	5,225.03	1,643.3	960:0.0,19.8	19.726064	-155.057444	0	12:00					
970	Weld	5,243.03	1,663.1	970:0.0,20.9	19.726036	-155.057496	0	12:00					
980	Weld	5,261.87	1,684.0	980:0.0,24.0	19.726008	-155.057552	0	12:00					
12000002	Tool stopped	5,292.12	1,693.3	980:9.3,14.7	19.725995	-155.057575	0	12:00					
12000003	Tool started	5,995.40	1,693.3	980:9.3,14.7	19.725995	-155.057575	0	12:00					
990	Weld	6,027.64	1,708.0	990:0.0,18.0	19.725978	-155.057610	0	12:00					
1000	Weld	6,045.27	1,725.9	1000:0.0,19.4	19.725943	-155.057675	0	12:00					
40000016	Metal Loss	6,057.13	1,744.7	1000:18.8,0.6	19.725918	-155.057723	165	5:30	12%	0.59	1.57	2.250	100%
1010	Weld	6,057.40	1,745.3	1010:0.0,21.2	19.725917	-155.057726	0	12:00					

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1020	Weld	6,067.46	1,766.4	1020:0.0,20.1	19.725889	-155.057780	0	12:00					
40000017	Metal Loss	6,070.22	1,772.3	1020:5.9,14.3	19.725881	-155.057795	330	11:00	14%	0.82	3.13	2.250	100%
1030	Weld	6,077.04	1,786.6	1030:0.0,22.4	19.725858	-155.057838	0	12:00					
1040	Weld	6,087.67	1,809.0	1040:0.0,23.5	19.725829	-155.057894	0	12:00					
1050	Weld	6,098.76	1,832.5	1050:0.0,19.1	19.725797	-155.057956	0	12:00					
40000018	Metal Loss	6,099.76	1,834.6	1050:2.0,17.1	19.725794	-155.057961	90	3:00	16%	1.30	4.70	2.250	100%
1060	Weld	6,107.92	1,851.6	1060:0.0,24.4	19.725763	-155.058021	0	12:00					
1070	Weld	6,119.52	1,876.0	1070:0.0,24.2	19.725736	-155.058074	0	12:00					
1080	Weld	6,130.97	1,900.1	1080:0.0,23.9	19.725701	-155.058141	0	12:00					
1090	Weld	6,142.41	1,924.0	1090:0.0,24.1	19.725666	-155.058207	0	12:00					
1100	Weld	6,153.94	1,948.2	1100:0.0,23.8	19.725632	-155.058273	0	12:00					
1110	Weld	6,165.33	1,971.9	1110:0.0,23.7	19.725598	-155.058339	0	12:00					
1120	Weld	6,176.74	1,995.6	1120:0.0,17.9	19.725564	-155.058404	0	12:00					
13000013	Gain	6,178.64	1,999.6	1120:2.2,15.7	19.725561	-155.058410	243	8:00					
1130	Weld	6,185.43	2,013.5	1130:0.0,23.8	19.725530	-155.058470	0	12:00					
1140	Weld	6,196.95	2,037.3	1140:0.0,23.7	19.725504	-155.058520	0	12:00					
1150	Weld	6,208.36	2,061.1	1150:0.0,19.2	19.725470	-155.058585	0	12:00					
1160	Weld	6,217.64	2,080.3	1160:0.0,24.1	19.725436	-155.058650	0	12:00					
1170	Weld	6,229.27	2,104.4	1170:0.0,17.6	19.725408	-155.058704	0	12:00					
1180	Weld	6,237.74	2,122.0	1180:0.0,19.4	19.725373	-155.058770	0	12:00					
1190	Weld	6,247.07	2,141.4	1190:0.0,20.4	19.725348	-155.058820	0	12:00					
40000019	Metal Loss	6,249.17	2,145.7	1190:4.3,16.0	19.725342	-155.058831	157	5:00	10%	0.47	1.57	2.250	100%
1200	Weld	6,256.85	2,161.7	1200:0.0,24.5	19.725320	-155.058874	0	12:00					
1210	Weld	6,268.75	2,186.2	1210:0.0,22.9	19.725290	-155.058931	0	12:00					
40000020	Metal Loss	6,273.70	2,196.5	1210:10.2,12.7	19.725277	-155.058957	240	8:00	22%	0.82	2.09	2.250	100%
1220	Weld	6,279.79	2,209.1	1220:0.0,26.5	19.725255	-155.058998	0	12:00					
40000021	Metal Loss	6,280.59	2,210.8	1220:1.6,24.9	19.725253	-155.059002	15	12:30	14%	1.06	3.13	2.250	100%
1230	Weld	6,292.69	2,235.6	1230:0.0,23.9	19.725222	-155.059061	0	12:00					
12000004	Inclusion @ 6:00	6,304.10	2,259.2	1230:23.6,0.4	19.725191	-155.059121	0	12:00					
1240	Weld	6,304.28	2,259.6	1240:0.0,27.8	19.725185	-155.059133	0	12:00					
1250	Weld	6,317.77	2,287.3	1250:0.0,22.8	19.725151	-155.059199	0	12:00					
1260	Weld	6,328.74	2,310.1	1260:0.0,20.9	19.725111	-155.059274	0	12:00					
1270	Weld	6,338.76	2,331.0	1270:0.0,23.4	19.725079	-155.059337	0	12:00					
1280	Weld	6,349.97	2,354.4	1280:0.0,21.7	19.725048	-155.059395	0	12:00					
1290	Weld	6,360.37	2,376.1	1290:0.0,24.5	19.725015	-155.059459	0	12:00					
1300	Weld	6,372.12	2,400.7	1300:0.0,21.6	19.724984	-155.059519	0	12:00					
1310	Weld	6,382.49	2,422.3	1310:0.0,21.1	19.724949	-155.059586	0	12:00					
1320	Weld	6,392.61	2,443.4	1320:0.0,22.6	19.724918	-155.059646	0	12:00					
1330	Weld	6,403.35	2,466.0	1330:0.0,23.2	19.724887	-155.059705	0	12:00					

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1340	Weld	6,414.43	2,489.2	1340:0.0,18.9	19.724855	-155.059767	0	12:00					
1350	Weld	6,423.48	2,508.0	1350:0.0,22.6	19.724822	-155.059831	0	12:00					
1360	Weld	6,434.28	2,530.6	1360:0.0,21.9	19.724794	-155.059884	0	12:00					
40000022	Metal Loss	6,435.88	2,534.0	1360:3.3,18.6	19.724790	-155.059892	135	4:30	19%	0.59	1.57	2.250	100%
1370	Weld	6,444.77	2,552.5	1370:0.0,21.6	19.724762	-155.059946	0	12:00					
1380	Weld	6,455.09	2,574.1	1380:0.0,21.1	19.724730	-155.060006	0	12:00					
1390	Weld	6,465.17	2,595.2	1390:0.0,19.5	19.724699	-155.060066	0	12:00					
40000023	Metal Loss	6,473.83	2,613.2	1390:17.9,1.5	19.724675	-155.060112	127	4:00	14%	0.94	3.66	2.250	100%
1400	Weld	6,474.55	2,614.7	1400:0.0,26.2	19.724669	-155.060125	0	12:00					
40000024	Metal Loss	6,475.53	2,616.7	1400:1.9,24.3	19.724666	-155.060129	218	7:15	12%	1.88	3.13	2.250	100%
40000025	Metal Loss	6,476.01	2,617.6	1400:3.0,23.2	19.724665	-155.060132	120	4:00	10%	0.82	4.18	2.250	100%
1410	Weld	6,487.27	2,640.9	1410:0.0,20.0	19.724640	-155.060179	0	12:00					
1420	Weld	6,496.92	2,660.9	1420:0.0,24.5	19.724603	-155.060250	0	12:00					
40000026	Metal Loss	6,505.63	2,679.2	1420:18.3,6.3	19.724579	-155.060297	157	5:00	14%	0.71	4.70	2.250	100%
40000027	Metal Loss	6,505.86	2,679.7	1420:18.7,5.8	19.724578	-155.060298	150	5:00	12%	0.82	3.13	2.250	100%
1430	Weld	6,508.61	2,685.4	1430:0.0,21.2	19.724574	-155.060306	0	12:00					
1440	Weld	6,518.71	2,706.6	1440:0.0,21.2	19.724539	-155.060373	0	12:00					
40000028	Metal Loss	6,523.66	2,716.9	1440:10.3,11.0	19.724526	-155.060399	165	5:30	12%	0.59	1.57	2.250	100%
40000029	Metal Loss	6,523.66	2,716.9	1440:10.3,11.0	19.724526	-155.060399	293	9:45	16%	0.71	7.84	2.250	100%
40000030	Metal Loss	6,524.05	2,717.7	1440:11.1,10.2	19.724525	-155.060402	315	10:30	12%	0.94	2.09	2.250	100%
1450	Weld	6,528.97	2,727.9	1450:0.0,21.3	19.724509	-155.060432	0	12:00					
40000031	Metal Loss	6,533.19	2,736.6	1450:8.7,12.6	19.724497	-155.060454	142	4:30	12%	2.00	3.66	2.250	100%
1460	Weld	6,539.12	2,749.1	1460:0.0,23.4	19.724478	-155.060491	0	12:00					
40000032	Metal Loss	6,543.80	2,759.0	1460:9.9,13.6	19.724465	-155.060516	210	7:00	22%	0.71	1.57	2.250	100%
1470	Weld	6,550.23	2,772.6	1470:0.0,23.3	19.724447	-155.060550	0	12:00					
1480	Weld	6,561.31	2,795.9	1480:0.0,23.8	19.724414	-155.060614	0	12:00					
1490	Weld	6,572.61	2,819.6	1490:0.0,23.1	19.724380	-155.060678	0	12:00					
1500	Weld	6,583.48	2,842.7	1500:0.0,24.0	19.724346	-155.060744	0	12:00					
1510	Weld	6,594.86	2,866.7	1510:0.0,22.0	19.724313	-155.060807	0	12:00					
1520	Weld	6,605.30	2,888.7	1520:0.0,22.3	19.724279	-155.060873	0	12:00					
1530	Weld	6,615.85	2,911.0	1530:0.0,23.4	19.724248	-155.060934	0	12:00					
1540	Weld	6,626.92	2,934.4	1540:0.0,21.2	19.724216	-155.060995	0	12:00					
40000033	Metal Loss	6,636.28	2,954.3	1540:19.9,1.3	19.724189	-155.061046	323	10:45	23%	0.82	1.57	2.250	100%
1550	Weld	6,636.86	2,955.6	1550:0.0,20.5	19.724182	-155.061060	0	12:00					
40000034	Metal Loss	6,639.55	2,961.3	1550:5.7,14.8	19.724175	-155.061074	180	6:00	18%	0.94	1.57	2.250	100%
1560	Weld	6,646.51	2,976.1	1560:0.0,22.5	19.724151	-155.061118	0	12:00					
1570	Weld	6,657.17	2,998.5	1570:0.0,25.5	19.724122	-155.061175	0	12:00					
1580	Weld	6,669.25	3,024.1	1580:0.0,22.9	19.724090	-155.061237	0	12:00					
1590	Weld	6,680.08	3,047.0	1590:0.0,21.2	19.724053	-155.061307	0	12:00					

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Magpie Systems Inc.

ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)		Depth (%)	Length or pipe thickness	Width or Yield Strength	P' (Sage max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor
1600	Weld	6,690.07	3,068.1	1600:0.0,22.6	19.724020	-155.061370	0	12:00					
1610	Weld	6,700.70	3,090.7	1610:0.0,24.8	19.723990	-155.061429	0	12:00					
40000035	Metal Loss	6,701.48	3,092.4	1610:1.6,23.1	19.723988	-155.061433	270	9:00	12%	0.47	1.57	2.250	100%
1620	Weld	6,712.39	3,115.5	1620:0.0,20.0	19.723958	-155.061491	0	12:00					
1630	Weld	6,721.96	3,135.5	1630:0.0,22.6	19.723922	-155.061559	0	12:00					
40000036	Metal Loss	6,722.90	3,137.4	1630:1.9,20.7	19.723920	-155.061564	165	5:30	19%	1.06	3.13	2.250	100%
40000037	Metal Loss	6,723.08	3,137.8	1630:2.2,20.3	19.723919	-155.061564	165	5:30	19%	1.41	2.61	2.250	100%
40000038	Metal Loss	6,723.18	3,138.0	1630:2.5,20.1	19.723919	-155.061565	180	6:00	18%	1.53	4.70	2.250	100%
40000039	Metal Loss	6,723.31	3,138.3	1630:2.7,19.8	19.723919	-155.061566	165	5:30	32%	1.53	2.09	2.250	100%
1640	Weld	6,732.75	3,158.0	1640:0.0,24.3	19.723893	-155.061614	0	12:00					
1650	Weld	6,744.21	3,182.3	1650:0.0,20.6	19.723861	-155.061676	0	12:00					
1660	Weld	6,754.03	3,202.9	1660:0.0,19.3	19.723826	-155.061743	0	12:00					
40000040	Metal Loss	6,761.93	3,219.4	1660:16.5,2.8	19.723804	-155.061785	315	10:30	12%	0.82	1.57	2.250	100%
1670	Weld	6,763.26	3,222.2	1670:0.0,20.0	19.723797	-155.061800	0	12:00					
1680	Weld	6,772.68	3,242.2	1680:0.0,23.3	19.723768	-155.061854	0	12:00					
1690	Weld	6,783.72	3,265.5	1690:0.0,23.3	19.723739	-155.061910	0	12:00					
1700	Weld	6,794.86	3,288.8	1700:0.0,20.6	19.723706	-155.061974	0	12:00					
40000041	Metal Loss	6,802.98	3,306.1	1700:17.2,3.3	19.723683	-155.062018	185	5:30	18%	0.71	1.57	2.250	100%
13000014	Gain	6,803.22	3,306.6	1700:17.7,2.8	19.723683	-155.062019	22	12:30					
1710	Weld	6,804.55	3,309.4	1710:0.0,15.3	19.723673	-155.062038	0	12:00					
10000030	Bend right	6,805.87	3,312.2	1710:0.2,15.1	19.723672	-155.062039	0	12:00					
1720	Weld	6,811.67	3,324.7	1720:0.0,22.5	19.723643	-155.062095	0	12:00					
10000031	Bend left	6,821.80	3,346.7	1720:21.4,1.1	19.723615	-155.062150	0	12:00					
1730	Weld	6,822.08	3,347.2	1730:0.0,2.9	19.723620	-155.062139	0	12:00					
1740	Weld	6,823.44	3,350.1	1740:0.0,0.9	19.723588	-155.062201	0	12:00					
10000032	Bend right	6,823.66	3,350.6	1740:0.1,0.8	19.723588	-155.062201	0	12:00					
1750	Weld	6,823.85	3,351.0	1750:0.0,21.5	19.723582	-155.062213	0	12:00					
1760	Weld	6,833.40	3,372.5	1760:0.0,21.4	19.723578	-155.062220	0	12:00					
1770	Weld	6,843.29	3,393.9	1770:0.0,0.9	19.723547	-155.062279	0	12:00					
10000033	Bend right	6,843.50	3,394.3	1770:0.1,0.8	19.723547	-155.062279	0	12:00					
1780	Weld	6,843.71	3,394.7	1780:0.0,1.3	19.723516	-155.062339	0	12:00					
1790	Weld	6,844.32	3,396.0	1790:0.0,1.0	19.723513	-155.062345	0	12:00					
1800	Weld	6,844.79	3,397.1	1800:0.0,1.6	19.723509	-155.062353	0	12:00					
10000034	Pigable "Y" at 90 deg.	6,845.21	3,398.0	1800:0.5,1.1	19.723500	-155.062370	82	2:30					
1810	Weld	6,845.52	3,398.6	1810:0.0,1.2	19.723502	-155.062367	0	12:00					
10000035	Bend left	6,845.76	3,399.2	1810:0.1,1.1	19.723502	-155.062366	0	12:00					
11000001	WT CHANGE	6,846.00	3,399.8	1810:1.2,0.0	19.723503	-155.062364	0	12:00		0.322	35.040	0.80	1
1820	Weld	6,846.00	3,399.8	1820:0.0,3.3	19.723502	-155.062366	0	12:00					
1830	Weld	6,847.51	3,403.1	1830:0.0,14.2	19.723502	-155.062366	0	12:00					

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1840	Weld	6,854.01	3,417.3	1840:0.0,42.4	19.723499	-155.062371	0	12:00					
13000015	Gain	6,860.69	3,431.6	1840:14.3,28.2	19.723480	-155.062408	86	2:45					
1850	Weld	6,873.86	3,459.7	1850:0.0,41.8	19.723482	-155.062404	0	12:00					
1860	Weld	6,893.36	3,501.5	1860:0.0,41.4	19.723427	-155.062509	0	12:00					
1870	Weld	6,912.61	3,542.8	1870:0.0,42.0	19.723373	-155.062612	0	12:00					
1880	Weld	6,932.13	3,584.8	1880:0.0,41.8	19.723319	-155.062714	0	12:00					
1890	Weld	6,951.54	3,626.6	1890:0.0,42.0	19.723264	-155.062817	0	12:00					
1900	Weld	6,971.06	3,668.5	1900:0.0,42.4	19.723210	-155.062920	0	12:00					
1910	Weld	6,990.79	3,710.9	1910:0.0,41.9	19.723156	-155.063023	0	12:00					
1920	Weld	7,010.20	3,752.8	1920:0.0,43.3	19.723100	-155.063128	0	12:00					
1930	Weld	7,030.33	3,796.1	1930:0.0,41.4	19.723046	-155.063231	0	12:00					
1940	Weld	7,049.56	3,837.5	1940:0.0,0.2	19.722990	-155.063338	0	12:00					
10000036	Bend right	7,049.62	3,837.7	1940:0.1,0.2	19.722989	-155.063338	0	12:00					
1950	Weld	7,049.67	3,837.8	1950:0.0,5.4	19.722936	-155.063440	0	12:00					
12000005	Sensors #13 & 14 damaged in heavy wall bend - both sensors fail 3862.12 through end of run	7,049.73	3,837.9	1950:0.1,5.3	19.722936	-155.063440	0	12:00					
1960	Weld	7,052.18	3,843.2	1960:0.0,43.1	19.722937	-155.063437	0	12:00					
1970	Weld	7,072.15	3,886.3	1970:0.0,0.5	19.722932	-155.063448	0	12:00					
10000037	Bend right	7,072.26	3,886.5	1970:0.0,0.4	19.722932	-155.063448	0	12:00					
1980	Weld	7,072.36	3,886.7	1980:0.0,32.1	19.722876	-155.063554	0	12:00					
1990	Weld	7,087.19	3,918.9	1990:0.0,10.4	19.722877	-155.063552	0	12:00					
2000	Weld	7,091.98	3,929.2	2000:0.0,40.9	19.722835	-155.063631	0	12:00					
2010	Weld	7,110.81	3,970.2	2010:0.0,41.7	19.722823	-155.063654	0	12:00					
2020	Weld	7,130.03	4,011.8	2020:0.0,33.7	19.722770	-155.063755	0	12:00					
2030	Weld	7,145.53	4,045.5	2030:0.0,1.5	19.722716	-155.063857	0	12:00					
2040	Weld	7,146.21	4,047.0	2040:0.0,6.8	19.722672	-155.063940	0	12:00					
40000042	Metal Loss	7,146.31	4,047.2	2040:0.2,6.6	19.722672	-155.063940	52	1:30	18%	0.94	3.66	2.093	100%
10000038	Pipeline clean-out top of pipe	7,149.20	4,053.4	2040:6.2,0.6	19.722664	-155.063956	345	11:30					
2050	Weld	7,149.39	4,053.8	2050:0.0,1.6	19.722672	-155.063940	0	12:00					
10000039	Bend left	7,149.84	4,054.7	2050:0.2,1.4	19.722672	-155.063941	67	2:00					
2060	Weld	7,150.20	4,055.4	2060:0.0,7.2	19.722665	-155.063954	0	12:00					
10000040	Pipeline clean-out top of pipe	7,150.36	4,055.7	2060:0.1,7.1	19.722665	-155.063955	338	11:15					
2070	Weld	7,153.39	4,062.6	2070:0.0,1.3	19.722664	-155.063955	0	12:00					
2080	Weld	7,154.02	4,063.9	2080:0.0,15.4	19.722656	-155.063970	0	12:00					
2090	Weld	7,161.03	4,079.3	2090:0.0,21.8	19.722656	-155.063970	0	12:00					
2100	Weld	7,171.08	4,101.2	2100:0.0,37.1	19.722637	-155.064006	0	12:00					
2110	Weld	7,188.04	4,138.2	2110:0.0,9.1	19.722610	-155.064059	0	12:00					
2120	Weld	7,192.21	4,147.3	2120:0.0,1.6	19.722562	-155.064150	0	12:00					
2130	Weld	7,192.93	4,148.9	2130:0.0,41.8	19.722551	-155.064169	0	12:00					

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2140	Weld	7,212.06	4,190.6	2140:0.0,40.5	19.722551	-155.064170	0	12:00					
10000041	AGM 01, Corner of Kanoelehua and Kalanianaole Hwy. -- Ref# 186	7,212.75	4,192.1	2140:1.5,39.0	19.722500	-155.064267	310	10:15					
2150	Weld	7,230.57	4,231.1	2150:0.0,42.2	19.722499	-155.064267	0	12:00					
2160	Weld	7,249.87	4,273.3	2160:0.0,41.4	19.722390	-155.064267	0	12:00					
2170	Weld	7,268.74	4,314.7	2170:0.0,19.8	19.722273	-155.064267	0	12:00					
12000006	Inclusion @ 12:00	7,269.03	4,315.3	2170:0.6,19.2	19.722271	-155.064267	0	12:00					
2180	Weld	7,277.78	4,334.5	2180:0.0,2.0	19.722158	-155.064267	0	12:00					
2190	Weld	7,278.69	4,336.5	2190:0.0,20.6	19.722102	-155.064267	0	12:00					
2200	Weld	7,288.08	4,357.1	2200:0.0,41.0	19.722095	-155.064267	0	12:00					
2210	Weld	7,306.75	4,398.1	2210:0.0,42.2	19.722038	-155.064267	0	12:00					
40000043	Metal Loss	7,320.05	4,427.3	2210:29.2,13.1	19.721958	-155.064267	345	11:30	23%	1.65	2.61	2.093	100%
40000044	Metal Loss	7,320.16	4,427.6	2210:29.4,12.8	19.721957	-155.064267	345	11:30	15%	1.06	2.61	2.093	100%
2220	Weld	7,325.98	4,440.3	2220:0.0,40.9	19.721924	-155.064267	0	12:00					
2230	Weld	7,344.54	4,481.2	2230:0.0,42.3	19.721807	-155.064268	0	12:00					
2240	Weld	7,363.81	4,523.6	2240:0.0,41.5	19.721693	-155.064268	0	12:00					
2250	Weld	7,382.71	4,565.1	2250:0.0,41.7	19.721575	-155.064268	0	12:00					
2260	Weld	7,401.66	4,606.8	2260:0.0,41.2	19.721460	-155.064268	0	12:00					
2270	Weld	7,420.34	4,648.0	2270:0.0,41.2	19.721344	-155.064268	0	12:00					
2280	Weld	7,438.97	4,689.2	2280:0.0,42.2	19.721230	-155.064269	0	12:00					
2290	Weld	7,458.10	4,731.4	2290:0.0,41.0	19.721115	-155.064269	0	12:00					
2300	Weld	7,476.67	4,772.4	2300:0.0,40.4	19.720998	-155.064269	0	12:00					
2310	Weld	7,494.99	4,812.8	2310:0.0,38.3	19.720884	-155.064269	0	12:00					
11000002	WT CHANGE	7,512.32	4,851.1	2310:38.3,0.0	19.720779	-155.064269	0	12:00		0.322	35.000	0.80	1
2320	Weld	7,512.33	4,851.2	2320:0.0,20.6	19.720772	-155.064269	0	12:00					
10000042	Pipeline clean-out top of pipe	7,517.55	4,862.8	2320:11.3,9.3	19.720741	-155.064269	345	11:30					
10000043	Pipeline clean-out top of pipe	7,517.95	4,863.7	2320:12.2,8.4	19.720739	-155.064269	353	11:45					
2330	Weld	7,521.45	4,871.8	2330:0.0,21.5	19.720666	-155.064269	0	12:00					
2340	Weld	7,531.07	4,893.3	2340:0.0,21.7	19.720608	-155.064270	0	12:00					
2350	Weld	7,540.78	4,915.0	2350:0.0,21.1	19.720547	-155.064270	0	12:00					
2360	Weld	7,550.21	4,936.1	2360:0.0,24.0	19.720486	-155.064270	0	12:00					
2370	Weld	7,560.91	4,960.1	2370:0.0,20.9	19.720427	-155.064270	0	12:00					
2380	Weld	7,570.19	4,981.0	2380:0.0,24.0	19.720360	-155.064270	0	12:00					
2390	Weld	7,580.88	5,005.0	2390:0.0,23.9	19.720301	-155.064270	0	12:00					
2400	Weld	7,591.46	5,028.9	2400:0.0,23.6	19.720234	-155.064270	0	12:00					
2410	Weld	7,602.00	5,052.6	2410:0.0,22.5	19.720167	-155.064270	0	12:00					
2420	Weld	7,611.95	5,075.0	2420:0.0,20.7	19.720100	-155.064270	0	12:00					
2430	Weld	7,621.16	5,095.8	2430:0.0,23.9	19.720037	-155.064270	0	12:00					
2440	Weld	7,631.81	5,119.7	2440:0.0,23.7	19.719979	-155.064270	0	12:00					

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2450	Weld	7,642.32	5,143.4	2450:0.0,23.9	19.719912	-155.064271	0	12:00					
2460	Weld	7,652.94	5,167.3	2460:0.0,19.2	19.719846	-155.064271	0	12:00					
2470	Weld	7,661.46	5,186.5	2470:0.0,22.3	19.719779	-155.064271	0	12:00					
2480	Weld	7,671.33	5,208.8	2480:0.0,21.9	19.719725	-155.064271	0	12:00					
2490	Weld	7,681.05	5,230.7	2490:0.0,23.9	19.719662	-155.064271	0	12:00					
2500	Weld	7,691.60	5,254.5	2500:0.0,23.9	19.719600	-155.064271	0	12:00					
2510	Weld	7,702.22	5,278.5	2510:0.0,21.0	19.719534	-155.064271	0	12:00					
2520	Weld	7,711.57	5,299.5	2520:0.0,24.1	19.719467	-155.064271	0	12:00					
2530	Weld	7,722.23	5,323.6	2530:0.0,21.9	19.719407	-155.064271	0	12:00					
2540	Weld	7,731.90	5,345.5	2540:0.0,22.2	19.719340	-155.064271	0	12:00					
2550	Weld	7,741.73	5,367.7	2550:0.0,23.7	19.719279	-155.064272	0	12:00					
2560	Weld	7,752.17	5,391.4	2560:0.0,23.9	19.719216	-155.064272	0	12:00					
2570	Weld	7,762.69	5,415.3	2570:0.0,21.9	19.719150	-155.064272	0	12:00					
2580	Weld	7,772.38	5,437.1	2580:0.0,23.9	19.719083	-155.064272	0	12:00					
2590	Weld	7,782.92	5,461.1	2590:0.0,21.3	19.719022	-155.064272	0	12:00					
2600	Weld	7,792.32	5,482.4	2600:0.0,23.7	19.718954	-155.064272	0	12:00					
2610	Weld	7,802.85	5,506.1	2610:0.0,22.1	19.718895	-155.064272	0	12:00					
2620	Weld	7,812.63	5,528.2	2620:0.0,21.1	19.718828	-155.064272	0	12:00					
2630	Weld	7,821.90	5,549.2	2630:0.0,19.8	19.718766	-155.064272	0	12:00					
2640	Weld	7,830.65	5,569.1	2640:0.0,20.9	19.718707	-155.064272	0	12:00					
2650	Weld	7,839.82	5,589.9	2650:0.0,21.0	19.718651	-155.064273	0	12:00					
2660	Weld	7,849.06	5,610.9	2660:0.0,23.6	19.718593	-155.064273	0	12:00					
2670	Weld	7,859.54	5,634.6	2670:0.0,20.7	19.718534	-155.064273	0	12:00					
2680	Weld	7,868.66	5,655.2	2680:0.0,21.9	19.718467	-155.064273	0	12:00					
40000045	Metal Loss	7,872.65	5,664.8	2680:9.5,12.4	19.718441	-155.064273	255	8:30	16%	0.82	1.57	2.091	100%
10000044	Pipeline clean-out top of pipe	7,876.44	5,673.0	2680:17.5,4.4	19.718419	-155.064273	353	11:45					
10000045	Pipeline clean-out top of pipe	7,876.83	5,673.8	2680:18.3,3.6	19.718417	-155.064273	353	11:45					
2690	Weld	7,878.28	5,677.1	2690:0.0,21.9	19.718409	-155.064273	0	12:00					
2700	Weld	7,887.89	5,699.0	2700:0.0,21.0	19.718348	-155.064273	0	12:00					
2710	Weld	7,897.09	5,720.1	2710:0.0,23.9	19.718286	-155.064273	0	12:00					
2720	Weld	7,907.56	5,744.0	2720:0.0,19.9	19.718227	-155.064273	0	12:00					
2730	Weld	7,916.32	5,763.8	2730:0.0,23.4	19.718160	-155.064273	0	12:00					
2740	Weld	7,926.59	5,787.2	2740:0.0,20.6	19.718104	-155.064273	0	12:00					
2750	Weld	7,935.63	5,807.8	2750:0.0,23.9	19.718039	-155.064273	0	12:00					
2760	Weld	7,946.09	5,831.7	2760:0.0,20.6	19.717981	-155.064274	0	12:00					
2770	Weld	7,955.09	5,852.3	2770:0.0,21.9	19.717914	-155.064274	0	12:00					
2780	Weld	7,964.71	5,874.3	2780:0.0,21.3	19.717856	-155.064274	0	12:00					
2790	Weld	7,974.01	5,895.6	2790:0.0,20.8	19.717794	-155.064274	0	12:00					
2800	Weld	7,983.12	5,916.4	2800:0.0,18.3	19.717734	-155.064274	0	12:00					

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ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)		Depth (%)	Length or pipe thickness	Width or Yield Strength	P' (simple max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor
2810	Weld	7,991.13	5,934.7	2810:0.0,21.8	19.717676	-155.064274	0	12:00					
2820	Weld	8,000.69	5,956.5	2820:0.0,20.9	19.717624	-155.064274	0	12:00					
2830	Weld	8,009.78	5,977.4	2830:0.0,22.0	19.717563	-155.064274	0	12:00					
2840	Weld	8,019.35	5,999.4	2840:0.0,21.9	19.717504	-155.064274	0	12:00					
2850	Weld	8,028.91	6,021.2	2850:0.0,23.9	19.717443	-155.064274	0	12:00					
2860	Weld	8,039.35	6,045.2	2860:0.0,23.6	19.717381	-155.064274	0	12:00					
2870	Weld	8,049.65	6,068.7	2870:0.0,20.4	19.717314	-155.064275	0	12:00					
2880	Weld	8,058.57	6,089.1	2880:0.0,24.0	19.717248	-155.064275	0	12:00					
2890	Weld	8,069.05	6,113.2	2890:0.0,24.2	19.717191	-155.064275	0	12:00					
2900	Weld	8,079.54	6,137.3	2900:0.0,24.0	19.717123	-155.064275	0	12:00					
2910	Weld	8,089.96	6,161.3	2910:0.0,21.1	19.717056	-155.064275	0	12:00					
2920	Weld	8,099.15	6,182.4	2920:0.0,19.4	19.716989	-155.064275	0	12:00					
2930	Weld	8,107.63	6,201.8	2930:0.0,21.4	19.716929	-155.064275	0	12:00					
2940	Weld	8,116.95	6,223.2	2940:0.0,20.9	19.716875	-155.064275	0	12:00					
2950	Weld	8,126.03	6,244.1	2950:0.0,21.9	19.716815	-155.064275	0	12:00					
2960	Weld	8,135.55	6,266.0	2960:0.0,20.8	19.716756	-155.064275	0	12:00					
2970	Weld	8,144.61	6,286.9	2970:0.0,21.4	19.716694	-155.064276	0	12:00					
2980	Weld	8,153.94	6,308.3	2980:0.0,21.8	19.716636	-155.064276	0	12:00					
2990	Weld	8,163.44	6,330.1	2990:0.0,21.9	19.716576	-155.064276	0	12:00					
3000	Weld	8,172.93	6,352.0	3000:0.0,21.1	19.716514	-155.064276	0	12:00					
3010	Weld	8,182.09	6,373.1	3010:0.0,23.9	19.716453	-155.064276	0	12:00					
3020	Weld	8,192.47	6,397.0	3020:0.0,21.8	19.716394	-155.064276	0	12:00					
3030	Weld	8,201.97	6,418.8	3030:0.0,20.9	19.716327	-155.064276	0	12:00					
3040	Weld	8,211.02	6,439.7	3040:0.0,24.0	19.716265	-155.064276	0	12:00					
3050	Weld	8,221.39	6,463.7	3050:0.0,21.9	19.716207	-155.064276	0	12:00					
3060	Weld	8,230.86	6,485.6	3060:0.0,19.9	19.716139	-155.064276	0	12:00					
3070	Weld	8,239.46	6,505.5	3070:0.0,20.1	19.716078	-155.064276	0	12:00					
10000046	Pipeline clean-out top of pipe	8,243.15	6,514.0	3070:8.3,11.8	19.716055	-155.064276	345	11:30					
10000047	Pipeline clean-out top of pipe	8,243.52	6,514.9	3070:9.2,10.9	19.716053	-155.064276	345	11:30					
3080	Weld	8,248.06	6,525.6	3080:0.0,23.8	19.716022	-155.064277	0	12:00					
3090	Weld	8,258.31	6,549.4	3090:0.0,23.4	19.715965.	-155.064277	0	12:00					
3100	Weld	8,268.45	6,572.8	3100:0.0,19.7	19.715899	-155.064277	0	12:00					
3110	Weld	8,276.97	6,592.5	3110:0.0,21.9	19.715833	-155.064277	0	12:00					
3120	Weld	8,286.45	6,614.4	3120:0.0,20.1	19.715778	-155.064277	0	12:00					
3130	Weld	8,295.11	6,634.5	3130:0.0,21.9	19.715716	-155.064277	0	12:00					
3140	Weld	8,304.56	6,656.3	3140:0.0,21.9	19.715660	-155.064277	0	12:00					
3150	Weld	8,314.00	6,678.3	3150:0.0,17.0	19.715598	-155.064277	0	12:00					
3160	Weld	8,321.29	6,695.3	3160:0.0,20.9	19.715537	-155.064277	0	12:00					
3170	Weld	8,330.27	6,716.2	3170:0.0,21.9	19.715489	-155.064277	0	12:00					

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3180	Weld	8,339.70	6,738.1	3180:0.0,21.9	19.715430	-155.064277	0	12:00					
3190	Weld	8,349.13	6,760.0	3190:0.0,21.9	19.715368	-155.064278	0	12:00					
3200	Weld	8,358.55	6,781.9	3200:0.0,24.0	19.715307	-155.064278	0	12:00					
3210	Weld	8,368.88	6,805.9	3210:0.0,22.3	19.715245	-155.064278	0	12:00					
3220	Weld	8,378.49	6,828.3	3220:0.0,21.9	19.715178	-155.064278	0	12:00					
3230	Weld	8,387.91	6,850.1	3230:0.0,21.1	19.715115	-155.064278	0	12:00					
3240	Weld	8,396.98	6,871.2	3240:0.0,23.9	19.715054	-155.064278	0	12:00					
3250	Weld	8,407.18	6,895.1	3250:0.0,20.2	19.714995	-155.064278	0	12:00					
3260	Weld	8,415.83	6,915.3	3260:0.0,16.9	19.714928	-155.064278	0	12:00					
3270	Weld	8,423.02	6,932.2	3270:0.0,21.9	19.714871	-155.064278	0	12:00					
3280	Weld	8,432.38	6,954.1	3280:0.0,24.0	19.714823	-155.064278	0	12:00					
3290	Weld	8,442.63	6,978.1	3290:0.0,23.9	19.714762	-155.064278	0	12:00					
3300	Weld	8,452.87	7,002.0	3300:0.0,18.3	19.714695	-155.064279	0	12:00					
3310	Weld	8,460.70	7,020.3	3310:0.0,21.7	19.714628	-155.064279	0	12:00					
10000048	Pipeline clean-out top of pipe	8,465.45	7,031.4	3310:10.8,10.9	19.714598	-155.064279	353	11:45					
10000049	Pipeline clean-out top of pipe	8,465.78	7,032.2	3310:11.6,10.1	19.714596	-155.064279	353	11:45					
11000003	WT CHANGE	8,470.01	7,042.0	3310:21.7,0.0	19.714568	-155.064279	0	12:00		0.322	35.040	0.80	1
3320	Weld	8,470.03	7,042.1	3320:0.0,5.1	19.714576	-155.064279	0	12:00					
3330	Weld	8,472.24	7,047.2	3330:0.0,1.7	19.714515	-155.064279	0	12:00					
3340	Weld	8,472.95	7,048.9	3340:0.0,29.0	19.714499	-155.064279	0	12:00					
3350	Weld	8,485.50	7,077.9	3350:0.0,5.6	19.714493	-155.064279	0	12:00					
3360	Weld	8,487.91	7,083.5	3360:0.0,41.5	19.714412	-155.064279	0	12:00					
3370	Weld	8,505.91	7,125.0	3370:0.0,26.6	19.714395	-155.064279	0	12:00					
3380	Weld	8,517.43	7,151.6	3380:0.0,41.8	19.714280	-155.064279	0	12:00					
3390	Weld	8,535.48	7,193.4	3390:0.0,18.1	19.714206	-155.064279	0	12:00					
3400	Weld	8,543.30	7,211.5	3400:0.0,41.7	19.714090	-155.064280	0	12:00					
10000050	Pipeline clean-out top of pipe	8,549.74	7,226.3	3400:14.6,27.1	19.714050	-155.064280	353	11:45					
10000051	Pipeline clean-out top of pipe	8,550.22	7,227.4	3400:15.7,26.0	19.714047	-155.064280	353	11:45					
3410	Weld	8,561.39	7,253.2	3410:0.0,42.7	19.714039	-155.064280	0	12:00					
3420	Weld	8,579.91	7,295.9	3420:0.0,43.3	19.713923	-155.064280	0	12:00					
3430	Weld	8,598.70	7,339.2	3430:0.0,42.2	19.713805	-155.064280	0	12:00					
3440	Weld	8,616.97	7,381.4	3440:0.0,41.2	19.713684	-155.064280	0	12:00					
3450	Weld	8,634.81	7,422.6	3450:0.0,41.4	19.713567	-155.064280	0	12:00					
3460	Weld	8,652.70	7,463.9	3460:0.0,41.2	19.713453	-155.064280	0	12:00					
3470	Weld	8,670.47	7,505.1	3470:0.0,41.8	19.713338	-155.064281	0	12:00					
40000046	Metal Loss	8,671.06	7,506.5	3470:1.3,40.5	19.713334	-155.064281	45	1:30	12%	0.59	2.09	2.093	100%
3480	Weld	8,688.53	7,547.0	3480:0.0,41.9	19.713224	-155.064281	0	12:00					
3490	Weld	8,706.59	7,588.8	3490:0.0,40.5	19.713107	-155.064281	0	12:00					
3500	Weld	8,724.08	7,629.3	3500:0.0,40.0	19.712991	-155.064281	0	12:00					

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3510	Weld	8,741.34	7,669.4	3510:0.0,42.3	19.712879	-155.064281	0	12:00					
3520	Weld	8,759.60	7,711.7	3520:0.0,41.1	19.712767	-155.064282	0	12:00					
3530	Weld	8,777.37	7,752.8	3530:0.0,41.4	19.712650	-155.064282	0	12:00					
3540	Weld	8,795.26	7,794.2	3540:0.0,40.1	19.712536	-155.064282	0	12:00					
3550	Weld	8,812.56	7,834.3	3550:0.0,40.3	19.712421	-155.064282	0	12:00					
3560	Weld	8,829.93	7,874.6	3560:0.0,10.6	19.712309	-155.064282	0	12:00					
12000007	Weld anomaly - Lack of metal from 8:00 to 1:00	8,834.48	7,885.2	3560:10.5,0.0	19.712281	-155.064282	0	12:00					
3570	Weld	8,834.48	7,885.2	3570:0.0,18.5	19.712197	-155.064282	0	12:00					
3580	Weld	8,842.39	7,903.7	3580:0.0,11.2	19.712167	-155.064282	0	12:00					
3590	Weld	8,847.18	7,914.9	3590:0.0,13.4	19.712115	-155.064283	0	12:00					
40000047	Metal Loss	8,852.93	7,928.2	3590:13.3,0.2	19.712078	-155.064283	248	8:15	26%	1.06	3.66	2,093	100%
3600	Weld	8,852.98	7,928.3	3600:0.0,20.9	19.712083	-155.064283	0	12:00					
3610	Weld	8,861.93	7,949.2	3610:0.0,7.1	19.712044	-155.064283	0	12:00					
3620	Weld	8,864.97	7,956.3	3620:0.0,28.3	19.711986	-155.064283	0	12:00					
3630	Weld	8,877.13	7,984.6	3630:0.0,41.7	19.711965	-155.064283	0	12:00					
3640	Weld	8,895.13	8,026.3	3640:0.0,22.2	19.711886	-155.064283	0	12:00					
3650	Weld	8,904.76	8,048.5	3650:0.0,0.7	19.711770	-155.064283	0	12:00					
10000052	Bend left	8,904.92	8,048.8	3650:0.0,0.6	19.711770	-155.064283	127	4:00					
3660	Weld	8,905.08	8,049.2	3660:0.0,12.4	19.711708	-155.064283	0	12:00					
12000008	Sensor #41 & 42 damaged on section of heavy wall - both fail 8073.75 through end of run	8,905.11	8,049.3	3660:0.1,12.3	19.711707	-155.064283	0	12:00					
3670	Weld	8,910.42	8,061.6	3670:0.0,17.5	19.711704	-155.064283	0	12:00					
10000053	Pipeline clean-out top of pipe	8,917.58	8,078.3	3670:16.5,1.0	19.711659	-155.064283	345	11:30					
3680	Weld	8,917.93	8,079.1	3680:0.0,20.2	19.711669	-155.064283	0	12:00					
10000054	Pipeline clean-out top of pipe	8,918.29	8,079.9	3680:0.5,19.6	19.711667	-155.064283	353	11:45					
10000055	AGM 02, Southeast Corner of Kanoelehua Ave. and Kekuanaoa St. – Ref# 320	8,918.30	8,080.0	3680:0.8,19.4	19.711617	-155.064283	324	10:45					
3690	Weld	8,926.60	8,099.3	3690:0.0,39.7	19.711634	-155.064303	0	12:00					
3700	Weld	8,943.76	8,139.0	3700:0.0,40.4	19.711545	-155.064203	0	12:00					
3710	Weld	8,961.21	8,179.4	3710:0.0,40.1	19.711453	-155.064099	0	12:00					
3720	Weld	8,978.50	8,219.4	3720:0.0,42.1	19.711360	-155.063993	0	12:00					
3730	Weld	8,996.70	8,261.6	3730:0.0,41.7	19.711267	-155.063889	0	12:00					
3740	Weld	9,014.68	8,303.3	3740:0.0,42.9	19.711170	-155.063780	0	12:00					
3750	Weld	9,033.22	8,346.2	3750:0.0,42.2	19.711074	-155.063671	0	12:00					
3760	Weld	9,051.48	8,388.4	3760:0.0,41.3	19.710976	-155.063561	0	12:00					
3770	Weld	9,069.29	8,429.7	3770:0.0,41.8	19.710879	-155.063451	0	12:00					
3780	Weld	9,087.30	8,471.6	3780:0.0,41.9	19.710784	-155.063344	0	12:00					
3790	Weld	9,105.32	8,513.5	3790:0.0,40.1	19.710686	-155.063236	0	12:00					
3800	Weld	9,122.64	8,553.6	3800:0.0,40.6	19.710591	-155.063127	0	12:00					
3810	Weld	9,140.25	8,594.2	3810:0.0,41.1	19.710498	-155.063022	0	12:00					

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3820	Weld	9,158.01	8,635.4	3820:0.0,41.5	19.710404	-155.062916	0	12:00					
3830	Weld	9,175.94	8,676.9	3830:0.0,41.0	19.710309	-155.062809	0	12:00					
3840	Weld	9,193.70	8,717.9	3840:0.0,41.5	19.710214	-155.062701	0	12:00					
3850	Weld	9,211.63	8,759.4	3850:0.0,42.8	19.710119	-155.062594	0	12:00					
3860	Weld	9,230.15	8,802.2	3860:0.0,14.3	19.710024	-155.062487	0	12:00					
10000056	Fitting on top of pipe	9,236.27	8,816.3	3860:14.1,0.3	19.709997	-155.062457	345	11:30					
3870	Weld	9,236.36	8,816.5	3870:0.0,10.3	19.709926	-155.062376	0	12:00					
3880	Weld	9,240.84	8,826.8	3880:0.0,17.7	19.709881	-155.062326	0	12:00					
3890	Weld	9,248.43	8,844.5	3890:0.0,41.5	19.709844	-155.062285	0	12:00					
3900	Weld	9,266.41	8,886.0	3900:0.0,35.7	19.709794	-155.062227	0	12:00					
3910	Weld	9,281.92	8,921.7	3910:0.0,1.4	19.709698	-155.062120	0	12:00					
3920	Weld	9,282.51	8,923.1	3920:0.0,5.7	19.709613	-155.062024	0	12:00					
10000057	Pipeline clean-out top of pipe	9,284.60	8,927.9	3920:4.6,1.2	19.709605	-155.062014	353	11:45					
3930	Weld	9,285.03	8,928.8	3930:0.0,0.8	19.709593	-155.062001	0	12:00					
10000058	Bend right	9,285.22	8,929.2	3930:0.1,0.8	19.709530	-155.061930	0	12:00					
3940	Weld	9,285.40	8,929.6	3940:0.0,6.1	19.709565	-155.061969	0	12:00					
10000059	Pipeline clean-out top of pipe	9,285.79	8,930.5	3940:0.6,5.5	19.709564	-155.061968	338	11:15					
3950	Weld	9,288.06	8,935.7	3950:0.0,1.4	19.709529	-155.061930	0	12:00					
3960	Weld	9,288.65	8,937.1	3960:0.0,22.7	19.709510	-155.061923	0	12:00					
3970	Weld	9,298.39	8,959.8	3970:0.0,41.9	19.709505	-155.061922	0	12:00					
3980	Weld	9,316.61	9,001.7	3980:0.0,41.3	19.709444	-155.061902	0	12:00					
3990	Weld	9,334.51	9,043.0	3990:0.0,43.4	19.709333	-155.061865	0	12:00					
4000	Weld	9,353.36	9,086.4	4000:0.0,41.7	19.709223	-155.061829	0	12:00					
4010	Weld	9,371.46	9,128.0	4010:0.0,40.4	19.709108	-155.061792	0	12:00					
4020	Weld	9,389.06	9,168.4	4020:0.0,0.4	19.708998	-155.061755	0	12:00					
10000060	Bend left	9,389.13	9,168.6	4020:0.0,0.4	19.708998	-155.061755	0	12:00					
4030	Weld	9,389.23	9,168.8	4030:0.0,38.6	19.708891	-155.061720	0	12:00					
4040	Weld	9,405.99	9,207.4	4040:0.0,39.7	19.708888	-155.061720	0	12:00					
4050	Weld	9,423.20	9,247.1	4050:0.0,41.6	19.708786	-155.061686	0	12:00					
4060	Weld	9,441.34	9,288.7	4060:0.0,14.1	19.708681	-155.061651	0	12:00					
10000061	Patch	9,447.16	9,302.2	4060:13.0,1.1	19.708647	-155.061640	353	11:45		0.97			
4070	Weld	9,447.41	9,302.8	4070:0.0,16.7	19.708570	-155.061615	0	12:00					
4080	Weld	9,454.63	9,319.4	4080:0.0,20.9	19.708532	-155.061603	0	12:00					
4090	Weld	9,463.65	9,340.3	4090:0.0,21.9	19.708487	-155.061588	0	12:00					
4100	Weld	9,473.12	9,362.2	4100:0.0,20.7	19.708431	-155.061570	0	12:00					
4110	Weld	9,482.05	9,383.0	4110:0.0,0.6	19.708373	-155.061550	0	12:00					
10000062	Bend up	9,482.23	9,383.4	4110:0.0,0.7	19.708373	-155.061550	195	6:30					
4120	Weld	9,482.40	9,383.7	4120:0.0,3.2	19.708317	-155.061532	0	12:00					
4130	Weld	9,483.90	9,387.0	4130:0.0,0.6	19.708314	-155.061531	0	12:00					

Pipeline Listing

Magpie Systems Inc.

ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)		Depth (%)	Length or pipe thickness	Width or Yield Strength	P' (temp max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor
10000063	Bend down	9,484.11	9,387.4	4130:0.0,0.8	19.708314	-155.061531	188	6:15					
4140	Weld	9,484.29	9,387.8	4140:0.0,28.4	19.708304	-155.061528	0	12:00					
4150	Weld	9,496.30	9,416.2	4150:0.0,42.2	19.708301	-155.061527	0	12:00					
4160	Weld	9,514.78	9,458.4	4160:0.0,41.7	19.708225	-155.061502	0	12:00					
10000064	Pipeline clean-out top of pipe	9,528.20	9,489.1	4160:30.5,11.1	19.708145	-155.061476	345	11:30					
10000065	Pipeline clean-out top of pipe	9,528.78	9,490.4	4160:31.8,9.8	19.708142	-155.061475	338	11:15					
4170	Weld	9,532.98	9,500.0	4170:0.0,40.9	19.708113	-155.061465	0	12:00					
4180	Weld	9,550.83	9,540.9	4180:0.0,41.5	19.708003	-155.061429	0	12:00					
4190	Weld	9,568.94	9,582.4	4190:0.0,40.5	19.707894	-155.061393	0	12:00					
4200	Weld	9,586.63	9,622.8	4200:0.0,41.9	19.707784	-155.061357	0	12:00					
4210	Weld	9,604.96	9,664.7	4210:0.0,42.2	19.707677	-155.061322	0	12:00					
4220	Weld	9,623.42	9,706.9	4220:0.0,40.7	19.707566	-155.061288	0	12:00					
12000009	Internal mill anomaly @ 4:00, 9 feet long	9,632.48	9,727.6	4220:20.7,20.1	19.707512	-155.061268	0	12:00					
4230	Weld	9,641.24	9,747.7	4230:0.0,40.4	19.707454	-155.061249	0	12:00					
4240	Weld	9,658.91	9,788.1	4240:0.0,40.8	19.707346	-155.061214	0	12:00					
4250	Weld	9,676.75	9,828.9	4250:0.0,41.4	19.707239	-155.061178	0	12:00					
4260	Weld	9,694.94	9,870.3	4260:0.0,41.6	19.707131	-155.061143	0	12:00					
4270	Weld	9,713.18	9,911.9	4270:0.0,41.4	19.707021	-155.061107	0	12:00					
4280	Weld	9,731.37	9,953.4	4280:0.0,42.4	19.706911	-155.061071	0	12:00					
4290	Weld	9,750.01	9,995.8	4290:0.0,42.1	19.706801	-155.061035	0	12:00					
4300	Weld	9,768.47	10,037.9	4300:0.0,41.3	19.706688	-155.060998	0	12:00					
4310	Weld	9,786.62	10,079.1	4310:0.0,40.1	19.706577	-155.060961	0	12:00					
4320	Weld	9,804.22	10,119.2	4320:0.0,41.8	19.706467	-155.060925	0	12:00					
4330	Weld	9,822.58	10,161.1	4330:0.0,40.3	19.706361	-155.060890	0	12:00					
4340	Weld	9,840.33	10,201.4	4340:0.0,41.0	19.706250	-155.060854	0	12:00					
4350	Weld	9,858.33	10,242.4	4350:0.0,41.4	19.706143	-155.060819	0	12:00					
10000066	Pipeline clean-out top of pipe	9,872.27	10,274.0	4350:31.4,9.9	19.706061	-155.060792	345	11:30					
10000067	Pipeline clean-out top of pipe	9,872.86	10,275.4	4350:32.8,8.6	19.706057	-155.060791	345	11:30					
4360	Weld	9,876.57	10,283.7	4360:0.0,42.8	19.706034	-155.060783	0	12:00					
4370	Weld	9,895.52	10,326.5	4370:0.0,41.8	19.705925	-155.060747	0	12:00					
4380	Weld	9,913.98	10,368.3	4380:0.0,41.9	19.705811	-155.060710	0	12:00					
4390	Weld	9,932.44	10,410.2	4390:0.0,41.3	19.705700	-155.060674	0	12:00					
4400	Weld	9,950.64	10,451.6	4400:0.0,41.7	19.705589	-155.060637	0	12:00					
4410	Weld	9,969.01	10,493.3	4410:0.0,41.6	19.705480	-155.060601	0	12:00					
4420	Weld	9,987.38	10,534.9	4420:0.0,37.4	19.705369	-155.060565	0	12:00					
4430	Weld	10,003.85	10,572.3	4430:0.0,37.2	19.705259	-155.060529	0	12:00					
4440	Weld	10,020.24	10,609.5	4440:0.0,42.6	19.705160	-155.060496	0	12:00					
4450	Weld	10,038.96	10,652.1	4450:0.0,38.4	19.705061	-155.060464	0	12:00					
13000016	Gain	10,053.01	10,683.8	4450:31.7,6.7	19.704978	-155.060437	71	2:15					

Pipeline Listing

Magpie Systems Inc.

ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)		Depth (%)	Length or pipe thickness	Width or Yield Strength	P' (max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor
4460	Weld	10,055.94	10,690.5	4460:0.0,34.4	19.704948	-155.060427	0	12:00					
4470	Weld	10,071.13	10,724.9	4470:0.0,1.4	19.704846	-155.060394	0	12:00					
4480	Weld	10,071.74	10,726.3	4480:0.0,3.9	19.704755	-155.060364	0	12:00					
10000068	Pipeline clean-out top of pipe	10,073.32	10,729.8	4480:3.3,0.6	19.704746	-155.060361	345	11:30					
4490	Weld	10,073.51	10,730.2	4490:0.0,1.5	19.704750	-155.060362	0	12:00					
10000069	Bend right	10,073.95	10,730.9	4490:0.1,1.4	19.704749	-155.060362	0	12:00					
4500	Weld	10,074.35	10,731.7	4500:0.0,41.9	19.704738	-155.060358	0	12:00					
10000070	Pipeline clean-out top of pipe	10,074.54	10,732.1	4500:0.2,41.7	19.704738	-155.060358	353	11:45					
4510	Weld	10,092.59	10,773.6	4510:0.0,26.1	19.704733	-155.060356	0	12:00					
4520	Weld	10,104.16	10,799.7	4520:0.0,1.2	19.704622	-155.060320	0	12:00					
10000071	Tee on top of pipe	10,104.42	10,800.3	4520:0.3,0.8	19.704621	-155.060320	353	11:45					
4530	Weld	10,104.68	10,800.9	4530:0.0,3.1	19.704552	-155.060297	0	12:00					
10000072	Bend left-up	10,105.40	10,802.5	4530:0.5,2.6	19.704551	-155.060297	0	12:00					
4540	Weld	10,106.08	10,804.0	4540:0.0,2.3	19.704548	-155.060296	0	12:00					
4550	Weld	10,107.11	10,806.3	4550:0.0,0.9	19.704538	-155.060293	0	12:00					
10000073	Bend down	10,107.30	10,806.8	4550:0.0,0.8	19.704538	-155.060293	0	12:00					
4560	Weld	10,107.48	10,807.2	4560:0.0,0.4	19.704531	-155.060290	0	12:00					
4570	Weld	10,107.67	10,807.7	4570:0.0,1.3	19.704527	-155.060289	0	12:00					
10000074	Tee at 90 deg.	10,107.94	10,808.4	4570:0.2,1.1	19.704527	-155.060289	82	2:30					
4580	Weld	10,108.18	10,809.0	4580:0.0,1.9	19.704525	-155.060288	0	12:00					
10000075	Tee at 270 deg.	10,108.58	10,809.9	4580:0.5,1.4	19.704524	-155.060288	263	8:45					
4590	Weld	10,109.01	10,810.8	4590:0.0,4.0	19.704520	-155.060287	0	12:00					
10000076	Pipe Support	10,110.43	10,814.2	4590:3.2,0.8	19.704512	-155.060284	0	12:00					
10000077	Pipe Support	10,110.61	10,814.5	4590:3.6,0.4	19.704511	-155.060284	0	12:00					
4600	Weld	10,110.75	10,814.8	4600:0.0,2.5	19.704514	-155.060285	0	12:00					
10000078	Flange	10,110.93	10,815.2	4600:0.4,2.1	19.704513	-155.060284	0	12:00					
10000079	Valve (Receiver), Hill Plant	10,111.31	10,816.1	4600:1.3,1.2	19.704500	-155.060280	0	12:00					
10000080	Flange	10,111.70	10,816.9	4600:2.1,0.4	19.704502	-155.060280	0	12:00					
4610	Weld	10,111.87	10,817.3	4610:0.0,-10817.3	1881.71846	-180.000000	0	12:00					
10000081	Pipe Support	10,112.85	10,819.4	4610:1.7,-10819.0	0.000000	0.000000	0	12:00					
12000010	End Run Tickle	17,778.01	11,512.3	4610:695.0,-11512.	0.000000	0.000000	0	12:00					

Pipeline Listing

Magpie Systems Inc.

ID#	Description	Time	Dist. (ft)	Joint #, U/S Weld Dist., D/S Weld Dist.	Latitude	Longitude	Orient (deg / clock)	Depth (%)	Length or pipe thickness	Width or Yield Strength	P' (max press - psi) or Safety Factor	% of established psi (P'/P) or Temp. Factor

Pipeline Listing Summary

Type	Number
GAINS	17
GROUPED PITS	48
LOCATIONS	82
MISC	11
WT CHANGES	4
WELDS	451

Glossary

AGM (Aboveground Marker)	A portable device placed at an aboveground reference point that both detects and records the passage of an in-line inspection tool. AGMs are typically reported using a marker number followed by the aboveground reference point description of the location of device (box) placement.
ABOVE-GROUND REFERENCE POINTS	The aboveground reference point is a permanent reference on or above the pipeline, which can be used to locate features in the pipeline. Reference points can be valves, fences, test stations, marker posts, or other permanent features.
ACCELERO-METERS	Part of the INS package of the in-line inspection tool. Each Magpie tool contains 3 axis-aligned accelerometers measuring orientation and shock.
ANCHOR, WEIGHT OR HANGAR	Non-welded full encirclement pipeline features typically evenly spaced across water crossings. These are usually not detrimental unless associated metal loss is detected.
ANOMALY	Any kind of imperfection or defect that may be present in the wall of the pipe.
ASME B31G, MODIFIED ASME B31G, or DNV RP-F101	Commonly used analysis criterion for metal loss anomalies in a pipeline. Magpie software may use ASME B31G, MODIFIED ASME B31G, or DNV RP-F101 to calculate the safe maximum allowable operating pressure at an area of metal loss. These formulas utilize only length and depth – they do not take into consideration the width of the anomaly. The MODIFIED ASME B31G more closely approximates the values obtained via the RSTRENG calculations, which is less conservative than the standard ASME B31G calculation. See also DNV RP-F101.
BEND (RADIUS)	The radius of the bend in the pipe as related to the pipe diameter (D). Example: A 3-D bend would have a radius of 3 times the diameter of the pipe measured to the centerline of the pipe.
BURST PRESSURE	The pressure at which the nominal hoop stress in the wall of a pipe equals the specified minimum yield stress of the pipe grade. It is calculated by 2st/D where s = SMYS, t = nominal wall thickness, D = nominal outside diameter of pipe.
CASING ANOMALY	When the casing is not welded, or when a gap occurs in the weld, this signature is detected by the tool, and identified with a miscellaneous remark.
CLAMP	Non-welded full encirclement pipeline feature not located at a bridge or water crossing.
CORROSION (External)	Metal loss due to electrochemical, galvanic, microbiological, or other attack on the pipe due to environmental conditions surrounding the pipe.
CORROSION (Internal)	Metal loss due to chemical or other attack on the steel from liquids on the inside of the pipe. Electrochemical attack can also occur in local cells, but this is less frequent.
DATA ANALYSIS	The process through which indications are evaluated to classify, characterize and size them as non-relevant conditions, pipeline components, anomalies, imperfections, or defects.
DNV RP-F101	An analysis procedure that differs from the commonly used ASME B31G criterion. Developed by the Norwegian company Det Norske Veritas, this method is employed for European and Asian pipelines. The DNV algorithm is generally considered to be more conservative than ASME B31G.
DEFECT	An anomaly for which an analysis, such as ASME B31G, would indicate that the pipe is approaching failure as the nominal hoop stress approaches the specified minimum yield stress (SMYS).

Glossary

DEFORMATION PIG	A pig designed to record conditions such as dents, wrinkles, ovality, bend radius and angle by making measurements of the inside surface of the pipeline.
DENTS	Dents are depressions in the pipeline that under limited conditions may be detected by the inline inspection tool. In the data, dents cannot be differentiated from other known types of anomalies, and are therefore called out as "possible dents" (once all other features have been ruled out).
ECCENTRIC CASINGS	Magpie tools detect when a casing is not centered on the pipeline. These casings are referred to as being eccentric. The closer the casing is to the pipeline, the stronger the signal seen by the inspection tool. The tool will not detect if the casing is shorted to the pipe wall. The tool might see evidence of a short, such as metal loss.
ERW (Electric-Resistance Weld	Describes a process used to form steel from a sheet into tubular form (pipe). Welds are formed by resistance heating of two edges of a metal sheet and then forcing them together to create a solid-state weld.
GPS (Global Positioning Satellite)	Using GPS equipment, the coordinates of valves, AGMs, and other locations can be recorded and when coupled with the on-board INS system in the tool, the route of the pipeline can be plotted on a map.
GYROSCOPES (Gyros)	Electronic sensors used to measure change in direction of in-line inspection tool during inspection process. Reported as pitch and yaw in PIGTRAP™.
GROUP	A group is several pits that are grouped together using specific interaction rules. If a pit is a mountain peak, then a group is a mountain range. The reason for groups is so that the overall extent of the metal loss area can be evaluated. Most formulas for calculating the strength of the pipe wall around metal loss look at the overall length of metal loss, and the interaction between pits.
HALF-SOLE	A device used to repair a pipeline by welding a small section over half the circumference of the pipe over the defect, literally half of a sleeve.
HALL SENSORS	A sensor that directly measures the remaining magnetic field strength not absorbed by the pipe.
HCA (High Consequence Area	A criterion for pipelines designed by the Code of Federal Regulations which define what program and practices operators must use to manage pipeline integrity if the pipeline is located near a commercially navigable waterway, a high population area, or an unusually sensitive area.
INCLUSION	An anomaly in the cross section of the pipeline caused by manufacturing processes. Inclusions may be detrimental if they protrude through the pipe wall. Refer to mill anomaly.
INDICATION	Any measured signal or response from an inspection of a pipe different than the normal baseline signal.
INS (Inertial-Navigation System)	Refers to a system of accelerometers and gyroscopes to track the movement and orientation of the inspection tool through bends, turns, etc.
INTERACTION RULES	Specifications that establish spacing criteria between anomalies or defects (pits). If the indications or defects are proximate to one another within the criteria, the anomaly or defect is treated as a single larger unit or group for engineering analysis purposes.

Glossary

LAUNCHER	Refers to the beginning of the inspection; an oversize section of pipe equipped with sealing door through which the inspection tool is loaded into the pipeline.
LOCATION	A location is a feature in the pipeline that can be used to correlate the inspection tool data to aboveground references. Common location features include valves, fittings, flanges, tees, casings, repairs and AGMs. For example, a metal loss area could be referenced as being 200 feet downstream from a valve. Not all locations can be easily found from aboveground.
LATITUDE & LONGITUDE	Latitude is the angular distance north or south from the earth's equator measured through 90 degrees. Longitude is the arc or portion of the earth's equator intersected between the meridian of a given place and the prime meridian and is expressed either in degrees or in time. Latitude and longitude are reported as GPS coordinates. Predicted GPS for features are provided in the Pipeline Listing section.
MAGPIE	A bird related to the Jay and Crow. The Magpie is found in western North America and Eurasia. Also, the highest value internal inspection tool on the market!
MAOP (Maximum Allowable Operating Pressure)	(or Design Pressure) The maximum internal pressure permitted in the operation of a pipeline as defined by the Code of Federal Regulations.
MILL ANOMALY	The process of manufacturing pipe can often leave indications in the pipe wall. Typically these anomalies are not detrimental, and are identified for the benefit of the client.
MOP (Maximum Operating Pressure)	The established maximum internal pressure expected during the operation of a pipeline, which cannot normally exceed the maximum allowable operating pressure (MAOP).
METAL LOSS	Any quantified reduction of metal in the pipe. Magpie reports the length, width and depth of detected metal loss using either ASME B31G or Modified B31G criteria, the defect length and depth are used to produce the (P') calculated safe maximum allowable operating pressure.
MFL (Magnetic Flux Leakage)	An inspection technique in which a magnetic field is applied to a pipe section and measurements are taken of the magnetic flux density at the pipe surface. Changes in measured flux density indicate the presence of a possible defect.
ODOMETER	Wheels on in-line inspection tool, which rotate along the pipe to measure the distance the tool has traveled.
ORIENTATION	The location of the reference around the circumference of the pipe, as viewed in the direction of flow (downstream). The value is represented in degrees 0-360° rotating clockwise around pipe. (0° = top of pipe, 90° = 3:00)
OVALITY	A condition in which a circular pipe forms into an ellipse, usually as the result of external forces.
P	Calculated pressure rating for the pipe. Per ASME B31G, it is the greater of either the established MOP, or 2stFT/D, where S = SMYS, F = appropriate design factor from ASME B31G, T = Temperature derating factor, D = nominal outside diameter of pipe, and t = nominal wall thickness. See ASME B31G. In application, this variable is identical per DNV RP-F101, however it is calculated using different formulas and factors.
P' (Calculated safe maximum operating pressure)	Calculated safe maximum operating pressure for the pipeline segment as calculated based on information provided by the Customer. Magpie software uses ASME B31G, MODIFIED ASME B31G, or DNV RP-F101 to calculate the calculated safe maximum allowable operating pressure (P') of the pipeline at a metal loss area. The calculation also takes into consideration a temperature factor, for use when the line is at elevated temperature, and a safety factor. The default values used in calculations are a temperature factor of 1, and a safety factor of 72%. For Canadian Customers the Software uses Z662-99 to calculate if a metal loss area is pressure reducing. This formula only uses length and depth. It does not take into consideration the width of the anomaly. Z662-99 does not provide a method to calculate the actual MAOP of an anomaly, so pressure fields in the database are set to 0.

Glossary

P'/P	Percent of maximum established pressure, this is calculated by dividing the calculated safe pressure of the defect (P') by the current established maximum operating pressure of the pipeline (P). For Magpie reporting, P is *either* established MOP provided by the customer or the calculated pressure rating for the pipe (P). Percentages less than 100% are considered pressure-reducing.
PATCH	A device used to repair a pipeline by welding a small section of pipe on top of the defect.
PIG	A generic term signifying any independent, self-contained device, tool or vehicle that moves through the interior of the pipeline for purposes of inspecting, batching, dimensioning, or cleaning.
PIGTRAP™	*Pipeline Inspection Graphical Test Reporting and Analysis Program* (PIGTRAP). Proprietary software developed by Magpie Systems Inc. for viewing data collected by the inspection tool.
PIPE SUPPORT	Any device used to support an aboveground pipeline.
PIT	Localized concentrated-cell corrosion on the external or internal surfaces that results from generation of a potential (voltage) difference set up by variations in oxygen concentrations within and outside the pit. The oxygen-starved pit acts as anode and the pipe surface acts as the cathode. If several pits are in close proximity to each other, they may be grouped together using interaction rules as one group.
RSTRENG	A computer program designed to calculate the calculated safe maximum operating pressure (P') of corroded pipe. RSTRENG results are approximated when Modified B31G criteria is used.
RECEIVER	Refers to the ending of the inspection; an oversize section of pipe equipped with sealing door through which the inspection tool is retrieved from the pipeline.
SAFETY FACTOR	(or Design Factor) Typically 0.72 per ASME B31Q. In setting the safety factor, due consideration has been given to and allowances made for the manufacturing tolerance and maximum allowable depth of imperfections provided for in the specifications. DNV RP-F101 uses a slightly different Total Usage Factor, which is entered as the Safety Factor in PIGTRAP. The typical 0.72 factor becomes 0.648 when applying the DNV modeling factor of 0.9.
SEAMLESS	Pipe that is manufactured by means of extrusion. This process typically creates significantly more variation in pipe wall thickness than ERW pipe.
SLEEVE	A device used to repair a pipeline by welding a small section of pipe over the full circumference of the pipe over the top of the defect.
SPACER	A device used to maintain space between a casing and a pipeline.
SMYS (Specified Minimum Yield Strength)	A required strength level that measured yield stress of a pipe material must exceed, which is reported as pipe grade. The measured yield stress is the tensile stress required to produce a total elongation of 0.5 percent of a gage length as determined by an extensometer during a tensile test.
TEMPERATURE FACTOR	Typically 1.0 unless the metal temperature is expected to exceed a normal temperature range of -20°F (-30°C) to 250°F (120°C).
TRACKING	The process used to monitor the progress of the inspection tool through the pipeline. AGM boxes are placed at aboveground marker reference locations to record the passage of the inspection tool.
TRAP	Pipeline facility for launching and receiving tools and pigs.
WELD ANOMALY	Any area or zone in a weld that lacks complete melting and fusion of a portion of the weld which could have occurred during the welding process or caused by corrosion.

Appendix A – Database Details

1. The Graphs, Dig Sheets, and Tables used in this report were generated and printed through *Microsoft Access*. The database format used by **Magpie Systems Inc.** for the inspection tool data is an *Access* format database. This allows the end user greater flexibility in creating a special or custom Graph or Table.

2. The end user has complete access to the inspection database. The database file, which has an extension of *.mdb (Microsoft Data Base) is stored in the same directory as the tool data. Using *Access* you can customize any of the Graphs or Tables, or alternatively, the data can be exported to a spreadsheet if preferred.

3. The **PigTrap™** software, included with this report, provides the user with an easy way to view the data collected by the Magpie in-line inspection tool, and can also be helpful when trying to locate certain sections of pipe. This software requires Windows 95 or later, or NT 4.0 as an operating system. It can be run off a CD/DVD or installed onto a hard drive. *Please refer to Appendix B for installation instructions.*

4. Magpie inspection tools use the magnetic flux leakage (MFL) technique to detect metal loss areas of the pipe. This is the most widely used technique in the world to detect metal loss in pipelines. This technique will not detect all features in a pipeline, or other features or anomalies that run parallel with the magnetic field, such as longitudinal seams in ERW pipe. More information about MFL tools is available from the Gas Research Institute on the Internet at www.gri.org.

5. The accuracy of the depth calculations is generally around +/- 15%, 85% of the time. The MFL technique is an indirect measurement of metal loss, and as such there are some inherent inaccuracies when trying to quantify the magnetic signals. Please keep this in mind when evaluating this data.

6. **Database Numbering System:** All entries in the database have a unique number assigned to it. The following table shows the number range of each category of database records.

Welds	110	to	9,999,999
Locations	10,000,000	to	10,999,999
Pipe	11,000,000	to	11,999,999
Misc	12,000,000	to	12,999,999
Gains	13,000,000	to	13,999,999
Pits	20,000,000	to	39,999,999
Group of pits	40,000,000	to	59,000,000

All records are numbered sequentially from the beginning of the pipeline section to the end of the pipeline section. **Welds** are incremented by 10 from one weld to the next. *For example:* the first weld in the pipeline section would be 110, the second weld would be 120, and the third weld would be 130, etc.

All other records are incremented by 1 from one record to the next. For example, the first **Misc.** record would be numbered 12,000,000, the second record would be 12,000,001, and the third record would be 12,000,002, etc.

Those familiar with *Access* may be interested in understanding the relationships between the tables. The database is a relational database. All records that are common among all database entries are stored in a "Parent Database Table" named "PIPEOBJ". This includes the unique number discussed above, along with time, distance, and location information. All records that are unique to a data record are stored in one of many "Child Database Tables."

This type of database design minimizes the size of the database file. For further information about the database structure and relationships, please open the database file in Microsoft's Access program.

Appendix B – Pipeline Inspection Graphical Test/Report Analysis Program (PigTrap)™

Installation Instructions

The PigTrap™ 3.0 software allows the user to view all of the data collected during the Magpie in-line inspection survey. Installation requires the CD(s) that accompanied the inspection report.

Minimum System Requirements

- ☐ Operating system: Windows™ 95, NT 4.0 or higher.
- ☐ Hard disk space: *Pigtrap 3.0* software requires 1.5 MB. The Database size will vary depending on run. Check database properties on CD #1 for database size. The HALL/INS (tool data) files can be run from the CD-ROM or copied to your hard drive. The space required for these files will vary depending on the size of the run.
- ☐ CD-ROM drive.

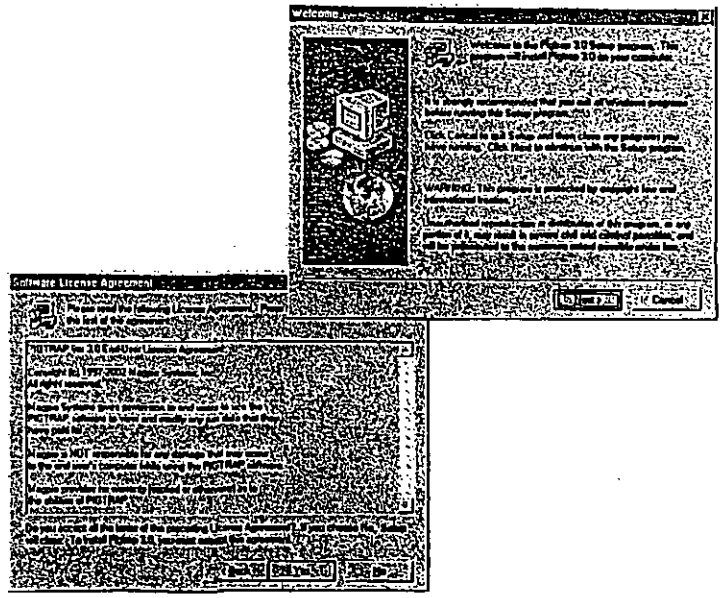
What is on the CD-ROM

The CD-ROM (or DVD) supplied by Magpie Systems Inc. for this PigTrap™ 3.0 inspection of your pipeline contains the following types of files:

- **.mdb file** – (*Microsoft Data Base*) Files of this type may be viewed through Microsoft Access. This file contains the analysis of the inspection.
- **.pig file** – This is a PigTrap™ reference file which holds specific settings for the run to be viewed.
- **.xls file(s)** – (*Microsoft Excel*) A Pipeline Listing is generated for your run in an Excel spread sheet format. Each event at a particular location is identified and described, including a predicted latitude and longitude reading of the location. You may use Copy and Paste techniques to build your own custom formatted report.
- **.sa9 file** – (*Street Atlas 9*) a pipeline map is printed for each report, and included on the CD-ROM. You will need DeLorme Street Atlas mapping software to view this file on your computer. Their website is www.delorme.com.
- **DAO DISK folders** – The PigTrap™ program requires the latest database drivers from Microsoft. These drivers are installed from this file.
- **h*.00x, c*.00x & l*.00x** – The raw tool data created on-board the inspection tool. These files are necessary for PigTrap™ to function properly. If you chose not to install these files onto your computer, the CD-ROM(s) must be used to view the run.

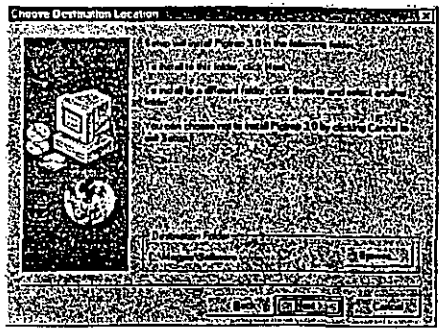
PigTrap™ 3.0 Software Installation

1. Remove the CD from the report binder, and insert into your computer's CD-ROM drive.
2. In this step, you will access the Setup.exe program located on the CD. This can be done by clicking on the Start button (located on the lower left-hand corner of the monitor), and selecting Run. Next click the **Browse** button, and locate the CD drive. Once located, open it and find the **Setup.exe** program file, double click on it. Then click **OK** to launch. This should start the program installation.
3. Click **Next** to continue. The Software license agreement will appear. Choose **Yes** to continue installation.

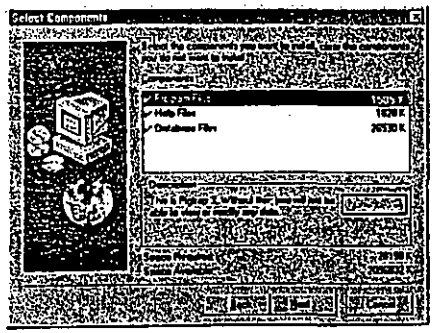


MAGPIE™ SYSTEMS, INC. a T.D. Williamson, Inc., company
4085 South 300 West, Salt Lake City, UT 84107 (801) 281-2226 FAX (801) 269-1516 www.magpiesystems.com
TDW 6801 S. 65th West Ave., Tulsa, OK 74131-2444 (800) 571-7447 www.tdwilliamson.com

4. The next step is to choose a destination location for the software on your computer. Click **Next** to accept the default location of **C:\Magpie\Software** or specify another location by clicking the Browse button.
Select **Next** to continue.



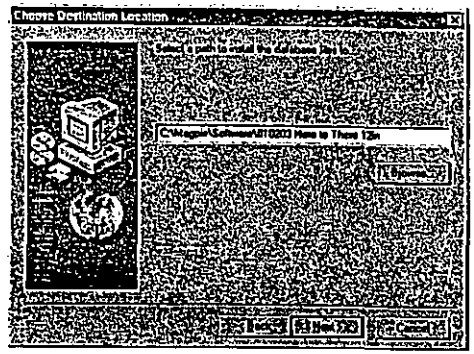
5. Choose the components you would like to install. Highlighting the component provides a description. Clicking the checkmark will select or deselect the component.
Select **Next** to continue.



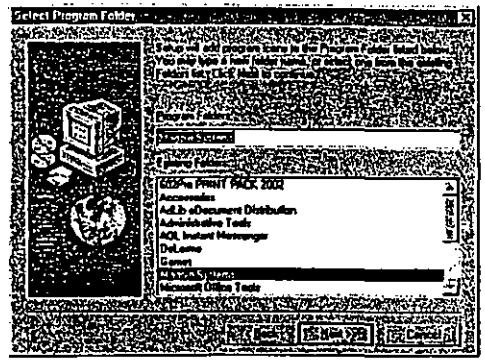
Note: If PigTrap™ has already been installed on your system, you should select "Program Files" to reinstall PigTrap™. Installing the Program Files will assure you are using the more current release of the software.

The database file must be installed for PigTrap™ to operate properly.

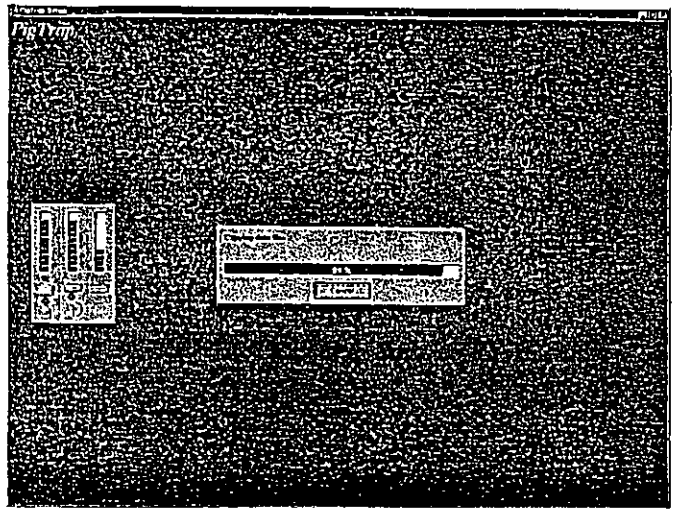
6. A default location for the database file will now appear. For clarification, this location is based on the date, name and size of the run. This will allow you to install multiple runs on the same computer without mixing data files.
Select **Next** if the location is acceptable or Browse to specify a new location.



7. Select the name of the Program folder to store the PigTrap™ shortcut from the Start Menu.
Select **Next** to accept the defaults.

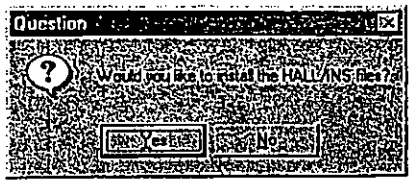


8. You should see a progress indicator similar to this as the files are installed to your system.

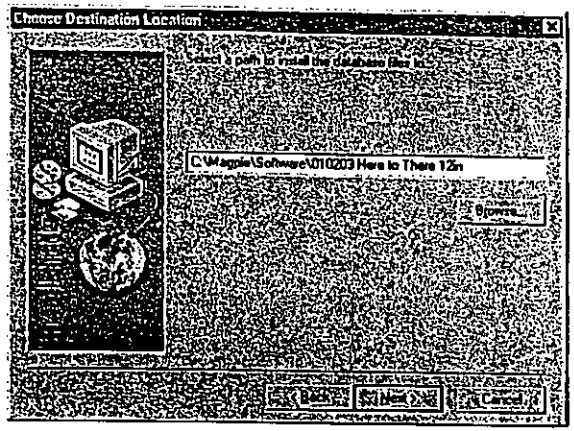


9. When the files have finished copying, you will be asked if you would like to install the HALL/INS files to your system. If you select No, you will need to use your CD-ROM while viewing the run in PigTrap™ – skip to Step 10.

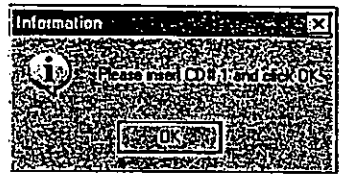
If you select Yes, you must have sufficient space available on your hard drive. These files can take up large amounts of hard drive space.

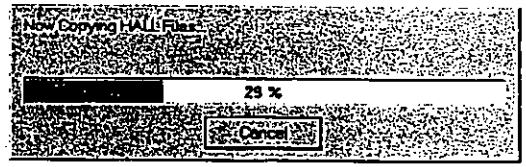


10. If you select Yes, you will be asked the location where you would like the files copied to. Ideally, you should install them in the same folder where the database resides for the run.
Select OK, then Next to continue.

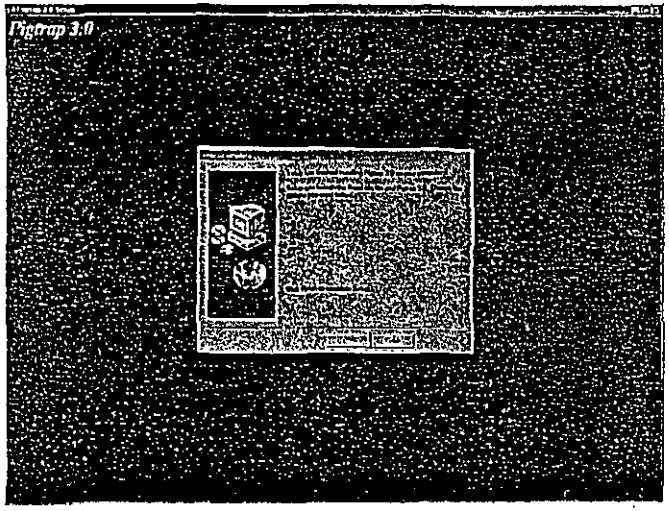


You will be asked to insert CD #1 and click OK. The files will be copied to your computer. If the run has multiple CDs, you will be prompted when to insert the next CD. In addition, you should see a progress bar indicating the files are being copied.





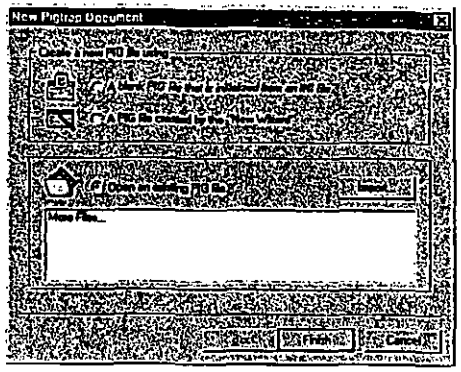
11. Setup is now complete.
Click **Finish** to exit the Setup program.
PigTrap™ software is now installed on your system.



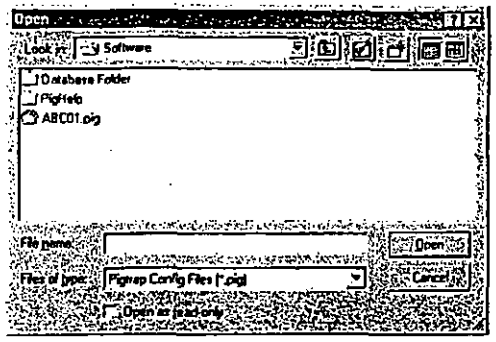
12. Opening PigTrap™ for the first time –

You will now have a shortcut to PigTrap™ in your Start Menu. Click on **Start**, select **Programs**, find PigTrap™ and launch. The first time you open a new installation of PigTrap™ you will get a message indicating the log file is being parsed.
Select **OK** to continue.

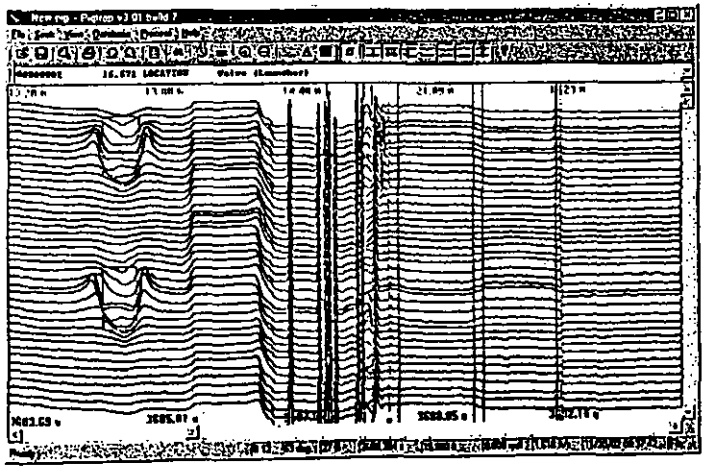
When the splash screen disappears, you will see the "New PigTrap Document" box. If this is a first time launch of PigTrap™ on your computer you will need to browse to the .pig file. Choose "Open an existing PIG file" and double-click on "More Files" or on the **Finish** button.



13. A dialog box will appear in the folder where the pigtrap.exe file is located. Select the .pig file for the desired run. Select the file by double-clicking and the PigTrap™ window will open.



14. The window will open to a view of the last saved location in the inspection. When opened for the first time, the screen should show the launch valve. You are now ready to review your run in PigTrap™!



KEYBOARD SHORTCUTS

CTRL ↑ – Jump to Launch

CTRL ↓ – Jump to Receive

CTRL F – Find (Search)

CTRL <Enter> – Open Tool/Run Options

Move cursor to left of object to highlight it.

Right Click and select Inspector to show object details.

To Zoom, click and drag to draw a box, and then select Zoom.

To measure linear distance, draw a box and select Measure

BACKGROUNDS

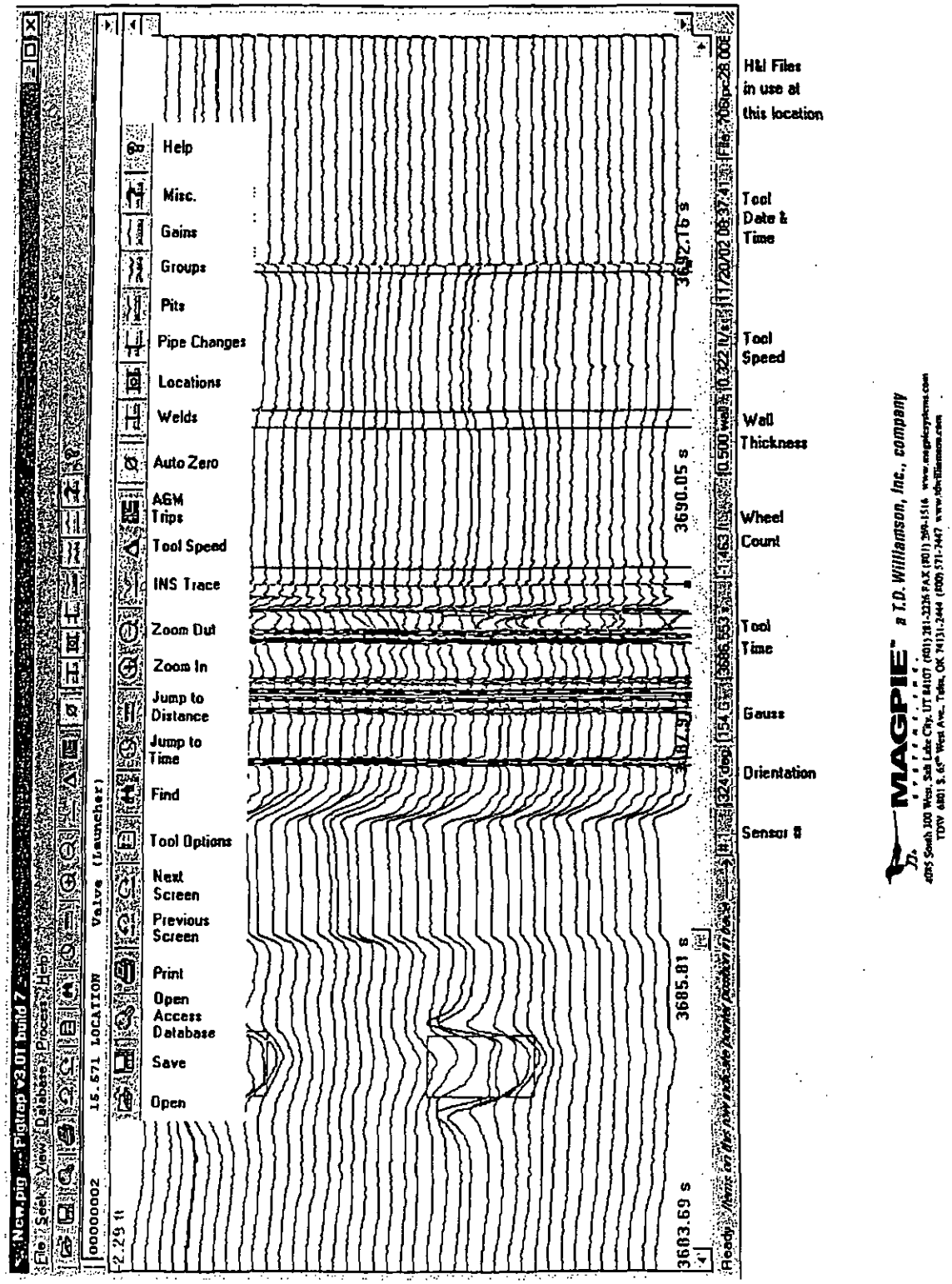
Alt + 0 – No background

Alt + 1 – Grayscale

Alt + 2 – 3D

Alt +3 – Thermal

<Esc> – removes line traces. (A-scan) when background is selected.
Hit <Esc> again to restore line traces


Help
Misc.
Gains
Groups
Pits
Pipe Changes
Locations
Welds
Auto Zero
AGM Trips
Tool Speed
INS Trace
Zoom Out
Zoom In
Jump to Distance
Jump to Time
Find
Tool Options
Next Screen
Previous Screen
Print
Open Access Database
Save
Open
H&I Files in use at this location
Tool Date & Time
Tool Speed
Wall Thickness
Wheel Count
Tool Time
Gauss
Orientation
Sensor #
3692.16 s
3690.05 s
3685.81 s
3683.69 s
MAGPIE
a T.D. Williamson, Inc., company

Appendix C – Printing Dig Sheet Reports
Instructions

The PigTrap™ software allows the user view and print dig sheets for any feature in the pipeline, including Locations, Gains, Wall thickness changes, Welds, and Miscellaneous features, etc. There are two different methods available for printing Dig Sheets:

Method #1 – ID Entry

To create your own Dig Sheet by entering in ID numbers for the item you wish to locate – open the Access Database. From the *Switchboard*, choose option 1 **Dig Site Information**.

1. An input window will appear where location ID number(s) can be entered and added to a list. *Enter the ID number for the item you* wish to locate, click **Add** to include item on the list.
   The ID number is a unique number assigned to all features in the database. Any features (such as Pits and Locations) are further categorized by type – see Appendix A.

2. When you are finished, click the **OK** button. The Access database will begin to generate Dig Sheets to the screen for your review. *This may take a few minutes, depending on the number of ID numbers entered.* You may review them by clicking the arrow buttons on the lower left corner of the screen.

3. To print, select **Print** from the File menu, or click the printer icon on the tool bar. All Dig Sheets will be printed unless otherwise directed by you.

Method #2 – Choose From List

To create your own Dig Sheet from a presorted list of the 100 deepest grouped pits/metal loss items – open the Access Database. From the *Switchboard*, choose option 5 **Go To Data Base Window**.

1. Click on "Forms" tab, highlight **frmFeature Request** then click **Open** button. *This may take a few minutes, depending on the number of features contained in the report.* When the report window opens a box with the Grouped Pits/Metal Loss list will appear sorted by depth then **%of Est PSI**, and the default is set to print to the screen.

2. To create a Dig Sheet report, highlight the ID number of the Grouped Pit from the box by clicking on it.

3. To review a Dig Sheet on your screen – in the "Print to" section select **Screen**. Next click the **Print Report** button. The Dig Site Information Report will appear to the screen for your review. To print, select **Print** from the File menu, or click the printer icon on the tool bar.

4. Or, you may send several reports directly to the printer by holding the **Ctrl** key down when clicking to highlight more than one feature. In the "Print to" section choose the **Printer/PDF** button. Next click the **Print Report** button – all Dig Sheets highlighted will be printed.

To print other features that appear in the report go to Select Feature section and click on the feature you wish to evaluate – follow step 3 & 4 to preview/print.

MAGPIE™ SYSTEMS, INC. a T.D. Williamson, Inc., company
4085 South 300 West, Salt Lake City, UT 84107 (801) 281-2226 FAX (801) 269-1516 www.magpiesystems.com
TDW 6801 S. 65th West Ave., Tulsa, OK 74131-2444 (800) 571-7447 www.tdwilliamson.com

CA-IR-60

Ref: HELCO T-5, page 57, CA-IR-2, Attachment 2F, Page 7, Emissions Fee Normalization.

According to the testimony, "HELCO was granted waivers for two of the 10 years. The granting of waivers is not predictable. Thus, for ratemaking purposes, the normalized amount was based on taking 80% of the 2006 forecast amount to derive the 2006 TY normalization cost of $245,000." Please provide the following information:

a. Calculations and source documents supportive of the 2006 forecast amount of $306,081.

b. Actual fee payments made by year for each of the referenced 10 years, as well as 2005 and 2006 to-date.

c. A copy of the actual billings for emission fees for each of the above years.

d. Copies of HELCO submitted calculations for the amounts in your response to parts (b) and (c) of this information request, if the payments (part b) differed from the billing (part c).

HELCO Response:

a. The most recent emission fee report (Attachment 1) and associated emission calculations are voluminous and are available for inspection at HECO's Regulatory Affairs Division office, Suite 1301, Central Pacific Plaza, 220 South King Street, Honolulu, Hawaii. Please contact Dean Matsuura at 543-4622 to make arrangements to inspect the requested information. The 2006 forecast amount of $306,081 is a reflection of the percentage increase in projected fuel use from the previous year and uses that percentage as a multiplier for the emissions fees (since it is a direct relationship...fuel to emissions). The projected fuel use is determined in the production simulation as discussed in HELCO T-4. The total forecasted at this point is then adjusted upward by a "10% Fudge Factor" as shown in Attachment 2. The "10% Fudge Factor" is used in the event more fuel is burned than estimated. Since the economy is booming and greater amounts of electricity were being demanded, it was an additional buffer to forecast emissions fees. Use of the 10% multiplier helped to more

accurately predict the emissions fees. The updated projected HELCO fees for 2006 as shown in the attached spread sheet would be $313,468, based on the estimated fuel consumption runs similar to what is discussed in HELCO T-4.

Emission fee assessments were provided for under the legal authority of the Clean Air Act, Hawaii Revised Statutes ("HRS") Chapter 342B, and Hawaii Administrative Rules ("HAR") Chapter 11-60.1. The authority for granting emission fee waivers rests with the Department of Health and is provided for under HAR 11-60.1-112(h). HELCO is typically notified by the Department of Health in January regarding waivers for the previous calendar year operations.

As advanced notice of an emission fee waiver is not possible, HELCO includes emission fees in its forecasted expenses. The estimated emission fees are calculated based on forecasted fuel consumption and formulas for associated emissions from calculations done in previous years. Emission fee estimates may be adjusted in the course of the year based on changes in actual fuel consumption or changes in fuel forecasts.

The basis for the 2/10 prorate calculations is provided in HELCO T-5, page 57. The calculation of the normalization adjustment of $61,000 was based on the annual emission fees being paid in eight (8) of the past ten (10) years as summarized below.

b. Although emission fees payments began in 1994 and were assessed for 1993 operations, the normalization of the TY amount was based on what was paid in the last 10 years as shown below.

Chronological Summary of Emission Fees for HELCO Operations

Operating Year	Fees Payable	Amount Paid
1995	1996	$293,905.00
1996	1997	$344,901.00
1997	1998	$345,086.00
1998	1999	$340,129.79
1999	2000	Waived
2000	2001	$379,426.02
2001	2002	$377,114.67
2002	2003	Waived
2003	2004	$281,431.30
2004	2005	$253,095.12
2005	2006	$312,859.77

c. The State of Hawaii-Department of Health ("DOH") does not send "bills" for emission fees. Forms are provided for sources to complete and the applicable emission fees are self-calculated. Included are 2002, 2004 and 2005 calendar year operations. Emission fees for 2003 operations were waived by the Department of Health, thus no emission fees were paid in 2004.

d. See Attachments 1, 3, and 4 for copies of emissions fee calculations for operations in 2005, 2004 and 2002, respectively. Fees were waived by the DOH for 2003 operations. Copies of records are only available going back five (5) years in accordance with HECO's record retention policy. Attachments 1, 3, and 4 are voluminous and are available for inspection at HECO's Regulatory Affairs Division office, Suite 1301, Central Pacific Plaza, 220 South King Street, Honolulu, Hawaii. Please contact Dean Matsuura at 543-4622 to make arrangements to inspect the requested information.

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

HELCO/C

May 1, 2006

Sherri-Ann Loo, Esq.
Manager
Environmental Department

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: 2005 Hawaii Emissions Inventory and Fees
Kanoelehua-Hill Generating Station (CSP 0234-01-C)
Keahole Generating Station (CSP 0256-01-C and PSD HI 88-01)
Puna Generating Station (CSP 0235-01-C)
Shipman Generating Station (CSP 0236-01-C)
Waimea Generating Station (CSP 0237-01-C)
Hawaii Electric Light Company, Inc. (HELCO)

Dear Mr. Nagamine:

In accordance with the subject permits, please find the enclosed 2005 Hawaii Emissions Inventory Reports for the subject facilities. In addition, enclosed are two checks (# 36782 and # 36783) submitted for 2005 operations.

If you have any question, please call Bruce Schlieman at 543-4516.

Sincerely,

Enclosures
c (w/ encl): E. Yamamoto (EHS – Hilo)
S. Okoji (EHS – Kona)

c (w/o encl): T. Simmons

HELCO/C

bc (w/o encl): W. Lee
N. Verbanic
B. Nakamoto
B. Schlieman
J. Clary (JCA)

bc (w/ encl): D. Heinzen (hard copy)
Environmental Department File

S2020

HAWAII ELECTRIC LIGHT CO., INC.

DATE	CHECK NO.
04/27/06	36782
HELC	006201

The attached Check is in Payment of the following invoice(s):

Date	Invoice/Credit Memo	Type	Description	Gross	Discount	Net
04/21/06	04212006 ANNUAL EMISSION FEES	FOR	OPERATING YR 2005	60936.43		60936.43
			TOTAL	60936.43	0.00	60936.43

9400006640/10098118 Moore Wallace North America, Inc. ©2004. SecureScan® Patents 5,018,767; 5,193,853; 5,707,083. PressureSeal Patent 4,918,128. - 0221

REMOVE DOCUMENT ALONG THIS PERFORATION

HAWAII ELECTRIC LIGHT CO., INC. Bank of Hawaii 59-702 CHECK NO. 36782

PAY SIXTY THOUSAND NINE HUNDRED THIRTY SIX DOLLARS AND 43 CENTS

TO THE ORDER OF DATE CHECK AMOUNT

HI STATE DEPT. OF HEALTH-CAB 04/27/06 60936.43

CLEAN AIR SPECIAL FUND - COV

P.O. BOX 3378

HONOLULU HI 96801

⑈036782⑈ ⑆121301028⑆ 0081⑉032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HI STATE-DEPT. OF HEALTH-CAB
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

36782

S2020

HAWAII ELECTRIC LIGHT CO., INC.

DATE	CHECK NO.
04/27/06	36783
HELC	006201

The attached Check is in Payment of the following Invoice(s):

Date	Invoice/Credit Memo	Type	Description	Gross	Discount	Net
04/20/06	6201			249923.33		249923.33
	ANNUAL EMISSION FEES	FOR	OPERATING YR 2005			
			TOTAL	249923.33	0.00	249923.33

9400006540010098118 Moore Wallace North America, Inc. ©2004. SecureScan ©
Patents 5,018,767; 5,193,853; 5,707,083. PressureSeal Patent 4,918,126. - 0221

REMOVE DOCUMENT ALONG THIS PERFORATION

HAWAII ELECTRIC LIGHT CO., INC.

Bank of Hawaii
Honolulu, Hawaii

CHECK NO.
36783

PAY TWO HUNDRED FORTY NINE THOUSAND NINE HUNDRED TWENTY THREE DOLLARS AND 33 CENTS

TO THE ORDER OF

DATE
04/27/06

CHECK AMOUNT
$249,923.33

HI STATE-DEPT. OF HEALTH-CAB
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

⑈036783⑈ ⑆121301028⑆ 0081⑈032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HI STATE-DEPT. OF HEALTH-CAB
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

36783

2005 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100014

DATA REPRESENTATIVE OF JANUARY 1, 2005 - DECEMBER 31, 2005
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Kanoelehua Power Plant

2) Permit No(s).: 0234-01-C

3) Physical Facility Address:

Street: 54 Halekauila Street

City: Hilo Zip Code: 96720

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Bruce Schlieman	808-543-4516	808-543-4511	bruce.schlieman@heco.com
Mailing Address:	Mailing City:	State:	Zip Code:
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 284300 (Easting (m)) Vertical (y): 2179800 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2005 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Norman Verbanic Jr.

Name: Norman Verbanic, Jr. Date: 4/20/06
Responsible Official

Title: Production Manager

Permit No.:	0234-01-C
Date Rec'd:	

FORM F-1

2006 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2005)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Kanoelehua Power Plant	B. Location:	54 Halekauila Street	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City:	Hilo	F. State: HI	G. Zip Code: 96721
H. Contact Person:	Bruce Schlieman	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4516
K. Responsible Official:	Norman Verbanic, Jr.	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:		Date:			

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS (Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton)

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												Annual Total
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
Hill 5	74.1	54.2	41.1	1014.6	18.1	170.7	2.8	0.0	0.7	–			
Hill 6	131.7	96.4	73.2	1804.0	32.3	303.4	4.9	0.0	1.2	–			
CT-1	0.2	0.1	0.1	2.1	0.0	11.5	0.0	0.0	0.0	–			
D-11	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	–			
A. Supplement (if appl.) A	0.6	0.5	0.5	1.4	7.7	28.7	0.8	0.0	0.0	–			
B. Total Report Emissions	206.6	151.2	114.9	2822.1	58.2	514.5	8.5	0.0	1.9	–			
C. Total Emissions Subject to Fees	206			2,822		514	8						D. 3,550

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2005 $/TON	Multiply	CPI Index Adjustmn 2.65% incr. '03 to '04)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	3,550	x	41.67	x	1.027	=	B.	$151,922.57
	"Clean Air Special Fund - NON"	C.	3,550	x	10.16	x	1.027	=	D.	$37,041.84
							Total	=	E.	$188,964.41

Note: 2006 $/ton charge payable to Clean Air Special Fund - COV = $41.67 x 1.027 = $42.80/ton.
2006 $/ton charge payable to Clean Air Special Fund - NON = $10.16 x 1.027 = $10.43/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with two separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

Permit No.:	0234-01-C
Date Rec'd:	

FORM F-2
SUPPLEMENT A
2006 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2005)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name: HELCO - Kanoelehua Power Plant	B. Location: 54 Halekaulia Street	C. Island: Hawaii
D. Responsible Official: Norman Verbanic, Jr.	E. Title: Production Manager	F. Telephone No.: 808-969-0421
G. Signature:	Date:	

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS (Report emissions to the nearest tenth of a ton)

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)											
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)											
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3		
D-15	0.1	0.1	0.1	0.3	1.8	6.6	0.2	0.0	0.0	–		
D-16	0.3	0.2	0.2	0.6	3.1	11.5	0.3	0.0	0.0	–		
D-17	0.2	0.2	0.2	0.5	2.8	10.6	0.3	0.0	0.0	–		
Supplement												
Total Report Emissions	0.6	0.5	0.5	1.4	7.7	28.7	0.8	0.0	0.0	–		

Hill 5 No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	7,230,174	150,558	1,088,561	1.863	M	1014.0
NOX	7,230,174	150,558	1,088,561	0.313	A	170.4
CO	7,230,174	150,558	1,088,561	0.0333	A	18.1
VOC	7,230,174	150,558	1,088,561	0.00507	A	2.8
PM-PRI	7,230,174	150,558	1,088,561	0.136	A	74.0
PM-FIL	7,230,174	150,558	1,088,561	0.126	A	68.6
PM-CON	7,230,174	150,558	1,088,561	0.010	A	5.4
PM10-PRI	7,230,174	150,558	1,088,561	0.0995	A	54.2
PM10-FIL	7,230,174	150,558	1,088,561	0.0895	A	48.7
PM25-PRI	7,230,174	150,558	1,088,561	0.0755	A	41.1
PM25-FIL	7,230,174	150,558	1,088,561	0.0655	A	35.7
Acetaldehyde	7,230,174	150,558	1,088,561		A	
Acrolein	7,230,174	150,558	1,088,561		A	
Antimony Compounds	7,230,174	150,558	1,088,561	3.50E-05	A	1.90E-02
Arsenic Compounds	7,230,174	150,558	1,088,561	8.80E-06	A	4.79E-03
Benzene	7,230,174	150,558	1,088,561	1.43E-06	A	7.77E-04
Beryllium Compounds	7,230,174	150,558	1,088,561	1.85E-07	A	1.01E-04
1,3-Butadiene	7,230,174	150,558	1,088,561		A	
Cadmium Compounds	7,230,174	150,558	1,088,561	2.65E-06	A	1.44E-03
Chromium Compounds	7,230,174	150,558	1,088,561	5.63E-06	A	3.07E-03
Cobalt Compounds	7,230,174	150,558	1,088,561	4.01E-05	A	2.18E-02
Ethylbenzene	7,230,174	150,558	1,088,561	4.24E-07	A	2.31E-04
Formaldehyde	7,230,174	150,558	1,088,561	4.07E-04	A	2.21E-01
Hydrochloric Acid	7,230,174	150,558	1,088,561		A	
Lead Compounds	7,230,174	150,558	1,088,561	1.01E-05	A	5.48E-03
Manganese Compounds	7,230,174	150,558	1,088,561	2.00E-05	A	1.09E-02
Mercury Compounds	7,230,174	150,558	1,088,561	7.53E-07	A	4.10E-04
Nickel Compounds	7,230,174	150,558	1,088,561	5.63E-04	A	3.07E-01
Naphthalene	7,230,174	150,558	1,088,561	7.53E-06	A	4.10E-03
Phosphorus	7,230,174	150,558	1,088,561	6.31E-05	A	3.43E-02
POM	7,230,174	150,558	1,088,561	8.67E-06	A	4.72E-03
Selenium Compounds	7,230,174	150,558	1,088,561	4.55E-06	A	2.48E-03
Toluene	7,230,174	150,558	1,088,561	4.13E-05	A	2.25E-02
Xylene	7,230,174	150,558	1,088,561		A	
o-Xylene	7,230,174	150,558	1,088,561	7.27E-07	A	3.96E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	7,555	137,976	1,042	0.163	M	0.085
NOX	7,555	137,976	1,042	0.171	A	0.089
CO	7,555	137,976	1,042	0.0357	A	0.019
VOC	7,555	137,976	1,042	0.00143	A	0.001
PM-PRI	7,555	137,976	1,042	0.0236	A	0.012
PM-FIL	7,555	137,976	1,042	0.0143	A	0.007
PM-CON	7,555	137,976	1,042	0.00929	A	0.005
PM10-PRI	7,555	137,976	1,042	0.0164	A	0.009
PM10-FIL	7,555	137,976	1,042	0.00714	A	0.004
PM25-PRI	7,555	137,976	1,042	0.0111	A	0.006
PM25-FIL	7,555	137,976	1,042	0.00179	A	0.001
Acetaldehyde	7,555	137,976	1,042		A	
Acrolein	7,555	137,976	1,042		A	
Antimony Compounds	7,555	137,976	1,042	3.75E-05	A	1.95E-05
Arsenic Compounds	7,555	137,976	1,042	4.00E-06	A	2.08E-06
Benzene	7,555	137,976	1,042	1.53E-06	A	7.97E-07
Beryllium Compounds	7,555	137,976	1,042	3.00E-06	A	1.56E-06
1,3-Butadiene	7,555	137,976	1,042		A	
Cadmium Compounds	7,555	137,976	1,042	3.00E-06	A	1.56E-06
Chromium Compounds	7,555	137,976	1,042	3.00E-06	A	1.56E-06
Cobalt Compounds	7,555	137,976	1,042	4.30E-05	A	2.24E-05
Ethylbenzene	7,555	137,976	1,042	4.54E-07	A	2.37E-07
Formaldehyde	7,555	137,976	1,042	4.36E-04	A	2.27E-04
Hydrochloric Acid	7,555	137,976	1,042		A	
Lead Compounds	7,555	137,976	1,042	9.00E-06	A	4.69E-06
Manganese Compounds	7,555	137,976	1,042	6.00E-06	A	3.13E-06
Mercury Compounds	7,555	137,976	1,042	3.00E-06	A	1.56E-06
Nickel Compounds	7,555	137,976	1,042	3.00E-06	A	1.56E-06
Naphthalene	7,555	137,976	1,042	8.07E-06	A	4.21E-06
Phosphorus	7,555	137,976	1,042	6.76E-05	A	3.52E-05
POM	7,555	137,976	1,042	9.29E-06	A	4.84E-06
Selenium Compounds	7,555	137,976	1,042	1.50E-05	A	7.82E-06
Toluene	7,555	137,976	1,042	4.43E-05	A	2.31E-05
Xylene	7,555	137,976	1,042		A	
o-Xylene	7,555	137,976	1,042	7.79E-07	A	4.06E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	1,369	91,500	125	0.00371	M	0.0002
NOX	1,369	91,500	125	0.208	A	0.0130
CO	1,369	91,500	125	0.035	A	0.0022
VOC	1,369	91,500	125	0.00546	A	0.0003
PM-PRI	1,369	91,500	125	0.0121	A	0.0008
PM-FIL	1,369	91,500	125	0.00656	A	0.0004
PM-CON	1,369	91,500	125	0.00558824	A	0.0004
PM10-PRI	1,369	91,500	125	0.0121	A	0.0008
PM10-FIL	1,369	91,500	125	0.00656	A	0.0004
PM25-PRI	1,369	91,500	125	0.0121	A	0.0008
PM25-FIL	1,369	91,500	125	0.00656	A	0.0004
Acetaldehyde	1,369	91,500	125		A	
Acrolein	1,369	91,500	125		A	
Antimony Compounds	1,369	91,500	125		A	
Arsenic Compounds	1,369	91,500	125		A	
Benzene	1,369	91,500	125		A	
Beryllium Compounds	1,369	91,500	125		A	
1,3-Butadiene	1,369	91,500	125		A	
Cadmium Compounds	1,369	91,500	125		A	
Chromium Compounds	1,369	91,500	125		A	
Cobalt Compounds	1,369	91,500	125		A	
Ethylbenzene	1,369	91,500	125		A	
Formaldehyde	1,369	91,500	125		A	
Hydrochloric Acid	1,369	91,500	125		A	
Lead Compounds	1,369	91,500	125		A	
Manganese Compounds	1,369	91,500	125		A	
Mercury Compounds	1,369	91,500	125		A	
Nickel Compounds	1,369	91,500	125		A	
Naphthalene	1,369	91,500	125		A	
Phosphorus	1,369	91,500	125		A	
POM	1,369	91,500	125		A	
Selenium Compounds	1,369	91,500	125		A	
Toluene	1,369	91,500	125		A	
Xylene	1,369	91,500	125		A	
o-Xylene	1,369	91,500	125		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Spec Used Oil

Pollutant	Annual Fuel Use (gal/yr)	Emission Factor (lb/10⁶ gal)	EF Ref	Annual Emissions (tons/yr)
SO2	8,330	130.3	A	0.5427
NOX	8,330	47	A	0.1958
CO	8,330	5.0	A	0.0208
VOC	8,330	0.76	A	0.0032
PM-PRI	8,330	12.35	A	0.0514
PM-FIL	8,330	10.85	A	0.0452
PM-CON	8,330	1.50	A	0.0062
PM10-PRI	8,330	9.20	A	0.0383
PM10-FIL	8,330	7.70	A	0.0321
PM25-PRI	8,330	7.14	A	0.0297
PM25-FIL	8,330	5.64	A	0.0235
Acetaldehyde	8,330		A	
Acrolein	8,330		A	
Antimony Compounds	8,330		A	
Arsenic Compounds	8,330	1.10E-01	A	4.58E-04
Benzene	8,330		A	
Beryllium Compounds	8,330		A	
1,3-Butadiene	8,330		A	
Cadmium Compounds	8,330	9.30E-03	A	3.87E-05
Chromium Compounds	8,330	2.00E-02	A	8.33E-05
Cobalt Compounds	8,330	2.10E-04	A	8.75E-07
Ethylbenzene	8,330		A	
Formaldehyde	8,330		A	
Hydrochloric Acid	8,330	3.30E-02	A	1.37E-04
Lead Compounds	8,330	5.50E-01	A	2.29E-03
Manganese Compounds	8,330	6.80E-02	A	2.83E-04
Mercury Compounds	8,330		A	
Nickel Compounds	8,330	1.10E-02	A	4.58E-05
Naphthalene	8,330		A	
Phosphorus	8,330		A	
POM	8,330		A	
Selenium Compounds	8,330		A	
Toluene	8,330		A	
Xylene	8,330		A	
o-Xylene	8,330		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Total

Pollutant	Annual Emissions No 6 Fuel Oil (tons/yr)	No 2 Fuel Oil (tons/yr)	Propane (tons/yr)	Spec Used Oil (tons/yr)	Total (tons/yr)
SO2	1014	0.085	0.0002	0.5427	1014.6
NOX	170.4	0.089	0.0130	0.1958	170.7
CO	18.1	0.019	0.0022	0.0208	18.1
VOC	2.8	0.001	0.0003	0.0032	2.8
PM-PRI	74	0.012	0.0008	0.0514	74.1
PM-FIL	68.6	0.007	0.0004	0.0452	68.7
PM-CON	5.4	0.005	0.0004	0.0062	5.4
PM10-PRI	54.2	0.009	0.0008	0.0383	54.2
PM10-FIL	48.7	0.004	0.0004	0.0321	48.7
PM25-PRI	41.1	0.006	0.0008	0.0297	41.1
PM25-FIL	35.7	0.001	0.0004	0.0235	35.7
Acetaldehyde					
Acrolein					
Antimony Compounds	1.90E-02	1.95E-05			1.91E-02
Arsenic Compounds	4.79E-03	2.08E-06		4.58E-04	5.25E-03
Benzene	7.77E-04	7.97E-07			7.77E-04
Beryllium Compounds	1.01E-04	1.56E-06			1.02E-04
1,3-Butadiene					
Cadmium Compounds	1.44E-03	1.56E-06		3.87E-05	1.48E-03
Chromium Compounds	3.07E-03	1.56E-06		8.33E-05	3.15E-03
Cobalt Compounds	2.18E-02	2.24E-05		8.75E-07	2.19E-02
Ethylbenzene	2.31E-04	2.37E-07			2.31E-04
Formaldehyde	2.21E-01	2.27E-04			2.22E-01
Hydrochloric Acid				1.37E-04	1.37E-04
Lead Compounds	5.48E-03	4.69E-06		2.29E-03	7.77E-03
Manganese Compounds	1.09E-02	3.13E-06		2.83E-04	1.12E-02
Mercury Compounds	4.10E-04	1.56E-06			4.12E-04
Nickel Compounds	3.07E-01	1.56E-06		4.58E-05	3.07E-01
Naphthalene	4.10E-03	4.21E-06			4.10E-03
Phosphorus	3.43E-02	3.52E-05			3.44E-02
POM	4.72E-03	4.84E-06			4.72E-03
Selenium Compounds	2.48E-03	7.82E-06			2.49E-03
Toluene	2.25E-02	2.31E-05			2.25E-02
Xylene					
o-Xylene	3.96E-04	4.06E-07			3.96E-04
Total HAPS					6.68E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	12,855,360	150,558	1,935,477	1.863	M	1802.9
NOX	12,855,360	150,558	1,935,477	0.313	A	302.9
CO	12,855,360	150,558	1,935,477	0.0333	A	32.2
VOC	12,855,360	150,558	1,935,477	0.00507	A	4.9
PM-PRI	12,855,360	150,558	1,935,477	0.136	A	131.6
PM-FIL	12,855,360	150,558	1,935,477	0.126	A	121.9
PM-CON	12,855,360	150,558	1,935,477	0.010	A	9.7
PM10-PRI	12,855,360	150,558	1,935,477	0.0995	A	96.3
PM10-FIL	12,855,360	150,558	1,935,477	0.0895	A	86.6
PM25-PRI	12,855,360	150,558	1,935,477	0.0755	A	73.1
PM25-FIL	12,855,360	150,558	1,935,477	0.0655	A	63.4
Acetaldehyde	12,855,360	150,558	1,935,477		A	
Acrolein	12,855,360	150,558	1,935,477		A	
Antimony Compounds	12,855,360	150,558	1,935,477	3.50E-05	A	3.39E-02
Arsenic Compounds	12,855,360	150,558	1,935,477	8.80E-06	A	8.52E-03
Benzene	12,855,360	150,558	1,935,477	1.43E-06	A	1.38E-03
Beryllium Compounds	12,855,360	150,558	1,935,477	1.85E-07	A	1.79E-04
1,3-Butadiene	12,855,360	150,558	1,935,477		A	
Cadmium Compounds	12,855,360	150,558	1,935,477	2.65E-06	A	2.57E-03
Chromium Compounds	12,855,360	150,558	1,935,477	5.63E-06	A	5.45E-03
Cobalt Compounds	12,855,360	150,558	1,935,477	4.01E-05	A	3.88E-02
Ethylbenzene	12,855,360	150,558	1,935,477	4.24E-07	A	4.10E-04
Formaldehyde	12,855,360	150,558	1,935,477	4.07E-04	A	3.94E-01
Hydrochloric Acid	12,855,360	150,558	1,935,477		A	
Lead Compounds	12,855,360	150,558	1,935,477	1.01E-05	A	9.74E-03
Manganese Compounds	12,855,360	150,558	1,935,477	2.00E-05	A	1.94E-02
Mercury Compounds	12,855,360	150,558	1,935,477	7.53E-07	A	7.29E-04
Nickel Compounds	12,855,360	150,558	1,935,477	5.63E-04	A	5.45E-01
Naphthalene	12,855,360	150,558	1,935,477	7.53E-06	A	7.29E-03
Phosphorus	12,855,360	150,558	1,935,477	6.31E-05	A	6.10E-02
POM	12,855,360	150,558	1,935,477	8.67E-06	A	8.39E-03
Selenium Compounds	12,855,360	150,558	1,935,477	4.55E-06	A	4.41E-03
Toluene	12,855,360	150,558	1,935,477	4.13E-05	A	4.00E-02
Xylene	12,855,360	150,558	1,935,477		A	
o-Xylene	12,855,360	150,558	1,935,477	7.27E-07	A	7.03E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	13,433	137,976	1,853	0.163	M	0.151
NOX	13,433	137,976	1,853	0.171	A	0.158
CO	13,433	137,976	1,853	0.0357	A	0.033
VOC	13,433	137,976	1,853	0.00143	A	0.001
PM-PRI	13,433	137,976	1,853	0.0236	A	0.022
PM-FIL	13,433	137,976	1,853	0.0143	A	0.013
PM-CON	13,433	137,976	1,853	0.00929	A	0.009
PM10-PRI	13,433	137,976	1,853	0.0164	A	0.015
PM10-FIL	13,433	137,976	1,853	0.00714	A	0.007
PM25-PRI	13,433	137,976	1,853	0.0111	A	0.010
PM25-FIL	13,433	137,976	1,853	0.00179	A	0.002
Acetaldehyde	13,433	137,976	1,853		A	
Acrolein	13,433	137,976	1,853		A	
Antimony Compounds	13,433	137,976	1,853	3.75E-05	A	3.48E-05
Arsenic Compounds	13,433	137,976	1,853	4.00E-06	A	3.71E-06
Benzene	13,433	137,976	1,853	1.53E-06	A	1.42E-06
Beryllium Compounds	13,433	137,976	1,853	3.00E-06	A	2.78E-06
1,3-Butadiene	13,433	137,976	1,853		A	
Cadmium Compounds	13,433	137,976	1,853	3.00E-06	A	2.78E-06
Chromium Compounds	13,433	137,976	1,853	3.00E-06	A	2.78E-06
Cobalt Compounds	13,433	137,976	1,853	4.30E-05	A	3.98E-05
Ethylbenzene	13,433	137,976	1,853	4.54E-07	A	4.21E-07
Formaldehyde	13,433	137,976	1,853	4.36E-04	A	4.04E-04
Hydrochloric Acid	13,433	137,976	1,853		A	
Lead Compounds	13,433	137,976	1,853	9.00E-06	A	8.34E-06
Manganese Compounds	13,433	137,976	1,853	6.00E-06	A	5.56E-06
Mercury Compounds	13,433	137,976	1,853	3.00E-06	A	2.78E-06
Nickel Compounds	13,433	137,976	1,853	3.00E-06	A	2.78E-06
Naphthalene	13,433	137,976	1,853	8.07E-06	A	7.48E-06
Phosphorus	13,433	137,976	1,853	6.76E-05	A	6.26E-05
POM	13,433	137,976	1,853	9.29E-06	A	8.61E-06
Selenium Compounds	13,433	137,976	1,853	1.50E-05	A	1.39E-05
Toluene	13,433	137,976	1,853	4.43E-05	A	4.10E-05
Xylene	13,433	137,976	1,853		A	
o-Xylene	13,433	137,976	1,853	7.79E-07	A	7.22E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 Spec Used Oil

Pollutant	Annual Spec Oil Use (gal/yr)	Emission Factor (lb/10³ gal)	EF Ref	Annual Emissions (tons/yr)
SO2	14,812	130.3	A	0.9651
NOX	14,812	47	A	0.3481
CO	14,812	5.0	A	0.0370
VOC	14,812	0.76	A	0.0056
PM-PRI	14,812	12.35	A	0.0915
PM-FIL	14,812	10.85	A	0.0804
PM-CON	14,812	1.50	A	0.0111
PM10-PRI	14,812	9.20	A	0.0681
PM10-FIL	14,812	7.70	A	0.0570
PM25-PRI	14,812	7.14	A	0.0529
PM25-FIL	14,812	5.64	A	0.0418
Acetaldehyde	14,812		A	
Acrolein	14,812		A	
Antimony Compounds	14,812		A	
Arsenic Compounds	14,812	1.10E-01	A	8.15E-04
Benzene	14,812		A	
Beryllium Compounds	14,812		A	
1,3-Butadiene	14,812		A	
Cadmium Compounds	14,812	9.30E-03	A	6.89E-05
Chromium Compounds	14,812	2.00E-02	A	1.48E-04
Cobalt Compounds	14,812	2.10E-04	A	1.56E-06
Ethylbenzene	14,812		A	
Formaldehyde	14,812		A	
Hydrochloric Acid	14,812	3.30E-02	A	2.44E-04
Lead Compounds	14,812	5.50E-01	A	4.07E-03
Manganese Compounds	14,812	6.80E-02	A	5.04E-04
Mercury Compounds	14,812		A	
Nickel Compounds	14,812	1.10E-02	A	8.15E-05
Naphthalene	14,812		A	
Phosphorus	14,812		A	
POM	14,812		A	
Selenium Compounds	14,812		A	
Toluene	14,812		A	
Xylene	14,812		A	
o-Xylene	14,812		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 Total

	Annual Emissions			
Pollutant	No 6 Fuel Oil (tons/yr)	No 6 Fuel Oil (tons/yr)	Spec Used Oil (tons/yr)	Total (tons/yr)
SO2	1802.9	0.151	0.97	1804.0
NOX	302.9	0.158	0.35	303.4
CO	32.2	0.033	0.04	32.3
VOC	4.9	0.001	0.006	4.9
PM-PRI	131.6	0.022	0.09	131.7
PM-FIL	121.9	0.013	0.08	122.0
PM-CON	9.7	0.009	0.01	9.7
PM10-PRI	96.3	0.015	0.07	96.4
PM10-FIL	86.6	0.007	0.06	86.7
PM25-PRI	73.1	0.010	0.05	73.2
PM25-FIL	63.4	0.002	0.04	63.4
Acetaldehyde				
Acrolein				
Antimony Compounds	3.39E-02	3.48E-05		3.39E-02
Arsenic Compounds	8.52E-03	3.71E-06	8.15E-04	9.33E-03
Benzene	1.38E-03	1.42E-06		1.38E-03
Beryllium Compounds	1.79E-04	2.78E-06		1.82E-04
1,3-Butadiene				
Cadmium Compounds	2.57E-03	2.78E-06	6.89E-05	2.64E-03
Chromium Compounds	5.45E-03	2.78E-06	1.48E-04	5.60E-03
Cobalt Compounds	3.88E-02	3.98E-05	1.56E-06	3.89E-02
Ethylbenzene	4.10E-04	4.21E-07		4.11E-04
Formaldehyde	3.94E-01	4.04E-04		3.94E-01
Hydrochloric Acid			2.44E-04	2.44E-04
Lead Compounds	9.74E-03	8.34E-06	4.07E-03	1.38E-02
Manganese Compounds	1.94E-02	5.56E-06	5.04E-04	1.99E-02
Mercury Compounds	7.29E-04	2.78E-06		7.32E-04
Nickel Compounds	5.45E-01	2.78E-06	8.15E-05	5.45E-01
Naphthalene	7.29E-03	7.48E-06		7.30E-03
Phosphorus	6.10E-02	6.26E-05		6.11E-02
POM	8.39E-03	8.61E-06		8.40E-03
Selenium Compounds	4.41E-03	1.39E-05		4.42E-03
Toluene	4.00E-02	4.10E-05		4.00E-02
Xylene				
o-Xylene	7.03E-04	7.22E-07		7.04E-04
Total HAPS				1.19E+00

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	189,278	137,976	26,116	0.163	M	2.13
NOX	189,278	137,976	26,116	0.88	A	11.49
CO	189,278	137,976	26,116	0.0033	A	0.04
VOC	189,278	137,976	26,116	0.00041	A	0.005
PM-PRI	189,278	137,976	26,116	0.0120	A	0.16
PM-FIL	189,278	137,976	26,116	0.0043	A	0.06
PM-CON	189,278	137,976	26,116	0.0072	A	0.09
PM10-PRI	189,278	137,976	26,116	0.0113	A	0.15
PM10-FIL	189,278	137,976	26,116	0.00413	A	0.05
PM25-PRI	189,278	137,976	26,116	0.01107	A	0.14
PM25-FIL	189,278	137,976	26,116	0.00387	A	0.05
Acetaldehyde	189,278	137,976	26,116	2.52E-05	A	3.29E-04
Acrolein	189,278	137,976	26,116	7.88E-06	A	1.03E-04
Antimony Compounds	189,278	137,976	26,116		A	
Arsenic Compounds	189,278	137,976	26,116	1.10E-05	A	1.44E-04
Benzene	189,278	137,976	26,116	5.50E-05	A	7.18E-04
Beryllium Compounds	189,278	137,976	26,116	3.10E-07	A	4.05E-06
1,3-Butadiene	189,278	137,976	26,116	1.60E-05	A	2.09E-04
Cadmium Compounds	189,278	137,976	26,116	4.80E-06	A	6.27E-05
Chromium Compounds	189,278	137,976	26,116	1.10E-05	A	1.44E-04
Cobalt Compounds	189,278	137,976	26,116		A	
Ethylbenzene	189,278	137,976	26,116		A	
Formaldehyde	189,278	137,976	26,116	2.80E-04	A	3.66E-03
Hydrochloric Acid	189,278	137,976	26,116		A	
Lead Compounds	189,278	137,976	26,116	1.40E-05	A	1.83E-04
Manganese Compounds	189,278	137,976	26,116	7.90E-04	A	1.03E-02
Mercury Compounds	189,278	137,976	26,116	1.20E-06	A	1.57E-05
Nickel Compounds	189,278	137,976	26,116	4.60E-06	A	6.01E-05
Naphthalene	189,278	137,976	26,116	3.50E-05	A	4.57E-04
Phosphorus	189,278	137,976	26,116		A	
POM	189,278	137,976	26,116	4.00E-05	A	5.22E-04
Selenium Compounds	189,278	137,976	26,116	2.50E-05	A	3.26E-04
Toluene	189,278	137,976	26,116	2.81E-04	A	3.67E-03
Xylene	189,278	137,976	26,116	1.93E-04	A	2.52E-03
o-Xylene	189,278	137,976	26,116		A	
Total HAPS						2.34E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-11

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	891	137,976	123	0.163	M	0.010
NOX	891	137,976	123	3.2	A	0.197
CO	891	137,976	123	0.85	A	0.052
VOC	891	137,976	123	0.0819	A	0.005
PM-PRI	891	137,976	123	0.0697	A	0.004
PM-FIL	891	137,976	123	0.0620	A	0.004
PM-CON	891	137,976	123	0.0077	A	0.0005
PM10-PRI	891	137,976	123	0.0573	A	0.004
PM10-FIL	891	137,976	123	0.0496	A	0.003
PM25-PRI	891	137,976	123	0.0556	A	0.003
PM25-FIL	891	137,976	123	0.0479	A	0.003
Acetaldehyde	891	137,976	123	2.52E-05	A	1.55E-06
Acrolein	891	137,976	123	7.88E-06	A	4.84E-07
Antimony Compounds	891	137,976	123		A	
Arsenic Compounds	891	137,976	123	1.10E-05	A	6.76E-07
Benzene	891	137,976	123	7.76E-04	A	4.77E-05
Beryllium Compounds	891	137,976	123	3.10E-07	A	1.91E-08
1,3-Butadiene	891	137,976	123	1.60E-05	A	9.83E-07
Cadmium Compounds	891	137,976	123	4.80E-06	A	2.95E-07
Chromium Compounds	891	137,976	123	1.10E-05	A	6.76E-07
Cobalt Compounds	891	137,976	123		A	
Ethylbenzene	891	137,976	123		A	
Formaldehyde	891	137,976	123	7.89E-05	A	4.85E-06
Hydrochloric Acid	891	137,976	123		A	
Lead Compounds	891	137,976	123	1.40E-05	A	8.61E-07
Manganese Compounds	891	137,976	123	7.90E-04	A	4.86E-05
Mercury Compounds	891	137,976	123	1.20E-06	A	7.38E-08
Nickel Compounds	891	137,976	123	4.60E-06	A	2.83E-07
Naphthalene	891	137,976	123	1.30E-04	A	7.99E-06
Phosphorus	891	137,976	123		A	
POM	891	137,976	123	2.12E-04	A	1.30E-05
Selenium Compounds	891	137,976	123	2.50E-05	A	1.54E-06
Toluene	891	137,976	123	2.81E-04	A	1.73E-05
Xylene	891	137,976	123	1.93E-04	A	1.19E-05
o-Xylene	891	137,976	123		A	
Total HAPS						1.59E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-15

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	29,951	137,976	4,133	0.163	M	0.3
NOX	29,951	137,976	4,133	3.2	A	6.6
CO	29,951	137,976	4,133	0.85	A	1.8
VOC	29,951	137,976	4,133	0.0819	A	0.2
PM-PRI	29,951	137,976	4,133	0.0697	A	0.1
PM-FIL	29,951	137,976	4,133	0.0620	A	0.1
PM-CON	29,951	137,976	4,133	0.00770	A	0.02
PM10-PRI	29,951	137,976	4,133	0.0573	A	0.1
PM10-FIL	29,951	137,976	4,133	0.0496	A	0.1
PM25-PRI	29,951	137,976	4,133	0.0556	A	0.1
PM25-FIL	29,951	137,976	4,133	0.0479	A	0.1
Acetaldehyde	29,951	137,976	4,133	2.52E-05	A	5.21E-05
Acrolein	29,951	137,976	4,133	7.88E-06	A	1.63E-05
Antimony Compounds	29,951	137,976	4,133		A	
Arsenic Compounds	29,951	137,976	4,133	1.10E-05	A	2.27E-05
Benzene	29,951	137,976	4,133	7.76E-04	A	1.60E-03
Beryllium Compounds	29,951	137,976	4,133	3.10E-07	A	6.41E-07
1,3-Butadiene	29,951	137,976	4,133	1.60E-05	A	3.31E-05
Cadmium Compounds	29,951	137,976	4,133	4.80E-06	A	9.92E-06
Chromium Compounds	29,951	137,976	4,133	1.10E-05	A	2.27E-05
Cobalt Compounds	29,951	137,976	4,133		A	
Ethylbenzene	29,951	137,976	4,133		A	
Formaldehyde	29,951	137,976	4,133	7.89E-05	A	1.63E-04
Hydrochloric Acid	29,951	137,976	4,133		A	
Lead Compounds	29,951	137,976	4,133	1.40E-05	A	2.89E-05
Manganese Compounds	29,951	137,976	4,133	7.90E-04	A	1.63E-03
Mercury Compounds	29,951	137,976	4,133	1.20E-06	A	2.48E-06
Nickel Compounds	29,951	137,976	4,133	4.60E-06	A	9.50E-06
Naphthalene	29,951	137,976	4,133	1.30E-04	A	2.69E-04
Phosphorus	29,951	137,976	4,133		A	
POM	29,951	137,976	4,133	2.12E-04	A	4.38E-04
Selenium Compounds	29,951	137,976	4,133	2.50E-05	A	5.17E-05
Toluene	29,951	137,976	4,133	2.81E-04	A	5.81E-04
Xylene	29,951	137,976	4,133	1.93E-04	A	3.99E-04
o-Xylene	29,951	137,976	4,133		A	
Total HAPS						5.33E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-16

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	52,253	137,976	7,210	0.163	M	0.6
NOX	52,253	137,976	7,210	3.2	A	11.5
CO	52,253	137,976	7,210	0.85	A	3.1
VOC	52,253	137,976	7,210	0.0819	A	0.3
PM-PRI	52,253	137,976	7,210	0.0697	A	0.3
PM-FIL	52,253	137,976	7,210	0.0620	A	0.2
PM-CON	52,253	137,976	7,210	0.00770	A	0.03
PM10-PRI	52,253	137,976	7,210	0.0573	A	0.2
PM10-FIL	52,253	137,976	7,210	0.0496	A	0.2
PM25-PRI	52,253	137,976	7,210	0.0556	A	0.2
PM25-FIL	52,253	137,976	7,210	0.0479	A	0.2
Acetaldehyde	52,253	137,976	7,210	2.52E-05	A	9.08E-05
Acrolein	52,253	137,976	7,210	7.88E-06	A	2.84E-05
Antimony Compounds	52,253	137,976	7,210		A	
Arsenic Compounds	52,253	137,976	7,210	1.10E-05	A	3.97E-05
Benzene	52,253	137,976	7,210	7.76E-04	A	2.80E-03
Beryllium Compounds	52,253	137,976	7,210	3.10E-07	A	1.12E-06
1,3-Butadiene	52,253	137,976	7,210	1.60E-05	A	5.77E-05
Cadmium Compounds	52,253	137,976	7,210	4.80E-06	A	1.73E-05
Chromium Compounds	52,253	137,976	7,210	1.10E-05	A	3.97E-05
Cobalt Compounds	52,253	137,976	7,210		A	
Ethylbenzene	52,253	137,976	7,210		A	
Formaldehyde	52,253	137,976	7,210	7.89E-05	A	2.84E-04
Hydrochloric Acid	52,253	137,976	7,210		A	
Lead Compounds	52,253	137,976	7,210	1.40E-05	A	5.05E-05
Manganese Compounds	52,253	137,976	7,210	7.90E-04	A	2.85E-03
Mercury Compounds	52,253	137,976	7,210	1.20E-06	A	4.33E-06
Nickel Compounds	52,253	137,976	7,210	4.60E-06	A	1.66E-05
Naphthalene	52,253	137,976	7,210	1.30E-04	A	4.69E-04
Phosphorus	52,253	137,976	7,210		A	
POM	52,253	137,976	7,210	2.12E-04	A	7.64E-04
Selenium Compounds	52,253	137,976	7,210	2.50E-05	A	9.01E-05
Toluene	52,253	137,976	7,210	2.81E-04	A	1.01E-03
Xylene	52,253	137,976	7,210	1.93E-04	A	6.96E-04
o-Xylene	52,253	137,976	7,210		A	
Total HAPS						9.31E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-17

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	48,224	137,976	6,654	0.163	M	0.5
NOX	48,224	137,976	6,654	3.2	A	10.6
CO	48,224	137,976	6,654	0.85	A	2.8
VOC	48,224	137,976	6,654	0.0819	A	0.3
PM-PRI	48,224	137,976	6,654	0.0697	A	0.2
PM-FIL	48,224	137,976	6,654	0.0620	A	0.2
PM-CON	48,224	137,976	6,654	0.00770	A	0.03
PM10-PRI	48,224	137,976	6,654	0.0573	A	0.2
PM10-FIL	48,224	137,976	6,654	0.0496	A	0.2
PM25-PRI	48,224	137,976	6,654	0.0556	A	0.2
PM25-FIL	48,224	137,976	6,654	0.0479	A	0.2
Acetaldehyde	48,224	137,976	6,654	2.52E-05	A	8.38E-05
Acrolein	48,224	137,976	6,654	7.88E-06	A	2.62E-05
Antimony Compounds	48,224	137,976	6,654		A	
Arsenic Compounds	48,224	137,976	6,654	1.10E-05	A	3.66E-05
Benzene	48,224	137,976	6,654	7.76E-04	A	2.58E-03
Beryllium Compounds	48,224	137,976	6,654	3.10E-07	A	1.03E-06
1,3-Butadiene	48,224	137,976	6,654	1.60E-05	A	5.32E-05
Cadmium Compounds	48,224	137,976	6,654	4.80E-06	A	1.60E-05
Chromium Compounds	48,224	137,976	6,654	1.10E-05	A	3.66E-05
Cobalt Compounds	48,224	137,976	6,654		A	
Ethylbenzene	48,224	137,976	6,654		A	
Formaldehyde	48,224	137,976	6,654	7.89E-05	A	2.62E-04
Hydrochloric Acid	48,224	137,976	6,654		A	
Lead Compounds	48,224	137,976	6,654	1.40E-05	A	4.66E-05
Manganese Compounds	48,224	137,976	6,654	7.90E-04	A	2.63E-03
Mercury Compounds	48,224	137,976	6,654	1.20E-06	A	3.99E-06
Nickel Compounds	48,224	137,976	6,654	4.60E-06	A	1.53E-05
Naphthalene	48,224	137,976	6,654	1.30E-04	A	4.32E-04
Phosphorus	48,224	137,976	6,654		A	
POM	48,224	137,976	6,654	2.12E-04	A	7.05E-04
Selenium Compounds	48,224	137,976	6,654	2.50E-05	A	8.32E-05
Toluene	48,224	137,976	6,654	2.81E-04	A	9.35E-04
Xylene	48,224	137,976	6,654	1.93E-04	A	6.42E-04
o-Xylene	48,224	137,976	6,654		A	
Total HAPS						8.59E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)							
	Hill 5	Hill 6	CT-1	D-11	D-15	D-16	D-17	Total
SO2	1014.6	1804.0	2.1	0.010	0.3	0.6	0.5	2,822.1
NOX	170.7	303.4	11.5	0.197	6.6	11.5	10.6	514.5
CO	18.1	32.3	0.04	0.052	1.8	3.1	2.8	58.2
VOC	2.8	4.9	0.01	0.005	0.2	0.3	0.3	8.5
PM-PRI	74.1	131.7	0.16	0.004	0.1	0.3	0.2	206.6
PM-FIL	68.7	122.0	0.06	0.004	0.1	0.2	0.2	191.3
PM-CON	5.4	9.7	0.09	0.0005	0.02	0.03	0.03	15.3
PM10-PRI	54.2	96.4	0.15	0.004	0.1	0.2	0.2	151.3
PM10-FIL	48.7	86.7	0.05	0.003	0.1	0.2	0.2	136.0
PM25-PRI	41.1	73.2	0.14	0.003	0.1	0.2	0.2	114.9
PM25-FIL	35.7	63.4	0.05	0.003	0.1	0.2	0.2	99.7
Acetaldehyde			3.29E-04	1.55E-06	5.21E-05	9.08E-05	8.38E-05	0.0006
Acrolein			1.03E-04	4.84E-07	1.63E-05	2.84E-05	2.62E-05	0.0002
Antimony Compounds	1.91E-02	3.39E-02						0.0530
Arsenic Compounds	5.25E-03	9.33E-03	1.44E-04	6.76E-07	2.27E-05	3.97E-05	3.66E-05	0.0148
Benzene	7.77E-04	1.38E-03	7.18E-04	4.77E-05	1.60E-03	2.80E-03	2.58E-03	0.0099
Beryllium Compounds	1.02E-04	1.82E-04	4.05E-06	1.91E-08	6.41E-07	1.12E-06	1.03E-06	0.0003
1,3-Butadiene			2.09E-04	9.83E-07	3.31E-05	5.77E-05	5.32E-05	0.0004
Cadmium Compounds	1.48E-03	2.64E-03	6.27E-05	2.95E-07	9.92E-06	1.73E-05	1.60E-05	0.0042
Chromium Compounds	3.15E-03	5.60E-03	1.44E-04	6.76E-07	2.27E-05	3.97E-05	3.66E-05	0.0090
Cobalt Compounds	2.19E-02	3.89E-02						0.0607
Ethylbenzene	2.31E-04	4.11E-04						0.0006
Formaldehyde	2.22E-01	3.94E-01	3.66E-03	4.85E-06	1.63E-04	2.84E-04	2.62E-04	0.6199
Hydrochloric Acid	1.37E-04	2.44E-04						0.0004
Lead Compounds	7.77E-03	1.38E-02	1.83E-04	8.61E-07	2.89E-05	5.05E-05	4.66E-05	0.0219
Manganese Compounds	1.12E-02	1.99E-02	1.03E-02	4.86E-05	1.63E-03	2.85E-03	2.63E-03	0.0485
Mercury Compounds	4.12E-04	7.32E-04	1.57E-05	7.38E-08	2.48E-06	4.33E-06	3.99E-06	0.0012
Nickel Compounds	3.07E-01	5.45E-01	6.01E-05	2.83E-07	9.50E-06	1.66E-05	1.53E-05	0.8520
Naphthalene	4.10E-03	7.30E-03	4.57E-04	7.99E-06	2.69E-04	4.69E-04	4.32E-04	0.0130
Phosphorus	3.44E-02	6.11E-02						0.0955
POM	4.72E-03	8.40E-03	5.22E-04	1.30E-05	4.38E-04	7.64E-04	7.05E-04	0.0156
Selenium Compounds	2.49E-03	4.42E-03	3.26E-04	1.54E-06	5.17E-05	9.01E-05	8.32E-05	0.0075
Toluene	2.25E-02	4.00E-02	3.67E-03	1.73E-05	5.81E-04	1.01E-03	9.35E-04	0.0688
Xylene			2.52E-03	1.19E-05	3.99E-04	6.96E-04	6.42E-04	0.0043
o-Xylene	3.96E-04	7.04E-04						0.0011
Total HAPS	6.68E-01	1.19E+00	2.34E-02	1.59E-04	5.33E-03	9.31E-03	8.59E-03	1.9032

2005 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100013

DATA REPRESENTATIVE OF JANUARY 1, 2005 - DECEMBER 31, 2005
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Keahole Power Plant

2) Permit No(s).: PSD HI 88-01, 0007-01-C & 0256-01-C

3) Physical Facility Address:

Street: 73-4249 Queen Kaahumanu Highway

City: Kailua-Kona Zip Code: 96740

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Bruce Schlieman	808-543-4516	808-543-4511	bruce.schlieman@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 811293 (Easting (m)) Vertical (y): 2184955 (Northing (m))

Zone: 4 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2005 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Norman Verbanic, Jr.

Name: Norman Verbanic, Jr. Date: 4/24/06
Responsible Official

Title: Production Manager

Permit No.:	0256-01-C
Date Rec'd:	

FORM F-1

2006 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2005)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Keahole Power Plant	B. Location:	73-4249 Queen Kaahumanu Highway	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City: Hilo	F. State: HI	G. Zip Code:	96721
H. Contact Person:	Bruce Schlieman	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4516
K. Responsible Official:	Norman Verbanic, Jr.	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:		Date:			

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												Annual Total
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
D-21	0.1	0.1	0.1	0.1	0.8	1.6	0.1	0.0	0.0	–			
D-22	0.4	0.4	0.3	1.0	5.2	11.7	0.5	0.0	0.0	–			
D-23	0.4	0.4	0.3	1.0	5.2	10.7	0.5	0.0	0.0	–			
CT-2	2.8	2.4	2.3	17.7	0.4	14.5	0.1	0.0	0.2	–			
A. Supplement (if appl.) A.	13.1	11.7	11.5	137.2	38.9	115.8	0.3	0.0	1.5	–			
B. Total Report Emissions	16.8	15.0	14.5	157.0	48.5	154.3	1.5	0.0	1.7	–			
C. Total Emissions Subject to Fees	16			157		154	1						D. 328

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2005 $/TON	Multiply	CPI Index Adjustmn 2.65% incr. '03 to '04)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	328	x	41.67	x	1.027	=	B.	$14,038.79
	"Clean Air Special Fund - NON"	C.	328	x	10.16	x	1.027	=	D.	$3,422.46
							Total	=	E.	$17,459.25

Note: 2006 $/ton charge payable to Clean Air Special Fund - COV = $41.67 x 1.027 = $42.80/ton.
2006 $/ton charge payable to Clean Air Special Fund - NON = $10.16 x 1.027 = $10.43/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with two separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

Permit No.:	0256-01-C
Date Rec'd:	

FORM F-2
SUPPLEMENT A
2006 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2005)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Keahole Power Plant	B. Location: 73-4249 Queen Kaahumanu Highway	C. Island: Hawaii
D. Responsible Official:	Norman Vanpanic, [illegible]	E. Title: Production Manager	F. Telephone No.: 808-969-0421
G. Signature:		Date:	

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS (Report emissions to the nearest tenth of a ton)

Equipment Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)											
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)											
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3		
BS-1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	–		
CT-4	6.8	6.1	6.0	73.6	16.3	68.3	0.1	0.0	0.8	–		
CT-5	6.5	5.6	5.5	63.4	20.8	47.4	0.2	0.0	0.7	–		
Supplement												
Total Report Emissions	13.1	11.7	11.5	137.2	36.0	115.8	0.3	0.0	1.5	–		

D-21

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	13,230	137,976	1,825	0.163	M	0.1
NOX	13,230	137,976	1,825	1.74	S	1.6
CO	13,230	137,976	1,825	0.85	A	0.8
VOC	13,230	137,976	1,825	0.0819	A	0.1
PM-PRI	13,230	137,976	1,825	0.0697	A	0.1
PM-FIL	13,230	137,976	1,825	0.062	A	0.1
PM-CON	13,230	137,976	1,825	0.0077	A	0.01
PM10-PRI	13,230	137,976	1,825	0.0573	A	0.1
PM10-FIL	13,230	137,976	1,825	0.0496	A	0.05
PM25-PRI	13,230	137,976	1,825	0.0556	A	0.1
PM25-FIL	13,230	137,976	1,825	0.0479	A	0.04
Acetaldehyde	13,230	137,976	1,825	2.52E-05	A	2.30E-05
Acrolein	13,230	137,976	1,825	7.88E-06	A	7.19E-06
Antimony Compounds	13,230	137,976	1,825		A	
Arsenic Compounds	13,230	137,976	1,825	1.10E-05	A	1.00E-05
Benzene	13,230	137,976	1,825	7.76E-04	A	7.08E-04
Beryllium Compounds	13,230	137,976	1,825	3.10E-07	A	2.83E-07
1,3-Butadiene	13,230	137,976	1,825	1.60E-05	A	1.46E-05
Cadmium Compounds	13,230	137,976	1,825	4.80E-06	A	4.38E-06
Chromium Compounds	13,230	137,976	1,825	1.10E-05	A	1.00E-05
Cobalt Compounds	13,230	137,976	1,825		A	
Ethylbenzene	13,230	137,976	1,825		A	
Formaldehyde	13,230	137,976	1,825	7.89E-05	A	7.20E-05
Hydrochloric Acid	13,230	137,976	1,825		A	
Lead Compounds	13,230	137,976	1,825	1.40E-05	A	1.28E-05
Manganese Compounds	13,230	137,976	1,825	7.90E-04	A	7.21E-04
Mercury Compounds	13,230	137,976	1,825	1.20E-06	A	1.10E-06
Nickel Compounds	13,230	137,976	1,825	4.60E-06	A	4.20E-06
Naphthalene	13,230	137,976	1,825	1.30E-04	A	1.19E-04
Phosphorus	13,230	137,976	1,825		A	
POM	13,230	137,976	1,825	2.12E-04	A	1.93E-04
Selenium Compounds	13,230	137,976	1,825	2.50E-05	A	2.28E-05
Toluene	13,230	137,976	1,825	2.81E-04	A	2.56E-04
Xylene	13,230	137,976	1,825	1.93E-04	A	1.76E-04
o-Xylene	13,230	137,976	1,825		A	
Total HAPs						2.36E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-22

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	89,073	137,976	12,290	0.163	M	1.0
NOX	89,073	137,976	12,290	1.9	S	11.7
CO	89,073	137,976	12,290	0.85	A	5.2
VOC	89,073	137,976	12,290	0.0819	A	0.5
PM-PRI	89,073	137,976	12,290	0.0697	A	0.4
PM-FIL	89,073	137,976	12,290	0.062	A	0.4
PM-CON	89,073	137,976	12,290	0.0077	A	0.05
PM10-PRI	89,073	137,976	12,290	0.0573	A	0.4
PM10-FIL	89,073	137,976	12,290	0.0496	A	0.3
PM25-PRI	89,073	137,976	12,290	0.0556	A	0.3
PM25-FIL	89,073	137,976	12,290	0.0479	A	0.3
Acetaldehyde	89,073	137,976	12,290	2.52E-05	A	1.55E-04
Acrolein	89,073	137,976	12,290	7.88E-06	A	4.84E-05
Antimony Compounds	89,073	137,976	12,290		A	
Arsenic Compounds	89,073	137,976	12,290	1.10E-05	A	6.76E-05
Benzene	89,073	137,976	12,290	7.76E-04	A	4.77E-03
Beryllium Compounds	89,073	137,976	12,290	3.10E-07	A	1.90E-06
1,3-Butadiene	89,073	137,976	12,290	1.60E-05	A	9.83E-05
Cadmium Compounds	89,073	137,976	12,290	4.80E-06	A	2.95E-05
Chromium Compounds	89,073	137,976	12,290	1.10E-05	A	6.76E-05
Cobalt Compounds	89,073	137,976	12,290		A	
Ethylbenzene	89,073	137,976	12,290		A	
Formaldehyde	89,073	137,976	12,290	7.89E-05	A	4.85E-04
Hydrochloric Acid	89,073	137,976	12,290		A	
Lead Compounds	89,073	137,976	12,290	1.40E-05	A	8.60E-05
Manganese Compounds	89,073	137,976	12,290	7.90E-04	A	4.85E-03
Mercury Compounds	89,073	137,976	12,290	1.20E-06	A	7.37E-06
Nickel Compounds	89,073	137,976	12,290	4.60E-06	A	2.83E-05
Naphthalene	89,073	137,976	12,290	1.30E-04	A	7.99E-04
Phosphorus	89,073	137,976	12,290		A	
POM	89,073	137,976	12,290	2.12E-04	A	1.30E-03
Selenium Compounds	89,073	137,976	12,290	2.50E-05	A	1.54E-04
Toluene	89,073	137,976	12,290	2.81E-04	A	1.73E-03
Xylene	89,073	137,976	12,290	1.93E-04	A	1.19E-03
o-Xylene	89,073	137,976	12,290		A	
Total HAPs						1.59E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-23

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	88,733	137,976	12,243	0.163	M	1.0
NOX	88,733	137,976	12,243	1.74	S	10.7
CO	88,733	137,976	12,243	0.85	A	5.2
VOC	88,733	137,976	12,243	0.0819	A	0.5
PM-PRI	88,733	137,976	12,243	0.0697	A	0.4
PM-FIL	88,733	137,976	12,243	0.062	A	0.4
PM-CON	88,733	137,976	12,243	0.0077	A	0.05
PM10-PRI	88,733	137,976	12,243	0.0573	A	0.4
PM10-FIL	88,733	137,976	12,243	0.0496	A	0.3
PM25-PRI	88,733	137,976	12,243	0.0556	A	0.3
PM25-FIL	88,733	137,976	12,243	0.0479	A	0.3
Acetaldehyde	88,733	137,976	12,243	2.52E-05	A	1.54E-04
Acrolein	88,733	137,976	12,243	7.88E-06	A	4.82E-05
Antimony Compounds	88,733	137,976	12,243		A	
Arsenic Compounds	88,733	137,976	12,243	1.10E-05	A	6.73E-05
Benzene	88,733	137,976	12,243	7.76E-04	A	4.75E-03
Beryllium Compounds	88,733	137,976	12,243	3.10E-07	A	1.90E-06
1,3-Butadiene	88,733	137,976	12,243	1.60E-05	A	9.79E-05
Cadmium Compounds	88,733	137,976	12,243	4.80E-06	A	2.94E-05
Chromium Compounds	88,733	137,976	12,243	1.10E-05	A	6.73E-05
Cobalt Compounds	88,733	137,976	12,243		A	
Ethylbenzene	88,733	137,976	12,243		A	
Formaldehyde	88,733	137,976	12,243	7.89E-05	A	4.83E-04
Hydrochloric Acid	88,733	137,976	12,243		A	
Lead Compounds	88,733	137,976	12,243	1.40E-05	A	8.57E-05
Manganese Compounds	88,733	137,976	12,243	7.90E-04	A	4.84E-03
Mercury Compounds	88,733	137,976	12,243	1.20E-06	A	7.35E-06
Nickel Compounds	88,733	137,976	12,243	4.60E-06	A	2.82E-05
Naphthalene	88,733	137,976	12,243	1.30E-04	A	7.96E-04
Phosphorus	88,733	137,976	12,243		A	
POM	88,733	137,976	12,243	2.12E-04	A	1.30E-03
Selenium Compounds	88,733	137,976	12,243	2.50E-05	A	1.53E-04
Toluene	88,733	137,976	12,243	2.81E-04	A	1.72E-03
Xylene	88,733	137,976	12,243	1.93E-04	A	1.18E-03
o-Xylene	88,733	137,976	12,243		A	
Total HAPs						1.58E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-2

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	1,577,763	137,976	217,693	0.163	M	17.7
NOX	1,577,763	137,976	217,693	0.133	S	14.5
CO	1,577,763	137,976	217,693	0.00392	S	0.4
VOC	1,577,763	137,976	217,693	0.000647	S	0.1
PM-PRI	1,577,763	137,976	217,693	0.0255	*	2.8
PM-FIL	1,577,763	137,976	217,693	0.0183	S	2.0
PM-CON	1,577,763	137,976	217,693	0.0072	A	0.8
PM10-PRI	1,577,763	137,976	217,693	0.02184	*	2.4
PM10-FIL	1,577,763	137,976	217,693	0.01464	*	1.6
PM25-PRI	1,577,763	137,976	217,693	0.02134	*	2.3
PM25-FIL	1,577,763	137,976	217,693	0.01414	*	1.5
Acetaldehyde	1,577,763	137,976	217,693	2.52E-05	A	2.74E-03
Acrolein	1,577,763	137,976	217,693	7.88E-06	A	8.58E-04
Antimony Compounds	1,577,763	137,976	217,693		A	
Arsenic Compounds	1,577,763	137,976	217,693	1.10E-05	A	1.20E-03
Benzene	1,577,763	137,976	217,693	5.50E-05	A	5.99E-03
Beryllium Compounds	1,577,763	137,976	217,693	3.10E-07	A	3.37E-05
1,3-Butadiene	1,577,763	137,976	217,693	1.60E-05	A	1.74E-03
Cadmium Compounds	1,577,763	137,976	217,693	4.80E-06	A	5.22E-04
Chromium Compounds	1,577,763	137,976	217,693	1.10E-05	A	1.20E-03
Cobalt Compounds	1,577,763	137,976	217,693		A	
Ethylbenzene	1,577,763	137,976	217,693		A	
Formaldehyde	1,577,763	137,976	217,693	2.80E-04	A	3.05E-02
Hydrochloric Acid	1,577,763	137,976	217,693		A	
Lead Compounds	1,577,763	137,976	217,693	1.40E-05	A	1.52E-03
Manganese Compounds	1,577,763	137,976	217,693	7.90E-04	A	8.60E-02
Mercury Compounds	1,577,763	137,976	217,693	1.20E-06	A	1.31E-04
Nickel Compounds	1,577,763	137,976	217,693	4.60E-06	A	5.01E-04
Naphthalene	1,577,763	137,976	217,693	3.50E-05	A	3.81E-03
Phosphorus	1,577,763	137,976	217,693		A	
POM	1,577,763	137,976	217,693	4.00E-05	A	4.35E-03
Selenium Compounds	1,577,763	137,976	217,693	2.50E-05	A	2.72E-03
Toluene	1,577,763	137,976	217,693	2.81E-04	A	3.06E-02
Xylene	1,577,763	137,976	217,693	1.93E-04	A	2.10E-02
o-Xylene	1,577,763	137,976	217,693		A	
Total HAPs						1.95E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

BS-1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	354	137,976	49	0.163	M	0.004
NOX	354	137,976	49	3.2	A	0.078
CO	354	137,976	49	0.85	A	0.021
VOC	354	137,976	49	0.0819	A	0.002
PM-PRI	354	137,976	49	0.0697	A	0.002
PM-FIL	354	137,976	49	0.062	A	0.002
PM-CON	354	137,976	49	0.0077	A	0.000
PM10-PRI	354	137,976	49	0.0573	A	0.001
PM10-FIL	354	137,976	49	0.0496	A	0.001
PM25-PRI	354	137,976	49	0.0556	A	0.001
PM25-FIL	354	137,976	49	0.0479	A	0.001
Acetaldehyde	354	137,976	49	2.52E-05	A	6.15E-07
Acrolein	354	137,976	49	7.88E-06	A	1.92E-07
Antimony Compounds	354	137,976	49		A	
Arsenic Compounds	354	137,976	49	1.10E-05	A	2.69E-07
Benzene	354	137,976	49	7.76E-04	A	1.90E-05
Beryllium Compounds	354	137,976	49	3.10E-07	A	7.57E-09
1,3-Butadiene	354	137,976	49	1.60E-05	A	3.91E-07
Cadmium Compounds	354	137,976	49	4.80E-06	A	1.17E-07
Chromium Compounds	354	137,976	49	1.10E-05	A	2.69E-07
Cobalt Compounds	354	137,976	49		A	
Ethylbenzene	354	137,976	49		A	
Formaldehyde	354	137,976	49	7.89E-05	A	1.93E-06
Hydrochloric Acid	354	137,976	49		A	
Lead Compounds	354	137,976	49	1.40E-05	A	3.42E-07
Manganese Compounds	354	137,976	49	7.90E-04	A	1.93E-05
Mercury Compounds	354	137,976	49	1.20E-06	A	2.93E-08
Nickel Compounds	354	137,976	49	4.60E-06	A	1.12E-07
Naphthalene	354	137,976	49	1.30E-04	A	3.17E-06
Phosphorus	354	137,976	49		A	
POM	354	137,976	49	2.12E-04	A	5.18E-06
Selenium Compounds	354	137,976	49	2.50E-05	A	6.11E-07
Toluene	354	137,976	49	2.81E-04	A	6.86E-06
Xylene	354	137,976	49	1.93E-04	A	4.71E-06
o-Xylene	354	137,976	49		A	
Total HAPs						6.31E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-4

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	6,559,756	137,976	905,089	0.163	M	73.8
NOX	6,559,756	137,976	905,089	0.151	S	68.3
CO	6,559,756	137,976	905,089	0.0361	S	16.3
VOC	6,559,756	137,976	905,089	0.000183	S	0.1
PM-PRI	6,559,756	137,976	905,089	0.01502	*	6.8
PM-FIL	6,559,756	137,976	905,089	0.00782	S	3.5
PM-CON	6,559,756	137,976	905,089	0.0072	A	3.3
PM10-PRI	6,559,756	137,976	905,089	0.01346	*	6.1
PM10-FIL	6,559,756	137,976	905,089	0.00626	*	2.8
PM25-PRI	6,559,756	137,976	905,089	0.01324	*	6.0
PM25-FIL	6,559,756	137,976	905,089	0.00604	*	2.7
Acetaldehyde	6,559,756	137,976	905,089	2.52E-05	A	1.14E-02
Acrolein	6,559,756	137,976	905,089	7.88E-06	A	3.57E-03
Antimony Compounds	6,559,756	137,976	905,089		A	
Arsenic Compounds	6,559,756	137,976	905,089	1.10E-05	A	4.98E-03
Benzene	6,559,756	137,976	905,089	5.50E-05	A	2.49E-02
Beryllium Compounds	6,559,756	137,976	905,089	3.10E-07	A	1.40E-04
1,3-Butadiene	6,559,756	137,976	905,089	1.60E-05	A	7.24E-03
Cadmium Compounds	6,559,756	137,976	905,089	4.80E-06	A	2.17E-03
Chromium Compounds	6,559,756	137,976	905,089	1.10E-05	A	4.98E-03
Cobalt Compounds	6,559,756	137,976	905,089		A	
Ethylbenzene	6,559,756	137,976	905,089		A	
Formaldehyde	6,559,756	137,976	905,089	2.80E-04	A	1.27E-01
Hydrochloric Acid	6,559,756	137,976	905,089		A	
Lead Compounds	6,559,756	137,976	905,089	1.40E-05	A	6.34E-03
Manganese Compounds	6,559,756	137,976	905,089	7.90E-04	A	3.58E-01
Mercury Compounds	6,559,756	137,976	905,089	1.20E-06	A	5.43E-04
Nickel Compounds	6,559,756	137,976	905,089	4.60E-06	A	2.08E-03
Naphthalene	6,559,756	137,976	905,089	3.50E-05	A	1.58E-02
Phosphorus	6,559,756	137,976	905,089		A	
POM	6,559,756	137,976	905,089	4.00E-05	A	1.81E-02
Selenium Compounds	6,559,756	137,976	905,089	2.50E-05	A	1.13E-02
Toluene	6,559,756	137,976	905,089	2.81E-04	A	1.27E-01
Xylene	6,559,756	137,976	905,089	1.93E-04	A	8.73E-02
o-Xylene	6,559,756	137,976	905,089		A	
Total HAPs						8.12E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

CT-5

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	5,635,622	137,976	777,581	0.163	M	63.4
NOX	5,635,622	137,976	777,581	0.122	S	47.4
CO	5,635,622	137,976	777,581	0.053	S	20.6
VOC	5,635,622	137,976	777,581	0.00051	S	0.2
PM-PRI	5,635,622	137,976	777,581	0.0163	*	6.3
PM-FIL	5,635,622	137,976	777,581	0.0091	S	3.5
PM-CON	5,635,622	137,976	777,581	0.0072	A	2.8
PM10-PRI	5,635,622	137,976	777,581	0.01448	*	5.6
PM10-FIL	5,635,622	137,976	777,581	0.00728	*	2.8
PM25-PRI	5,635,622	137,976	777,581	0.01423	*	5.5
PM25-FIL	5,635,622	137,976	777,581	0.00703	*	2.7
Acetaldehyde	5,635,622	137,976	777,581	2.52E-05	A	9.80E-03
Acrolein	5,635,622	137,976	777,581	7.88E-06	A	3.06E-03
Antimony Compounds	5,635,622	137,976	777,581		A	
Arsenic Compounds	5,635,622	137,976	777,581	1.10E-05	A	4.28E-03
Benzene	5,635,622	137,976	777,581	5.50E-05	A	2.14E-02
Beryllium Compounds	5,635,622	137,976	777,581	3.10E-07	A	1.21E-04
1,3-Butadiene	5,635,622	137,976	777,581	1.60E-05	A	6.22E-03
Cadmium Compounds	5,635,622	137,976	777,581	4.80E-06	A	1.87E-03
Chromium Compounds	5,635,622	137,976	777,581	1.10E-05	A	4.28E-03
Cobalt Compounds	5,635,622	137,976	777,581		A	
Ethylbenzene	5,635,622	137,976	777,581		A	
Formaldehyde	5,635,622	137,976	777,581	2.80E-04	A	1.09E-01
Hydrochloric Acid	5,635,622	137,976	777,581		A	
Lead Compounds	5,635,622	137,976	777,581	1.40E-05	A	5.44E-03
Manganese Compounds	5,635,622	137,976	777,581	7.90E-04	A	3.07E-01
Mercury Compounds	5,635,622	137,976	777,581	1.20E-06	A	4.67E-04
Nickel Compounds	5,635,622	137,976	777,581	4.60E-06	A	1.79E-03
Naphthalene	5,635,622	137,976	777,581	3.50E-05	A	1.36E-02
Phosphorus	5,635,622	137,976	777,581		A	
POM	5,635,622	137,976	777,581	4.00E-05	A	1.56E-02
Selenium Compounds	5,635,622	137,976	777,581	2.50E-05	A	9.72E-03
Toluene	5,635,622	137,976	777,581	2.81E-04	A	1.09E-01
Xylene	5,635,622	137,976	777,581	1.93E-04	A	7.50E-02
o-Xylene	5,635,622	137,976	777,581		A	
Total HAPs						6.98E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

Summary

Pollutant	Annual Emissions (tons/year)							
	D-21	D-22	D-23	CT-2	BS-1	CT-4	CT-5	Total
SO2	0.1	1.0	1.0	17.7	0.004	73.8	63.4	157.0
NOX	1.6	11.7	10.7	14.5	0.078	68.3	47.4	154.3
CO	0.8	5.2	5.2	0.4	0.021	16.3	20.6	48.5
VOC	0.1	0.5	0.5	0.1	0.002	0.1	0.2	1.5
PM-PRI	0.1	0.4	0.4	2.8	0.002	6.8	6.3	16.8
PM-FIL	0.1	0.4	0.4	2.0	0.002	3.5	3.5	9.9
PM-CON	0.01	0.05	0.05	0.8	0.0002	3.3	2.8	7.0
PM10-PRI	0.1	0.4	0.4	2.4	0.001	6.1	5.6	15.0
PM10-FIL	0.05	0.3	0.3	1.6	0.001	2.8	2.8	7.9
PM25-PRI	0.1	0.3	0.3	2.3	0.001	6.0	5.5	14.5
PM25-FIL	0.04	0.3	0.3	1.5	0.001	2.7	2.7	7.5
Acetaldehyde	2.30E-05	1.55E-04	1.54E-04	2.74E-03	6.15E-07	1.14E-02	9.80E-03	0.0243
Acrolein	7.19E-06	4.84E-05	4.82E-05	8.58E-04	1.92E-07	3.57E-03	3.06E-03	0.0076
Antimony Compounds								
Arsenic Compounds	1.00E-05	6.76E-05	6.73E-05	1.20E-03	2.69E-07	4.98E-03	4.28E-03	0.0106
Benzene	7.08E-04	4.77E-03	4.75E-03	5.99E-03	1.90E-05	2.49E-02	2.14E-02	0.0625
Beryllium Compounds	2.83E-07	1.90E-06	1.90E-06	3.37E-05	7.57E-09	1.40E-04	1.21E-04	0.0003
1,3-Butadiene	1.46E-05	9.83E-05	9.79E-05	1.74E-03	3.91E-07	7.24E-03	6.22E-03	0.0154
Cadmium Compounds	4.38E-06	2.95E-05	2.94E-05	5.22E-04	1.17E-07	2.17E-03	1.87E-03	0.0046
Chromium Compounds	1.00E-05	6.76E-05	6.73E-05	1.20E-03	2.69E-07	4.98E-03	4.28E-03	0.0106
Cobalt Compounds								
Ethylbenzene								
Formaldehyde	7.20E-05	4.85E-04	4.83E-04	3.05E-02	1.93E-06	1.27E-01	1.09E-01	0.2671
Hydrochloric Acid								
Lead Compounds	1.28E-05	8.60E-05	8.57E-05	1.52E-03	3.42E-07	6.34E-03	5.44E-03	0.0135
Manganese Compounds	7.21E-04	4.85E-03	4.84E-03	8.60E-02	1.93E-05	3.58E-01	3.07E-01	0.7611
Mercury Compounds	1.10E-06	7.37E-06	7.35E-06	1.31E-04	2.93E-08	5.43E-04	4.67E-04	0.0012
Nickel Compounds	4.20E-06	2.83E-05	2.82E-05	5.01E-04	1.12E-07	2.08E-03	1.79E-03	0.0044
Naphthalene	1.19E-04	7.99E-04	7.96E-04	3.81E-03	3.17E-06	1.58E-02	1.36E-02	0.0350
Phosphorus								
POM	1.93E-04	1.30E-03	1.30E-03	4.35E-03	5.18E-06	1.81E-02	1.56E-02	0.0408
Selenium Compounds	2.28E-05	1.54E-04	1.53E-04	2.72E-03	6.11E-07	1.13E-02	9.72E-03	0.0241
Toluene	2.56E-04	1.73E-03	1.72E-03	3.06E-02	6.86E-06	1.27E-01	1.09E-01	0.2707
Xylene	1.76E-04	1.19E-03	1.18E-03	2.10E-02	4.71E-06	8.73E-02	7.50E-02	0.1859
o-Xylene								
Total HAPS	2.36E-03	1.59E-02	1.58E-02	1.95E-01	6.31E-05	8.12E-01	6.98E-01	1.74E+00

2005 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100021

DATA REPRESENTATIVE OF JANUARY 1, 2005 - DECEMBER 31, 2005
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Puna Power Plant

2) Permit No(s).: 0235-01-C

3) Physical Facility Address:

Street: Puna Mill Road

City: Keaau Zip Code: 96749

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Bruce Schlieman	808-543-4516	808-543-4511	bruce.schlieman@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: ____ Type B: X Neither: ____

6) SIC Code (Primary / Secondary): 4911 / ____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 286646 (Easting (m)) Vertical (y): 2172337 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2005 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Norman Verbanic, Jr.

Name: Norman Verbanic, Jr. Date: 4/20/06
Responsible Official

Title: Production Manager

Permit No.:	0235-01-C
Date Rec'd:	

FORM F-1

2006 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2005)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Puna Power Plant	B. Location:	Puna Mill Road	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City:	Hilo	F. State: HI	G. Zip Code: 96721
H. Contact Person:	Bruce Schileman	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4616
K. Responsible Official:	Norman Verbanic	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:		Date:			

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												Annual Total
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
Boiler	96.2	70.4	53.5	1317.1	23.5	221.5	3.6	0.0	0.9	–			
CT-3	5.3	4.5	4.4	28.1	14.0	19.3	0.1	0.0	0.3	–			
PBSG1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	–			
A. Supplement (if appl.)													
B. Total Report Emissions	101.5	74.9	57.7	1345.2	37.5	240.9	3.7	0.0	1.2	–			
C. Total Emissions Subject to Fees	101			1,345		240	3						D. 1,689

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2005 $/TON	Multiply	CPI Index Adjustmn 2.65% Incr. '03 to '04)	Equal		Total
Fee payable to:	'Clean Air Special Fund - COV'	A.	1,689	x	41.67	x	1.027	=	B.	$72,280.91
	'Clean Air Special Fund - NON'	C.	1,689	x	10.16	x	1.027	=	D.	$17,623.57
							Total	=	E.	$89,904.48

Note: 2006 $/ton charge payable to Clean Air Special Fund - COV = $41.67 x 1.027 = $42.80/ton.
2006 $/ton charge payable to Clean Air Special Fund - NON = $10.16 x 1.027 = $10.43/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with two separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

Boiler No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	9,386,034	150,558	1,413,143	1.863	M	1316.3
NOX	9,386,034	150,558	1,413,143	0.313	A	221.2
CO	9,386,034	150,558	1,413,143	0.0333	A	23.5
VOC	9,386,034	150,558	1,413,143	0.00507	A	3.6
PM-PRI	9,386,034	150,558	1,413,143	0.136	A	96.1
PM-FIL	9,386,034	150,558	1,413,143	0.126	A	89.0
PM-CON	9,386,034	150,558	1,413,143	0.0100	A	7.1
PM10-PRI	9,386,034	150,558	1,413,143	0.0995	A	70.3
PM10-FIL	9,386,034	150,558	1,413,143	0.0895	A	63.2
PM25-PRI	9,386,034	150,558	1,413,143	0.0755	A	53.3
PM25-FIL	9,386,034	150,558	1,413,143	0.0655	A	46.3
Acetaldehyde	9,386,034	150,558	1,413,143		A	
Acrolein	9,386,034	150,558	1,413,143		A	
Antimony Compounds	9,386,034	150,558	1,413,143	3.50E-05	A	2.47E-02
Arsenic Compounds	9,386,034	150,558	1,413,143	8.80E-06	A	6.22E-03
Benzene	9,386,034	150,558	1,413,143	1.43E-06	A	1.01E-03
Beryllium Compounds	9,386,034	150,558	1,413,143	1.85E-07	A	1.31E-04
1,3-Butadiene	9,386,034	150,558	1,413,143		A	
Cadmium Compounds	9,386,034	150,558	1,413,143	2.65E-06	A	1.87E-03
Chromium Compounds	9,386,034	150,558	1,413,143	5.63E-06	A	3.98E-03
Cobalt Compounds	9,386,034	150,558	1,413,143	4.01E-05	A	2.84E-02
Ethylbenzene	9,386,034	150,558	1,413,143	4.24E-07	A	3.00E-04
Formaldehyde	9,386,034	150,558	1,413,143	4.07E-04	A	2.87E-01
Hydrochloric Acid	9,386,034	150,558	1,413,143		A	
Lead Compounds	9,386,034	150,558	1,413,143	1.01E-05	A	7.11E-03
Manganese Compounds	9,386,034	150,558	1,413,143	2.00E-05	A	1.41E-02
Mercury Compounds	9,386,034	150,558	1,413,143	7.53E-07	A	5.32E-04
Nickel Compounds	9,386,034	150,558	1,413,143	5.63E-04	A	3.98E-01
Naphthalene	9,386,034	150,558	1,413,143	7.53E-06	A	5.32E-03
Phosphorus	9,386,034	150,558	1,413,143	6.31E-05	A	4.46E-02
POM	9,386,034	150,558	1,413,143	8.67E-06	A	6.12E-03
Selenium Compounds	9,386,034	150,558	1,413,143	4.55E-06	A	3.22E-03
Toluene	9,386,034	150,558	1,413,143	4.13E-05	A	2.92E-02
Xylene	9,386,034	150,558	1,413,143		A	
o-Xylene	9,386,034	150,558	1,413,143	7.27E-07	A	5.13E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	11,124	137,976	1,535	0.163	M	0.1251
NOX	11,124	137,976	1,535	0.171	A	0.1312
CO	11,124	137,976	1,535	0.0357	A	0.0274
VOC	11,124	137,976	1,535	0.00143	A	0.0011
PM-PRI	11,124	137,976	1,535	0.0236	A	0.0181
PM-FIL	11,124	137,976	1,535	0.0143	A	0.0110
PM-CON	11,124	137,976	1,535	0.00929	A	0.0071
PM10-PRI	11,124	137,976	1,535	0.0164	A	0.0126
PM10-FIL	11,124	137,976	1,535	0.00714	A	0.0055
PM25-PRI	11,124	137,976	1,535	0.0111	A	0.0085
PM25-FIL	11,124	137,976	1,535	0.00179	A	0.0014
Acetaldehyde	11,124	137,976	1,535		A	
Acrolein	11,124	137,976	1,535		A	
Antimony Compounds	11,124	137,976	1,535	3.75E-05	A	2.88E-05
Arsenic Compounds	11,124	137,976	1,535	4.00E-06	A	3.07E-06
Benzene	11,124	137,976	1,535	1.53E-06	A	1.17E-06
Beryllium Compounds	11,124	137,976	1,535	3.00E-06	A	2.30E-06
1,3-Butadiene	11,124	137,976	1,535		A	
Cadmium Compounds	11,124	137,976	1,535	3.00E-06	A	2.30E-06
Chromium Compounds	11,124	137,976	1,535	3.00E-06	A	2.30E-06
Cobalt Compounds	11,124	137,976	1,535	4.30E-05	A	3.30E-05
Ethylbenzene	11,124	137,976	1,535	4.54E-07	A	3.49E-07
Formaldehyde	11,124	137,976	1,535	4.36E-04	A	3.34E-04
Hydrochloric Acid	11,124	137,976	1,535		A	
Lead Compounds	11,124	137,976	1,535	9.00E-06	A	6.91E-06
Manganese Compounds	11,124	137,976	1,535	6.00E-06	A	4.60E-06
Mercury Compounds	11,124	137,976	1,535	3.00E-06	A	2.30E-06
Nickel Compounds	11,124	137,976	1,535	3.00E-06	A	2.30E-06
Naphthalene	11,124	137,976	1,535	8.07E-06	A	6.19E-06
Phosphorus	11,124	137,976	1,535	6.76E-05	A	5.19E-05
POM	11,124	137,976	1,535	9.29E-06	A	7.13E-06
Selenium Compounds	11,124	137,976	1,535	1.50E-05	A	1.15E-05
Toluene	11,124	137,976	1,535	4.43E-05	A	3.40E-05
Xylene	11,124	137,976	1,535		A	
o-Xylene	11,124	137,976	1,535	7.79E-07	A	5.97E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler Spec Used Oil

Pollutant	Annual Fuel Use (gal/yr)	Emission Factor (lb/10^3 gal)	EF Ref	Annual Emissions (tons/yr)
SO2	5,376	268.5	A	0.7217
NOX	5,376	47	A	0.1263
CO	5,376	5.0	A	0.0134
VOC	5,376	0.76	A	0.0020
PM-PRI	5,376	20.43	A	0.0549
PM-FIL	5,376	18.93	A	0.0509
PM-CON	5,376	1.5	A	0.0040
PM10-PRI	5,376	14.94	A	0.0402
PM10-FIL	5,376	13.44	A	0.0361
PM25-PRI	5,376	11.34	A	0.0305
PM25-FIL	5,376	9.84	A	0.0264
Acetaldehyde	5,376		A	
Acrolein	5,376		A	
Antimony Compounds	5,376		A	
Arsenic Compounds	5,376	1.10E-01	A	2.96E-04
Benzene	5,376		A	
Beryllium Compounds	5,376		A	
1,3-Butadiene	5,376		A	
Cadmium Compounds	5,376	9.30E-03	A	2.50E-05
Chromium Compounds	5,376	2.00E-02	A	5.38E-05
Cobalt Compounds	5,376	2.10E-04	A	5.64E-07
Ethylbenzene	5,376		A	
Formaldehyde	5,376		A	
Hydrochloric Acid	5,376	3.30E-02	A	8.87E-05
Lead Compounds	5,376	5.50E-01	A	1.48E-03
Manganese Compounds	5,376	6.80E-02	A	1.83E-04
Mercury Compounds	5,376		A	
Nickel Compounds	5,376	1.10E-02	A	2.96E-05
Naphthalene	5,376		A	
Phosphorus	5,376		A	
POM	5,376		A	
Selenium Compounds	5,376		A	
Toluene	5,376		A	
Xylene	5,376		A	
o-Xylene	5,376		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler Total

	Annual Emissions			
Pollutant	No. 6 FO (tons/yr)	No. 2 FO (tons/yr)	Spec Oil (tons/yr)	Total (tons/yr)
SO2	1,316.3	0.1251	0.7217	1317.1
NOX	221.2	0.1312	0.1263	221.5
CO	23.5	0.0274	0.0134	23.5
VOC	3.6	0.0011	0.0020	3.6
PM-PRI	96.1	0.0181	0.0549	96.2
PM-FIL	89.0	0.0110	0.0509	89.1
PM-CON	7.1	0.0071	0.0040	7.1
PM10-PRI	70.3	0.0126	0.0402	70.4
PM10-FIL	63.2	0.0055	0.0361	63.2
PM25-PRI	53.3	0.0085	0.0305	53.3
PM25-FIL	46.3	0.0014	0.0264	46.3
Acetaldehyde				
Acrolein				
Antimony Compounds	2.47E-02	2.88E-05		2.48E-02
Arsenic Compounds	6.22E-03	3.07E-06	2.96E-04	6.52E-03
Benzene	1.01E-03	1.17E-06		1.01E-03
Beryllium Compounds	1.31E-04	2.30E-06		1.33E-04
1,3-Butadiene				
Cadmium Compounds	1.87E-03	2.30E-06	2.50E-05	1.90E-03
Chromium Compounds	3.98E-03	2.30E-06	5.38E-05	4.04E-03
Cobalt Compounds	2.84E-02	3.30E-05	5.64E-07	2.84E-02
Ethylbenzene	3.00E-04	3.49E-07		3.00E-04
Formaldehyde	2.87E-01	3.34E-04		2.88E-01
Hydrochloric Acid			8.87E-05	8.87E-05
Lead Compounds	7.11E-03	6.91E-06	1.48E-03	8.60E-03
Manganese Compounds	1.41E-02	4.60E-06	1.83E-04	1.43E-02
Mercury Compounds	5.32E-04	2.30E-06		5.35E-04
Nickel Compounds	3.98E-01	2.30E-06	2.96E-05	3.98E-01
Naphthalene	5.32E-03	6.19E-06		5.33E-03
Phosphorus	4.46E-02	5.19E-05		4.46E-02
POM	6.12E-03	7.13E-06		6.13E-03
Selenium Compounds	3.22E-03	1.15E-05		3.23E-03
Toluene	2.92E-02	3.40E-05		2.92E-02
Xylene				
o-Xylene	5.13E-04	5.97E-07		5.14E-04
Total HAPs				8.65E-01

CT-3

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	2,499,765	137,976	344,908	0.163	M	28.1
NOX	2,499,765	137,976	344,908	0.112	S	19.3
CO	2,499,765	137,976	344,908	0.0809	S	14.0
VOC	2,499,765	137,976	344,908	0.000647	S	0.11
PM-PRI	2,499,765	137,976	344,908	0.031	*	5.3
PM-FIL	2,499,765	137,976	344,908	0.02380	S	4.1
PM-CON	2,499,765	137,976	344,908	0.00720	A	1.2
PM10-PRI	2,499,765	137,976	344,908	0.0262	*	4.5
PM10-FIL	2,499,765	137,976	344,908	0.01900	*	3.3
PM25-PRI	2,499,765	137,976	344,908	0.0256	*	4.4
PM25-FIL	2,499,765	137,976	344,908	0.0184	*	3.2
Acetaldehyde	2,499,765	137,976	344,908	2.52E-05	A	4.35E-03
Acrolein	2,499,765	137,976	344,908	7.88E-06	A	1.36E-03
Antimony Compounds	2,499,765	137,976	344,908		A	
Arsenic Compounds	2,499,765	137,976	344,908	1.10E-05	A	1.90E-03
Benzene	2,499,765	137,976	344,908	5.50E-05	A	9.48E-03
Beryllium Compounds	2,499,765	137,976	344,908	3.10E-07	A	5.35E-05
1,3-Butadiene	2,499,765	137,976	344,908	1.60E-05	A	2.76E-03
Cadmium Compounds	2,499,765	137,976	344,908	4.80E-06	A	8.28E-04
Chromium Compounds	2,499,765	137,976	344,908	1.10E-05	A	1.90E-03
Cobalt Compounds	2,499,765	137,976	344,908		A	
Ethylbenzene	2,499,765	137,976	344,908		A	
Formaldehyde	2,499,765	137,976	344,908	2.80E-04	A	4.83E-02
Hydrochloric Acid	2,499,765	137,976	344,908		A	
Lead Compounds	2,499,765	137,976	344,908	1.40E-05	A	2.41E-03
Manganese Compounds	2,499,765	137,976	344,908	7.90E-04	A	1.36E-01
Mercury Compounds	2,499,765	137,976	344,908	1.20E-06	A	2.07E-04
Nickel Compounds	2,499,765	137,976	344,908	4.60E-06	A	7.93E-04
Naphthalene	2,499,765	137,976	344,908	3.50E-05	A	6.04E-03
Phosphorus	2,499,765	137,976	344,908		A	
POM	2,499,765	137,976	344,908	4.00E-05	A	6.90E-03
Selenium Compounds	2,499,765	137,976	344,908	2.50E-05	A	4.31E-03
Toluene	2,499,765	137,976	344,908	2.81E-04	A	4.85E-02
Xylene	2,499,765	137,976	344,908	1.93E-04	A	3.33E-02
o-Xylene	2,499,765	137,976	344,908		A	
Total HAPs						3.10E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

PBSG1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	268	137,976	37	0.163	M	0.003
NOX	268	137,976	37	3.2	A	0.059
CO	268	137,976	37	0.85	A	0.016
VOC	268	137,976	37	0.0819	A	0.002
PM-PRI	268	137,976	37	0.0697	A	1.29E-03
PM-FIL	268	137,976	37	0.062	A	1.15E-03
PM-CON	268	137,976	37	0.0077	A	1.42E-04
PM10-PRI	268	137,976	37	0.0573	A	1.06E-03
PM10-FIL	268	137,976	37	0.0496	A	9.17E-04
PM25-PRI	268	137,976	37	0.0556	A	1.03E-03
PM25-FIL	268	137,976	37	0.0479	A	8.86E-04
Acetaldehyde	268	137,976	37	2.52E-05	A	4.66E-07
Acrolein	268	137,976	37	7.88E-06	A	1.46E-07
Antimony Compounds	268	137,976	37		A	
Arsenic Compounds	*268*	*137,976*	*37*	*1.10E-05*	*A*	*2.03E-07*
Benzene	268	137,976	37	7.76E-04	A	1.43E-05
Beryllium Compounds	268	137,976	37	3.10E-07	A	5.73E-09
1,3-Butadiene	268	137,976	37	1.60E-05	A	2.96E-07
Cadmium Compounds	268	137,976	37	4.80E-06	A	8.87E-08
Chromium Compounds	268	137,976	37	1.10E-05	A	2.03E-07
Cobalt Compounds	268	137,976	37		A	
Ethylbenzene	268	137,976	37		A	
Formaldehyde	268	137,976	37	7.89E-05	A	1.46E-06
Hydrochloric Acid	268	137,976	37		A	
Lead Compounds	268	137,976	37	1.40E-05	A	2.59E-07
Manganese Compounds	268	137,976	37	7.90E-04	A	1.46E-05
Mercury Compounds	268	137,976	37	1.20E-06	A	2.22E-08
Nickel Compounds	268	137,976	37	4.60E-06	A	8.50E-08
Naphthalene	268	137,976	37	1.30E-04	A	2.40E-06
Phosphorus	268	137,976	37		A	
POM	268	137,976	37	2.12E-04	A	3.92E-06
Selenium Compounds	268	137,976	37	2.50E-05	A	4.62E-07
Toluene	268	137,976	37	2.81E-04	A	5.20E-06
Xylene	268	137,976	37	1.93E-04	A	3.57E-06
o-Xylene	268	137,976	37		A	
Total HAPs						*4.77E-05*

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)			
	Boiler	CT-3	PBSG1	Total
SO2	1317.1	28.1	0.003	1,345.2
NOX	221.5	19.3	0.059	240.9
CO	23.5	14.0	0.016	37.5
VOC	3.6	0.1	0.002	3.7
PM-PRI	96.2	5.3	1.29E-03	101.5
PM-FIL	89.1	4.1	1.15E-03	93.2
PM-CON	7.1	1.2	1.42E-04	8.3
PM10-PRI	70.4	4.5	1.06E-03	74.9
PM10-FIL	63.2	3.3	9.17E-04	66.5
PM25-PRI	53.3	4.4	1.03E-03	57.7
PM25-FIL	46.3	3.2	8.86E-04	49.5
Acetaldehyde		4.35E-03	4.66E-07	0.0043
Acrolein		1.36E-03	1.46E-07	0.0014
Antimony Compounds	2.48E-02			0.0248
Arsenic Compounds	6.52E-03	1.90E-03	2.03E-07	0.0084
Benzene	1.01E-03	9.48E-03	1.43E-05	0.0105
Beryllium Compounds	1.33E-04	5.35E-05	5.73E-09	0.0002
1,3-Butadiene		2.76E-03	2.96E-07	0.0028
Cadmium Compounds	1.90E-03	8.28E-04	8.87E-08	0.0027
Chromium Compounds	4.04E-03	1.90E-03	2.03E-07	0.0059
Cobalt Compounds	2.84E-02			0.0284
Ethylbenzene	3.00E-04			0.0003
Formaldehyde	2.88E-01	4.83E-02	1.46E-06	0.3360
Hydrochloric Acid	8.87E-05			0.0001
Lead Compounds	8.60E-03	2.41E-03	2.59E-07	0.0110
Manganese Compounds	1.43E-02	1.36E-01	1.46E-05	0.1506
Mercury Compounds	5.35E-04	2.07E-04	2.22E-08	0.0007
Nickel Compounds	3.98E-01	7.93E-04	8.50E-08	0.3989
Naphthalene	5.33E-03	6.04E-03	2.40E-06	0.0114
Phosphorus	4.46E-02			0.0446
POM	6.13E-03	6.90E-03	3.92E-06	0.0130
Selenium Compounds	3.23E-03	4.31E-03	4.62E-07	0.0075
Toluene	2.92E-02	4.85E-02	5.20E-06	0.0777
Xylene		3.33E-02	3.57E-06	0.0333
o-Xylene	5.14E-04			0.0005
Total HAPS	8.65E-01	3.10E-01	4.77E-05	1.1750

2005 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100023

DATA REPRESENTATIVE OF JANUARY 1, 2005 - DECEMBER 31, 2005
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Shipman Power Plant

2) Permit No(s).: 0236-01-C

3) Physical Facility Address:

Street: Corner of Lihiwai and Banyan Drive

City: Hilo Zip Code: 96720

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Bruce Schlieman	808-543-4516	808-543-4511	bruce.schlieman@heco.com
Mailing Address:	Mailing City:	State:	Zip Code:
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 282583 (Easting (m)) Vertical (y): 2182613 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2005 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Norman Verbanic, Jr.

Name: Norman Verbanic, Jr. Date: 4/20/06
Responsible Official

Title: Production Manager

Permit No.:	0236-01-C
Date Rec'd:	

FORM F-1

2006 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2005)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Shipman Power Plant	B. Location:	Corner of Lihiwai and Banyan Drive	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City: Hilo	F. State: HI	G. Zip Code:	96721
H. Contact Person:	Bruce Schlieman	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4516
K. Responsible Official:	Norman Verbanic, Jr.	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:		Date:			

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												Annual Total
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
S-3	4.8	3.5	2.7	65.7	1.2	11.1	0.2	0.0	0.0	–			
S-4	5.7	4.2	3.2	78.1	1.4	13.3	0.2	0.0	0.1	–			
A. Supplement (if appl.)													
B. Total Report Emissions	10.5	7.7	5.9	143.8	2.6	24.4	0.4	0.0	0.1	–			
C. Total Emissions Subject to Fees	10			143		24	0						D. 177

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2005 $/TON	Multiply	CPI Index Adjustmnt 2.65% incr. '03 to '04)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	177	x	41.67	x	1.027	=	B.	$7,574.73
	"Clean Air Special Fund - NON"	C.	177	x	10.16	x	1.027	=	D.	$1,846.87
							Total	=	E.	$9,421.60

Note: 2006 $/ton charge payable to Clean Air Special Fund - COV = $41.67 x 1.027 = $42.80/ton.
2006 $/ton charge payable to Clean Air Special Fund - NON = $10.16 x 1.027 = $10.43/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with two separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

S-3 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	468,132	150,558	70,481	1.863	M	65.7
NOX	468,132	150,558	70,481	0.313	A	11.0
CO	468,132	150,558	70,481	0.0333	A	1.2
VOC	468,132	150,558	70,481	0.00507	A	0.2
PM-PRI	468,132	150,558	70,481	0.136	A	4.8
PM-FIL	468,132	150,558	70,481	0.126	A	4.4
PM-CON	468,132	150,558	70,481	0.0100	A	0.4
PM10-PRI	468,132	150,558	70,481	0.0995	A	3.5
PM10-FIL	468,132	150,558	70,481	0.0895	A	3.2
PM25-PRI	468,132	150,558	70,481	0.0755	A	2.7
PM25-FIL	468,132	150,558	70,481	0.0655	A	2.3
Acetaldehyde	468,132	150,558	70,481		A	
Acrolein	468,132	150,558	70,481		A	
Antimony Compounds	468,132	150,558	70,481	3.50E-05	A	1.23E-03
Arsenic Compounds	468,132	150,558	70,481	8.80E-06	A	3.10E-04
Benzene	468,132	150,558	70,481	1.43E-06	A	5.03E-05
Beryllium Compounds	468,132	150,558	70,481	1.85E-07	A	6.53E-06
1,3-Butadiene	468,132	150,558	70,481		A	
Cadmium Compounds	468,132	150,558	70,481	2.65E-06	A	9.35E-05
Chromium Compounds	468,132	150,558	70,481	5.63E-06	A	1.99E-04
Cobalt Compounds	468,132	150,558	70,481	4.01E-05	A	1.41E-03
Ethylbenzene	468,132	150,558	70,481	4.24E-07	A	1.49E-05
Formaldehyde	468,132	150,558	70,481	4.07E-04	A	1.43E-02
Hydrochloric Acid	468,132	150,558	70,481		A	
Lead Compounds	468,132	150,558	70,481	1.01E-05	A	3.55E-04
Manganese Compounds	468,132	150,558	70,481	2.00E-05	A	7.05E-04
Mercury Compounds	468,132	150,558	70,481	7.53E-07	A	2.65E-05
Nickel Compounds	468,132	150,558	70,481	5.63E-04	A	1.99E-02
Naphthalene	468,132	150,558	70,481	7.53E-06	A	2.65E-04
Phosphorus	468,132	150,558	70,481	6.31E-05	A	2.22E-03
POM	468,132	150,558	70,481	8.67E-06	A	3.05E-04
Selenium Compounds	468,132	150,558	70,481	4.55E-06	A	1.60E-04
Toluene	468,132	150,558	70,481	4.13E-05	A	1.46E-03
Xylene	468,132	150,558	70,481		A	
o-Xylene	468,132	150,558	70,481	7.27E-07	A	2.56E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-3 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	13,271	91,500	1,214	0.00371	M	0.0023
NOX	13,271	91,500	1,214	0.208	A	0.1263
CO	13,271	91,500	1,214	0.0350	A	0.0213
VOC	13,271	91,500	1,214	0.00546	A	0.0033
PM-PRI	13,271	91,500	1,214	0.01210	A	0.0073
PM-FIL	13,271	91,500	1,214	0.00656	A	0.0040
PM-CON	13,271	91,500	1,214	0.00559	A	0.0034
PM10-PRI	13,271	91,500	1,214	0.01210	A	0.0073
PM10-FIL	13,271	91,500	1,214	0.00656	A	0.0040
PM25-PRI	13,271	91,500	1,214	0.01210	A	0.0073
PM25-FIL	13,271	91,500	1,214	0.00656	A	0.0040
Acetaldehyde	13,271	91,500	1,214		A	
Acrolein	13,271	91,500	1,214		A	
Antimony Compounds	13,271	91,500	1,214		A	
Arsenic Compounds	13,271	91,500	1,214		A	
Benzene	13,271	91,500	1,214		A	
Beryllium Compounds	13,271	91,500	1,214		A	
1,3-Butadiene	13,271	91,500	1,214		A	
Cadmium Compounds	13,271	91,500	1,214		A	
Chromium Compounds	13,271	91,500	1,214		A	
Cobalt Compounds	13,271	91,500	1,214		A	
Ethylbenzene	13,271	91,500	1,214		A	
Formaldehyde	13,271	91,500	1,214		A	
Hydrochloric Acid	13,271	91,500	1,214		A	
Lead Compounds	13,271	91,500	1,214		A	
Manganese Compounds	13,271	91,500	1,214		A	
Mercury Compounds	13,271	91,500	1,214		A	
Nickel Compounds	13,271	91,500	1,214		A	
Naphthalene	13,271	91,500	1,214		A	
Phosphorus	13,271	91,500	1,214		A	
POM	13,271	91,500	1,214		A	
Selenium Compounds	13,271	91,500	1,214		A	
Toluene	13,271	91,500	1,214		A	
Xylene	13,271	91,500	1,214		A	
o-Xylene	13,271	91,500	1,214		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-3 Total

Pollutant	Annual Emissions Fuel Oil (tons/yr)	Propane (tons/yr)	Total (tons/yr)
SO2	65.7	0.0023	65.7
NOX	11	0.1263	11.1
CO	1.2	0.0213	1.2
VOC	0.2	0.0033	0.2
PM-PRI	4.8	0.0073	4.8
PM-FIL	4.4	0.0040	4.4
PM-CON	0.4	0.0034	0.4
PM10-PRI	3.5	0.0073	3.5
PM10-FIL	3.2	0.0040	3.2
PM25-PRI	2.7	0.0073	2.7
PM25-FIL	2.3	0.0040	2.3
Acetaldehyde			
Acrolein			
Antimony Compounds	1.23E-03		1.23E-03
Arsenic Compounds	3.10E-04		3.10E-04
Benzene	5.03E-05		5.03E-05
Beryllium Compounds	6.53E-06		6.53E-06
1,3-Butadiene			
Cadmium Compounds	9.35E-05		9.35E-05
Chromium Compounds	1.99E-04		1.99E-04
Cobalt Compounds	1.41E-03		1.41E-03
Ethylbenzene	1.49E-05		1.49E-05
Formaldehyde	1.43E-02		1.43E-02
Hydrochloric Acid			
Lead Compounds	3.55E-04		3.55E-04
Manganese Compounds	7.05E-04		7.05E-04
Mercury Compounds	2.65E-05		2.65E-05
Nickel Compounds	1.99E-02		1.99E-02
Naphthalene	2.65E-04		2.65E-04
Phosphorus	2.22E-03		2.22E-03
POM	3.05E-04		3.05E-04
Selenium Compounds	1.60E-04		1.60E-04
Toluene	1.46E-03		1.46E-03
Xylene			
o-Xylene	2.56E-05		2.56E-05
Total HAPS			4.30E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	556,542	150,558	83,792	1.863	M	78.1
NOX	556,542	150,558	83,792	0.313	A	13.1
CO	556,542	150,558	83,792	0.0333	A	1.4
VOC	556,542	150,558	83,792	0.00507	A	0.20
PM-PRI	556,542	150,558	83,792	0.136	A	5.7
PM-FIL	556,542	150,558	83,792	0.126	A	5.3
PM-CON	556,542	150,558	83,792	0.0100	A	0.4
PM10-PRI	556,542	150,558	83,792	0.0995	A	4.2
PM10-FIL	556,542	150,558	83,792	0.0895	A	3.7
PM25-PRI	556,542	150,558	83,792	0.0755	A	3.2
PM25-FIL	556,542	150,558	83,792	0.0655	A	2.7
Acetaldehyde	556,542	150,558	83,792		A	
Acrolein	556,542	150,558	83,792		A	
Antimony Compounds	556,542	150,558	83,792	3.50E-05	A	1.47E-03
Arsenic Compounds	556,542	150,558	83,792	8.80E-06	A	3.69E-04
Benzene	556,542	150,558	83,792	1.43E-06	A	5.98E-05
Beryllium Compounds	556,542	150,558	83,792	1.85E-07	A	7.76E-06
1,3-Butadiene	556,542	150,558	83,792		A	
Cadmium Compounds	556,542	150,558	83,792	2.65E-06	A	1.11E-04
Chromium Compounds	556,542	150,558	83,792	5.63E-06	A	2.36E-04
Cobalt Compounds	556,542	150,558	83,792	4.01E-05	A	1.68E-03
Ethylbenzene	556,542	150,558	83,792	4.24E-07	A	1.78E-05
Formaldehyde	556,542	150,558	83,792	4.07E-04	A	1.70E-02
Hydrochloric Acid	556,542	150,558	83,792		A	
Lead Compounds	556,542	150,558	83,792	1.01E-05	A	4.22E-04
Manganese Compounds	556,542	150,558	83,792	2.00E-05	A	8.38E-04
Mercury Compounds	556,542	150,558	83,792	7.53E-07	A	3.16E-05
Nickel Compounds	556,542	150,558	83,792	5.63E-04	A	2.36E-02
Naphthalene	556,542	150,558	83,792	7.53E-06	A	3.16E-04
Phosphorus	556,542	150,558	83,792	6.31E-05	A	2.64E-03
POM	556,542	150,558	83,792	8.67E-06	A	3.63E-04
Selenium Compounds	556,542	150,558	83,792	4.55E-06	A	1.91E-04
Toluene	556,542	150,558	83,792	4.13E-05	A	1.73E-03
Xylene	556,542	150,558	83,792		A	
o-Xylene	556,542	150,558	83,792	7.27E-07	A	3.04E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	15,777	91,500	1,444	0.00371	M	0.0027
NOX	15,777	91,500	1,444	0.208	A	0.1501
CO	15,777	91,500	1,444	0.0350	A	0.0253
VOC	15,777	91,500	1,444	0.00546	A	0.0039
PM-PRI	15,777	91,500	1,444	0.01210	A	0.0087
PM-FIL	15,777	91,500	1,444	0.00656	A	0.0047
PM-CON	15,777	91,500	1,444	0.00559	A	0.0040
PM10-PRI	15,777	91,500	1,444	0.01210	A	0.0087
PM10-FIL	15,777	91,500	1,444	0.00656	A	0.0047
PM25-PRI	15,777	91,500	1,444	0.01210	A	0.0087
PM25-FIL	15,777	91,500	1,444	0.00656	A	0.0047
Acetaldehyde	15,777	91,500	1,444		A	
Acrolein	15,777	91,500	1,444		A	
Antimony Compounds	15,777	91,500	1,444		A	
Arsenic Compounds	15,777	91,500	1,444		A	
Benzene	15,777	91,500	1,444		A	
Beryllium Compounds	15,777	91,500	1,444		A	
1,3-Butadiene	15,777	91,500	1,444		A	
Cadmium Compounds	15,777	91,500	1,444		A	
Chromium Compounds	15,777	91,500	1,444		A	
Cobalt Compounds	15,777	91,500	1,444		A	
Ethylbenzene	15,777	91,500	1,444		A	
Formaldehyde	15,777	91,500	1,444		A	
Hydrochloric Acid	15,777	91,500	1,444		A	
Lead Compounds	15,777	91,500	1,444		A	
Manganese Compounds	15,777	91,500	1,444		A	
Mercury Compounds	15,777	91,500	1,444		A	
Nickel Compounds	15,777	91,500	1,444		A	
Naphthalene	15,777	91,500	1,444		A	
Phosphorus	15,777	91,500	1,444		A	
POM	15,777	91,500	1,444		A	
Selenium Compounds	15,777	91,500	1,444		A	
Toluene	15,777	91,500	1,444		A	
Xylene	15,777	91,500	1,444		A	
o-Xylene	15,777	91,500	1,444		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 Total

Pollutant	Annual Emissions Fuel Oil (tons/yr)	Propane (tons/yr)	Total (tons/yr)
SO2	78.1	0.0027	78.1
NOX	13.1	0.1501	13.3
CO	1.4	0.0253	1.4
VOC	0.20	0.0039	0.2
PM-PRI	5.7	0.0087	5.7
PM-FIL	5.3	0.0047	5.3
PM-CON	0.4	0.0040	0.4
PM10-PRI	4.2	0.0087	4.2
PM10-FIL	3.7	0.0047	3.7
PM25-PRI	3.2	0.0087	3.2
PM25-FIL	2.7	0.0047	2.7
Acetaldehyde			
Acrolein			
Antimony Compounds	1.47E-03		1.47E-03
Arsenic Compounds	3.69E-04		3.69E-04
Benzene	5.98E-05		5.98E-05
Beryllium Compounds	7.76E-06		7.76E-06
1,3-Butadiene			
Cadmium Compounds	1.11E-04		1.11E-04
Chromium Compounds	2.36E-04		2.36E-04
Cobalt Compounds	1.68E-03		1.68E-03
Ethylbenzene	1.78E-05		1.78E-05
Formaldehyde	1.70E-02		1.70E-02
Hydrochloric Acid			
Lead Compounds	4.22E-04		4.22E-04
Manganese Compounds	8.38E-04		8.38E-04
Mercury Compounds	3.16E-05		3.16E-05
Nickel Compounds	2.36E-02		2.36E-02
Naphthalene	3.16E-04		3.16E-04
Phosphorus	2.64E-03		2.64E-03
POM	3.63E-04		3.63E-04
Selenium Compounds	1.91E-04		1.91E-04
Toluene	1.73E-03		1.73E-03
Xylene			
o-Xylene	3.04E-05		3.04E-05
Total HAPS			5.12E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year) S-3	S-4	Total
SO2	65.7	78.1	143.8
NOX	11.1	13.3	24.4
CO	1.2	1.4	2.6
VOC	0.2	0.2	0.4
PM-PRI	4.8	5.7	10.5
PM-FIL	4.4	5.3	9.7
PM-CON	0.4	0.4	0.8
PM10-PRI	3.5	4.2	7.7
PM10-FIL	3.2	3.7	6.9
PM25-PRI	2.7	3.2	5.9
PM25-FIL	2.3	2.7	5.0
Acetaldehyde			
Acrolein			
Antimony Compounds	1.23E-03	1.47E-03	2.70E-03
Arsenic Compounds	3.10E-04	3.69E-04	6.79E-04
Benzene	5.03E-05	5.98E-05	1.10E-04
Beryllium Compounds	6.53E-06	7.76E-06	1.43E-05
1,3-Butadiene			
Cadmium Compounds	9.35E-05	1.11E-04	2.05E-04
Chromium Compounds	1.99E-04	2.36E-04	4.35E-04
Cobalt Compounds	1.41E-03	1.68E-03	3.10E-03
Ethylbenzene	1.49E-05	1.78E-05	3.27E-05
Formaldehyde	1.43E-02	1.70E-02	3.14E-02
Hydrochloric Acid			
Lead Compounds	3.55E-04	4.22E-04	7.77E-04
Manganese Compounds	7.05E-04	8.38E-04	1.54E-03
Mercury Compounds	2.65E-05	3.16E-05	5.81E-05
Nickel Compounds	1.99E-02	2.36E-02	4.35E-02
Naphthalene	2.65E-04	3.16E-04	5.81E-04
Phosphorus	2.22E-03	2.64E-03	4.86E-03
POM	3.05E-04	3.63E-04	6.69E-04
Selenium Compounds	1.60E-04	1.91E-04	3.51E-04
Toluene	1.46E-03	1.73E-03	3.19E-03
Xylene			
o-Xylene	2.56E-05	3.04E-05	5.61E-05
Total HAPS	4.30E-02	5.12E-02	9.42E-02

2005 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100519

DATA REPRESENTATIVE OF JANUARY 1, 2005 - DECEMBER 31, 2005
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Waimea Power Plant

2) Permit No(s).: 0237-01-C

3) Physical Facility Address:

Street: Rubbish Dump Road

City: Kamuela Zip Code: 96743

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Bruce Schlieman	808-543-4516	808-543-4511	bruce.schlieman@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: ____ Type B: X Neither: ____

6) SIC Code (Primary / Secondary): 4911 / ____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 217,725 (Easting (m)) Vertical (y): 2,216,930 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2005 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Norman Verbanic, Jr.

Name: Norman Verbanic, Jr. Date: 4/20/06
Responsible Official

Title: Production Manager

Permit No.:	0237-01-C
Date Rec'd:	

FORM F-1

2006 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2005)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Waimea Power Plant	B. Location:	Rubbish Dump Road	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City: Hilo	F. State: HI	G. Zip Code:	96721
H. Contact Person:	Bruce Schlieman	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4516
K. Responsible Official:	Norman Verbanic, Jr.	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:		Date:			

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												Annual Total
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
D-12	0.6	0.5	0.5	1.4	7.2	27.2	0.7	0.0	0.0	–			
D-13	0.8	0.6	0.6	1.8	9.2	34.5	0.9	0.0	0.0	–			
D-14	0.6	0.5	0.5	1.4	7.2	27.2	0.7	0.0	0.0	–			
A. Supplement (if appl.) _____													
B. Total Report Emissions	2.0	1.6	1.6	4.6	23.6	88.9	2.3	0.0	0.0	–			
C. Total Emissions Subject to Fees	2			4		88	2						D. 96

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2005 $/TON	Multiply	CPI Index Adjustmn 2.65% incr. '03 to '04)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	96	x	41.67	x	1.027	=	B.	$4,108.33
	"Clean Air Special Fund - NON"	C.	96	x	10.16	x	1.027	=	D.	$1,001.69
							Total	=	E.	$5,110.02

Note: 2006 $/ton charge payable to Clean Air Special Fund - COV = $41.67 x 1.027 = $42.80/ton.
2006 $/ton charge payable to Clean Air Special Fund - NON = $10.16 x 1.027 = $10.43/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with two separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

D-12

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	123,176	137,976	16,995	0.163	M	1.4
NOX	123,176	137,976	16,995	3.2	A	27.2
CO	123,176	137,976	16,995	0.85	A	7.2
VOC	123,176	137,976	16,995	0.0819	A	0.7
PM-PRI	123,176	137,976	16,995	0.0697	A	0.6
PM-FIL	123,176	137,976	16,995	0.0620	A	0.5
PM-CON	123,176	137,976	16,995	0.0077	A	0.1
PM10-PRI	123,176	137,976	16,995	0.0573	A	0.5
PM10-FIL	123,176	137,976	16,995	0.0496	A	0.4
PM25-PRI	123,176	137,976	16,995	0.0556	A	0.5
PM25-FIL	123,176	137,976	16,995	0.0479	A	0.4
Acetaldehyde	123,176	137,976	16,995	2.52E-05	A	2.14E-04
Acrolein	123,176	137,976	16,995	7.88E-06	A	6.70E-05
Antimony Compounds	123,176	137,976	16,995		A	
Arsenic Compounds	123,176	137,976	16,995	1.10E-05	A	9.35E-05
Benzene	123,176	137,976	16,995	7.76E-04	A	6.59E-03
Beryllium Compounds	123,176	137,976	16,995	3.10E-07	A	2.63E-06
1,3-Butadiene	123,176	137,976	16,995	1.60E-05	A	1.36E-04
Cadmium Compounds	123,176	137,976	16,995	4.80E-06	A	4.08E-05
Chromium Compounds	123,176	137,976	16,995	1.10E-05	A	9.35E-05
Cobalt Compounds	123,176	137,976	16,995		A	
Ethylbenzene	123,176	137,976	16,995		A	
Formaldehyde	123,176	137,976	16,995	7.89E-05	A	6.70E-04
Hydrochloric Acid	123,176	137,976	16,995		A	
Lead Compounds	123,176	137,976	16,995	1.40E-05	A	1.19E-04
Manganese Compounds	123,176	137,976	16,995	7.90E-04	A	6.71E-03
Mercury Compounds	123,176	137,976	16,995	1.20E-06	A	1.02E-05
Nickel Compounds	123,176	137,976	16,995	4.60E-06	A	3.91E-05
Naphthalene	123,176	137,976	16,995	1.30E-04	A	1.10E-03
Phosphorus	123,176	137,976	16,995		A	
POM	123,176	137,976	16,995	2.12E-04	A	1.80E-03
Selenium Compounds	123,176	137,976	16,995	2.50E-05	A	2.12E-04
Toluene	123,176	137,976	16,995	2.81E-04	A	2.39E-03
Xylene	123,176	137,976	16,995	1.93E-04	A	1.64E-03
o-Xylene	123,176	137,976	16,995		A	
Total HAPs						2.19E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-13

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	156,059	137,976	21,532	0.163	M	1.8
NOX	156,059	137,976	21,532	3.2	A	34.5
CO	156,059	137,976	21,532	0.85	A	9.2
VOC	156,059	137,976	21,532	0.0819	A	0.9
PM-PRI	156,059	137,976	21,532	0.0697	A	0.8
PM-FIL	156,059	137,976	21,532	0.0620	A	0.7
PM-CON	156,059	137,976	21,532	0.0077	A	0.1
PM10-PRI	156,059	137,976	21,532	0.0573	A	0.6
PM10-FIL	156,059	137,976	21,532	0.0496	A	0.5
PM25-PRI	156,059	137,976	21,532	0.0556	A	0.6
PM25-FIL	156,059	137,976	21,532	0.0479	A	0.5
Acetaldehyde	156,059	137,976	21,532	2.52E-05	A	2.71E-04
Acrolein	156,059	137,976	21,532	7.88E-06	A	8.48E-05
Antimony Compounds	156,059	137,976	21,532		A	
Arsenic Compounds	156,059	137,976	21,532	1.10E-05	A	1.18E-04
Benzene	156,059	137,976	21,532	7.76E-04	A	8.35E-03
Beryllium Compounds	156,059	137,976	21,532	3.10E-07	A	3.34E-06
1,3-Butadiene	156,059	137,976	21,532	1.60E-05	A	1.72E-04
Cadmium Compounds	156,059	137,976	21,532	4.80E-06	A	5.17E-05
Chromium Compounds	156,059	137,976	21,532	1.10E-05	A	1.18E-04
Cobalt Compounds	156,059	137,976	21,532		A	
Ethylbenzene	156,059	137,976	21,532		A	
Formaldehyde	156,059	137,976	21,532	7.89E-05	A	8.49E-04
Hydrochloric Acid	156,059	137,976	21,532		A	
Lead Compounds	156,059	137,976	21,532	1.40E-05	A	1.51E-04
Manganese Compounds	156,059	137,976	21,532	7.90E-04	A	8.51E-03
Mercury Compounds	156,059	137,976	21,532	1.20E-06	A	1.29E-05
Nickel Compounds	156,059	137,976	21,532	4.60E-06	A	4.95E-05
Naphthalene	156,059	137,976	21,532	1.30E-04	A	1.40E-03
Phosphorus	156,059	137,976	21,532		A	
POM	156,059	137,976	21,532	2.12E-04	A	2.28E-03
Selenium Compounds	156,059	137,976	21,532	2.50E-05	A	2.69E-04
Toluene	156,059	137,976	21,532	2.81E-04	A	3.03E-03
Xylene	156,059	137,976	21,532	1.93E-04	A	2.08E-03
o-Xylene	156,059	137,976	21,532		A	
Total HAPs						2.78E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-14

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	123,221	137,976	17,002	0.163	M	1.4
NOX	123,221	137,976	17,002	3.2	A	27.2
CO	123,221	137,976	17,002	0.85	A	7.2
VOC	123,221	137,976	17,002	0.0819	A	0.7
PM-PRI	123,221	137,976	17,002	0.0697	A	0.6
PM-FIL	123,221	137,976	17,002	0.0620	A	0.5
PM-CON	123,221	137,976	17,002	0.0077	A	0.1
PM10-PRI	123,221	137,976	17,002	0.0573	A	0.5
PM10-FIL	123,221	137,976	17,002	0.0496	A	0.4
PM25-PRI	123,221	137,976	17,002	0.0556	A	0.5
PM25-FIL	123,221	137,976	17,002	0.0479	A	0.4
Acetaldehyde	123,221	137,976	17,002	2.52E-05	A	2.14E-04
Acrolein	123,221	137,976	17,002	7.88E-06	A	6.70E-05
Antimony Compounds	123,221	137,976	17,002		A	
Arsenic Compounds	123,221	137,976	17,002	1.10E-05	A	9.35E-05
Benzene	123,221	137,976	17,002	7.76E-04	A	6.60E-03
Beryllium Compounds	123,221	137,976	17,002	3.10E-07	A	2.64E-06
1,3-Butadiene	123,221	137,976	17,002	1.60E-05	A	1.36E-04
Cadmium Compounds	123,221	137,976	17,002	4.80E-06	A	4.08E-05
Chromium Compounds	123,221	137,976	17,002	1.10E-05	A	9.35E-05
Cobalt Compounds	123,221	137,976	17,002		A	
Ethylbenzene	123,221	137,976	17,002		A	
Formaldehyde	123,221	137,976	17,002	7.89E-05	A	6.71E-04
Hydrochloric Acid	123,221	137,976	17,002		A	
Lead Compounds	123,221	137,976	17,002	1.40E-05	A	1.19E-04
Manganese Compounds	123,221	137,976	17,002	7.90E-04	A	6.72E-03
Mercury Compounds	123,221	137,976	17,002	1.20E-06	A	1.02E-05
Nickel Compounds	123,221	137,976	17,002	4.60E-06	A	3.91E-05
Naphthalene	123,221	137,976	17,002	1.30E-04	A	1.11E-03
Phosphorus	123,221	137,976	17,002		A	
POM	123,221	137,976	17,002	2.12E-04	A	1.80E-03
Selenium Compounds	123,221	137,976	17,002	2.50E-05	A	2.13E-04
Toluene	123,221	137,976	17,002	2.81E-04	A	2.39E-03
Xylene	123,221	137,976	17,002	1.93E-04	A	1.64E-03
o-Xylene	123,221	137,976	17,002		A	
Total HAPs						2.19E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)			
	D-12	D-13	D-14	Total
SO2	1.4	1.8	1.4	4.6
NOX	27.2	34.5	27.2	88.9
CO	7.2	9.2	7.2	23.6
VOC	0.7	0.9	0.7	2.3
PM-PRI	0.6	0.8	0.6	2.0
PM-FIL	0.5	0.7	0.5	1.7
PM-CON	0.1	0.1	0.1	0.3
PM10-PRI	0.5	0.6	0.5	1.6
PM10-FIL	0.4	0.5	0.4	1.3
PM25-PRI	0.5	0.6	0.5	1.6
PM25-FIL	0.4	0.5	0.4	1.3
Acetaldehyde	2.14E-04	2.71E-04	2.14E-04	0.0007
Acrolein	6.70E-05	8.48E-05	6.70E-05	0.0002
Antimony Compounds				
Arsenic Compounds	9.35E-05	1.18E-04	9.35E-05	0.0003
Benzene	6.59E-03	8.35E-03	6.60E-03	0.0215
Beryllium Compounds	2.63E-06	3.34E-06	2.64E-06	0.0000
1,3-Butadiene	1.36E-04	1.72E-04	1.36E-04	0.0004
Cadmium Compounds	4.08E-05	5.17E-05	4.08E-05	0.0001
Chromium Compounds	9.35E-05	1.18E-04	9.35E-05	0.0003
Cobalt Compounds				
Ethylbenzene				
Formaldehyde	6.70E-04	8.49E-04	6.71E-04	0.0022
Hydrochloric Acid				
Lead Compounds	1.19E-04	1.51E-04	1.19E-04	0.0004
Manganese Compounds	6.71E-03	8.51E-03	6.72E-03	0.0219
Mercury Compounds	1.02E-05	1.29E-05	1.02E-05	0.0000
Nickel Compounds	3.91E-05	4.95E-05	3.91E-05	0.0001
Naphthalene	1.10E-03	1.40E-03	1.11E-03	0.0036
Phosphorus				
POM	1.80E-03	2.28E-03	1.80E-03	0.0059
Selenium Compounds	2.12E-04	2.69E-04	2.13E-04	0.0007
Toluene	2.39E-03	3.03E-03	2.39E-03	0.0078
Xylene	1.64E-03	2.08E-03	1.64E-03	0.0054
o-Xylene				
Total HAPS	2.19E-02	2.78E-02	2.19E-02	0.0717

Table 4 - HELCO 2006-08 Fee Projection Calculation

Plant	Units	2005 Primary Fuel (bbls)[1]	2005 Emission Fee Total	Projected 2006 Primary Fuel (bbls)[3,4]	Projected 2005 to 2006 $/ton Increase[2]	Projected 2006 Emission Fee	Projected 2007 Primary Fuel (bbls)[3,4]	Projected 2006 to 2007 $/ton Increase[2]	Projected 2007 Emission Fee	Projected 2008 Primary Fuel (bbls)[3,4]	Projected 2007 to 2008 $/ton Increase[2]	Projected 2008 Emission Fee
Hill-Kanoelehua	Hill 5 & 6	478,227	$186,543.64	421,404	2.65%	$168,735	488,568	5.30%	$200,878	477,166	7.95%	$200,927
	CT-1	4,507	$734.21	3,518	2.65%	$588	2,586	5.30%	$444	2,923	7.95%	$514
	D-11, D-15, D-16, D-17	3,127	$1,686.57	3,518	2.65%	$1,948	2,586	5.30%	$1,469	2,923	7.95%	$1,702
	Subtotal		$188,964.41			$171,271			$202,591			$203,143
Keahole	D-21, D-22, D-23	4,548	$1,488.94									
	CT-2	37,566	$1,859.85									
	CT-4	156,185	$7,895.08									
	CT-5	134,181	$6,215.38									
	Subtotal	332,480	$17,459.25	354,775	2.65%	$19,124	292,369	5.30%	$16,167	290,917	7.95%	$16,491
PGH	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
	Subtotal		$89,904.48			$81,826			$86,458			$92,006
Shipman	S-3, S-4	24,397	$9,421.60	102,894	2.65%	$40,788	120,857	5.30%	$49,146	119,450	7.95%	$49,796
Waimea	D-12, D-13, D-14	9,582	$5,110.02	1,204	2.65%	$659	2,399	5.30%	$1,347	2,829	7.95%	$1,629
	Total		$310,859.76			$313,468			$359,707			$363,065

Notes:

1. 2005 primary fuel use obtained from 2005 EI spreadsheets.
2. $/ton increase based on a CPI Index Adjustment of 2.65% per year (Source - Form F-1 of Emission Fee Reports).
3. Projected fuel values from an email from B. Schlieman "HELCO Emission Fee Estimates 2006 - 2008" dated 4/19/2006.
4. Projected CT-1 and D-11, D-15, D-16, and D-17 fuel use based on a 50/50 split of Kanoelehua diesel.

CA-IR-60
DOCKET NO. 05-0315
ATTACHMENT 2
PAGE 1 OF 2

2006

PLANT	UNIT	COV	NON	Total	Fudge Factor 10%
Hill	Total	$ 144,709.28	$ 35,281.10	$ 179,990.38	$ 197,989
	5 & 6	$ 143,000.94	$ 34,864.59	$ 177,865.53	$ 195,652
	CT-1	$ 250.00	$ 60.96	$ 310.96	$ 342
	Diesels	$ 1,458.34	$ 355.55	$ 1,813.89	$ 1,995
Keahole	Total	$ 11,041.74	$ 2,692.05	$ 13,733.79	$ 15,107
	CT-2	$ 500.00	$ 121.90	$ 621.90	$ 684
	Diesels	$ 1,416.68	$ 345.40	$ 1,762.08	$ 1,938
	CT-4 & 5	$ 9,125.06	$ 2,224.75	$ 11,349.81	$ 12,485
Puna	Total	$ 57,458.71	$ 14,008.82	$ 71,467.53	$ 78,614
	Puna Boiler	$ 55,333.70	$ 13,490.73	$ 68,824.43	$ 75,707
	CT-3	$ 2,125.01	$ 518.09	$ 2,643.10	$ 2,907
Shipman	3 & 4	$ 6,666.71	$ 1,625.39	$ 8,292.10	$ 9,121
Waimea	12, 13 & 14	$ 2,375.02	$ 579.04	$ 2,954.06	$ 3,249
HELCO	Total	$ 222,251.46	$ 54,186.40	$ 276,437.86	$ 304,082

(4) DISB gen 2,000

PRELIMINARY AMOUNT USED FOR THE BUDGET. 306,080

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

HELCO/C

April 22, 2005

Sherri-Ann Loo, Esq.
Manager
Environmental Department

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: 2004 Hawaii Emissions Inventory Reports and Annual Fee Payment
Hawaii Electric Light Company, Inc. (HELCO)
Kanoelehua-Hill Generating Station (CSP No. 0234-01-C)
Keahole Generating Station (CSP No. 0256-01-C and PSD No. HI 88-01)
Puna Generating Station (CSP No. 0235-01-C)
Shipman Generating Station (CSP No. 0236-01-C)
Waimea Generating Station (CSP No. 0237-01-C)

Dear Mr. Nagamine:

In accordance with the Department's correspondence, dated January 6, 2005, please find the enclosed 2004 Hawaii Emissions Inventory Reports and a floppy disk with the electronic files for the subject facilities. On February 4, 2005, the Department granted written approval for an Extension of the Annual Fee Payment and Emission Summary Submittals. The total fee payment due for HELCO is $251,095.12.

In addition to the 2004 Hawaii Emissions Inventory Reports are the following:

- Form F-1, 2005 Annual fee Summary for Covered Sources
- Form F-2, Supplement ___, 2005 Annual fee Summary for Covered Sources
- Check No. 35464, made to the order of, Hawaii State Dept. of Health, Clean Air Special Fund - COV, in the amount of $201,876.32.
- Check No. 35465, made to the order of, Hawaii State Dept. of Health, Clean Air Special Fund - NON, in the amount of $49,218.80.

Please call Michael Watanabe with questions at 543-4517.

Sincerely,

Enclosures
cc (w/ encl): E. Yamamoto (EHS – Hilo)
cc (w/o encl): T. Simmons

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

HELCO/C

Electronic Distribution

bcc (w/o encl): W. Lee
D. Giovanni
B. Nakamoto
J. Clary (JCA)
bcc (w/ encl): D. Heinzen
B. Schlieman
Electronic Annual Emissions File: Date & Title

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100014

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Kanoelehua Power Plant

2) Permit No(s).: 0234-01-C

3) Physical Facility Address:

Street: 54 Halekauila Street

City: Hilo Zip Code: 96720

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: ____ Type B: X Neither: ____

6) SIC Code (Primary / Secondary): 4911 / ____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 284300 (Easting (m)) Vertical (y): 2179800 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Dan V. Giovanni

Name: Dan V. Giovanni Date: 3/31/05
Responsible Official

Title: Production Manager

Permit No.:	0234-01-C
Date Rec'd:	

FORM F-1

2005 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2004)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Kanoelehua Power Plant	B. Location:	54 Halekauila Street	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City: Hilo	F. State: HI	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:	Dan V. Giovanni	Date:	3/31/05		

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												Annual Total
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
Hill 5	40.2	29.4	22.3	561.0	9.9	92.7	1.5	0.0	0.4	–			
Hill 6	126.0	92.2	69.9	1756.3	30.9	290.2	4.7	0.0	1.1	–			
CT-1	0.1	0.1	0.1	1.8	0.0	9.6	0.0	0.0	0.0	–			
D-11	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	–			
A. Supplement (if appl.) A	0.4	0.4	0.4	0.9	5.2	19.6	0.5	0.0	0.0	–			
B. Total Report Emissions	166.7	122.1	92.7	2320.0	46.1	412.3	6.7	0.0	1.5	–			
C. Total Emissions Subject to Fees	166			2,320		412	6						D. 2,904

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2004 $/TON	Multiply	CPI Index Adjustmnt (2.2% incr. '02 to '03)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	2,904	x	40.77	x	1.022	=	B.	$121,000.79
	"Clean Air Special Fund - NON'	C.	2,904	x	9.94	x	1.022	=	D.	$29,500.81
							Total	=	E.	$150,501.60

Note: 2005 $/ton charge payable to Clean Air Special Fund - COV = $40.77 x 1.022 = $41.67/ton.
2005 $/ton charge payable to Clean Air Special Fund - NON = $9.94 x 1.022 = $10.16/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with tow separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

Permit No.:	0234-01-C
Date Rec'd:	

FORM F-2
SUPPLEMENT A
2005 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2004)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name: HELCO - Kanoelehua Power Plant	B. Location: 54 Halekauila Street	C. Island: Hawaii
D. Responsible Official: Dan V. Giovanni	E. Title: Production Manager	F. Telephone No.: 808-969-0421
G. Signature: Dan V. Giovanni	Date: 3/3/05	

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS (Report emissions to the nearest tenth of a ton)

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)											
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)											
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3		
D-15	0.1	0.1	0.1	0.2	1.2	4.6	0.1	0.0	0.0	–		
D-16	0.1	0.1	0.1	0.2	1.1	4.2	0.1	0.0	0.0	–		
D-17	0.2	0.2	0.2	0.5	2.9	10.8	0.3	0.0	0.0	–		
Supplement												
Total Report Emissions	0.4	0.4	0.4	0.9	5.2	19.6	0.5	0.0	0.0	–		

Hill 5 No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	3,913,266	151,189	591,643	1.896	M	560.9
NOX	3,913,266	151,189	591,643	0.313	A	92.6
CO	3,913,266	151,189	591,643	0.0333	A	9.9
VOC	3,913,266	151,189	591,643	0.00507	A	1.5
PM-PRI	3,913,266	151,189	591,643	0.136	A	40.2
PM-FIL	3,913,266	151,189	591,643	0.126	A	37.3
PM-CON	3,913,266	151,189	591,643	0.010	A	3.0
PM10-PRI	3,913,266	151,189	591,643	0.0995	A	29.4
PM10-FIL	3,913,266	151,189	591,643	0.0895	A	26.5
PM25-PRI	3,913,266	151,189	591,643	0.0755	A	22.3
PM25-FIL	3,913,266	151,189	591,643	0.0655	A	19.4
Acetaldehyde	3,913,266	151,189	591,643		A	
Acrolein	3,913,266	151,189	591,643		A	
Antimony Compounds	3,913,266	151,189	591,643	3.50E-05	A	1.04E-02
Arsenic Compounds	3,913,266	151,189	591,643	8.80E-06	A	2.60E-03
Benzene	3,913,266	151,189	591,643	1.43E-06	A	4.22E-04
Beryllium Compounds	3,913,266	151,189	591,643	1.85E-07	A	5.48E-05
1,3-Butadiene	3,913,266	151,189	591,643		A	
Cadmium Compounds	3,913,266	151,189	591,643	2.65E-06	A	7.85E-04
Chromium Compounds	3,913,266	151,189	591,643	5.63E-06	A	1.67E-03
Cobalt Compounds	3,913,266	151,189	591,643	4.01E-05	A	1.19E-02
Ethylbenzene	3,913,266	151,189	591,643	4.24E-07	A	1.25E-04
Formaldehyde	3,913,266	151,189	591,643	4.07E-04	A	1.20E-01
Hydrochloric Acid	3,913,266	151,189	591,643		A	
Lead Compounds	3,913,266	151,189	591,643	1.01E-05	A	2.98E-03
Manganese Compounds	3,913,266	151,189	591,643	2.00E-05	A	5.92E-03
Mercury Compounds	3,913,266	151,189	591,643	7.53E-07	A	2.23E-04
Nickel Compounds	3,913,266	151,189	591,643	5.63E-04	A	1.67E-01
Naphthalene	3,913,266	151,189	591,643	7.53E-06	A	2.23E-03
Phosphorus	3,913,266	151,189	591,643	6.31E-05	A	1.87E-02
POM	3,913,266	151,189	591,643	8.67E-06	A	2.56E-03
Selenium Compounds	3,913,266	151,189	591,643	4.55E-06	A	1.35E-03
Toluene	3,913,266	151,189	591,643	4.13E-05	A	1.22E-02
Xylene	3,913,266	151,189	591,643		A	
o-Xylene	3,913,266	151,189	591,643	7.27E-07	A	2.15E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	4,110	137,819	566	0.163	M	0.046
NOX	4,110	137,819	566	0.171	A	0.048
CO	4,110	137,819	566	0.0357	A	0.010
VOC	4,110	137,819	566	0.00143	A	0.000
PM-PRI	4,110	137,819	566	0.0236	A	0.007
PM-FIL	4,110	137,819	566	0.0143	A	0.004
PM-CON	4,110	137,819	566	0.00929	A	0.003
PM10-PRI	4,110	137,819	566	0.0164	A	0.005
PM10-FIL	4,110	137,819	566	0.00714	A	0.002
PM25-PRI	4,110	137,819	566	0.0111	A	0.003
PM25-FIL	4,110	137,819	566	0.00179	A	0.001
Acetaldehyde	4,110	137,819	566		A	
Acrolein	4,110	137,819	566		A	
Antimony Compounds	4,110	137,819	566	3.75E-05	A	1.06E-05
Arsenic Compounds	4,110	137,819	566	9.43E-06	A	2.67E-06
Benzene	4,110	137,819	566	1.53E-06	A	4.33E-07
Beryllium Compounds	4,110	137,819	566	1.99E-07	A	5.62E-08
1,3-Butadiene	4,110	137,819	566		A	
Cadmium Compounds	4,110	137,819	566	2.84E-06	A	8.05E-07
Chromium Compounds	4,110	137,819	566	6.04E-06	A	1.71E-06
Cobalt Compounds	4,110	137,819	566	4.30E-05	A	1.22E-05
Ethylbenzene	4,110	137,819	566	4.54E-07	A	1.29E-07
Formaldehyde	4,110	137,819	566	4.36E-04	A	1.23E-04
Hydrochloric Acid	4,110	137,819	566		A	
Lead Compounds	4,110	137,819	566	1.08E-05	A	3.05E-06
Manganese Compounds	4,110	137,819	566	2.14E-05	A	6.07E-06
Mercury Compounds	4,110	137,819	566	8.07E-07	A	2.29E-07
Nickel Compounds	4,110	137,819	566	6.04E-04	A	1.71E-04
Naphthalene	4,110	137,819	566	8.07E-06	A	2.29E-06
Phosphorus	4,110	137,819	566	6.76E-05	A	1.91E-05
POM	4,110	137,819	566	9.29E-06	A	2.63E-06
Selenium Compounds	4,110	137,819	566	4.88E-06	A	1.38E-06
Toluene	4,110	137,819	566	4.43E-05	A	1.25E-05
Xylene	4,110	137,819	566		A	
o-Xylene	4,110	137,819	566	7.79E-07	A	2.21E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	1,232	91,500	113	0.00423	M	0.0002
NOX	1,232	91,500	113	0.208	A	0.0117
CO	1,232	91,500	113	0.035	A	0.0020
VOC	1,232	91,500	113	0.00546	A	0.0003
PM-PRI	1,232	91,500	113	0.0121	A	0.0007
PM-FIL	1,232	91,500	113	0.00656	A	0.0004
PM-CON	1,232	91,500	113	0.00558824	A	0.0003
PM10-PRI	1,232	91,500	113	0.0121	A	0.0007
PM10-FIL	1,232	91,500	113	0.00656	A	0.0004
PM25-PRI	1,232	91,500	113	0.0121	A	0.0007
PM25-FIL	1,232	91,500	113	0.00656	A	0.0004
Acetaldehyde	1,232	91,500	113		A	
Acrolein	1,232	91,500	113		A	
Antimony Compounds	1,232	91,500	113		A	
Arsenic Compounds	1,232	91,500	113		A	
Benzene	1,232	91,500	113		A	
Beryllium Compounds	1,232	91,500	113		A	
1,3-Butadiene	1,232	91,500	113		A	
Cadmium Compounds	1,232	91,500	113		A	
Chromium Compounds	1,232	91,500	113		A	
Cobalt Compounds	1,232	91,500	113		A	
Ethylbenzene	1,232	91,500	113		A	
Formaldehyde	1,232	91,500	113		A	
Hydrochloric Acid	1,232	91,500	113		A	
Lead Compounds	1,232	91,500	113		A	
Manganese Compounds	1,232	91,500	113		A	
Mercury Compounds	1,232	91,500	113		A	
Nickel Compounds	1,232	91,500	113		A	
Naphthalene	1,232	91,500	113		A	
Phosphorus	1,232	91,500	113		A	
POM	1,232	91,500	113		A	
Selenium Compounds	1,232	91,500	113		A	
Toluene	1,232	91,500	113		A	
Xylene	1,232	91,500	113		A	
o-Xylene	1,232	91,500	113		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Spec Used Oil

Pollutant	Annual Fuel Use (gal/yr)	Emission Factor (lb/10⁴ gal)	EF Ref	Annual Emissions (tons/yr)
SO2	2,418	12.6	A	0.0152
NOX	2,418	47	A	0.0568
CO	2,418	5.0	A	0.0060
VOC	2,418	0.76	A	0.0009
PM-PRI	2,418	5.46	A	0.0066
PM-FIL	2,418	3.96	A	0.0048
PM-CON	2,418	1.50	A	0.0018
PM10-PRI	2,418	4.31	A	0.0052
PM10-FIL	2,418	2.81	A	0.0034
PM25-PRI	2,418	3.56	A	0.0043
PM25-FIL	2,418	2.06	A	0.0025
Acetaldehyde	2,418		A	
Acrolein	2,418		A	
Antimony Compounds	2,418		A	
Arsenic Compounds	2,418	1.10E-01	A	1.33E-04
Benzene	2,418		A	
Beryllium Compounds	2,418		A	
1,3-Butadiene	2,418		A	
Cadmium Compounds	2,418	9.30E-03	A	1.12E-05
Chromium Compounds	2,418	2.00E-02	A	2.42E-05
Cobalt Compounds	2,418	2.10E-04	A	2.54E-07
Ethylbenzene	2,418		A	
Formaldehyde	2,418		A	
Hydrochloric Acid	2,418	3.30E-02	A	3.99E-05
Lead Compounds	2,418	5.50E-01	A	6.65E-04
Manganese Compounds	2,418	6.80E-02	A	8.22E-05
Mercury Compounds	2,418		A	
Nickel Compounds	2,418	1.10E-02	A	1.33E-05
Naphthalene	2,418		A	
Phosphorus	2,418		A	
POM	2,418		A	
Selenium Compounds	2,418		A	
Toluene	2,418		A	
Xylene	2,418		A	
o-Xylene	2,418		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Total

	Annual Emissions				
Pollutant	No 6 Fuel Oil (tons/yr)	No 2 Fuel Oil (tons/yr)	Propane (tons/yr)	Spec Used Oil (tons/yr)	Total (tons/yr)
SO2	560.9	0.046	0.0002	0.0152	561.0
NOX	92.6	0.048	0.0117	0.0568	92.7
CO	9.9	0.010	0.0020	0.0060	9.9
VOC	1.5	0.000	0.0003	0.0009	1.5
PM-PRI	40.2	0.007	0.0007	0.0066	40.2
PM-FIL	37.3	0.004	0.0004	0.0048	37.3
PM-CON	3.0	0.003	0.0003	0.0018	3.0
PM10-PRI	29.4	0.005	0.0007	0.0052	29.4
PM10-FIL	26.5	0.002	0.0004	0.0034	26.5
PM25-PRI	22.3	0.003	0.0007	0.0043	22.3
PM25-FIL	19.4	0.001	0.0004	0.0025	19.4
Acetaldehyde					
Acrolein					
Antimony Compounds	1.04E-02	1.06E-05			1.04E-02
Arsenic Compounds	2.60E-03	2.67E-06		1.33E-04	2.74E-03
Benzene	4.22E-04	4.33E-07			4.22E-04
Beryllium Compounds	5.48E-05	5.62E-08			5.49E-05
1,3-Butadiene					
Cadmium Compounds	7.85E-04	8.05E-07		1.12E-05	7.97E-04
Chromium Compounds	1.67E-03	1.71E-06		2.42E-05	1.69E-03
Cobalt Compounds	1.19E-02	1.22E-05		2.54E-07	1.19E-02
Ethylbenzene	1.25E-04	1.29E-07			1.26E-04
Formaldehyde	1.20E-01	1.23E-04			1.20E-01
Hydrochloric Acid				3.99E-05	3.99E-05
Lead Compounds	2.98E-03	3.05E-06		6.65E-04	3.65E-03
Manganese Compounds	5.92E-03	6.07E-06		8.22E-05	6.00E-03
Mercury Compounds	2.23E-04	2.29E-07			2.23E-04
Nickel Compounds	1.67E-01	1.71E-04		1.33E-05	1.67E-01
Naphthalene	2.23E-03	2.29E-06			2.23E-03
Phosphorus	1.87E-02	1.91E-05			1.87E-02
POM	2.56E-03	2.63E-06			2.57E-03
Selenium Compounds	1.35E-03	1.38E-06			1.35E-03
Toluene	1.22E-02	1.25E-05			1.22E-02
Xylene					
o-Xylene	2.15E-04	2.21E-07			2.15E-04
Total HAPS					3.63E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	12,252,576	151,189	1,852,455	1.896	M	1756.1
NOX	12,252,576	151,189	1,852,455	0.313	A	289.9
CO	12,252,576	151,189	1,852,455	0.0333	A	30.8
VOC	12,252,576	151,189	1,852,455	0.00507	A	4.7
PM-PRI	12,252,576	151,189	1,852,455	0.136	A	126.0
PM-FIL	12,252,576	151,189	1,852,455	0.126	A	116.7
PM-CON	12,252,576	151,189	1,852,455	0.010	A	9.3
PM10-PRI	12,252,576	151,189	1,852,455	0.0995	A	92.2
PM10-FIL	12,252,576	151,189	1,852,455	0.0895	A	82.9
PM25-PRI	12,252,576	151,189	1,852,455	0.0755	A	69.9
PM25-FIL	12,252,576	151,189	1,852,455	0.0655	A	60.7
Acetaldehyde	12,252,576	151,189	1,852,455		A	
Acrolein	12,252,576	151,189	1,852,455		A	
Antimony Compounds	12,252,576	151,189	1,852,455	3.50E-05	A	3.24E-02
Arsenic Compounds	12,252,576	151,189	1,852,455	8.80E-06	A	8.15E-03
Benzene	12,252,576	151,189	1,852,455	1.43E-06	A	1.32E-03
Beryllium Compounds	12,252,576	151,189	1,852,455	1.85E-07	A	1.72E-04
1,3-Butadiene	12,252,576	151,189	1,852,455		A	
Cadmium Compounds	12,252,576	151,189	1,852,455	2.65E-06	A	2.46E-03
Chromium Compounds	12,252,576	151,189	1,852,455	5.63E-06	A	5.22E-03
Cobalt Compounds	12,252,576	151,189	1,852,455	4.01E-05	A	3.72E-02
Ethylbenzene	12,252,576	151,189	1,852,455	4.24E-07	A	3.93E-04
Formaldehyde	12,252,576	151,189	1,852,455	4.07E-04	A	3.77E-01
Hydrochloric Acid	12,252,576	151,189	1,852,455		A	
Lead Compounds	12,252,576	151,189	1,852,455	1.01E-05	A	9.32E-03
Manganese Compounds	12,252,576	151,189	1,852,455	2.00E-05	A	1.85E-02
Mercury Compounds	12,252,576	151,189	1,852,455	7.53E-07	A	6.98E-04
Nickel Compounds	12,252,576	151,189	1,852,455	5.63E-04	A	5.22E-01
Naphthalene	12,252,576	151,189	1,852,455	7.53E-06	A	6.98E-03
Phosphorus	12,252,576	151,189	1,852,455	6.31E-05	A	5.84E-02
POM	12,252,576	151,189	1,852,455	8.67E-06	A	8.03E-03
Selenium Compounds	12,252,576	151,189	1,852,455	4.55E-06	A	4.22E-03
Toluene	12,252,576	151,189	1,852,455	4.13E-05	A	3.83E-02
Xylene	12,252,576	151,189	1,852,455		A	
o-Xylene	12,252,576	151,189	1,852,455	7.27E-07	A	6.73E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	13,382	137,819	1,844	0.163	M	0.150
NOX	13,382	137,819	1,844	0.171	A	0.158
CO	13,382	137,819	1,844	0.0357	A	0.033
VOC	13,382	137,819	1,844	0.00143	A	0.001
PM-PRI	13,382	137,819	1,844	0.0236	A	0.022
PM-FIL	13,382	137,819	1,844	0.0143	A	0.013
PM-CON	13,382	137,819	1,844	0.00929	A	0.009
PM10-PRI	13,382	137,819	1,844	0.0164	A	0.015
PM10-FIL	13,382	137,819	1,844	0.00714	A	0.007
PM25-PRI	13,382	137,819	1,844	0.0111	A	0.010
PM25-FIL	13,382	137,819	1,844	0.00179	A	0.002
Acetaldehyde	13,382	137,819	1,844		A	
Acrolein	13,382	137,819	1,844		A	
Antimony Compounds	13,382	137,819	1,844	3.75E-05	A	3.46E-05
Arsenic Compounds	13,382	137,819	1,844	9.43E-06	A	8.69E-06
Benzene	13,382	137,819	1,844	1.53E-06	A	1.41E-06
Beryllium Compounds	13,382	137,819	1,844	1.99E-07	A	1.83E-07
1,3-Butadiene	13,382	137,819	1,844		A	
Cadmium Compounds	13,382	137,819	1,844	2.84E-06	A	2.62E-06
Chromium Compounds	13,382	137,819	1,844	6.04E-06	A	5.57E-06
Cobalt Compounds	13,382	137,819	1,844	4.30E-05	A	3.97E-05
Ethylbenzene	13,382	137,819	1,844	4.54E-07	A	4.19E-07
Formaldehyde	13,382	137,819	1,844	4.36E-04	A	4.02E-04
Hydrochloric Acid	13,382	137,819	1,844		A	
Lead Compounds	13,382	137,819	1,844	1.08E-05	A	9.95E-06
Manganese Compounds	13,382	137,819	1,844	2.14E-05	A	1.98E-05
Mercury Compounds	13,382	137,819	1,844	8.07E-07	A	7.44E-07
Nickel Compounds	13,382	137,819	1,844	6.04E-04	A	5.57E-04
Naphthalene	13,382	137,819	1,844	8.07E-06	A	7.44E-06
Phosphorus	13,382	137,819	1,844	6.76E-05	A	6.23E-05
POM	13,382	137,819	1,844	9.29E-06	A	8.56E-06
Selenium Compounds	13,382	137,819	1,844	4.88E-06	A	4.50E-06
Toluene	13,382	137,819	1,844	4.43E-05	A	4.08E-05
Xylene	13,382	137,819	1,844		A	
o-Xylene	13,382	137,819	1,844	7.79E-07	A	7.18E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 Spec Used Oil

Pollutant	Annual Spec Oil Use (gal/yr)	Emission Factor (lb/10³ gal)	EF Ref	Annual Emissions (tons/yr)
SO2	7,872	12.6	A	0.0494
NOX	7,872	47	A	0.1850
CO	7,872	5.0	A	0.0197
VOC	7,872	0.76	A	0.0030
PM-PRI	7,872	5.46	A	0.0215
PM-FIL	7,872	3.96	A	0.0156
PM-CON	7,872	1.50	A	0.0059
PM10-PRI	7,872	4.31	A	0.0170
PM10-FIL	7,872	2.81	A	0.0111
PM25-PRI	7,872	3.56	A	0.0140
PM25-FIL	7,872	2.06	A	0.0081
Acetaldehyde	7,872		A	
Acrolein	7,872		A	
Antimony Compounds	7,872		A	
Arsenic Compounds	7,872	1.10E-01	A	4.33E-04
Benzene	7,872		A	
Beryllium Compounds	7,872		A	
1,3-Butadiene	7,872		A	
Cadmium Compounds	7,872	9.30E-03	A	3.66E-05
Chromium Compounds	7,872	2.00E-02	A	7.87E-05
Cobalt Compounds	7,872	2.10E-04	A	8.27E-07
Ethylbenzene	7,872		A	
Formaldehyde	7,872		A	
Hydrochloric Acid	7,872	3.30E-02	A	1.30E-04
Lead Compounds	7,872	5.50E-01	A	2.16E-03
Manganese Compounds	7,872	6.80E-02	A	2.68E-04
Mercury Compounds	7,872		A	
Nickel Compounds	7,872	1.10E-02	A	4.33E-05
Naphthalene	7,872		A	
Phosphorus	7,872		A	
POM	7,872		A	
Selenium Compounds	7,872		A	
Toluene	7,872		A	
Xylene	7,872		A	
o-Xylene	7,872		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 Total

	Annual Emissions			
Pollutant	No 6 Fuel Oil (tons/yr)	No 6 Fuel Oil (tons/yr)	Spec Used Oil (tons/yr)	Total (tons/yr)
SO2	1756.1	0.150	0.05	1756.3
NOX	289.9	0.158	0.18	290.2
CO	30.8	0.033	0.02	30.9
VOC	4.7	0.001	0.003	4.7
PM-PRI	126	0.022	0.02	126.0
PM-FIL	116.7	0.013	0.02	116.7
PM-CON	9.3	0.009	0.01	9.3
PM10-PRI	92.2	0.015	0.02	92.2
PM10-FIL	82.9	0.007	0.01	82.9
PM25-PRI	69.9	0.010	0.01	69.9
PM25-FIL	60.7	0.002	0.01	60.7
Acetaldehyde				
Acrolein				
Antimony Compounds	3.24E-02	3.46E-05		3.25E-02
Arsenic Compounds	8.15E-03	8.69E-06	4.33E-04	8.59E-03
Benzene	1.32E-03	1.41E-06		1.32E-03
Beryllium Compounds	1.72E-04	1.83E-07		1.72E-04
1,3-Butadiene				
Cadmium Compounds	2.46E-03	2.62E-06	3.66E-05	2.50E-03
Chromium Compounds	5.22E-03	5.57E-06	7.87E-05	5.30E-03
Cobalt Compounds	3.72E-02	3.97E-05	8.27E-07	3.72E-02
Ethylbenzene	3.93E-04	4.19E-07		3.93E-04
Formaldehyde	3.77E-01	4.02E-04		3.77E-01
Hydrochloric Acid			1.30E-04	1.30E-04
Lead Compounds	9.32E-03	9.95E-06	2.16E-03	1.15E-02
Manganese Compounds	1.85E-02	1.98E-05	2.68E-04	1.88E-02
Mercury Compounds	6.98E-04	7.44E-07		6.99E-04
Nickel Compounds	5.22E-01	5.57E-04	4.33E-05	5.22E-01
Naphthalene	6.98E-03	7.44E-06		6.99E-03
Phosphorus	5.84E-02	6.23E-05		5.85E-02
POM	8.03E-03	8.56E-06		8.04E-03
Selenium Compounds	4.22E-03	4.50E-06		4.22E-03
Toluene	3.83E-02	4.08E-05		3.83E-02
Xylene				
o-Xylene	6.73E-04	7.18E-07		6.74E-04
Total HAPS				1.14E+00

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	158,579	137,819	21,855	0.163	M	1.78
NOX	158,579	137,819	21,855	0.88	A	9.62
CO	158,579	137,819	21,855	0.0033	A	0.04
VOC	158,579	137,819	21,855	0.00041	A	0.004
PM-PRI	158,579	137,819	21,855	0.0120	A	0.13
PM-FIL	158,579	137,819	21,855	0.0043	A	0.05
PM-CON	158,579	137,819	21,855	0.0072	A	0.08
PM10-PRI	158,579	137,819	21,855	0.0113	A	0.12
PM10-FIL	158,579	137,819	21,855	0.00413	A	0.05
PM25-PRI	158,579	137,819	21,855	0.01107	A	0.12
PM25-FIL	158,579	137,819	21,855	0.00387	A	0.04
Acetaldehyde	158,579	137,819	21,855	2.52E-05	A	2.75E-04
Acrolein	158,579	137,819	21,855	7.88E-06	A	8.61E-05
Antimony Compounds	158,579	137,819	21,855		A	
Arsenic Compounds	158,579	137,819	21,855	1.10E-05	A	1.20E-04
Benzene	158,579	137,819	21,855	5.50E-05	A	6.01E-04
Beryllium Compounds	158,579	137,819	21,855	3.10E-07	A	3.39E-06
1,3-Butadiene	158,579	137,819	21,855	1.60E-05	A	1.75E-04
Cadmium Compounds	158,579	137,819	21,855	4.80E-06	A	5.25E-05
Chromium Compounds	158,579	137,819	21,855	1.10E-05	A	1.20E-04
Cobalt Compounds	158,579	137,819	21,855		A	
Ethylbenzene	158,579	137,819	21,855		A	
Formaldehyde	158,579	137,819	21,855	2.80E-04	A	3.06E-03
Hydrochloric Acid	158,579	137,819	21,855		A	
Lead Compounds	158,579	137,819	21,855	1.40E-05	A	1.53E-04
Manganese Compounds	158,579	137,819	21,855	7.90E-04	A	8.63E-03
Mercury Compounds	158,579	137,819	21,855	1.20E-06	A	1.31E-05
Nickel Compounds	158,579	137,819	21,855	4.60E-06	A	5.03E-05
Naphthalene	158,579	137,819	21,855	3.50E-05	A	3.82E-04
Phosphorus	158,579	137,819	21,855		A	
POM	158,579	137,819	21,855	4.00E-05	A	4.37E-04
Selenium Compounds	158,579	137,819	21,855	2.50E-05	A	2.73E-04
Toluene	158,579	137,819	21,855	2.81E-04	A	3.07E-03
Xylene	158,579	137,819	21,855	1.93E-04	A	2.11E-03
o-Xylene	158,579	137,819	21,855		A	
Total HAPS						1.96E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-11

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	951	137,819	131	0.163	M	0.011
NOX	951	137,819	131	3.2	A	0.210
CO	951	137,819	131	0.85	A	0.056
VOC	951	137,819	131	0.0819	A	0.005
PM-PRI	951	137,819	131	0.0697	A	0.005
PM-FIL	951	137,819	131	0.0620	A	0.004
PM-CON	951	137,819	131	0.0077	A	0.001
PM10-PRI	951	137,819	131	0.0573	A	0.004
PM10-FIL	951	137,819	131	0.0496	A	0.003
PM25-PRI	951	137,819	131	0.0556	A	0.004
PM25-FIL	951	137,819	131	0.0479	A	0.003
Acetaldehyde	951	137,819	131	2.52E-05	A	1.65E-06
Acrolein	951	137,819	131	7.88E-06	A	5.16E-07
Antimony Compounds	951	137,819	131		A	
Arsenic Compounds	951	137,819	131	1.10E-05	A	7.21E-07
Benzene	951	137,819	131	7.76E-04	A	5.09E-05
Beryllium Compounds	951	137,819	131	3.10E-07	A	2.03E-08
1,3-Butadiene	951	137,819	131	1.60E-05	A	1.05E-06
Cadmium Compounds	951	137,819	131	4.80E-06	A	3.15E-07
Chromium Compounds	951	137,819	131	1.10E-05	A	7.21E-07
Cobalt Compounds	951	137,819	131		A	
Ethylbenzene	951	137,819	131		A	
Formaldehyde	951	137,819	131	7.89E-05	A	5.17E-06
Hydrochloric Acid	951	137,819	131		A	
Lead Compounds	951	137,819	131	1.40E-05	A	9.17E-07
Manganese Compounds	951	137,819	131	7.90E-04	A	5.18E-05
Mercury Compounds	951	137,819	131	1.20E-06	A	7.86E-08
Nickel Compounds	951	137,819	131	4.60E-06	A	3.01E-07
Naphthalene	951	137,819	131	1.30E-04	A	8.52E-06
Phosphorus	951	137,819	131		A	
POM	951	137,819	131	2.12E-04	A	1.39E-05
Selenium Compounds	951	137,819	131	2.50E-05	A	1.64E-06
Toluene	951	137,819	131	2.81E-04	A	1.84E-05
Xylene	951	137,819	131	1.93E-04	A	1.26E-05
o-Xylene	951	137,819	131		A	
Total HAPS						1.69E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-15

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	20,955	137,819	2,888	0.163	M	0.2
NOX	20,955	137,819	2,888	3.2	A	4.6
CO	20,955	137,819	2,888	0.85	A	1.2
VOC	20,955	137,819	2,888	0.0819	A	0.1
PM-PRI	20,955	137,819	2,888	0.0697	A	0.1
PM-FIL	20,955	137,819	2,888	0.0620	A	0.1
PM-CON	20,955	137,819	2,888	0.00770	A	0.01
PM10-PRI	20,955	137,819	2,888	0.0573	A	0.1
PM10-FIL	20,955	137,819	2,888	0.0496	A	0.1
PM25-PRI	20,955	137,819	2,888	0.0556	A	0.1
PM25-FIL	20,955	137,819	2,888	0.0479	A	0.1
Acetaldehyde	20,955	137,819	2,888	2.52E-05	A	3.64E-05
Acrolein	20,955	137,819	2,888	7.88E-06	A	1.14E-05
Antimony Compounds	20,955	137,819	2,888		A	
Arsenic Compounds	20,955	137,819	2,888	1.10E-05	A	1.59E-05
Benzene	20,955	137,819	2,888	7.76E-04	A	1.12E-03
Beryllium Compounds	20,955	137,819	2,888	3.10E-07	A	4.48E-07
1,3-Butadiene	20,955	137,819	2,888	1.60E-05	A	2.31E-05
Cadmium Compounds	20,955	137,819	2,888	4.80E-06	A	6.93E-06
Chromium Compounds	20,955	137,819	2,888	1.10E-05	A	1.59E-05
Cobalt Compounds	20,955	137,819	2,888		A	
Ethylbenzene	20,955	137,819	2,888		A	
Formaldehyde	20,955	137,819	2,888	7.89E-05	A	1.14E-04
Hydrochloric Acid	20,955	137,819	2,888		A	
Lead Compounds	20,955	137,819	2,888	1.40E-05	A	2.02E-05
Manganese Compounds	20,955	137,819	2,888	7.90E-04	A	1.14E-03
Mercury Compounds	20,955	137,819	2,888	1.20E-06	A	1.73E-06
Nickel Compounds	20,955	137,819	2,888	4.60E-06	A	6.64E-06
Naphthalene	20,955	137,819	2,888	1.30E-04	A	1.88E-04
Phosphorus	20,955	137,819	2,888		A	
POM	20,955	137,819	2,888	2.12E-04	A	3.06E-04
Selenium Compounds	20,955	137,819	2,888	2.50E-05	A	3.61E-05
Toluene	20,955	137,819	2,888	2.81E-04	A	4.06E-04
Xylene	20,955	137,819	2,888	1.93E-04	A	2.79E-04
o-Xylene	20,955	137,819	2,888		A	
Total HAPS						3.73E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-16

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	19,268	137,819	2,655	0.163	M	0.2
NOX	19,268	137,819	2,655	3.2	A	4.2
CO	19,268	137,819	2,655	0.85	A	1.1
VOC	19,268	137,819	2,655	0.0819	A	0.1
PM-PRI	19,268	137,819	2,655	0.0697	A	0.1
PM-FIL	19,268	137,819	2,655	0.0620	A	0.1
PM-CON	19,268	137,819	2,655	0.00770	A	0.01
PM10-PRI	19,268	137,819	2,655	0.0573	A	0.1
PM10-FIL	19,268	137,819	2,655	0.0496	A	0.1
PM25-PRI	19,268	137,819	2,655	0.0556	A	0.1
PM25-FIL	19,268	137,819	2,655	0.0479	A	0.1
Acetaldehyde	19,268	137,819	2,655	2.52E-05	A	3.35E-05
Acrolein	19,268	137,819	2,655	7.88E-06	A	1.05E-05
Antimony Compounds	19,268	137,819	2,655		A	
Arsenic Compounds	19,268	137,819	2,655	1.10E-05	A	1.46E-05
Benzene	19,268	137,819	2,655	7.76E-04	A	1.03E-03
Beryllium Compounds	19,268	137,819	2,655	3.10E-07	A	4.12E-07
1,3-Butadiene	19,268	137,819	2,655	1.60E-05	A	2.12E-05
Cadmium Compounds	19,268	137,819	2,655	4.80E-06	A	6.37E-06
Chromium Compounds	19,268	137,819	2,655	1.10E-05	A	1.46E-05
Cobalt Compounds	19,268	137,819	2,655		A	
Ethylbenzene	19,268	137,819	2,655		A	
Formaldehyde	19,268	137,819	2,655	7.89E-05	A	1.05E-04
Hydrochloric Acid	19,268	137,819	2,655		A	
Lead Compounds	19,268	137,819	2,655	1.40E-05	A	1.86E-05
Manganese Compounds	19,268	137,819	2,655	7.90E-04	A	1.05E-03
Mercury Compounds	19,268	137,819	2,655	1.20E-06	A	1.59E-06
Nickel Compounds	19,268	137,819	2,655	4.60E-06	A	6.11E-06
Naphthalene	19,268	137,819	2,655	1.30E-04	A	1.73E-04
Phosphorus	19,268	137,819	2,655		A	
POM	19,268	137,819	2,655	2.12E-04	A	2.81E-04
Selenium Compounds	19,268	137,819	2,655	2.50E-05	A	3.32E-05
Toluene	19,268	137,819	2,655	2.81E-04	A	3.73E-04
Xylene	19,268	137,819	2,655	1.93E-04	A	2.56E-04
o-Xylene	19,268	137,819	2,655		A	
Total HAPS						3.43E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-17

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	48,952	137,819	6,747	0.163	M	0.5
NOX	48,952	137,819	6,747	3.2	A	10.8
CO	48,952	137,819	6,747	0.85	A	2.9
VOC	48,952	137,819	6,747	0.0819	A	0.3
PM-PRI	48,952	137,819	6,747	0.0697	A	0.2
PM-FIL	48,952	137,819	6,747	0.0620	A	0.2
PM-CON	48,952	137,819	6,747	0.00770	A	
PM10-PRI	48,952	137,819	6,747	0.0573	A	0.2
PM10-FIL	48,952	137,819	6,747	0.0496	A	0.2
PM25-PRI	48,952	137,819	6,747	0.0556	A	0.2
PM25-FIL	48,952	137,819	6,747	0.0479	A	0.2
Acetaldehyde	48,952	137,819	6,747	2.52E-05	A	8.50E-05
Acrolein	48,952	137,819	6,747	7.88E-06	A	2.66E-05
Antimony Compounds	48,952	137,819	6,747		A	
Arsenic Compounds	48,952	137,819	6,747	1.10E-05	A	3.71E-05
Benzene	48,952	137,819	6,747	7.76E-04	A	2.62E-03
Beryllium Compounds	48,952	137,819	6,747	3.10E-07	A	1.05E-06
1,3-Butadiene	48,952	137,819	6,747	1.60E-05	A	5.40E-05
Cadmium Compounds	48,952	137,819	6,747	4.80E-06	A	1.62E-05
Chromium Compounds	48,952	137,819	6,747	1.10E-05	A	3.71E-05
Cobalt Compounds	48,952	137,819	6,747		A	
Ethylbenzene	48,952	137,819	6,747		A	
Formaldehyde	48,952	137,819	6,747	7.89E-05	A	2.66E-04
Hydrochloric Acid	48,952	137,819	6,747		A	
Lead Compounds	48,952	137,819	6,747	1.40E-05	A	4.72E-05
Manganese Compounds	48,952	137,819	6,747	7.90E-04	A	2.66E-03
Mercury Compounds	48,952	137,819	6,747	1.20E-06	A	4.05E-06
Nickel Compounds	48,952	137,819	6,747	4.60E-06	A	1.55E-05
Naphthalene	48,952	137,819	6,747	1.30E-04	A	4.39E-04
Phosphorus	48,952	137,819	6,747		A	
POM	48,952	137,819	6,747	2.12E-04	A	7.15E-04
Selenium Compounds	48,952	137,819	6,747	2.50E-05	A	8.43E-05
Toluene	48,952	137,819	6,747	2.81E-04	A	9.48E-04
Xylene	48,952	137,819	6,747	1.93E-04	A	6.51E-04
o-Xylene	48,952	137,819	6,747		A	
Total HAPS						8.71E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)							
	Hill 5	Hill 6	CT-1	D-11	D-15	D-16	D-17	Total
SO2	561.0	1756.3	1.8	0.0	0.2	0.2	0.5	2,320.0
NOX	92.7	290.2	9.6	0.2	4.6	4.2	10.8	412.3
CO	9.9	30.9	0.0	0.1	1.2	1.1	2.9	46.1
VOC	1.5	4.7	0.0	0.0	0.1	0.1	0.3	6.7
PM-PRI	40.2	126.0	0.1	0.0	0.1	0.1	0.2	166.7
PM-FIL	37.3	116.7	0.0	0.0	0.1	0.1	0.2	154.5
PM-CON	3.0	9.3	0.1	0.0	0.0	0.0		12.4
PM10-PRI	29.4	92.2	0.1	0.0	0.1	0.1	0.2	122.1
PM10-FIL	26.5	82.9	0.0	0.0	0.1	0.1	0.2	109.8
PM25-PRI	22.3	69.9	0.1	0.0	0.1	0.1	0.2	92.7
PM25-FIL	19.4	60.7	0.0	0.0	0.1	0.1	0.2	80.5
Acetaldehyde			2.75E-04	1.65E-06	3.64E-05	3.35E-05	8.50E-05	0.0004
Acrolein			8.61E-05	5.16E-07	1.14E-05	1.05E-05	2.66E-05	0.0001
Antimony Compounds	1.04E-02	3.25E-02						0.0428
Arsenic Compounds	2.74E-03	8.59E-03	1.20E-04	7.21E-07	1.59E-05	1.46E-05	3.71E-05	0.0115
Benzene	4.22E-04	1.32E-03	6.01E-04	5.09E-05	1.12E-03	1.03E-03	2.62E-03	0.0072
Beryllium Compounds	5.49E-05	1.72E-04	3.39E-06	2.03E-08	4.48E-07	4.12E-07	1.05E-06	0.0002
1,3-Butadiene			1.75E-04	1.05E-06	2.31E-05	2.12E-05	5.40E-05	0.0003
Cadmium Compounds	7.97E-04	2.50E-03	5.25E-05	3.15E-07	6.93E-06	6.37E-06	1.62E-05	0.0034
Chromium Compounds	1.69E-03	5.30E-03	1.20E-04	7.21E-07	1.59E-05	1.46E-05	3.71E-05	0.0072
Cobalt Compounds	1.19E-02	3.72E-02						0.0491
Ethylbenzene	1.26E-04	3.93E-04						0.0005
Formaldehyde	1.20E-01	3.77E-01	3.06E-03	5.17E-06	1.14E-04	1.05E-04	2.66E-04	0.5010
Hydrochloric Acid	3.99E-05	1.30E-04						0.0002
Lead Compounds	3.65E-03	1.15E-02	1.53E-04	9.17E-07	2.02E-05	1.86E-05	4.72E-05	0.0154
Manganese Compounds	6.00E-03	1.88E-02	8.63E-03	5.18E-05	1.14E-03	1.05E-03	2.66E-03	0.0384
Mercury Compounds	2.23E-04	6.99E-04	1.31E-05	7.86E-08	1.73E-06	1.59E-06	4.05E-06	0.0009
Nickel Compounds	1.67E-01	5.22E-01	5.03E-05	3.01E-07	6.64E-06	6.11E-06	1.55E-05	0.6893
Naphthalene	2.23E-03	6.99E-03	3.82E-04	8.52E-06	1.88E-04	1.73E-04	4.39E-04	0.0104
Phosphorus	1.87E-02	5.85E-02						0.0772
POM	2.57E-03	8.04E-03	4.37E-04	1.39E-05	3.06E-04	2.81E-04	7.15E-04	0.0124
Selenium Compounds	1.35E-03	4.22E-03	2.73E-04	1.64E-06	3.61E-05	3.32E-05	8.43E-05	0.0060
Toluene	1.22E-02	3.83E-02	3.07E-03	1.84E-05	4.06E-04	3.73E-04	9.48E-04	0.0554
Xylene			2.11E-03	1.26E-05	2.79E-04	2.56E-04	6.51E-04	0.0033
o-Xylene	2.15E-04	6.74E-04						0.0009
Total HAPS	3.63E-01	1.14E+00	1.96E-02	1.69E-04	3.73E-03	3.43E-03	8.71E-03	1.5334

2003 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100519

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Waimea Power Plant

2) Permit No(s).: 0237-01-C

3) Physical Facility Address:

Street: Rubbish Dump Road

City: Kamuela Zip Code: 96743

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 217,725 (Easting (m)) Vertical (y): 2,216,930 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Dan V. Giovanni

Name: Dan V. Giovanni Date: 3/31/05
Responsible Official

Title: *Production Manager*

Permit No.:	0237-01-C
Date Rec'd:	

FORM F-1

2005 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2004)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Waimea Power Plant	B. Location:	Rubbish Dump Road	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City: Hilo	F. State: HI	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.:	808-969-0421
N. Signature:		Date:	3/31/05		

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												Annual Total
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
D-12	0.6	0.5	0.5	1.4	7.1	26.9	0.7	0.0	0.0	–			
D-13	0.7	0.5	0.5	1.5	8.0	30.3	0.8	0.0	0.0	–			
D-14	0.2	0.2	0.2	0.6	3.0	11.3	0.3	0.0	0.0	–			
A. Supplement (if appl.) _____													
B. Total Report Emissions	1.5	1.2	1.2	3.5	18.1	68.5	1.8	0.0	0.0	–			
C. Total Emissions Subject to Fees	1			3		68	1						D. 73

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2004 $/TON	Multiply	CPI Index Adjustmnt (2.2% incr. '02 to '03)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	73	x	40.77	x	1.022	=	B.	$3,041.69
	"Clean Air Special Fund - NON"	C.	73	x	9.94	x	1.022	=	D.	$741.58
							Total	=	E.	$3,783.27

Note: 2005 $/ton charge payable to Clean Air Special Fund - COV = $40.77 x 1.022 = $41.67/ton.
2005 $/ton charge payable to Clean Air Special Fund - NON = $9.94 x 1.022 = $10.16/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with tow separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

D-12

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	121,852	137,819	16,794	0.163	M	1.4
NOX	121,852	137,819	16,794	3.2	A	26.9
CO	121,852	137,819	16,794	0.85	A	7.1
VOC	121,852	137,819	16,794	0.0819	A	0.7
PM-PRI	121,852	137,819	16,794	0.0697	A	0.6
PM-FIL	121,852	137,819	16,794	0.0620	A	0.5
PM-CON	121,852	137,819	16,794	0.0077	A	0.1
PM10-PRI	121,852	137,819	16,794	0.0573	A	0.5
PM10-FIL	121,852	137,819	16,794	0.0496	A	0.4
PM25-PRI	121,852	137,819	16,794	0.0556	A	0.5
PM25-FIL	121,852	137,819	16,794	0.0479	A	0.4
Acetaldehyde	121,852	137,819	16,794	2.52E-05	A	2.12E-04
Acrolein	121,852	137,819	16,794	7.88E-06	A	6.62E-05
Antimony Compounds	121,852	137,819	16,794		A	
Arsenic Compounds	121,852	137,819	16,794	1.10E-05	A	9.24E-05
Benzene	121,852	137,819	16,794	7.76E-04	A	6.52E-03
Beryllium Compounds	121,852	137,819	16,794	3.10E-07	A	2.60E-06
1,3-Butadiene	121,852	137,819	16,794	1.60E-05	A	1.34E-04
Cadmium Compounds	121,852	137,819	16,794	4.80E-06	A	4.03E-05
Chromium Compounds	121,852	137,819	16,794	1.10E-05	A	9.24E-05
Cobalt Compounds	121,852	137,819	16,794		A	
Ethylbenzene	121,852	137,819	16,794		A	
Formaldehyde	121,852	137,819	16,794	7.89E-05	A	6.63E-04
Hydrochloric Acid	121,852	137,819	16,794		A	
Lead Compounds	121,852	137,819	16,794	1.40E-05	A	1.18E-04
Manganese Compounds	121,852	137,819	16,794	7.90E-04	A	6.63E-03
Mercury Compounds	121,852	137,819	16,794	1.20E-06	A	1.01E-05
Nickel Compounds	121,852	137,819	16,794	4.60E-06	A	3.86E-05
Naphthalene	121,852	137,819	16,794	1.30E-04	A	1.09E-03
Phosphorus	121,852	137,819	16,794		A	
POM	121,852	137,819	16,794	2.12E-04	A	1.78E-03
Selenium Compounds	121,852	137,819	16,794	2.50E-05	A	2.10E-04
Toluene	121,852	137,819	16,794	2.81E-04	A	2.36E-03
Xylene	121,852	137,819	16,794	1.93E-04	A	1.62E-03
o-Xylene	121,852	137,819	16,794		A	
Total HAPs						2.17E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-13

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	137,191	137,819	18,908	0.163	M	1.5
NOX	137,191	137,819	18,908	3.2	A	30.3
CO	137,191	137,819	18,908	0.85	A	8.0
VOC	137,191	137,819	18,908	0.0819	A	0.8
PM-PRI	137,191	137,819	18,908	0.0697	A	0.7
PM-FIL	137,191	137,819	18,908	0.0620	A	0.6
PM-CON	137,191	137,819	18,908	0.0077	A	0.1
PM10-PRI	137,191	137,819	18,908	0.0573	A	0.5
PM10-FIL	137,191	137,819	18,908	0.0496	A	0.5
PM25-PRI	137,191	137,819	18,908	0.0556	A	0.5
PM25-FIL	137,191	137,819	18,908	0.0479	A	0.5
Acetaldehyde	137,191	137,819	18,908	2.52E-05	A	2.38E-04
Acrolein	137,191	137,819	18,908	7.88E-06	A	7.45E-05
Antimony Compounds	137,191	137,819	18,908		A	
Arsenic Compounds	137,191	137,819	18,908	1.10E-05	A	1.04E-04
Benzene	137,191	137,819	18,908	7.76E-04	A	7.34E-03
Beryllium Compounds	137,191	137,819	18,908	3.10E-07	A	2.93E-06
1,3-Butadiene	137,191	137,819	18,908	1.60E-05	A	1.51E-04
Cadmium Compounds	137,191	137,819	18,908	4.80E-06	A	4.54E-05
Chromium Compounds	137,191	137,819	18,908	1.10E-05	A	1.04E-04
Cobalt Compounds	137,191	137,819	18,908		A	
Ethylbenzene	137,191	137,819	18,908		A	
Formaldehyde	137,191	137,819	18,908	7.89E-05	A	7.46E-04
Hydrochloric Acid	137,191	137,819	18,908		A	
Lead Compounds	137,191	137,819	18,908	1.40E-05	A	1.32E-04
Manganese Compounds	137,191	137,819	18,908	7.90E-04	A	7.47E-03
Mercury Compounds	137,191	137,819	18,908	1.20E-06	A	1.13E-05
Nickel Compounds	137,191	137,819	18,908	4.60E-06	A	4.35E-05
Naphthalene	137,191	137,819	18,908	1.30E-04	A	1.23E-03
Phosphorus	137,191	137,819	18,908		A	
POM	137,191	137,819	18,908	2.12E-04	A	2.00E-03
Selenium Compounds	137,191	137,819	18,908	2.50E-05	A	2.36E-04
Toluene	137,191	137,819	18,908	2.81E-04	A	2.66E-03
Xylene	137,191	137,819	18,908	1.93E-04	A	1.82E-03
o-Xylene	137,191	137,819	18,908		A	
Total HAPs						2.44E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-14

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	51,062	137,819	7,037	0.163	M	0.6
NOX	51,062	137,819	7,037	3.2	A	11.3
CO	51,062	137,819	7,037	0.85	A	3.0
VOC	51,062	137,819	7,037	0.0819	A	0.3
PM-PRI	51,062	137,819	7,037	0.0697	A	0.2
PM-FIL	51,062	137,819	7,037	0.0620	A	0.2
PM-CON	51,062	137,819	7,037	0.0077	A	
PM10-PRI	51,062	137,819	7,037	0.0573	A	0.2
PM10-FIL	51,062	137,819	7,037	0.0496	A	0.2
PM25-PRI	51,062	137,819	7,037	0.0556	A	0.2
PM25-FIL	51,062	137,819	7,037	0.0479	A	0.2
Acetaldehyde	51,062	137,819	7,037	2.52E-05	A	8.87E-05
Acrolein	51,062	137,819	7,037	7.88E-06	A	2.77E-05
Antimony Compounds	51,062	137,819	7,037		A	
Arsenic Compounds	51,062	137,819	7,037	1.10E-05	A	3.87E-05
Benzene	51,062	137,819	7,037	7.76E-04	A	2.73E-03
Beryllium Compounds	51,062	137,819	7,037	3.10E-07	A	1.09E-06
1,3-Butadiene	51,062	137,819	7,037	1.60E-05	A	5.63E-05
Cadmium Compounds	51,062	137,819	7,037	4.80E-06	A	1.69E-05
Chromium Compounds	51,062	137,819	7,037	1.10E-05	A	3.87E-05
Cobalt Compounds	51,062	137,819	7,037		A	
Ethylbenzene	51,062	137,819	7,037		A	
Formaldehyde	51,062	137,819	7,037	7.89E-05	A	2.78E-04
Hydrochloric Acid	51,062	137,819	7,037		A	
Lead Compounds	51,062	137,819	7,037	1.40E-05	A	4.93E-05
Manganese Compounds	51,062	137,819	7,037	7.90E-04	A	2.78E-03
Mercury Compounds	51,062	137,819	7,037	1.20E-06	A	4.22E-06
Nickel Compounds	51,062	137,819	7,037	4.60E-06	A	1.62E-05
Naphthalene	51,062	137,819	7,037	1.30E-04	A	4.57E-04
Phosphorus	51,062	137,819	7,037		A	
POM	51,062	137,819	7,037	2.12E-04	A	7.46E-04
Selenium Compounds	51,062	137,819	7,037	2.50E-05	A	8.80E-05
Toluene	51,062	137,819	7,037	2.81E-04	A	9.89E-04
Xylene	51,062	137,819	7,037	1.93E-04	A	6.79E-04
o-Xylene	51,062	137,819	7,037		A	
Total HAPs						9.08E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)			
	D-12	D-13	D-14	Total
SO2	1.4	1.5	0.6	3.5
NOX	26.9	30.3	11.3	68.5
CO	7.1	8.0	3.0	18.1
VOC	0.7	0.8	0.3	1.8
PM-PRI	0.6	0.7	0.2	1.5
PM-FIL	0.5	0.6	0.2	1.3
PM-CON	0.1	0.1		0.2
PM10-PRI	0.5	0.5	0.2	1.2
PM10-FIL	0.4	0.5	0.2	1.1
PM25-PRI	0.5	0.5	0.2	1.2
PM25-FIL	0.4	0.5	0.2	1.1
Acetaldehyde	2.12E-04	2.38E-04	8.87E-05	0.0005
Acrolein	6.62E-05	7.45E-05	2.77E-05	0.0002
Antimony Compounds				
Arsenic Compounds	9.24E-05	1.04E-04	3.87E-05	0.0002
Benzene	6.52E-03	7.34E-03	2.73E-03	0.0166
Beryllium Compounds	2.60E-06	2.93E-06	1.09E-06	0.0000
1,3-Butadiene	1.34E-04	1.51E-04	5.63E-05	0.0003
Cadmium Compounds	4.03E-05	4.54E-05	1.69E-05	0.0001
Chromium Compounds	9.24E-05	1.04E-04	3.87E-05	0.0002
Cobalt Compounds				
Ethylbenzene				
Formaldehyde	6.63E-04	7.46E-04	2.78E-04	0.0017
Hydrochloric Acid				
Lead Compounds	1.18E-04	1.32E-04	4.93E-05	0.0003
Manganese Compounds	6.63E-03	7.47E-03	2.78E-03	0.0169
Mercury Compounds	1.01E-05	1.13E-05	4.22E-06	0.0000
Nickel Compounds	3.86E-05	4.35E-05	1.62E-05	0.0001
Naphthalene	1.09E-03	1.23E-03	4.57E-04	0.0028
Phosphorus				
POM	1.78E-03	2.00E-03	7.46E-04	0.0045
Selenium Compounds	2.10E-04	2.36E-04	8.80E-05	0.0005
Toluene	2.36E-03	2.66E-03	9.89E-04	0.0060
Xylene	1.62E-03	1.82E-03	6.79E-04	0.0041
o-Xylene				
Total HAPS	2.17E-02	2.44E-02	9.08E-03	0.0552

2003 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100021

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Puna Power Plant

2) Permit No(s).: 0235-01-C

3) Physical Facility Address:

Street: Puna Mill Road

City: Keaau Zip Code: 96749

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: ____ Type B: X Neither: ____

6) SIC Code (Primary / Secondary): 4911 / ____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 286646 (Easting (m)) Vertical (y): 2172337 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Dan V. Giovanni

Name: Dan V. Giovanni Date: 3/31/05
Responsible Official

Title: Production Manager

Permit No.:	0235-01-C
Date Rec'd:	

FORM F-1

2005 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2004)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Puna Power Plant	B. Location:	Puna Mill Road	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City: Hilo	F. State: HI	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4517
K. Responsible Official:	DAN Y. GOVDIGT	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:	Dan Y. Govdigt	Date:	3/31/05		

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												Annual Total
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
Boiler	78.6	57.5	43.7	1095.6	19.3	181.2	2.9	0.0	0.7	–			
CT-3	15.1	12.4	12.0	32.9	10.1	26.4	0.0	0.0	0.4	–			
PBSG1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	–			
A. Supplement (if appl.) _____													
B. Total Report Emissions	93.7	69.9	55.7	1128.7	29.4	207.7	2.9	0.0	1.1	–			
C. Total Emissions Subject to Fees	93			1,128		207	2						D. 1,430

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2004 $/TON	Multiply	CPI Index Adjustmnt (2.2% incr. '02 to '03)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	1,430	x	40.77	x	1.022	=	B.	$59,583.72
	"Clean Air Special Fund - NON"	C.	1,430	x	9.94	x	1.022	=	D.	$14,526.91
							Total	=	E.	$74,110.63

Note: 2005 $/ton charge payable to Clean Air Special Fund - COV = $40.77 x 1.022 = $41.67/ton.
2005 $/ton charge payable to Clean Air Special Fund - NON = $9.94 x 1.022 = $10.16/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with tow separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

Boiler No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	7,633,248	151,189	1,154,063	1.898	M	1095.2
NOX	7,633,248	151,189	1,154,063	0.313	A	180.6
CO	7,633,248	151,189	1,154,063	0.0333	A	19.2
VOC	7,633,248	151,189	1,154,063	0.00507	A	2.9
PM-PRI	7,633,248	151,189	1,154,063	0.136	A	78.5
PM-FIL	7,633,248	151,189	1,154,063	0.126	A	72.7
PM-CON	7,633,248	151,189	1,154,063	0.0100	A	5.8
PM10-PRI	7,633,248	151,189	1,154,063	0.0995	A	57.4
PM10-FIL	7,633,248	151,189	1,154,063	0.0895	A	51.6
PM25-PRI	7,633,248	151,189	1,154,063	0.0755	A	43.6
PM25-FIL	7,633,248	151,189	1,154,063	0.0655	A	37.8
Acetaldehyde	7,633,248	151,189	1,154,063		A	
Acrolein	7,633,248	151,189	1,154,063		A	
Antimony Compounds	7,633,248	151,189	1,154,063	3.50E-05	A	2.02E-02
Arsenic Compounds	7,633,248	151,189	1,154,063	8.80E-06	A	5.08E-03
Benzene	7,633,248	151,189	1,154,063	1.43E-06	A	8.23E-04
Beryllium Compounds	7,633,248	151,189	1,154,063	1.85E-07	A	1.07E-04
1,3-Butadiene	7,633,248	151,189	1,154,063		A	
Cadmium Compounds	7,633,248	151,189	1,154,063	2.65E-06	A	1.53E-03
Chromium Compounds	7,633,248	151,189	1,154,063	5.63E-06	A	3.25E-03
Cobalt Compounds	7,633,248	151,189	1,154,063	4.01E-05	A	2.32E-02
Ethylbenzene	7,633,248	151,189	1,154,063	4.24E-07	A	2.45E-04
Formaldehyde	7,633,248	151,189	1,154,063	4.07E-04	A	2.35E-01
Hydrochloric Acid	7,633,248	151,189	1,154,063		A	
Lead Compounds	7,633,248	151,189	1,154,063	1.01E-05	A	5.81E-03
Manganese Compounds	7,633,248	151,189	1,154,063	2.00E-05	A	1.15E-02
Mercury Compounds	7,633,248	151,189	1,154,063	7.53E-07	A	4.35E-04
Nickel Compounds	7,633,248	151,189	1,154,063	5.63E-04	A	3.25E-01
Naphthalene	7,633,248	151,189	1,154,063	7.53E-06	A	4.35E-03
Phosphorus	7,633,248	151,189	1,154,063	6.31E-05	A	3.64E-02
POM	7,633,248	151,189	1,154,063	8.67E-06	A	5.00E-03
Selenium Compounds	7,633,248	151,189	1,154,063	4.55E-06	A	2.63E-03
Toluene	7,633,248	151,189	1,154,063	4.13E-05	A	2.39E-02
Xylene	7,633,248	151,189	1,154,063		A	
o-Xylene	7,633,248	151,189	1,154,063	7.27E-07	A	4.19E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	17,200	137,819	2,370	0.163	M	0.1932
NOX	17,200	137,819	2,370	0.171	A	0.2027
CO	17,200	137,819	2,370	0.0357	A	0.0423
VOC	17,200	137,819	2,370	0.00143	A	0.0017
PM-PRI	17,200	137,819	2,370	0.0236	A	0.0280
PM-FIL	17,200	137,819	2,370	0.0143	A	0.0169
PM-CON	17,200	137,819	2,370	0.00929	A	0.0110
PM10-PRI	17,200	137,819	2,370	0.0164	A	0.0194
PM10-FIL	17,200	137,819	2,370	0.00714	A	0.0085
PM25-PRI	17,200	137,819	2,370	0.0111	A	0.0132
PM25-FIL	17,200	137,819	2,370	0.00179	A	0.0021
Acetaldehyde	17,200	137,819	2,370		A	
Acrolein	17,200	137,819	2,370		A	
Antimony Compounds	17,200	137,819	2,370	3.75E-05	A	4.44E-05
Arsenic Compounds	17,200	137,819	2,370	9.43E-06	A	1.12E-05
Benzene	17,200	137,819	2,370	1.53E-06	A	1.81E-06
Beryllium Compounds	17,200	137,819	2,370	1.99E-07	A	2.35E-07
1,3-Butadiene	17,200	137,819	2,370		A	
Cadmium Compounds	17,200	137,819	2,370	2.84E-06	A	3.37E-06
Chromium Compounds	17,200	137,819	2,370	6.04E-06	A	7.15E-06
Cobalt Compounds	17,200	137,819	2,370	4.30E-05	A	5.10E-05
Ethylbenzene	17,200	137,819	2,370	4.54E-07	A	5.38E-07
Formaldehyde	17,200	137,819	2,370	4.36E-04	A	5.16E-04
Hydrochloric Acid	17,200	137,819	2,370		A	
Lead Compounds	17,200	137,819	2,370	1.08E-05	A	1.28E-05
Manganese Compounds	17,200	137,819	2,370	2.14E-05	A	2.54E-05
Mercury Compounds	17,200	137,819	2,370	8.07E-07	A	9.57E-07
Nickel Compounds	17,200	137,819	2,370	6.04E-04	A	7.15E-04
Naphthalene	17,200	137,819	2,370	8.07E-06	A	9.57E-06
Phosphorus	17,200	137,819	2,370	6.76E-05	A	8.01E-05
POM	17,200	137,819	2,370	9.29E-06	A	1.10E-05
Selenium Compounds	17,200	137,819	2,370	4.88E-06	A	5.78E-06
Toluene	17,200	137,819	2,370	4.43E-05	A	5.25E-05
Xylene	17,200	137,819	2,370		A	
o-Xylene	17,200	137,819	2,370	7.79E-07	A	9.23E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler Spec Used Oil

Pollutant	Annual Fuel Use (gal/yr)	Emission Factor (lb/10^3 gal)	EF Ref	Annual Emissions (tons/yr)
SO2	15,918	51.8	A	0.4123
NOX	15,918	47	A	0.3741
CO	15,918	5.0	A	0.0398
VOC	15,918	0.76	A	0.0060
PM-PRI	15,918	7.75	A	0.0617
PM-FIL	15,918	6.25	A	0.0497
PM-CON	15,918	1.5	A	0.0119
PM10-PRI	15,918	5.94	A	0.0473
PM10-FIL	15,918	4.44	A	0.0353
PM25-PRI	15,918	4.75	A	0.0378
PM25-FIL	15,918	3.25	A	0.0259
Acetaldehyde	15,918		A	
Acrolein	15,918		A	
Antimony Compounds	15,918		A	
Arsenic Compounds	15,918	1.10E-01	A	8.75E-04
Benzene	15,918		A	
Beryllium Compounds	15,918		A	
1,3-Butadiene	15,918		A	
Cadmium Compounds	15,918	9.30E-03	A	7.40E-05
Chromium Compounds	15,918	2.00E-02	A	1.59E-04
Cobalt Compounds	15,918	2.10E-04	A	1.67E-06
Ethylbenzene	15,918		A	
Formaldehyde	15,918		A	
Hydrochloric Acid	15,918	3.30E-02	A	2.63E-04
Lead Compounds	15,918	5.50E-01	A	4.38E-03
Manganese Compounds	15,918	6.80E-02	A	5.41E-04
Mercury Compounds	15,918		A	
Nickel Compounds	15,918	1.10E-02	A	8.75E-05
Naphthalene	15,918		A	
Phosphorus	15,918		A	
POM	15,918		A	
Selenium Compounds	15,918		A	
Toluene	15,918		A	
Xylene	15,918		A	
o-Xylene	15,918		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler Total

Pollutant	Annual Emissions No. 6 FO (tons/yr)	No. 2 FO (tons/yr)	Spec Oil (tons/yr)	Total (tons/yr)
SO2	1,095.2	0.1932	0.4123	1095.8
NOX	180.6	0.2027	0.3741	181.2
CO	19.2	0.0423	0.0398	19.3
VOC	2.9	0.0017	0.0060	2.9
PM-PRI	78.5	0.0280	0.0617	78.6
PM-FIL	72.7	0.0169	0.0497	72.8
PM-CON	5.8	0.0110	0.0119	5.8
PM10-PRI	57.4	0.0194	0.0473	57.5
PM10-FIL	51.6	0.0085	0.0353	51.6
PM25-PRI	43.6	0.0132	0.0378	43.7
PM25-FIL	37.8	0.0021	0.0259	37.8
Acetaldehyde				
Acrolein				
Antimony Compounds	2.02E-02	4.44E-05		2.02E-02
Arsenic Compounds	5.08E-03	1.12E-05	8.75E-04	5.96E-03
Benzene	8.23E-04	1.81E-06		8.25E-04
Beryllium Compounds	1.07E-04	2.35E-07		1.07E-04
1,3-Butadiene				
Cadmium Compounds	1.53E-03	3.37E-06	7.40E-05	1.61E-03
Chromium Compounds	3.25E-03	7.15E-06	1.59E-04	3.42E-03
Cobalt Compounds	2.32E-02	5.10E-05	1.67E-06	2.32E-02
Ethylbenzene	2.45E-04	5.38E-07		2.45E-04
Formaldehyde	2.35E-01	5.16E-04		2.35E-01
Hydrochloric Acid			2.63E-04	2.63E-04
Lead Compounds	5.81E-03	1.28E-05	4.38E-03	1.02E-02
Manganese Compounds	1.15E-02	2.54E-05	5.41E-04	1.21E-02
Mercury Compounds	4.35E-04	9.57E-07		4.36E-04
Nickel Compounds	3.25E-01	7.15E-04	8.75E-05	3.26E-01
Naphthalene	4.35E-03	9.57E-06		4.36E-03
Phosphorus	3.64E-02	8.01E-05		3.65E-02
POM	5.00E-03	1.10E-05		5.01E-03
Selenium Compounds	2.63E-03	5.78E-06		2.63E-03
Toluene	2.39E-02	5.25E-05		2.39E-02
Xylene				
o-Xylene	4.19E-04	9.23E-07		4.20E-04
Total HAPs				7.12E-01

CT-3

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	2,925,677	137,819	403,214	0.163	M	32.9
NOX	2,925,677	137,819	403,214	0.131	S	26.4
CO	2,925,677	137,819	403,214	0.0500	S	10.1
VOC	2,925,677	137,819	403,214	0.0000439	S	0.01
PM-PRI	2,925,677	137,819	403,214	0.0751	*	15.1
PM-FIL	2,925,677	137,819	403,214	0.06790	S	13.7
PM-CON	2,925,677	137,819	403,214	0.00720	A	1.5
PM10-PRI	2,925,677	137,819	403,214	0.0615	*	12.4
PM10-FIL	2,925,677	137,819	403,214	0.05430	*	10.9
PM25-PRI	2,925,677	137,819	403,214	0.0597	*	12.0
PM25-FIL	2,925,677	137,819	403,214	0.0525	*	10.6
Acetaldehyde	2,925,677	137,819	403,214	2.52E-05	A	5.08E-03
Acrolein	2,925,677	137,819	403,214	7.88E-06	A	1.59E-03
Antimony Compounds	2,925,677	137,819	403,214		A	
Arsenic Compounds	2,925,677	137,819	403,214	1.10E-05	A	2.22E-03
Benzene	2,925,677	137,819	403,214	5.50E-05	A	1.11E-02
Beryllium Compounds	2,925,677	137,819	403,214	3.10E-07	A	6.25E-05
1,3-Butadiene	2,925,677	137,819	403,214	1.60E-05	A	3.23E-03
Cadmium Compounds	2,925,677	137,819	403,214	4.80E-06	A	9.68E-04
Chromium Compounds	2,925,677	137,819	403,214	1.10E-05	A	2.22E-03
Cobalt Compounds	2,925,677	137,819	403,214		A	
Ethylbenzene	2,925,677	137,819	403,214		A	
Formaldehyde	2,925,677	137,819	403,214	2.80E-04	A	5.64E-02
Hydrochloric Acid	2,925,677	137,819	403,214		A	
Lead Compounds	2,925,677	137,819	403,214	1.40E-05	A	2.82E-03
Manganese Compounds	2,925,677	137,819	403,214	7.90E-04	A	1.59E-01
Mercury Compounds	2,925,677	137,819	403,214	1.20E-06	A	2.42E-04
Nickel Compounds	2,925,677	137,819	403,214	4.60E-06	A	9.27E-04
Naphthalene	2,925,677	137,819	403,214	3.50E-05	A	7.06E-03
Phosphorus	2,925,677	137,819	403,214		A	
POM	2,925,677	137,819	403,214	4.00E-05	A	8.06E-03
Selenium Compounds	2,925,677	137,819	403,214	2.50E-05	A	5.04E-03
Toluene	2,925,677	137,819	403,214	2.81E-04	A	5.67E-02
Xylene	2,925,677	137,819	403,214	1.93E-04	A	3.89E-02
o-Xylene	2,925,677	137,819	403,214		A	
Total HAPs						3.62E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

PBSG1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	604	137,819	83	0.163	M	0.01
NOX	604	137,819	83	3.2	A	0.13
CO	604	137,819	83	0.85	A	0.04
VOC	604	137,819	83	0.0819	A	
PM-PRI	604	137,819	83	0.0697	A	
PM-FIL	604	137,819	83	0.062	A	
PM-CON	604	137,819	83	0.0077	A	
PM10-PRI	604	137,819	83	0.0573	A	
PM10-FIL	604	137,819	83	0.0496	A	
PM25-PRI	604	137,819	83	0.0556	A	
PM25-FIL	604	137,819	83	0.0479	A	
Acetaldehyde	604	137,819	83	2.52E-05	A	1.05E-06
Acrolein	604	137,819	83	7.88E-06	A	3.28E-07
Antimony Compounds	604	137,819	83		A	
Arsenic Compounds	604	137,819	83	1.10E-05	A	4.58E-07
Benzene	604	137,819	83	7.76E-04	A	3.23E-05
Beryllium Compounds	604	137,819	83	3.10E-07	A	1.29E-08
1,3-Butadiene	604	137,819	83	1.60E-05	A	6.66E-07
Cadmium Compounds	604	137,819	83	4.80E-06	A	2.00E-07
Chromium Compounds	604	137,819	83	1.10E-05	A	4.58E-07
Cobalt Compounds	604	137,819	83		A	
Ethylbenzene	604	137,819	83		A	
Formaldehyde	604	137,819	83	7.89E-05	A	3.28E-06
Hydrochloric Acid	604	137,819	83		A	
Lead Compounds	604	137,819	83	1.40E-05	A	5.83E-07
Manganese Compounds	604	137,819	83	7.90E-04	A	3.29E-05
Mercury Compounds	604	137,819	83	1.20E-06	A	4.99E-08
Nickel Compounds	604	137,819	83	4.60E-06	A	1.91E-07
Naphthalene	604	137,819	83	1.30E-04	A	5.41E-06
Phosphorus	604	137,819	83		A	
POM	604	137,819	83	2.12E-04	A	8.82E-06
Selenium Compounds	604	137,819	83	2.50E-05	A	1.04E-06
Toluene	604	137,819	83	2.81E-04	A	1.17E-05
Xylene	604	137,819	83	1.93E-04	A	8.03E-06
o-Xylene	604	137,819	83		A	
Total HAPs						1.07E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)			
	Boiler	CT-3	PBSG1	Total
SO2	1095.8	32.9	0.0	1,128.7
NOX	181.2	26.4	0.1	207.7
CO	19.3	10.1	0.0	29.4
VOC	2.9	0.0		2.9
PM-PRI	78.6	15.1		93.7
PM-FIL	72.8	13.7		86.5
PM-CON	5.8	1.5		7.3
PM10-PRI	57.5	12.4		69.9
PM10-FIL	51.6	10.9		62.5
PM25-PRI	43.7	12.0		55.7
PM25-FIL	37.8	10.6		48.4
Acetaldehyde		5.08E-03	1.05E-06	0.0051
Acrolein		1.59E-03	3.28E-07	0.0016
Antimony Compounds	2.02E-02			0.0202
Arsenic Compounds	5.96E-03	2.22E-03	4.58E-07	0.0082
Benzene	8.25E-04	1.11E-02	3.23E-05	0.0119
Beryllium Compounds	1.07E-04	6.25E-05	1.29E-08	0.0002
1,3-Butadiene		3.23E-03	6.66E-07	0.0032
Cadmium Compounds	1.61E-03	9.68E-04	2.00E-07	0.0026
Chromium Compounds	3.42E-03	2.22E-03	4.58E-07	0.0056
Cobalt Compounds	2.32E-02			0.0232
Ethylbenzene	2.45E-04			0.0002
Formaldehyde	2.35E-01	5.64E-02	3.28E-06	0.2916
Hydrochloric Acid	2.63E-04			0.0003
Lead Compounds	1.02E-02	2.82E-03	5.83E-07	0.0130
Manganese Compounds	1.21E-02	1.59E-01	3.29E-05	0.1714
Mercury Compounds	4.36E-04	2.42E-04	4.99E-08	0.0007
Nickel Compounds	3.26E-01	9.27E-04	1.91E-07	0.3268
Naphthalene	4.36E-03	7.06E-03	5.41E-06	0.0114
Phosphorus	3.65E-02			0.0365
POM	5.01E-03	8.06E-03	8.82E-06	0.0131
Selenium Compounds	2.63E-03	5.04E-03	1.04E-06	0.0077
Toluene	2.39E-02	5.67E-02	1.17E-05	0.0806
Xylene		3.89E-02	8.03E-06	0.0389
o-Xylene	4.20E-04			0.0004
Total HAPS	7.12E-01	3.62E-01	1.07E-04	1.0744

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100023

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Shipman Power Plant

2) Permit No(s).: 0236-01-C

3) *Physical Facility Address:*

Street: Corner of Lihiwai and Banyan Drive

City: Hilo Zip Code: 96720

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	Mailing City:	State:	Zip Code:
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 282583 (Easting (m)) Vertical (y): 2182613 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Dan V. Giovanni

Name: Dan V. Giovanni Date: 3/31/05
Responsible Official

Title: Production Manager

Permit No.:	0236-01-C
Date Rec'd:	

FORM F-1

2005 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2004)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Shipman Power Plant	B. Location:	Corner of Lihiwai and Banyan Drive	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City:	Hilo	F. State: HI	G. Zip Code: 96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4517
K. Responsible Official:	0	L. Title:	Dan V. Giovanni	M. Telephone No.	808-969-0421
N. Signature:	[signature]	Date:	3/31/05		

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												Annual Total
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
S-3	4.8	3.4	2.5	63.7	1.2	11.0	0.2	0.0	0.0	–			
S-4	5.0	3.6	2.8	68.7	1.3	11.8	0.2	0.0	0.0	–			
A. Supplement (if appl.)													
B. Total Report Emissions	9.6	7.0	5.3	132.4	2.5	22.8	0.4	0.0	0.0	–			
C. Total Emissions Subject to Fees	9			132		22	0						D. 163

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2004 $/TON	Multiply	CPI Index Adjustmnt (2.2% incr. '02 to '03)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	163	x	40.77	x	1.022	=	B.	$6,791.71
	"Clean Air Special Fund - NON"	C.	163	x	9.94	x	1.022	=	D.	$1,655.86
							Total	=	E.	$8,447.57

Note: 2005 $/ton charge payable to Clean Air Special Fund - COV = $40.77 x 1.022 = $41.67/ton.
2005 $/ton charge payable to Clean Air Special Fund - NON = $9.94 x 1.022 = $10.16/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with tow separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

S-3 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	443,688	151,189	67,081	1.898	M	63.7
NOX	443,688	151,189	67,081	0.313	A	10.5
CO	443,688	151,189	67,081	0.0333	A	1.1
VOC	443,688	151,189	67,081	0.00507	A	0.2
PM-PRI	443,688	151,189	67,081	0.137	A	4.6
PM-FIL	443,688	151,189	67,081	0.127	A	4.3
PM-CON	443,688	151,189	67,081	0.0100	A	0.3
PM10-PRI	443,688	151,189	67,081	0.1002	A	3.4
PM10-FIL	443,688	151,189	67,081	0.0902	A	3.0
PM25-PRI	443,688	151,189	67,081	0.076	A	2.5
PM25-FIL	443,688	151,189	67,081	0.066	A	2.2
Acetaldehyde	443,688	151,189	67,081		A	
Acrolein	443,688	151,189	67,081		A	
Antimony Compounds	443,688	151,189	67,081	3.50E-05	A	1.17E-03
Arsenic Compounds	443,688	151,189	67,081	8.80E-06	A	2.95E-04
Benzene	443,688	151,189	67,081	1.43E-06	A	4.79E-05
Beryllium Compounds	443,688	151,189	67,081	1.85E-07	A	6.22E-06
1,3-Butadiene	443,688	151,189	67,081		A	
Cadmium Compounds	443,688	151,189	67,081	2.65E-06	A	8.90E-05
Chromium Compounds	443,688	151,189	67,081	5.63E-06	A	1.89E-04
Cobalt Compounds	443,688	151,189	67,081	4.01E-05	A	1.35E-03
Ethylbenzene	443,688	151,189	67,081	4.24E-07	A	1.42E-05
Formaldehyde	443,688	151,189	67,081	4.07E-04	A	1.36E-02
Hydrochloric Acid	443,688	151,189	67,081		A	
Lead Compounds	443,688	151,189	67,081	1.01E-05	A	3.38E-04
Manganese Compounds	443,688	151,189	67,081	2.00E-05	A	6.71E-04
Mercury Compounds	443,688	151,189	67,081	7.53E-07	A	2.53E-05
Nickel Compounds	443,688	151,189	67,081	5.63E-04	A	1.89E-02
Naphthalene	443,688	151,189	67,081	7.53E-06	A	2.53E-04
Phosphorus	443,688	151,189	67,081	6.31E-05	A	2.12E-03
POM	443,688	151,189	67,081	8.67E-06	A	2.91E-04
Selenium Compounds	443,688	151,189	67,081	4.55E-06	A	1.53E-04
Toluene	443,688	151,189	67,081	4.13E-05	A	1.39E-03
Xylene	443,688	151,189	67,081		A	
o-Xylene	443,688	151,189	67,081	7.27E-07	A	2.44E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-3 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	51,461	91,500	4,709	0.00423	M	0.0100
NOX	51,461	91,500	4,709	0.208	A	0.4897
CO	51,461	91,500	4,709	0.0350	A	0.0824
VOC	51,461	91,500	4,709	0.00546	A	0.0129
PM-PRI	51,461	91,500	4,709	0.01210	A	0.0285
PM-FIL	51,461	91,500	4,709	0.00656	A	0.0154
PM-CON	51,461	91,500	4,709	0.00559	A	0.0132
PM10-PRI	51,461	91,500	4,709	0.01210	A	0.0285
PM10-FIL	51,461	91,500	4,709	0.00656	A	0.0154
PM25-PRI	51,461	91,500	4,709	0.01210	A	0.0285
PM25-FIL	51,461	91,500	4,709	0.00656	A	0.0154
Acetaldehyde	51,461	91,500	4,709		A	
Acrolein	51,461	91,500	4,709		A	
Antimony Compounds	51,461	91,500	4,709		A	
Arsenic Compounds	51,461	91,500	4,709		A	
Benzene	51,461	91,500	4,709		A	
Beryllium Compounds	51,461	91,500	4,709		A	
1,3-Butadiene	51,461	91,500	4,709		A	
Cadmium Compounds	51,461	91,500	4,709		A	
Chromium Compounds	51,461	91,500	4,709		A	
Cobalt Compounds	51,461	91,500	4,709		A	
Ethylbenzene	51,461	91,500	4,709		A	
Formaldehyde	51,461	91,500	4,709		A	
Hydrochloric Acid	51,461	91,500	4,709		A	
Lead Compounds	51,461	91,500	4,709		A	
Manganese Compounds	51,461	91,500	4,709		A	
Mercury Compounds	51,461	91,500	4,709		A	
Nickel Compounds	51,461	91,500	4,709		A	
Naphthalene	51,461	91,500	4,709		A	
Phosphorus	51,461	91,500	4,709		A	
POM	51,461	91,500	4,709		A	
Selenium Compounds	51,461	91,500	4,709		A	
Toluene	51,461	91,500	4,709		A	
Xylene	51,461	91,500	4,709		A	
o-Xylene	51,461	91,500	4,709		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-3 Total

Pollutant	Annual Emissions Fuel Oil (tons/yr)	Propane (tons/yr)	Total (tons/yr)
SO2	63.7	0.0100	63.7
NOX	10.5	0.4897	11.0
CO	1.1	0.0824	1.2
VOC	0.2	0.0129	0.2
PM-PRI	4.6	0.0285	4.6
PM-FIL	4.3	0.0154	4.3
PM-CON	0.3	0.0132	0.3
PM10-PRI	3.4	0.0285	3.4
PM10-FIL	3	0.0154	3.0
PM25-PRI	2.5	0.0285	2.5
PM25-FIL	2.2	0.0154	2.2
Acetaldehyde			
Acrolein			
Antimony Compounds	1.17E-03		1.17E-03
Arsenic Compounds	2.95E-04		2.95E-04
Benzene	4.79E-05		4.79E-05
Beryllium Compounds	6.22E-06		6.22E-06
1,3-Butadiene			
Cadmium Compounds	8.90E-05		8.90E-05
Chromium Compounds	1.89E-04		1.89E-04
Cobalt Compounds	1.35E-03		1.35E-03
Ethylbenzene	1.42E-05		1.42E-05
Formaldehyde	1.36E-02		1.36E-02
Hydrochloric Acid			
Lead Compounds	3.38E-04		3.38E-04
Manganese Compounds	6.71E-04		6.71E-04
Mercury Compounds	2.53E-05		2.53E-05
Nickel Compounds	1.89E-02		1.89E-02
Naphthalene	2.53E-04		2.53E-04
Phosphorus	2.12E-03		2.12E-03
POM	2.91E-04		2.91E-04
Selenium Compounds	1.53E-04		1.53E-04
Toluene	1.39E-03		1.39E-03
Xylene			
o-Xylene	2.44E-05		2.44E-05
Total HAPS			4.10E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	478,716	151,189	72,377	1.898	M	68.7
NOX	478,716	151,189	72,377	0.313	A	11.3
CO	478,716	151,189	72,377	0.0333	A	1.2
VOC	478,716	151,189	72,377	0.00507	A	0.20
PM-PRI	478,716	151,189	72,377	0.137	A	5.0
PM-FIL	478,716	151,189	72,377	0.127	A	4.6
PM-CON	478,716	151,189	72,377	0.0100	A	0.4
PM10-PRI	478,716	151,189	72,377	0.1002	A	3.6
PM10-FIL	478,716	151,189	72,377	0.0902	A	3.3
PM25-PRI	478,716	151,189	72,377	0.076	A	2.8
PM25-FIL	478,716	151,189	72,377	0.066	A	2.4
Acetaldehyde	478,716	151,189	72,377		A	
Acrolein	478,716	151,189	72,377		A	
Antimony Compounds	478,716	151,189	72,377	3.50E-05	A	1.27E-03
Arsenic Compounds	478,716	151,189	72,377	8.80E-06	A	3.18E-04
Benzene	478,716	151,189	72,377	1.43E-06	A	5.16E-05
Beryllium Compounds	478,716	151,189	72,377	1.85E-07	A	6.71E-06
1,3-Butadiene	478,716	151,189	72,377		A	
Cadmium Compounds	478,716	151,189	72,377	2.65E-06	A	9.60E-05
Chromium Compounds	478,716	151,189	72,377	5.63E-06	A	2.04E-04
Cobalt Compounds	478,716	151,189	72,377	4.01E-05	A	1.45E-03
Ethylbenzene	478,716	151,189	72,377	4.24E-07	A	1.53E-05
Formaldehyde	478,716	151,189	72,377	4.07E-04	A	1.47E-02
Hydrochloric Acid	478,716	151,189	72,377		A	
Lead Compounds	478,716	151,189	72,377	1.01E-05	A	3.64E-04
Manganese Compounds	478,716	151,189	72,377	2.00E-05	A	7.24E-04
Mercury Compounds	478,716	151,189	72,377	7.53E-07	A	2.73E-05
Nickel Compounds	478,716	151,189	72,377	5.63E-04	A	2.04E-02
Naphthalene	478,716	151,189	72,377	7.53E-06	A	2.73E-04
Phosphorus	478,716	151,189	72,377	6.31E-05	A	2.28E-03
POM	478,716	151,189	72,377	8.67E-06	A	3.14E-04
Selenium Compounds	478,716	151,189	72,377	4.55E-06	A	1.65E-04
Toluene	478,716	151,189	72,377	4.13E-05	A	1.50E-03
Xylene	478,716	151,189	72,377		A	
o-Xylene	478,716	151,189	72,377	7.27E-07	A	2.63E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	55,046	91,500	5,037	0.00423	M	0.0107
NOX	55,046	91,500	5,037	0.208	A	0.5238
CO	55,046	91,500	5,037	0.0350	A	0.0881
VOC	55,046	91,500	5,037	0.00546	A	0.0138
PM-PRI	55,046	91,500	5,037	0.01210	A	0.0305
PM-FIL	55,046	91,500	5,037	0.00656	A	0.0165
PM-CON	55,046	91,500	5,037	0.00559	A	0.0141
PM10-PRI	55,046	91,500	5,037	0.01210	A	0.0305
PM10-FIL	55,046	91,500	5,037	0.00656	A	0.0165
PM25-PRI	55,046	91,500	5,037	0.01210	A	0.0305
PM25-FIL	55,046	91,500	5,037	0.00656	A	0.0165
Acetaldehyde	55,046	91,500	5,037		A	
Acrolein	55,046	91,500	5,037		A	
Antimony Compounds	55,046	91,500	5,037		A	
Arsenic Compounds	55,046	91,500	5,037		A	
Benzene	55,046	91,500	5,037		A	
Beryllium Compounds	55,046	91,500	5,037		A	
1,3-Butadiene	55,046	91,500	5,037		A	
Cadmium Compounds	55,046	91,500	5,037		A	
Chromium Compounds	55,046	91,500	5,037		A	
Cobalt Compounds	55,046	91,500	5,037		A	
Ethylbenzene	55,046	91,500	5,037		A	
Formaldehyde	55,046	91,500	5,037		A	
Hydrochloric Acid	55,046	91,500	5,037		A	
Lead Compounds	55,046	91,500	5,037		A	
Manganese Compounds	55,046	91,500	5,037		A	
Mercury Compounds	55,046	91,500	5,037		A	
Nickel Compounds	55,046	91,500	5,037		A	
Naphthalene	55,046	91,500	5,037		A	
Phosphorus	55,046	91,500	5,037		A	
POM	55,046	91,500	5,037		A	
Selenium Compounds	55,046	91,500	5,037		A	
Toluene	55,046	91,500	5,037		A	
Xylene	55,046	91,500	5,037		A	
o-Xylene	55,046	91,500	5,037		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 Total

Pollutant	Annual Emissions Fuel Oil (tons/yr)	Propane (tons/yr)	Total (tons/yr)
SO2	68.7	0.0107	68.7
NOX	11.3	0.5238	11.8
CO	1.2	0.0881	1.3
VOC	0.20	0.0138	0.2
PM-PRI	5	0.0305	5.0
PM-FIL	4.6	0.0165	4.6
PM-CON	0.4	0.0141	0.4
PM10-PRI	3.6	0.0305	3.6
PM10-FIL	3.3	0.0165	3.3
PM25-PRI	2.8	0.0305	2.8
PM25-FIL	2.4	0.0165	2.4
Acetaldehyde			
Acrolein			
Antimony Compounds	1.27E-03		1.27E-03
Arsenic Compounds	3.18E-04		3.18E-04
Benzene	5.16E-05		5.16E-05
Beryllium Compounds	6.71E-06		6.71E-06
1,3-Butadiene			
Cadmium Compounds	9.60E-05		9.60E-05
Chromium Compounds	2.04E-04		2.04E-04
Cobalt Compounds	1.45E-03		1.45E-03
Ethylbenzene	1.53E-05		1.53E-05
Formaldehyde	1.47E-02		1.47E-02
Hydrochloric Acid			
Lead Compounds	3.64E-04		3.64E-04
Manganese Compounds	7.24E-04		7.24E-04
Mercury Compounds	2.73E-05		2.73E-05
Nickel Compounds	2.04E-02		2.04E-02
Naphthalene	2.73E-04		2.73E-04
Phosphorus	2.28E-03		2.28E-03
POM	3.14E-04		3.14E-04
Selenium Compounds	1.65E-04		1.65E-04
Toluene	1.50E-03		1.50E-03
Xylene			
o-Xylene	2.63E-05		2.63E-05
Total HAPS			4.42E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year) S-3	S-4	Total
SO2	63.7	68.7	132.4
NOX	11.0	11.8	22.8
CO	1.2	1.3	2.5
VOC	0.2	0.2	0.4
PM-PRI	4.6	5.0	9.6
PM-FIL	4.3	4.6	8.9
PM-CON	0.3	0.4	0.7
PM10-PRI	3.4	3.6	7.0
PM10-FIL	3.0	3.3	6.3
PM25-PRI	2.5	2.8	5.3
PM25-FIL	2.2	2.4	4.6
Acetaldehyde			
Acrolein			
Antimony Compounds	1.17E-03	1.27E-03	2.44E-03
Arsenic Compounds	2.95E-04	3.18E-04	6.14E-04
Benzene	4.79E-05	5.16E-05	9.95E-05
Beryllium Compounds	6.22E-06	6.71E-06	1.29E-05
1,3-Butadiene			
Cadmium Compounds	8.90E-05	9.60E-05	1.85E-04
Chromium Compounds	1.89E-04	2.04E-04	3.93E-04
Cobalt Compounds	1.35E-03	1.45E-03	2.80E-03
Ethylbenzene	1.42E-05	1.53E-05	2.96E-05
Formaldehyde	1.36E-02	1.47E-02	2.84E-02
Hydrochloric Acid			
Lead Compounds	3.38E-04	3.64E-04	7.02E-04
Manganese Compounds	6.71E-04	7.24E-04	1.39E-03
Mercury Compounds	2.53E-05	2.73E-05	5.25E-05
Nickel Compounds	1.89E-02	2.04E-02	3.93E-02
Naphthalene	2.53E-04	2.73E-04	5.25E-04
Phosphorus	2.12E-03	2.28E-03	4.40E-03
POM	2.91E-04	3.14E-04	6.04E-04
Selenium Compounds	1.53E-04	1.65E-04	3.17E-04
Toluene	1.39E-03	1.50E-03	2.88E-03
Xylene			
o-Xylene	2.44E-05	2.63E-05	5.07E-05
Total HAPS	4.10E-02	4.42E-02	8.51E-02

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100013

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Keahole Power Plant

2) Permit No(s).: PSD HI 88-01, 0007-01-C & 0256-01-C

3) Physical Facility Address:

Street: 73-4249 Queen Kaahumanu Highway

City: Kailua-Kona Zip Code: 96740

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 811293 (Easting (m)) Vertical (y): 2184955 (Northing (m))

Zone: 4 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: Dan V. Giovanni

Name: Dan V. Giovanni Date: 3/31/05
Responsible Official

Title: Production Manager

Permit No.:	0256-01-C
Date Rec'd:	

FORM F-1

2005 ANNUAL FEE SUMMARY FOR COVERED SOURCES

(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2004)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Keahole Power Plant	B. Location:	73-4249 Queen Kaahumanu Highway	C. Island:	Hawaii
D. Mailing Address:	P.O. Box 1027	E. City: Hilo	F. State: HI	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J. Telephone No.:	808-543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.	808-969-0421
N. Signature:	Dan V. Giovanni	Date:	3/31/05		

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS [Report emissions to the nearest tenth of a ton (Line 2.B.) and total annual emis. (Line 2.C.) subject to fees without the fraction(s) of a ton]

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)												Annual Total
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)												
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3			
D-18	0.3	0.2	0.2	0.6	3.1	11.5	0.3	0.0	0.0	–			
D-19	0.1	0.1	0.1	0.3	1.7	6.3	0.2	0.0	0.0	–			
D-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	–			
D-21	0.6	0.5	0.5	1.3	7.0	14.4	0.7	0.0	0.0	–			
A. Supplement (if appl.) A	15.6	13.4	13.1	104.9	25.7	117.0	1.8	0.0	1.1	–			
B. Total Report Emissions	16.6	14.2	13.9	107.1	37.5	149.2	3.0	0.0	1.1	–			
C. Total Emissions Subject to Fees	16			107		149	3						D. 275

3 ANNUAL FEE CALCULATION (Use the total annual emissions subject to fees calculated in Block 2.D.)

		Total Annual Emissions Subject to Fees (enter 2.D. value below)		Multiply	2004 $/TON	Multiply	CPI Index Adjustmnt (2.2% incr. '02 to '03)	Equal		Total
Fee payable to:	"Clean Air Special Fund - COV"	A.	275	x	40.77	x	1.022	=	B.	$11,458.41
	"Clean Air Special Fund - NON"	C.	275	x	9.94	x	1.022	=	D.	$2,793.64
							Total	=	E.	$14,252.05

Note: 2005 $/ton charge payable to Clean Air Special Fund - COV = $40.77 x 1.022 = $41.67/ton.
2005 $/ton charge payable to Clean Air Special Fund - NON = $9.94 x 1.022 = $10.16/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500, with a check made payable to the 'Clean Air Special Fund - COV.'
If the summed amount found in 3.E is greater than $500, then pay the fee amounts found in 3.B & 3.D with tow separate checks made payable to the 'Clean Air Special Fund - COV' & 'Clean Air Special Fund - NON,' respectively.

Permit No.:	0256-01-C
Date Rec'd:	

FORM F-2
SUPPLEMENT A
2005 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2004)

INPUT DATA IN YELLOW COLORED CELLS

1. FACILITY INFORMATION (Signature box to be signed by Responsible Official)

A. Facility Name:	HELCO - Keahole Power Plant	B. Location: 73-4249 Queen Kaahumanu Highway	C. Island: Hawaii
D. Responsible Official: Dan V. Giovanni		E. Title: Production Manager	F. Telephone No.: 808-969-0421
G. Signature:		Date: 3/31/05	

Based on the information and belief formed after reasonable inquiry, the statements and information in this document are true, accurate, and complete

2. CALCULATED EMISSIONS (Report emissions to the nearest tenth of a ton)

Equipment: Unit No. or Activity No.	Air Pollutant Emissions (tons/yr)											
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (please specify)											
	TSP	PM_{10}	$PM_{2.5}$	SO_2	CO	NOx	VOC	Pb	HAPs	NH_3		
D-22	0.5	0.4	0.4	1.1	5.5	9.6	0.5	0.0	0.0	–		
D-23	0.6	0.5	0.5	1.4	7.5	19.2	0.7	0.0	0.0	–		
CT-2	5.9	5.1	5.0	37.8	0.9	30.9	0.1	0.0	0.4	–		
BS-1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	–		
CT-4	4.5	3.9	3.8	36.7	5.3	33.7	0.4	0.0	0.4	–		
CT-5	4.1	3.5	3.4	27.9	6.5	23.5	0.1	0.0	0.3	–		
Supplement												
Total Report Emissions	15.6	13.4	13.1	104.9	25.7	117.0	1.8	0.0	1.1	–		

D-18

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	52,139	137,819	7,186	0.163	M	0.6
NOX	52,139	137,819	7,186	3.2	A	11.5
CO	52,139	137,819	7,186	0.85	A	3.1
VOC	52,139	137,819	7,186	0.0819	A	0.3
PM-PRI	52,139	137,819	7,186	0.0697	A	0.3
PM-FIL	52,139	137,819	7,186	0.062	A	0.2
PM-CON	52,139	137,819	7,186	0.0077	A	0.028
PM10-PRI	52,139	137,819	7,186	0.0573	A	0.2
PM10-FIL	52,139	137,819	7,186	0.0496	A	0.2
PM25-PRI	52,139	137,819	7,186	0.0556	A	0.2
PM25-FIL	52,139	137,819	7,186	0.0479	A	0.2
Acetaldehyde	52,139	137,819	7,186	2.52E-05	A	9.05E-05
Acrolein	52,139	137,819	7,186	7.88E-06	A	2.83E-05
Antimony Compounds	52,139	137,819	7,186		A	
Arsenic Compounds	52,139	137,819	7,186	1.10E-05	A	3.95E-05
Benzene	52,139	137,819	7,186	7.76E-04	A	2.79E-03
Beryllium Compounds	52,139	137,819	7,186	3.10E-07	A	1.11E-06
1,3-Butadiene	52,139	137,819	7,186	1.60E-05	A	5.75E-05
Cadmium Compounds	52,139	137,819	7,186	4.80E-06	A	1.72E-05
Chromium Compounds	52,139	137,819	7,186	1.10E-05	A	3.95E-05
Cobalt Compounds	52,139	137,819	7,186		A	
Ethylbenzene	52,139	137,819	7,186		A	
Formaldehyde	52,139	137,819	7,186	7.89E-05	A	2.83E-04
Hydrochloric Acid	52,139	137,819	7,186		A	
Lead Compounds	52,139	137,819	7,186	1.40E-05	A	5.03E-05
Manganese Compounds	52,139	137,819	7,186	7.90E-04	A	2.84E-03
Mercury Compounds	52,139	137,819	7,186	1.20E-06	A	4.31E-06
Nickel Compounds	52,139	137,819	7,186	4.60E-06	A	1.65E-05
Naphthalene	52,139	137,819	7,186	1.30E-04	A	4.67E-04
Phosphorus	52,139	137,819	7,186		A	
POM	52,139	137,819	7,186	2.12E-04	A	7.62E-04
Selenium Compounds	52,139	137,819	7,186	2.50E-05	A	8.98E-05
Toluene	52,139	137,819	7,186	2.81E-04	A	1.01E-03
Xylene	52,139	137,819	7,186	1.93E-04	A	6.93E-04
o-Xylene	52,139	137,819	7,186		A	
Total HAPs						9.28E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-19

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	28,412	137,819	3,916	0.163	M	0.3
NOX	28,412	137,819	3,916	3.2	A	6.3
CO	28,412	137,819	3,916	0.85	A	1.7
VOC	28,412	137,819	3,916	0.0819	A	0.2
PM-PRI	28,412	137,819	3,916	0.0697	A	0.1
PM-FIL	28,412	137,819	3,916	0.062	A	0.1
PM-CON	28,412	137,819	3,916	0.0077	A	0.015
PM10-PRI	28,412	137,819	3,916	0.0573	A	0.1
PM10-FIL	28,412	137,819	3,916	0.0496	A	0.1
PM25-PRI	28,412	137,819	3,916	0.0556	A	0.1
PM25-FIL	28,412	137,819	3,916	0.0479	A	0.1
Acetaldehyde	28,412	137,819	3,916	2.52E-05	A	4.93E-05
Acrolein	28,412	137,819	3,916	7.88E-06	A	1.54E-05
Antimony Compounds	28,412	137,819	3,916		A	
Arsenic Compounds	28,412	137,819	3,916	1.10E-05	A	2.15E-05
Benzene	28,412	137,819	3,916	7.76E-04	A	1.52E-03
Beryllium Compounds	28,412	137,819	3,916	3.10E-07	A	6.07E-07
1,3-Butadiene	28,412	137,819	3,916	1.60E-05	A	3.13E-05
Cadmium Compounds	28,412	137,819	3,916	4.80E-06	A	9.40E-06
Chromium Compounds	28,412	137,819	3,916	1.10E-05	A	2.15E-05
Cobalt Compounds	28,412	137,819	3,916		A	
Ethylbenzene	28,412	137,819	3,916		A	
Formaldehyde	28,412	137,819	3,916	7.89E-05	A	1.54E-04
Hydrochloric Acid	28,412	137,819	3,916		A	
Lead Compounds	28,412	137,819	3,916	1.40E-05	A	2.74E-05
Manganese Compounds	28,412	137,819	3,916	7.90E-04	A	1.55E-03
Mercury Compounds	28,412	137,819	3,916	1.20E-06	A	2.35E-06
Nickel Compounds	28,412	137,819	3,916	4.60E-06	A	9.01E-06
Naphthalene	28,412	137,819	3,916	1.30E-04	A	2.55E-04
Phosphorus	28,412	137,819	3,916		A	
POM	28,412	137,819	3,916	2.12E-04	A	4.15E-04
Selenium Compounds	28,412	137,819	3,916	2.50E-05	A	4.89E-05
Toluene	28,412	137,819	3,916	2.81E-04	A	5.50E-04
Xylene	28,412	137,819	3,916	1.93E-04	A	3.78E-04
o-Xylene	28,412	137,819	3,916		A	
Total HAPs						5.05E-03

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-20

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	26	137,819	4	0.163	M	
NOX	26	137,819	4	1.79	S	
CO	26	137,819	4	0.85	A	
VOC	26	137,819	4	0.0819	A	
PM-PRI	26	137,819	4	0.0697	A	
PM-FIL	26	137,819	4	0.062	A	
PM-CON	26	137,819	4	0.0077	A	
PM10-PRI	26	137,819	4	0.0573	A	
PM10-FIL	26	137,819	4	0.0496	A	
PM25-PRI	26	137,819	4	0.0556	A	
PM25-FIL	26	137,819	4	0.0479	A	
Acetaldehyde	26	137,819	4	2.52E-05	A	4.51E-08
Acrolein	26	137,819	4	7.88E-06	A	1.41E-08
Antimony Compounds	26	137,819	4		A	
Arsenic Compounds	26	137,819	4	1.10E-05	A	1.97E-08
Benzene	26	137,819	4	7.76E-04	A	1.39E-06
Beryllium Compounds	26	137,819	4	3.10E-07	A	5.55E-10
1,3-Butadiene	26	137,819	4	1.60E-05	A	2.87E-08
Cadmium Compounds	26	137,819	4	4.80E-06	A	8.60E-09
Chromium Compounds	26	137,819	4	1.10E-05	A	1.97E-08
Cobalt Compounds	26	137,819	4		A	
Ethylbenzene	26	137,819	4		A	
Formaldehyde	26	137,819	4	7.89E-05	A	1.41E-07
Hydrochloric Acid	26	137,819	4		A	
Lead Compounds	26	137,819	4	1.40E-05	A	2.51E-08
Manganese Compounds	26	137,819	4	7.90E-04	A	1.42E-06
Mercury Compounds	26	137,819	4	1.20E-06	A	2.15E-09
Nickel Compounds	26	137,819	4	4.60E-06	A	8.24E-09
Naphthalene	26	137,819	4	1.30E-04	A	2.33E-07
Phosphorus	26	137,819	4		A	
POM	26	137,819	4	2.12E-04	A	3.80E-07
Selenium Compounds	26	137,819	4	2.50E-05	A	4.48E-08
Toluene	26	137,819	4	2.81E-04	A	5.03E-07
Xylene	26	137,819	4	1.93E-04	A	3.46E-07
o-Xylene	26	137,819	4		A	
Total HAPs						4.63E-06

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-21

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	119,596	137,819	16,483	0.163	M	1.3
NOX	119,596	137,819	16,483	1.75	S	14.4
CO	119,596	137,819	16,483	0.85	A	7.0
VOC	119,596	137,819	16,483	0.0819	A	0.7
PM-PRI	119,596	137,819	16,483	0.0697	A	0.6
PM-FIL	119,596	137,819	16,483	0.062	A	0.5
PM-CON	119,596	137,819	16,483	0.0077	A	0.1
PM10-PRI	119,596	137,819	16,483	0.0573	A	0.5
PM10-FIL	119,596	137,819	16,483	0.0496	A	0.4
PM25-PRI	119,596	137,819	16,483	0.0556	A	0.5
PM25-FIL	119,596	137,819	16,483	0.0479	A	0.4
Acetaldehyde	119,596	137,819	16,483	2.52E-05	A	2.08E-04
Acrolein	119,596	137,819	16,483	7.88E-06	A	6.49E-05
Antimony Compounds	119,596	137,819	16,483		A	
Arsenic Compounds	119,596	137,819	16,483	1.10E-05	A	9.07E-05
Benzene	119,596	137,819	16,483	7.76E-04	A	6.40E-03
Beryllium Compounds	119,596	137,819	16,483	3.10E-07	A	2.55E-06
1,3-Butadiene	119,596	137,819	16,483	1.60E-05	A	1.32E-04
Cadmium Compounds	119,596	137,819	16,483	4.80E-06	A	3.96E-05
Chromium Compounds	119,596	137,819	16,483	1.10E-05	A	9.07E-05
Cobalt Compounds	119,596	137,819	16,483		A	
Ethylbenzene	119,596	137,819	16,483		A	
Formaldehyde	119,596	137,819	16,483	7.89E-05	A	6.50E-04
Hydrochloric Acid	119,596	137,819	16,483		A	
Lead Compounds	119,596	137,819	16,483	1.40E-05	A	1.15E-04
Manganese Compounds	119,596	137,819	16,483	7.90E-04	A	6.51E-03
Mercury Compounds	119,596	137,819	16,483	1.20E-06	A	9.89E-06
Nickel Compounds	119,596	137,819	16,483	4.60E-06	A	3.79E-05
Naphthalene	119,596	137,819	16,483	1.30E-04	A	1.07E-03
Phosphorus	119,596	137,819	16,483		A	
POM	119,596	137,819	16,483	2.12E-04	A	1.75E-03
Selenium Compounds	119,596	137,819	16,483	2.50E-05	A	2.06E-04
Toluene	119,596	137,819	16,483	2.81E-04	A	2.32E-03
Xylene	119,596	137,819	16,483	1.93E-04	A	1.59E-03
o-Xylene	119,596	137,819	16,483		A	
Total HAPs						2.13E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-22

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	94,700	137,819	13,051	0.163	M	1.1
NOX	94,700	137,819	13,051	1.47	S	9.6
CO	94,700	137,819	13,051	0.85	A	5.5
VOC	94,700	137,819	13,051	0.0819	A	0.5
PM-PRI	94,700	137,819	13,051	0.0697	A	0.5
PM-FIL	94,700	137,819	13,051	0.062	A	0.4
PM-CON	94,700	137,819	13,051	0.0077	A	0.1
PM10-PRI	94,700	137,819	13,051	0.0573	A	0.4
PM10-FIL	94,700	137,819	13,051	0.0496	A	0.3
PM25-PRI	94,700	137,819	13,051	0.0556	A	0.4
PM25-FIL	94,700	137,819	13,051	0.0479	A	0.3
Acetaldehyde	94,700	137,819	13,051	2.52E-05	A	1.64E-04
Acrolein	94,700	137,819	13,051	7.88E-06	A	5.14E-05
Antimony Compounds	94,700	137,819	13,051		A	
Arsenic Compounds	94,700	137,819	13,051	1.10E-05	A	7.18E-05
Benzene	94,700	137,819	13,051	7.76E-04	A	5.06E-03
Beryllium Compounds	94,700	137,819	13,051	3.10E-07	A	2.02E-06
1,3-Butadiene	94,700	137,819	13,051	1.60E-05	A	1.04E-04
Cadmium Compounds	94,700	137,819	13,051	4.80E-06	A	3.13E-05
Chromium Compounds	94,700	137,819	13,051	1.10E-05	A	7.18E-05
Cobalt Compounds	94,700	137,819	13,051		A	
Ethylbenzene	94,700	137,819	13,051		A	
Formaldehyde	94,700	137,819	13,051	7.89E-05	A	5.15E-04
Hydrochloric Acid	94,700	137,819	13,051		A	
Lead Compounds	94,700	137,819	13,051	1.40E-05	A	9.14E-05
Manganese Compounds	94,700	137,819	13,051	7.90E-04	A	5.16E-03
Mercury Compounds	94,700	137,819	13,051	1.20E-06	A	7.83E-06
Nickel Compounds	94,700	137,819	13,051	4.60E-06	A	3.00E-05
Naphthalene	94,700	137,819	13,051	1.30E-04	A	8.48E-04
Phosphorus	94,700	137,819	13,051		A	
POM	94,700	137,819	13,051	2.12E-04	A	1.38E-03
Selenium Compounds	94,700	137,819	13,051	2.50E-05	A	1.63E-04
Toluene	94,700	137,819	13,051	2.81E-04	A	1.83E-03
Xylene	94,700	137,819	13,051	1.93E-04	A	1.26E-03
o-Xylene	94,700	137,819	13,051		A	
Total HAPs						1.68E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-23

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	128,687	137,819	17,736	0.163	M	1.4
NOX	128,687	137,819	17,736	2.17	S	19.2
CO	128,687	137,819	17,736	0.85	A	7.5
VOC	128,687	137,819	17,736	0.0819	A	0.7
PM-PRI	128,687	137,819	17,736	0.0697	A	0.6
PM-FIL	128,687	137,819	17,736	0.062	A	0.5
PM-CON	128,687	137,819	17,736	0.0077	A	0.1
PM10-PRI	128,687	137,819	17,736	0.0573	A	0.5
PM10-FIL	128,687	137,819	17,736	0.0496	A	0.4
PM25-PRI	128,687	137,819	17,736	0.0556	A	0.5
PM25-FIL	128,687	137,819	17,736	0.0479	A	0.4
Acetaldehyde	128,687	137,819	17,736	2.52E-05	A	2.23E-04
Acrolein	128,687	137,819	17,736	7.88E-06	A	6.99E-05
Antimony Compounds	128,687	137,819	17,736		A	
Arsenic Compounds	128,687	137,819	17,736	1.10E-05	A	9.75E-05
Benzene	128,687	137,819	17,736	7.76E-04	A	6.88E-03
Beryllium Compounds	128,687	137,819	17,736	3.10E-07	A	2.75E-06
1,3-Butadiene	128,687	137,819	17,736	1.60E-05	A	1.42E-04
Cadmium Compounds	128,687	137,819	17,736	4.80E-06	A	4.26E-05
Chromium Compounds	128,687	137,819	17,736	1.10E-05	A	9.75E-05
Cobalt Compounds	128,687	137,819	17,736		A	
Ethylbenzene	128,687	137,819	17,736		A	
Formaldehyde	128,687	137,819	17,736	7.89E-05	A	7.00E-04
Hydrochloric Acid	128,687	137,819	17,736		A	
Lead Compounds	128,687	137,819	17,736	1.40E-05	A	1.24E-04
Manganese Compounds	128,687	137,819	17,736	7.90E-04	A	7.01E-03
Mercury Compounds	128,687	137,819	17,736	1.20E-06	A	1.06E-05
Nickel Compounds	128,687	137,819	17,736	4.60E-06	A	4.08E-05
Naphthalene	128,687	137,819	17,736	1.30E-04	A	1.15E-03
Phosphorus	128,687	137,819	17,736		A	
POM	128,687	137,819	17,736	2.12E-04	A	1.88E-03
Selenium Compounds	128,687	137,819	17,736	2.50E-05	A	2.22E-04
Toluene	128,687	137,819	17,736	2.81E-04	A	2.49E-03
Xylene	128,687	137,819	17,736	1.93E-04	A	1.71E-03
o-Xylene	128,687	137,819	17,736		A	
Total HAPs						2.29E-02

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-2

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	3,368,970	137,819	464,308	0.163	M	37.8
NOX	3,368,970	137,819	464,308	0.133	S	30.9
CO	3,368,970	137,819	464,308	0.004	S	0.9
VOC	3,368,970	137,819	464,308	0.0006	S	0.1
PM-PRI	3,368,970	137,819	464,308	0.02552	*	5.9
PM-FIL	3,368,970	137,819	464,308	0.01832	S	4.3
PM-CON	3,368,970	137,819	464,308	0.0072	A	1.7
PM10-PRI	3,368,970	137,819	464,308	0.02186	*	5.1
PM10-FIL	3,368,970	137,819	464,308	0.01466	*	3.4
PM25-PRI	3,368,970	137,819	464,308	0.02135	*	5.0
PM25-FIL	3,368,970	137,819	464,308	0.01415	*	3.3
Acetaldehyde	3,368,970	137,819	464,308	2.52E-05	A	5.85E-03
Acrolein	3,368,970	137,819	464,308	7.88E-06	A	1.83E-03
Antimony Compounds	3,368,970	137,819	464,308		A	
Arsenic Compounds	3,368,970	137,819	464,308	1.10E-05	A	2.55E-03
Benzene	3,368,970	137,819	464,308	5.50E-05	A	1.28E-02
Beryllium Compounds	3,368,970	137,819	464,308	3.10E-07	A	7.20E-05
1,3-Butadiene	3,368,970	137,819	464,308	1.60E-05	A	3.71E-03
Cadmium Compounds	3,368,970	137,819	464,308	4.80E-06	A	1.11E-03
Chromium Compounds	3,368,970	137,819	464,308	1.10E-05	A	2.55E-03
Cobalt Compounds	3,368,970	137,819	464,308		A	
Ethylbenzene	3,368,970	137,819	464,308		A	
Formaldehyde	3,368,970	137,819	464,308	2.80E-04	A	6.50E-02
Hydrochloric Acid	3,368,970	137,819	464,308		A	
Lead Compounds	3,368,970	137,819	464,308	1.40E-05	A	3.25E-03
Manganese Compounds	3,368,970	137,819	464,308	7.90E-04	A	1.83E-01
Mercury Compounds	3,368,970	137,819	464,308	1.20E-06	A	2.79E-04
Nickel Compounds	3,368,970	137,819	464,308	4.60E-06	A	1.07E-03
Naphthalene	3,368,970	137,819	464,308	3.50E-05	A	8.13E-03
Phosphorus	3,368,970	137,819	464,308		A	
POM	3,368,970	137,819	464,308	4.00E-05	A	9.29E-03
Selenium Compounds	3,368,970	137,819	464,308	2.50E-05	A	5.80E-03
Toluene	3,368,970	137,819	464,308	2.81E-04	A	6.52E-02
Xylene	3,368,970	137,819	464,308	1.93E-04	A	4.48E-02
o-Xylene	3,368,970	137,819	464,308		A	
Total HAPs						4.17E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

BS-1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	276	137,819	38	0.163	M	0.003
NOX	276	137,819	38	3.2	A	0.061
CO	276	137,819	38	0.85	A	0.016
VOC	276	137,819	38	0.0819	A	0.002
PM-PRI	276	137,819	38	0.0697	A	0.001
PM-FIL	276	137,819	38	0.062	A	0.001
PM-CON	276	137,819	38	0.0077	A	0.000
PM10-PRI	276	137,819	38	0.0573	A	0.001
PM10-FIL	276	137,819	38	0.0496	A	0.001
PM25-PRI	276	137,819	38	0.0556	A	0.001
PM25-FIL	276	137,819	38	0.0479	A	0.001
Acetaldehyde	276	137,819	38	2.52E-05	A	4.79E-07
Acrolein	276	137,819	38	7.88E-06	A	1.50E-07
Antimony Compounds	276	137,819	38		A	
Arsenic Compounds	276	137,819	38	1.10E-05	A	2.09E-07
Benzene	276	137,819	38	7.76E-04	A	1.48E-05
Beryllium Compounds	276	137,819	38	3.10E-07	A	5.90E-09
1,3-Butadiene	276	137,819	38	1.60E-05	A	3.04E-07
Cadmium Compounds	276	137,819	38	4.80E-06	A	9.13E-08
Chromium Compounds	276	137,819	38	1.10E-05	A	2.09E-07
Cobalt Compounds	276	137,819	38		A	
Ethylbenzene	276	137,819	38		A	
Formaldehyde	276	137,819	38	7.89E-05	A	1.50E-06
Hydrochloric Acid	276	137,819	38		A	
Lead Compounds	276	137,819	38	1.40E-05	A	2.66E-07
Manganese Compounds	276	137,819	38	7.90E-04	A	1.50E-05
Mercury Compounds	276	137,819	38	1.20E-06	A	2.28E-08
Nickel Compounds	276	137,819	38	4.60E-06	A	8.75E-08
Naphthalene	276	137,819	38	1.30E-04	A	2.47E-06
Phosphorus	276	137,819	38		A	
POM	276	137,819	38	2.12E-04	A	4.03E-06
Selenium Compounds	276	137,819	38	2.50E-05	A	4.75E-07
Toluene	276	137,819	38	2.81E-04	A	5.34E-06
Xylene	276	137,819	38	1.93E-04	A	3.67E-06
o-Xylene	276	137,819	38		A	
Total HAPs						4.91E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-4

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	3,263,415	137,819	449,761	0.163	M	36.7
NOX	3,263,415	137,819	449,761	0.14996	S	33.7
CO	3,263,415	137,819	449,761	0.0235	S	5.3
VOC	3,263,415	137,819	449,761	0.00173	S	0.4
PM-PRI	3,263,415	137,819	449,761	0.01994	*	4.5
PM-FIL	3,263,415	137,819	449,761	0.012741	S	2.9
PM-CON	3,263,415	137,819	449,761	0.0072	A	1.6
PM10-PRI	3,263,415	137,819	449,761	0.01739	*	3.9
PM10-FIL	3,263,415	137,819	449,761	0.01019	*	2.3
PM25-PRI	3,263,415	137,819	449,761	0.01704	*	3.8
PM25-FIL	3,263,415	137,819	449,761	0.00984	*	2.2
Acetaldehyde	3,263,415	137,819	449,761	2.52E-05	A	5.67E-03
Acrolein	3,263,415	137,819	449,761	7.88E-06	A	1.77E-03
Antimony Compounds	3,263,415	137,819	449,761		A	
Arsenic Compounds	3,263,415	137,819	449,761	1.10E-05	A	2.47E-03
Benzene	3,263,415	137,819	449,761	5.50E-05	A	1.24E-02
Beryllium Compounds	3,263,415	137,819	449,761	3.10E-07	A	6.97E-05
1,3-Butadiene	3,263,415	137,819	449,761	1.60E-05	A	3.60E-03
Cadmium Compounds	3,263,415	137,819	449,761	4.80E-06	A	1.08E-03
Chromium Compounds	3,263,415	137,819	449,761	1.10E-05	A	2.47E-03
Cobalt Compounds	3,263,415	137,819	449,761		A	
Ethylbenzene	3,263,415	137,819	449,761		A	
Formaldehyde	3,263,415	137,819	449,761	2.80E-04	A	6.30E-02
Hydrochloric Acid	3,263,415	137,819	449,761		A	
Lead Compounds	3,263,415	137,819	449,761	1.40E-05	A	3.15E-03
Manganese Compounds	3,263,415	137,819	449,761	7.90E-04	A	1.78E-01
Mercury Compounds	3,263,415	137,819	449,761	1.20E-06	A	2.70E-04
Nickel Compounds	3,263,415	137,819	449,761	4.60E-06	A	1.03E-03
Naphthalene	3,263,415	137,819	449,761	3.50E-05	A	7.87E-03
Phosphorus	3,263,415	137,819	449,761		A	
POM	3,263,415	137,819	449,761	4.00E-05	A	9.00E-03
Selenium Compounds	3,263,415	137,819	449,761	2.50E-05	A	5.62E-03
Toluene	3,263,415	137,819	449,761	2.81E-04	A	6.32E-02
Xylene	3,263,415	137,819	449,761	1.93E-04	A	4.34E-02
o-Xylene	3,263,415	137,819	449,761		A	
Total HAPs						4.04E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

CT-5

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	2,480,034	137,819	341,796	0.163	M	27.9
NOX	2,480,034	137,819	341,796	0.1375	S	23.5
CO	2,480,034	137,819	341,796	0.0381	S	6.5
VOC	2,480,034	137,819	341,796	0.00058	S	0.1
PM-PRI	2,480,034	137,819	341,796	0.02395	*	4.1
PM-FIL	2,480,034	137,819	341,796	0.016749	S	2.9
PM-CON	2,480,034	137,819	341,796	0.0072	A	1.2
PM10-PRI	2,480,034	137,819	341,796	0.0206	*	3.5
PM10-FIL	2,480,034	137,819	341,796	0.0134	*	2.3
PM25-PRI	2,480,034	137,819	341,796	0.02014	*	3.4
PM25-FIL	2,480,034	137,819	341,796	0.01294	*	2.2
Acetaldehyde	2,480,034	137,819	341,796	2.52E-05	A	4.31E-03
Acrolein	2,480,034	137,819	341,796	7.88E-06	A	1.35E-03
Antimony Compounds	2,480,034	137,819	341,796		A	
Arsenic Compounds	2,480,034	137,819	341,796	1.10E-05	A	1.88E-03
Benzene	2,480,034	137,819	341,796	5.50E-05	A	9.40E-03
Beryllium Compounds	2,480,034	137,819	341,796	3.10E-07	A	5.30E-05
1,3-Butadiene	2,480,034	137,819	341,796	1.60E-05	A	2.73E-03
Cadmium Compounds	2,480,034	137,819	341,796	4.80E-06	A	8.20E-04
Chromium Compounds	2,480,034	137,819	341,796	1.10E-05	A	1.88E-03
Cobalt Compounds	2,480,034	137,819	341,796		A	
Ethylbenzene	2,480,034	137,819	341,796		A	
Formaldehyde	2,480,034	137,819	341,796	2.80E-04	A	4.79E-02
Hydrochloric Acid	2,480,034	137,819	341,796		A	
Lead Compounds	2,480,034	137,819	341,796	1.40E-05	A	2.39E-03
Manganese Compounds	2,480,034	137,819	341,796	7.90E-04	A	1.35E-01
Mercury Compounds	2,480,034	137,819	341,796	1.20E-06	A	2.05E-04
Nickel Compounds	2,480,034	137,819	341,796	4.60E-06	A	7.86E-04
Naphthalene	2,480,034	137,819	341,796	3.50E-05	A	5.98E-03
Phosphorus	2,480,034	137,819	341,796		A	
POM	2,480,034	137,819	341,796	4.00E-05	A	6.84E-03
Selenium Compounds	2,480,034	137,819	341,796	2.50E-05	A	4.27E-03
Toluene	2,480,034	137,819	341,796	2.81E-04	A	4.80E-02
Xylene	2,480,034	137,819	341,796	1.93E-04	A	3.30E-02
o-Xylene	2,480,034	137,819	341,796		A	
Total HAPs						3.07E-01

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data
* - Stack Test Data and AP-42 Particle Size Distribution

Summary

Pollutant	Annual Emissions (tons/year)										
	D-18	D-19	D-20	D-21	D-22	D-23	CT-2	BS-1	CT-4	CT-5	Total
SO2	0.6	0.3		1.3	1.1	1.4	37.8	0.0	36.7	27.9	107.1
NOX	11.5	6.3		14.4	9.6	19.2	30.9	0.1	33.7	23.5	149.2
CO	3.1	1.7		7.0	5.5	7.5	0.9	0.0	5.3	6.5	37.5
VOC	0.3	0.2		0.7	0.5	0.7	0.1	0.0	0.4	0.1	3.0
PM-PRI	0.3	0.1		0.6	0.5	0.6	5.9	0.0	4.5	4.1	16.6
PM-FIL	0.2	0.1		0.5	0.4	0.5	4.3	0.0	2.9	2.9	11.8
PM-CON	0.0	0.0		0.1	0.1	0.1	1.7	0.0	1.6	1.2	4.8
PM10-PRI	0.2	0.1		0.5	0.4	0.5	5.1	0.0	3.9	3.5	14.2
PM10-FIL	0.2	0.1		0.4	0.3	0.4	3.4	0.0	2.3	2.3	9.4
PM25-PRI	0.2	0.1		0.5	0.4	0.5	5.0	0.0	3.8	3.4	13.9
PM25-FIL	0.2	0.1		0.4	0.3	0.4	3.3	0.0	2.2	2.2	9.1
Acetaldehyde	9.05E-05	4.93E-05	4.51E-08	2.08E-04	1.64E-04	2.23E-04	5.85E-03	4.79E-07	5.67E-03	4.31E-03	0.0166
Acrolein	2.83E-05	1.54E-05	1.41E-08	6.49E-05	5.14E-05	6.99E-05	1.83E-03	1.50E-07	1.77E-03	1.35E-03	0.0052
Antimony Compounds											
Arsenic Compounds	3.95E-05	2.15E-05	1.97E-08	9.07E-05	7.18E-05	9.75E-05	2.55E-03	2.09E-07	2.47E-03	1.88E-03	0.0072
Benzene	2.79E-03	1.52E-03	1.39E-06	6.40E-03	5.06E-03	6.88E-03	1.28E-02	1.48E-05	1.24E-02	9.40E-03	0.0572
Beryllium Compounds	1.11E-06	6.07E-07	5.55E-10	2.55E-06	2.02E-06	2.75E-06	7.20E-05	5.90E-09	6.97E-05	5.30E-05	0.0002
1,3-Butadiene	5.75E-05	3.13E-05	2.87E-08	1.32E-04	1.04E-04	1.42E-04	3.71E-03	3.04E-07	3.60E-03	2.73E-03	0.0105
Cadmium Compounds	1.72E-05	9.40E-06	8.60E-09	3.96E-05	3.13E-05	4.26E-05	1.11E-03	9.13E-08	1.08E-03	8.20E-04	0.0032
Chromium Compounds	3.95E-05	2.15E-05	1.97E-08	9.07E-05	7.18E-05	9.75E-05	2.55E-03	2.09E-07	2.47E-03	1.88E-03	0.0072
Cobalt Compounds											
Ethylbenzene											
Formaldehyde	2.83E-04	1.54E-04	1.41E-07	6.50E-04	5.15E-04	7.00E-04	6.50E-02	1.50E-06	6.30E-02	4.79E-02	0.1781
Hydrochloric Acid											
Lead Compounds	5.03E-05	2.74E-05	2.51E-08	1.15E-04	9.14E-05	1.24E-04	3.25E-03	2.66E-07	3.15E-03	2.39E-03	0.0092
Manganese Compounds	2.84E-03	1.55E-03	1.42E-06	6.51E-03	5.16E-03	7.01E-03	1.83E-01	1.50E-05	1.78E-01	1.35E-01	0.5191
Mercury Compounds	4.31E-06	2.35E-06	2.15E-09	9.89E-06	7.83E-06	1.06E-05	2.79E-04	2.28E-08	2.70E-04	2.05E-04	0.0008
Nickel Compounds	1.65E-05	9.01E-06	8.24E-09	3.79E-05	3.00E-05	4.08E-05	1.07E-03	8.75E-08	1.03E-03	7.86E-04	0.0030
Naphthalene	4.67E-04	2.55E-04	2.33E-07	1.07E-03	8.48E-04	1.15E-03	8.13E-03	2.47E-06	7.87E-03	5.98E-03	0.0258
Phosphorus											
POM	7.62E-04	4.15E-04	3.80E-07	1.75E-03	1.38E-03	1.88E-03	9.29E-03	4.03E-06	9.00E-03	6.84E-03	0.0313
Selenium Compounds	8.98E-05	4.89E-05	4.48E-08	2.06E-04	1.63E-04	2.22E-04	5.80E-03	4.75E-07	5.62E-03	4.27E-03	0.0164
Toluene	1.01E-03	5.50E-04	5.03E-07	2.32E-03	1.83E-03	2.49E-03	6.52E-02	5.34E-06	6.32E-02	4.80E-02	0.1847
Xylene	6.93E-04	3.78E-04	3.46E-07	1.59E-03	1.26E-03	1.71E-03	4.48E-02	3.67E-06	4.34E-02	3.30E-02	0.1268
o-Xylene											
Total HAPS	9.28E-03	5.05E-03	4.63E-06	2.13E-02	1.68E-02	2.29E-02	4.17E-01	4.91E-05			1.20E+00

S2020

HAWAII ELECTRIC LIGHT CO., INC.

DATE	CHECK NO.
04/05/05	35465
HELC	006202

The attached Check is in Payment of the following invoice(s):

Date	Invoice/Credit Memo	Type	Description	Gross	Discount	Net
03/30/05	03302005			49218.80		49218.80
	ANNUAL EMISSION FEES	FOR	OPERATING YEAR 2004			
			TOTAL	49218.80	0.00	49218.80

9400006640-10098118 Moore Wallace North America, Inc. ©2004. SecureScan® Patents 5,018,767, 5,193,853, 5,707,083. PressureSeal Patent 4,918,128. - 0221

REMOVE DOCUMENT ALONG THIS PERFORATION

HAWAII ELECTRIC LIGHT CO., INC.

Bank of Hawaii
Honolulu, Hawaii
59-102
1213

CHECK NO. 35465

PAY FORTY NINE THOUSAND TWO HUNDRED EIGHTEEN DOLLARS AND 80 CENTS

TO THE ORDER OF

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

DATE 04/05/05

CHECK AMOUNT ********49,218.80

⑈035465⑈ ⑆121301028⑆ 0081⑉032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

35465

52020

HAWAII ELECTRIC LIGHT CO., INC.

DATE	CHECK NO.
04/05/05	35464
HELC	006201

The attached Check is in Payment of the following invoice(s):

Date	Invoice/Credit Memo	Type	Description	Gross	Discount	Net
03/30/05	03302005			201876.32		201876.32
	ANNUAL EMISSION FEES FOR OPERATING YEAR 2004					
			TOTAL	201876.32	0.00	201876.32

REMOVE DOCUMENT ALONG THIS PERFORATION

HAWAII ELECTRIC LIGHT CO., INC.

Bank of Hawaii
Honolulu, Hawaii
59-102
1213

CHECK NO. 35464

PAY TWO HUNDRED ONE THOUSAND EIGHT HUNDRED SEVENTY SIX DOLLARS AND 32 CENTS

TO THE ORDER OF

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

DATE 04/05/05

CHECK AMOUNT *******201876.32

⑈035464⑈ ⑆121301028⑆ 0081⑉032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

35464

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Patents 5,018,767, 5,193,853, 5,707,063, PressureSeal Patent 4,918,126, - 0221

The following were submitted to DOH in electronic format

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100014

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Kanoelehua Power Plant

2) Permit No(s).: 0234-01-C

3) Physical Facility Address:

Street: 54 Halekauila Street

City: Hilo Zip Code: 96720

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	Mailing City:	State:	Zip Code:
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) *Facility UTM coordinates (m):* *Horizontal (x):* 284300 Easting (m) *Vertical (y):* 2179800 Northing (m)

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: _____

Name: Dan V. Giovanni Date: _____
Responsible Official

Title: Production Manager

FH85	1	Hill 5	No. 6 Fuel Oil	823	10100401	151,189	E6BTU	E3GAL	1.73		14.1	197	E6BTU	HR	0000	24	7	52	9	32	51	17	3,813,288	10.7	E3GAL
FH85	2	Hill 5	No. 2 Fuel Oil	58	10100501	137,619	E6BTU	E3GAL	0.16		14.1	197	E6BTU	HR	0000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				4,110	0.0113	E3GAL
FH85	3	Hill 5	Spec Used Oil	2	10101302	150,000	E6BTU	E3GAL	0.09		14.1	22.5	E6BTU	HR	0000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				2,415	0.0066	E3GAL
FH85	4	Hill 5	Propane	255	10101002	91,500	E6BTU	E3GAL	0.80		14.1	197	E6BTU	HR	0000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				1,232	0.0034	E3GAL
FH86	1	Hill 6	No. 6 Fuel Oil	823	10100401	151,189	E6BTU	E3GAL	1.73		23.0	349	E6BTU	HR	0000	24	7	52	26	29	26	28	12,252,576	33.6	E3GAL
FH86	2	Hill 6	No. 2 Fuel Oil	58	10100501	137,619	E6BTU	E3GAL	0.16		23.0	349	E6BTU	HR	0000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				13,382	0.0367	E3GAL
FH86	3	Hill 6	Spec Used Oil	2	10101302	150,000	E6BTU	E3GAL	0.09		23.0	22.5	E6BTU	HR	0000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				7,872	0.0216	E3GAL
FCT1	2	CT-1	No. 2 Fuel Oil	58	20100101	137,619	E6BTU	E3GAL	0.16		11.8	177.2	E6BTU	HR	0000	24	7	52	61	3	18	28	158,679	0.434	E3GAL
FD11	2	D-11	No. 2 Fuel Oil	58	20100102	137,619	E6BTU	E3GAL	0.16		2.9	29.2	E6BTU	HR	0000	24	7	52	19	0	0	81	0,951	0.00261	E3GAL
FD15	2	D-15	No. 2 Fuel Oil	58	20100102	137,619	E6BTU	E3GAL	0.16		2.76	29.1	E6BTU	HR	0000	24	7	52	22	6	17	55	20,965	0.057	E3GAL
FD16	2	D-16	No. 2 Fuel Oil	58	20100102	137,619	E6BTU	E3GAL	0.16		2.76	29.1	E6BTU	HR	0000	24	7	52	16	20	47	17	19,269	0.053	E3GAL
FD17	2	D-17	No. 2 Fuel Oil	58	20100102	137,619	E6BTU	E3GAL	0.16		2.76	29.1	E6BTU	HR	0000	24	7	52	39	14	34	24	48,962	0.134	E3GAL

* Not Applicable - Less than 5% of Total Fuel - Due to the small percentage of fuel used compared to the primary fuel seasonal breakdown is Not Applicable.

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☒ Yes ☐ No

If YES, list on a seperate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

Deviations from the normal operating schedule

FH85 Unit was on outage for generator repair 12/29/2003 - 7/25/2004

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

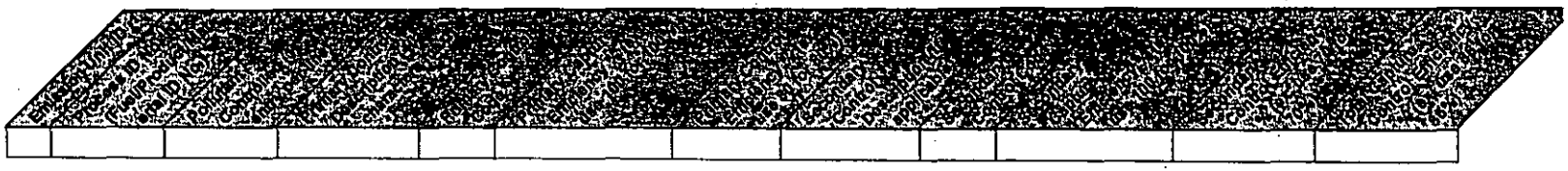
Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

Stacks for Fugitive Emission Release Point ID	Emission Point ID	Process ID	Process Name	Stack ID	Stack Name	UTM Easternmost Coordinate (m)	UTM Northernmost Coordinate (m)	UTM Zone	Datum	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Exit Temperature (K)	Stack Flow Rate (acfm)
HILL5	FHill5	1	Hill 5	02		283,727	2,180,434	5	Old Hawaiian	130.9	5.0	47.9	422	936
HILL5	FHill5	2	Hill 5	02		283,727	2,180,434	5	Old Hawaiian	130.9	5.0	47.9	422	936
HILL5	FHill5	3	Hill 5	02		283,727	2,180,434	5	Old Hawaiian	130.9	5.0	47.9	422	936
HILL5	FHill5	4	Hill 5	02		283,727	2,180,434	5	Old Hawaiian	130.9	5.0	47.9	422	936
HILL6	FHill6	1	Hill 6	02		283,735	2,180,408	5	Old Hawaiian	130.9	7.5	38.3	276	1,697
HILL6	FHill6	2	Hill 6	02		283,735	2,180,408	5	Old Hawaiian	130.9	7.5	38.3	276	1,697
HILL6	FHill6	3	Hill 6	02		283,735	2,180,408	5	Old Hawaiian	130.9	7.5	38.3	276	1,697
CT1	FCT1	2	CT-1	02		283,602	2,180,516	5	Old Hawaiian	27.9	4.9	74.6	835	1,423
D11	FD11	2	D-11	02		283,510	2,180,548	5	Old Hawaiian	21.0	1.5	192.3	739	344
D15	FD15	2	D-15	02		283,510	2,180,542	5	Old Hawaiian	21.7	2.7	76.4	761	424
D16	FD16	2	D-16	02		283,511	2,180,536	5	Old Hawaiian	21.7	2.7	76.4	761	424
D17	FD17	2	D-17	02		283,511	2,180,529	5	Old Hawaiian	21.7	2.7	76.4	761	424



Emission Unit ID	Process ID	Equipment ID	Annual Throughput	Units	Pollutant	Emissions	Units	Method	Factor	Control Device	Control Efficiency	Reliability	Calculation Date	Actual Emissions
FHill5	1		591,643	E6BTU	SO2	1.896	LB	E6BTU	03		U			560.9
FHill5	1		591,643	E6BTU	NOX	0.313	LB	E6BTU	08		U	9/98	A	92.6
FHill5	1		591,643	E6BTU	CO	0.0333	LB	E6BTU	08		U	9/98	A	9.9
FHill5	1		591,643	E6BTU	VOC	0.00507	LB	E6BTU	08		U	9/98	A	1.5
FHill5	1		591,643	E6BTU	PM-PRI	0.136	LB	E6BTU	08		U	9/98	A	40.2
FHill5	1		591,643	E6BTU	PM-FIL	0.1260	LB	E6BTU	08		U	9/98	C	37.3
FHill5	1		591,643	E6BTU	PM-CON	0.0100	LB	E6BTU	08		U	9/98	D	3.0
FHill5	1		591,643	E6BTU	PM10-PRI	0.0995	LB	E6BTU	08		U	9/98	C	29.4
FHill5	1		591,643	E6BTU	PM10-FIL	0.0895	LB	E6BTU	08		U	9/98	C	26.5
FHill5	1		591,643	E6BTU	PM25-PRI	0.0755	LB	E6BTU	08		U	9/98	C	22.3
FHill5	1		591,643	E6BTU	PM25-FIL	0.0655	LB	E6BTU	08		U	9/98	C	19.4
FHill5	1		591,643	E6BTU	7439921	1.01E-05	LB	E6BTU	08		U	9/98	C	2.98E-03
FHill5	2		566	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.046
FHill5	2		566	E6BTU	NOX	0.171	LB	E6BTU	08		U	9/98	D	0.048
FHill5	2		566	E6BTU	CO	0.0357	LB	E6BTU	08		U	9/98	A	0.010
FHill5	2		566	E6BTU	VOC	0.00143	LB	E6BTU	08		U	9/98	A	0.000
FHill5	2		566	E6BTU	PM-PRI	0.0236	LB	E6BTU	08		U	9/98	A	0.007
FHill5	2		566	E6BTU	PM-FIL	0.0143	LB	E6BTU	08		U	9/98	E	0.004
FHill5	2		566	E6BTU	PM-CON	0.0093	LB	E6BTU	08		U	9/98	D	0.003
FHill5	2		566	E6BTU	PM10-PRI	0.0164	LB	E6BTU	08		U	9/98	E	0.005
FHill5	2		566	E6BTU	PM10-FIL	0.0071	LB	E6BTU	08		U	9/98	E	0.002
FHill5	2		566	E6BTU	PM25-PRI	0.0111	LB	E6BTU	08		U	9/98	E	0.003
FHill5	2		566	E6BTU	PM25-FIL	0.0018	LB	E6BTU	08		U	9/98	E	0.001
FHill5	2		566	E6BTU	7439921	1.08E-05	LB	E6BTU	08		U	9/98	C	3.05E-06
FHill5	3		2.418	E3GAL	SO2	12.6	LB	E3GAL	03		U			0.015
FHill5	3		2.418	E3GAL	NOX	47.0	LB	E3GAL	08		U	9/98	A	0.057
FHill5	3		2.418	E3GAL	CO	5.0	LB	E3GAL	08		U	9/98	A	0.006
FHill5	3		2.418	E3GAL	VOC	0.76	LB	E3GAL	08		U	9/98	A	0.001

FHill5	3	2.418	E3GAL	PM-PRI	5.5	LB	E3GAL	08		U	9/98	A	0.007
FHill5	3	2.418	E3GAL	PM-FIL	4.0	LB	E3GAL	08		U	9/98	C	0.005
FHill5	3	2.418	E3GAL	PM-CON	1.5	LB	E3GAL	08		U	9/98	D	0.002
FHill5	3	2.418	E3GAL	PM10-PRI	4.3	LB	E3GAL	08		U	9/98	C	0.005
FHill5	3	2.418	E3GAL	PM10-FIL	2.8	LB	E3GAL	08		U	9/98	C	0.003
FHill5	3	2.418	E3GAL	PM25-PRI	3.6	LB	E3GAL	08		U	9/98	C	0.004
FHill5	3	2.418	E3GAL	PM25-FIL	2.1	LB	E3GAL	08		U	9/98	C	0.002
FHill5	3	2.418	E3GAL	7439921	5.50E-01	LB	E3GAL	08		U	10/96	D	6.65E-04
FHill5	4	113	E6BTU	SO2	0.00423	LB	E6BTU	03		U			0.0002
FHill5	4	113	E6BTU	NOX	0.208	LB	E6BTU	08		U	10/96	E	0.0117
FHill5	4	113	E6BTU	CO	0.035	LB	E6BTU	08		U	10/96	E	0.0020
FHill5	4	113	E6BTU	VOC	0.00546	LB	E6BTU	08		U	10/96	E	0.0003
FHill5	4	113	E6BTU	PM-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0007
FHill5	4	113	E6BTU	PM-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0004
FHill5	4	113	E6BTU	PM-CON	0.00559	LB	E6BTU	08		U	7/98	D	0.0003
FHill5	4	113	E6BTU	PM10-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0007
FHill5	4	113	E6BTU	PM10-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0004
FHill5	4	113	E6BTU	PM25-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0007
FHill5	4	113	E6BTU	PM25-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0004
FHill6	1	1,852,455	E6BTU	SO2	1.896	LB	E6BTU	03		U			1756.1
FHill6	1	1,852,455	E6BTU	NOX	0.313	LB	E6BTU	08		U	9/98	A	289.9
FHill6	1	1,852,455	E6BTU	CO	0.0333	LB	E6BTU	08		U	9/98	A	30.8
FHill6	1	1,852,455	E6BTU	VOC	0.00507	LB	E6BTU	08		U	9/98	A	4.7
FHill6	1	1,852,455	E6BTU	PM-PRI	0.136	LB	E6BTU	08		U	9/98	A	126
FHill6	1	1,852,455	E6BTU	PM-FIL	0.1260	LB	E6BTU	08		U	9/98	C	116.7
FHill6	1	1,852,455	E6BTU	PM-CON	0.0100	LB	E6BTU	08		U	9/98	D	9.3
FHill6	1	1,852,455	E6BTU	PM10-PRI	0.0995	LB	E6BTU	08		U	9/98	C	92.2
FHill6	1	1,852,455	E6BTU	PM10-FIL	0.0895	LB	E6BTU	08		U	9/98	C	82.9

FHill6	1	1,852,455	E6BTU	PM25-PRI	0.0755	LB	E6BTU	08		U	9/98	C	69.9
FHill6	1	1,852,455	E6BTU	PM25-FIL	0.0655	LB	E6BTU	08		U	9/98	C	60.7
FHill6	1	1,852,455	E6BTU	7439921	1.01E-05	LB	E6BTU	08		U	9/98	C	9.32E-03
FHill6	2	1,844	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.150
FHill6	2	1,844	E6BTU	NOX	0.171	LB	E6BTU	08		U	9/98	D	0.158
FHill6	2	1,844	E6BTU	CO	0.0357	LB	E6BTU	08		U	9/98	A	0.033
FHill6	2	1,844	E6BTU	VOC	0.00143	LB	E6BTU	08		U	9/98	A	0.001
FHill6	2	1,844	E6BTU	PM-PRI	0.0236	LB	E6BTU	08		U	9/98	A	0.022
FHill6	2	1,844	E6BTU	PM-FIL	0.0143	LB	E6BTU	08		U	9/98	E	0.013
FHill6	2	1,844	E6BTU	PM-CON	0.0093	LB	E6BTU	08		U	9/98	D	0.009
FHill6	2	1,844	E6BTU	PM10-PRI	0.0164	LB	E6BTU	08		U	9/98	E	0.015
FHill6	2	1,844	E6BTU	PM10-FIL	0.0071	LB	E6BTU	08		U	9/98	E	0.007
FHill6	2	1,844	E6BTU	PM25-PRI	0.0111	LB	E6BTU	08		U	9/98	E	0.010
FHill6	2	1,844	E6BTU	PM25-FIL	0.0018	LB	E6BTU	08		U	9/98	E	0.002
FHill6	2	1,844	E6BTU	7439921	1.08E-05	LB	E6BTU	08		U	9/98	C	9.95E-06
FHill6	3	7,872	E3GAL	SO2	12.6	LB	E3GAL	03		U			0.049
FHill6	3	7.872	E3GAL	NOX	47.0	LB	E3GAL	08		U	9/98	A	0.185
FHill6	3	7.872	E3GAL	CO	5.0	LB	E3GAL	08		U	9/98	A	0.020
FHill6	3	7.872	E3GAL	VOC	0.76	LB	E3GAL	08		U	9/98	A	0.003
FHill6	3	7.872	E3GAL	PM-PRI	5.5	LB	E3GAL	08		U	9/98	A	0.021
FHill6	3	7.872	E3GAL	PM-FIL	4.0	LB	E3GAL	08		U	9/98	C	0.016
FHill6	3	7.872	E3GAL	PM-CON	1.5	LB	E3GAL	08		U	9/98	D	0.006
FHill6	3	7.872	E3GAL	PM10-PRI	4.3	LB	E3GAL	08		U	9/98	C	0.017
FHill6	3	7.872	E3GAL	PM10-FIL	2.8	LB	E3GAL	08		U	9/98	C	0.011
FHill6	3	7.872	E3GAL	PM25-PRI	3.6	LB	E3GAL	08		U	9/98	C	0.014
FHill6	3	7.872	E3GAL	PM25-FIL	2.1	LB	E3GAL	08		U	9/98	C	0.008
FHill6	3	7.872	E3GAL	7439921	5.50E-01	LB	E3GAL	08		U	10/96	D	2.16E-03
FCT1	2	21,855	E6BTU	SO2	0.163	LB	E6BTU	03		U			1.781

FHill6	1	1,852,455	E6BTU	PM25-PRI	0.0755	LB	E6BTU	08		U	9/98	C	69.9
FHill6	1	1,852,455	E6BTU	PM25-FIL	0.0655	LB	E6BTU	08		U	9/98	C	60.7
FHill6	1	1,852,455	E6BTU	7439921	1.01E-05	LB	E6BTU	08		U	9/98	C	9.32E-03
FHill6	2	1,844	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.150
FHill6	2	1,844	E6BTU	NOX	0.171	LB	E6BTU	08		U	9/98	D	0.158
FHill6	2	1,844	E6BTU	CO	0.0357	LB	E6BTU	08		U	9/98	A	0.033
FHill6	2	1,844	E6BTU	VOC	0.00143	LB	E6BTU	08		U	9/98	A	0.001
FHill6	2	1,844	E6BTU	PM-PRI	0.0236	LB	E6BTU	08		U	9/98	A	0.022
FHill6	2	1,844	E6BTU	PM-FIL	0.0143	LB	E6BTU	08		U	9/98	E	0.013
FHill6	2	1,844	E6BTU	PM-CON	0.0093	LB	E6BTU	08		U	9/98	D	0.009
FHill6	2	1,844	E6BTU	PM10-PRI	0.0164	LB	E6BTU	08		U	9/98	E	0.015
FHill6	2	1,844	E6BTU	PM10-FIL	0.0071	LB	E6BTU	08		U	9/98	E	0.007
FHill6	2	1,844	E6BTU	PM25-PRI	0.0111	LB	E6BTU	08		U	9/98	E	0.010
FHill6	2	1,844	E6BTU	PM25-FIL	0.0018	LB	E6BTU	08		U	9/98	E	0.002
FHill6	2	1,844	E6BTU	7439921	1.08E-05	LB	E6BTU	08		U	9/98	C	9.95E-06
FHill6	3	7.872	E3GAL	SO2	12.6	LB	E3GAL	03		U			0.049
FHill6	3	7.872	E3GAL	NOX	47.0	LB	E3GAL	08		U	9/98	A	0.185
FHill6	3	7.872	E3GAL	CO	5.0	LB	E3GAL	08		U	9/98	A	0.020
FHill6	3	7.872	E3GAL	VOC	0.76	LB	E3GAL	08		U	9/98	A	0.003
FHill6	3	7.872	E3GAL	PM-PRI	5.5	LB	E3GAL	08		U	9/98	A	0.021
FHill6	3	7.872	E3GAL	PM-FIL	4.0	LB	E3GAL	08		U	9/98	C	0.016
FHill6	3	7.872	E3GAL	PM-CON	1.5	LB	E3GAL	08		U	9/98	D	0.006
FHill6	3	7.872	E3GAL	PM10-PRI	4.3	LB	E3GAL	08		U	9/98	C	0.017
FHill6	3	7.872	E3GAL	PM10-FIL	2.8	LB	E3GAL	08		U	9/98	C	0.011
FHill6	3	7.872	E3GAL	PM25-PRI	3.6	LB	E3GAL	08		U	9/98	C	0.014
FHill6	3	7.872	E3GAL	PM25-FIL	2.1	LB	E3GAL	08		U	9/98	C	0.008
FHill6	3	7.872	E3GAL	7439921	5.50E-01	LB	E3GAL	08		U	10/96	D	2.16E-03
FCT1	2	21,855	E6BTU	SO2	0.163	LB	E6BTU	03		U			1.781

FCT1	2	21,855	E6BTU	NOX	0.88	LB	E6BTU	08		U	4/00	C	9.616
FCT1	2	21,855	E6BTU	CO	0.0033	LB	E6BTU	08		U	4/00	C	0.036
FCT1	2	21,855	E6BTU	VOC	0.00041	LB	E6BTU	08		U	4/00	E	0.004
FCT1	2	21,855	E6BTU	PM-PRI	0.012	LB	E6BTU	08		U	4/00	C	0.131
FCT1	2	21,855	E6BTU	PM-FIL	0.004	LB	E6BTU	08		U	4/00	C	0.047
FCT1	2	21,855	E6BTU	PM-CON	0.007	LB	E6BTU	08		U	4/00	C	0.079
FCT1	2	21,855	E6BTU	PM10-PRI	0.011	LB	E6BTU	08		U	1/95	E	0.124
FCT1	2	21,855	E6BTU	PM10-FIL	0.004	LB	E6BTU	08		U	1/95	E	0.045
FCT1	2	21,855	E6BTU	PM25-PRI	0.011	LB	E6BTU	08		U	1/95	E	0.121
FCT1	2	21,855	E6BTU	PM25-FIL	0.004	LB	E6BTU	08		U	1/95	E	0.042
FCT1	2	21,855	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	1.53E-04
FD11	2	131	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.011
FD11	2	131	E6BTU	NOX	3.2	LB	E6BTU	08		U	10/96	B	0.210
FD11	2	131	E6BTU	CO	0.85	LB	E6BTU	08		U	10/96	C	0.056
FD11	2	131	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.005
FD11	2	131	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.005
FD11	2	131	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.004
FD11	2	131	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.001
FD11	2	131	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.004
FD11	2	131	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.003
FD11	2	131	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.004
FD11	2	131	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.003
FD11	2	131	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	9.17E-07
FD15	2	2,888	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.2
FD15	2	2,888	E6BTU	NOX	3.2	LB	E6BTU	08		U	10/96	B	4.6
FD15	2	2,888	E6BTU	CO	0.85	LB	E6BTU	08		U	10/96	C	1.2
FD15	2	2,888	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.1
FD15	2	2,888	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.1

FD15	2	2,888	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.1
FD15	2	2,888	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.0
FD15	2	2,888	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.1
FD15	2	2,888	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.1
FD15	2	2,888	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.1
FD15	2	2,888	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.1
FD15	2	2,888	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	2.02E-05
FD16	2	2,655	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.2
FD16	2	2,655	E6BTU	NOX	3.2	LB	E6BTU	08		U	10/96	B	4.2
FD16	2	2,655	E6BTU	CO	0.85	LB	E6BTU	08		U	10/96	C	1.1
FD16	2	2,655	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.1
FD16	2	2,655	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.1
FD16	2	2,655	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.1
FD16	2	2,655	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.0
FD16	2	2,655	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.1
FD16	2	2,655	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.1
FD16	2	2,655	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.1
FD16	2	2,655	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.1
FD16	2	2,655	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	1.86E-05
FD17	2	6,747	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.5
FD17	2	6,747	E6BTU	NOX	3.2	LB	E6BTU	08		U	10/96	B	10.8
FD17	2	6,747	E6BTU	CO	0.85	LB	E6BTU	08		U	10/96	C	2.9
FD17	2	6,747	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.3
FD17	2	6,747	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.2
FD17	2	6,747	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.2
FD17	2	6,747	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.0
FD17	2	6,747	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.2
FD17	2	6,747	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.2

FD17	2	6,747	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.2
FD17	2	6,747	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.2
FD17	2	6,747	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	4.72E-05

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100519

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Waimea Power Plant

2) Permit No(s).: 0237-01-C

3) Physical Facility Address:

Street: Rubbish Dump Road

City: Kamuela Zip Code: 96743

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: ____ Type B: X Neither: ____

6) SIC Code (Primary / Secondary): 4911 / ____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 217,725 (Easting (m)) Vertical (y): 2,216,930 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: ____

Name: Dan V. Giovanni Date: ____
Responsible Official

Title: Production Manager

FD12	1	Diesel Generator D-12	No. 2 Fuel Oil	68	20100102	137.819	E6BTU	E3GAL	0.16		2.5	29.1	E6BTU	HR	0000	24	7	52	[illegible]	[illegible]	[illegible]	[illegible]	121.852	0.334	E3GAL
FD13	1	Diesel Generator D-13	No. 2 Fuel Oil	68	20100102	137.819	E6BTU	E3GAL	0.16		2.5	29.1	E6BTU	HR	0000	24	7	52	[illegible]	[illegible]	[illegible]	[illegible]	137.191	0.376	E3GAL
FD14	1	Diesel Generator D-14	No. 2 Fuel Oil	68	20100102	137.819	E6BTU	E3GAL	0.16		2.5	29.1	E6BTU	HR	0000	24	7	52	[illegible]	[illegible]	[illegible]	[illegible]	$1.062	0.140	E3GAL

Deviation in Operating Schedules for Calendar Year 2004

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☑ No

If YES, list on a seperate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

Deviation in Operating Schedules for Calendar Year 2004

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

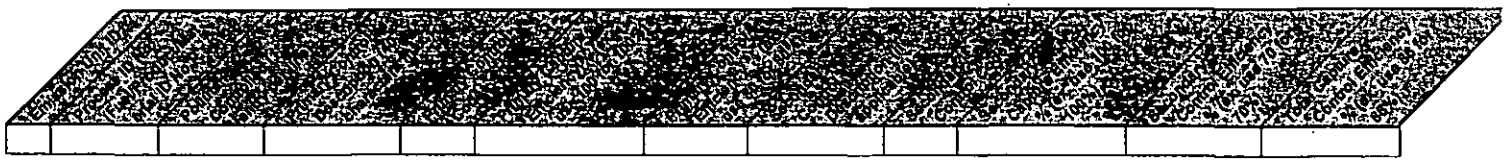
Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

12	FD12	1	Diesel Generator D-12	02		217,715	2,216,913	5	Old Hawaiian	17.0	2.67	76.6	760	429
13	FD13	1	Diesel Generator D-13	02		217,723	2,216,921	5	Old Hawaiian	17.0	2.67	76.6	760	429
14	FD14	1	Diesel Generator D-14	02		217,729	2,216,922	5	Old Hawaiian	17.0	2.67	76.6	760	429



Emission Unit ID	Process ID No.	Fuel/Product Throughput	Units	Pollutant	Emission Factor	Units	Units	Method		Emission Factor Quality			Actual Emissions
FD12	1	16,794	E6BTU	SO2	0.163	LB	E6BTU	03		U			1.4
FD12	1	16,794	E6BTU	NOX	3.20	LB	E6BTU	08		U	10/96	B	26.9
FD12	1	16,794	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	7.1
FD12	1	16,794	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.7
FD12	1	16,794	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.6
FD12	1	16,794	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.5
FD12	1	16,794	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.1
FD12	1	16,794	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.5
FD12	1	16,794	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.4
FD12	1	16,794	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.5
FD12	1	16,794	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.4
FD12	1	16,794	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	1.18E-04
FD13	1	18,908	E6BTU	SO2	0.163	LB	E6BTU	03		U			1.5
FD13	1	18,908	E6BTU	NOX	3.20	LB	E6BTU	08		U	10/96	B	30.3
FD13	1	18,908	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	8.0
FD13	1	18,908	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.8
FD13	1	18,908	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.7
FD13	1	18,908	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.6
FD13	1	18,908	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.1
FD13	1	18,908	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.5
FD13	1	18,908	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.5
FD13	1	18,908	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.5
FD13	1	18,908	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.5
FD13	1	18,908	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	1.32E-04
FD14	1	7,037	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.6
FD14	1	7,037	E6BTU	NOX	3.20	LB	E6BTU	08		U	10/96	B	11.3
FD14	1	7,037	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	3
FD14	1	7,037	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.3
FD14	1	7,037	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.2
FD14	1	7,037	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.2

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FD14	1	7,037	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.0
FD14	1	7,037	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.2
FD14	1	7,037	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.2
FD14	1	7,037	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.2
FD14	1	7,037	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.2
FD14	1	7,037	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	4.93E-05

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100021

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Puna Power Plant

2) Permit No(s).: 0235-01-C

3) Physical Facility Address:

Street: *Puna Mill Road*

City: Keaau Zip Code: 96749

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 286646 (Easting (m)) Vertical (y): 2172337 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: _____

Name: Dan V. Giovanni Date: _____
Responsible Official

Title: Production Manager

F1	1	Boiler 1	No. 6 Fuel Oil	6/23	10100401	151,189	E6BTU	E3GAL	1.73		15.5	249	E6BTU	HR	0000	24	7	52	31	29	18	22	7,633,248	20.9	E3GAL
F1	2	Boiler 1	No. 2 Fuel Oil	56	10100501	137,819	E6BTU	E3GAL	0.16		15.5	249	E6BTU	HR	0000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				17,200	0.0471	E3GAL
F1	3	Boiler 1	Spec Used Oil	2	10101302	150,000	E6BTU	E3GAL	0.33		15.5	13.5	E6BTU	HR	0000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				15,918	0.0436	E3GAL
FCT3	2	CT3	No. 2 Fuel Oil	56	20100101	137,819	E6BTU	E3GAL	0.16		20.0	275	E6BTU	HR	0000	24	7	52	27	24	19	20	2,925,677	8.0	E3GAL
FP8001	2	(Blackstart Generator)	No. 2 Fuel Oil	56	20100102	137,819	E6BTU	E3GAL	0.16		0.60	8.34	E6BTU	HR	0000	24	7	52	34	12	10	44	8,604	0.0017	E3GAL

* Not Applicable - Less than 5% of Total Fuel - Due to the small percentage of fuel used compared to the primary fuel seasonal breakdown is Not Applicable.

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☒ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

Deviations from the normal operating schedule

F1 Unit outage due to boiler repairs 6/23 - 10/5/2004

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

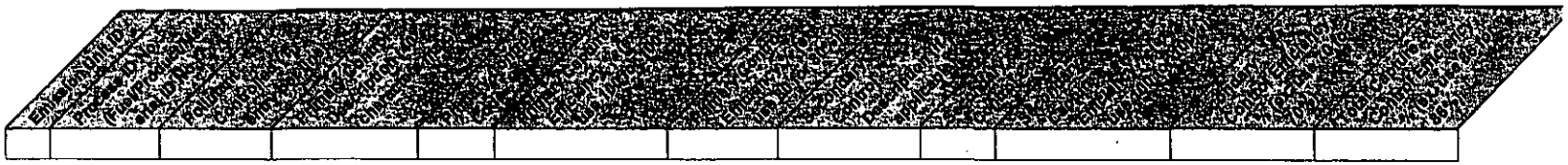
<u>Deviation in Operating Schedules for Calendar Year 2004</u>:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

1	F1	1	Boiler 1	02		286,700	2,172,260	5	Old Hawaiian	170.0	10.3	33.5	300	2,805
1	F1	2	Boiler 1	02		286,700	2,172,260	5	Old Hawaiian	170.0	10.3	33.5	300	2,805
1	F1	3	Boiler 1	02		286,700	2,172,260	5	Old Hawaiian	170.0	10.3	33.5	300	2,805
CT3	FCT3	2	CT3	02		286,646	2,172,337	5	Old Hawaiian	250.0	8.0	126.0	1,018	6,341
2	FPBSG1	2	Blackstart Generator	02		286,646	2,172,337	5	Old Hawaiian	250.0	0.82	188.3	845	100



F1	1	1,154,063	E6BTU	SO2	1.898	LB	E6BTU	03		U			1095.2
F1	1	1,154,063	E6BTU	NOX	0.313	LB	E6BTU	08		U	9/98	A	180.6
F1	1	1,154,063	E6BTU	CO	0.0333	LB	E6BTU	08		U	9/98	A	19.2
F1	1	1,154,063	E6BTU	VOC	0.00507	LB	E6BTU	08		U	9/98	A	2.9
F1	1	1,154,063	E6BTU	PM-PRI	0.136	LB	E6BTU	08		U	9/98	A	78.5
F1	1	1,154,063	E6BTU	PM-FIL	0.1260	LB	E6BTU	08		U	9/98	C	72.7
F1	1	1,154,063	E6BTU	PM-CON	0.0100	LB	E6BTU	08		U	9/98	D	5.8
F1	1	1,154,063	E6BTU	PM10-PRI	0.0995	LB	E6BTU	08		U	9/98	C	57.4
F1	1	1,154,063	E6BTU	PM10-FIL	0.0895	LB	E6BTU	08		U	9/98	C	51.6
F1	1	1,154,063	E6BTU	PM25-PRI	0.0755	LB	E6BTU	08		U	9/98	C	43.6
F1	1	1,154,063	E6BTU	PM25-FIL	0.0655	LB	E6BTU	08		U	9/98	C	37.8
F1	1	1,154,063	E6BTU	7439921	1.01E-05	LB	E6BTU	08		U	9/98	C	5.81E-03
F1	2	2,370	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.193
F1	2	2,370	E6BTU	NOX	0.171	LB	E6BTU	08		U	9/98	D	0.203
F1	2	2,370	E6BTU	CO	0.0357	LB	E6BTU	08		U	9/98	A	0.042
F1	2	2,370	E6BTU	VOC	0.00143	LB	E6BTU	08		U	9/98	A	0.002
F1	2	2,370	E6BTU	PM-PRI	0.0236	LB	E6BTU	08		U	9/98	A	0.028
F1	2	2,370	E6BTU	PM-FIL	0.0143	LB	E6BTU	08		U	9/98	E	0.017
F1	2	2,370	E6BTU	PM-CON	0.0093	LB	E6BTU	08		U	9/98	D	0.011
F1	2	2,370	E6BTU	PM10-PRI	0.0164	LB	E6BTU	08		U	9/98	E	0.019
F1	2	2,370	E6BTU	PM10-FIL	0.0071	LB	E6BTU	08		U	9/98	E	0.008
F1	2	2,370	E6BTU	PM25-PRI	0.0111	LB	E6BTU	08		U	9/98	E	0.013
F1	2	2,370	E6BTU	PM25-FIL	0.0018	LB	E6BTU	08		U	9/98	E	0.002
F1	2	2,370	E6BTU	7439921	1.08E-05	LB	E6BTU	08		U	9/98	C	1.28E-05
F1	3	15.918	E3GAL	SO2	51.8	LB	E3GAL	03		U			4.12E-01
F1	3	15.918	E3GAL	NOX	47.0	LB	E3GAL	08		U	9/98	A	3.74E-01
F1	3	15.918	E3GAL	CO	5.00	LB	E3GAL	08		U	9/98	A	3.98E-02
F1	3	15.918	E3GAL	VOC	0.760	LB	E3GAL	08		U	9/98	A	6.05E-03
F1	3	15.918	E3GAL	PM-PRI	7.75	LB	E3GAL	08		U	9/98	A	6.17E-02
F1	3	15.918	E3GAL	PM-FIL	6.25	LB	E3GAL	08		U	9/98	C	4.97E-02
F1	3	15.918	E3GAL	PM-CON	1.50	LB	E3GAL	08		U	9/98	D	1.19E-02
F1	3	15.918	E3GAL	PM10-PRI	5.94	LB	E3GAL	08		U	9/98	C	4.73E-02
F1	3	15.918	E3GAL	PM10-FIL	4.44	LB	E3GAL	08		U	9/98	C	3.53E-02
F1	3	15.918	E3GAL	PM25-PRI	4.75	LB	E3GAL	08		U	9/98	C	3.78E-02
F1	3	15.918	E3GAL	PM25-FIL	3.25	LB	E3GAL	08		U	9/98	C	2.59E-02

F1	3	15.918	E3GAL	7439921	0.550	LB	E3GAL	08		U	10/96	D	4.38E-03
FCT3	2	403,214	E6BTU	SO2	0.163	LB	E6BTU	03		U			32.9
FCT3	2	403,214	E6BTU	NOX	0.131	LB	E6BTU	04		U			26.4
FCT3	2	403,214	E6BTU	CO	0.0500	LB	E6BTU	04		U			10.1
FCT3	2	403,214	E6BTU	VOC	4.39E-05	LB	E6BTU	04		U			0.01
FCT3	2	403,214	E6BTU	PM-PRI	0.0751	LB	E6BTU	05		U			15.1
FCT3	2	403,214	E6BTU	PM-FIL	0.0679	LB	E6BTU	04		U			13.7
FCT3	2	403,214	E6BTU	PM-CON	0.0072	LB	E6BTU	08		U	4/00	C	1.5
FCT3	2	403,214	E6BTU	PM10-PRI	0.0615	LB	E6BTU	05		U			12.4
FCT3	2	403,214	E6BTU	PM10-FIL	0.0543	LB	E6BTU	05		U			10.9
FCT3	2	403,214	E6BTU	PM25-PRI	0.0597	LB	E6BTU	05		U			12.0
FCT3	2	403,214	E6BTU	PM25-FIL	0.0525	LB	E6BTU	05		U			10.6
FCT3	2	403,214	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	2.82E-03
FPBSG1	2	83	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.01
FPBSG1	2	83	E6BTU	NOX	3.20	LB	E6BTU	08		U	10/96	B	0.13
FPBSG1	2	83	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	0.04
FPBSG1	2	83	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.00
FPBSG1	2	83	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	5.83E-07

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100023

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Shipman Power Plant

2) Permit No(s).: 0236-01-C

3) Physical Facility Address:

Street: Corner of Lihiwai and Banyan Drive

City: Hilo Zip Code: 96720

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 282583 (Easting (m)) Vertical (y): 2182613 (Northing (m))

Zone: 5 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: _____

Name: Dan V. Giovanni Date: _____
Responsible Official

Title: Production Manager

FS3	1	Boiler S-3	No. 6 Fuel Oil	823	10100401	151,189	E6BTU	E3GAL	1.73		7.5	115.9	E6BTU	HR	8000	24	7	52	49	28	6	25	443,688	1.22	E3GAL
FS3	2	Boiler S-3	Propane	255	10101002	91,500	E6BTU	E3GAL	0.094		7.5	115.9	E6BTU	HR	8000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				51,461	0.1410	E3GAL
FS4	1	Boiler S-4	No. 6 Fuel Oil	823	10100401	151,189	E6BTU	E3GAL	1.73		7.7	117.5	E6BTU	HR	8000	24	7	52	43	17	17	23	478,718	1.31	E3GAL
FS4	2	Boiler S-4	Propane	255	10101002	91,500	E6BTU	E3GAL	0.094		7.7	117.5	E6BTU	HR	8000	24	7	52	Not Applicable* - Less Than 5% of Total Fuel				55,048	0.1508	E3GAL

* Not Applicable - Less than 5% of Total Fuel - Due to the small percentage of fuel used compared to the primary fuel entered breakdown is Not Applicable.

Deviation in Operating Schedules for Calender Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☒ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

Deviations from the normal operating schedule

FS3 Unit outage due to boiler and turbine repair 8/13 - 12/12/2004.

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Emission Unit ID	Process ID No. (Stack)	Process ID No. (Fugitive)	Product ID No.	Tank Description	Tank Capacity	Shape of Product Tank	Product Material	Stack Height	Stack Diameter	Stack Temperature	Stack Velocity	Stack Flow Rate	Unit Numerator	Unit Denominator	Emission Factor	Emission Factor Unit	Emission Factor Reference	Emission Factor Comment	Emission Factor Calculation	Emission Factor Calculation Comment	Maximum Hourly Throughput	Maximum Hourly Throughput Units	Maximum Hourly Throughput Comment	Maximum Annual Throughput	Maximum Annual Throughput Units	Maximum Annual Throughput Comment	Daily Process Throughput	Daily Process Throughput Units	Process Throughput Comment

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

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Emission Unit ID	Process ID No.	Process Unit ID No.	Process Unit Description	Emission Unit Description	Raw Material/Fuel Description	Hourly Throughput	MAXIMUM Hourly Throughput	Maximum Annual Throughput	Maximum % Sulfur	Maximum % Ash	Maximum Heating Value	Maximum Heating Value	Maximum % Moisture	Maximum % Nitrogen	Maximum % Lead	Maximum % Mercury	Maximum % Chlorine	Maximum % Fluorine	Maximum % Phosphorus	Maximum % Hydrogen	Maximum % Beryllium	Maximum % Cadmium	Maximum % Chromium	Maximum % Manganese	Maximum % Nickel	Maximum % Selenium

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

3	FS3	1	Boiler S-3	02		282,877	2,182,614	5	Old Hawaiian	83.0	6.3	50.4	352	1,547
3	FS3	2	Boiler S-3	02		282,877	2,182,614	5	Old Hawaiian	83.0	6.3	50.4	352	1,547
4	FS4	1	Boiler S-4	02		282,877	2,182,614	5	Old Hawaiian	83.0	6.3	50.4	352	1,547
4	FS4	2	Boiler S-4	02		282,877	2,182,614	5	Old Hawaiian	83.0	6.3	50.4	352	1,547

2005_03_25 Shipman 2004 EI (submit to DOH).xls 5 Stack Info

Emission Unit ID	Process ID No. (Fuel/Product/Material ID No.)	Pollutant	Control Method	Primary Control Method	Description	Control Efficiency	Capture Efficiency	Control Efficiency	Capture Efficiency	Control Efficiency	Capture Efficiency	Control Efficiency

Emission Unit ID	Process ID	Annual Process Unit (non-Power Plant)	Annual Process Unit Units	Pollutant	Emission Factor	EF Units	Emission Factor Units	Method Code	Method Code Description	Control Device	Applicable Rule	Rule Section	Annual Emissions
FS3	1	67,081	E6BTU	SO2	1.898	LB	E6BTU	03		U			63.7
FS3	1	67,081	E6BTU	NOX	0.313	LB	E6BTU	08		U	9/98	A	10.5
FS3	1	67,081	E6BTU	CO	0.0333	LB	E6BTU	08		U	9/98	A	1.1
FS3	1	67,081	E6BTU	VOC	0.00507	LB	E6BTU	08		U	9/98	A	0.2
FS3	1	67,081	E6BTU	PM-PRI	0.137	LB	E6BTU	08		U	9/98	A	4.6
FS3	1	67,081	E6BTU	PM-FIL	0.1270	LB	E6BTU	08		U	9/98	C	4.3
FS3	1	67,081	E6BTU	PM-CON	0.0100	LB	E6BTU	08		U	9/98	D	0.3
FS3	1	67,081	E6BTU	PM10-PRI	0.1002	LB	E6BTU	08		U	9/98	C	3.4
FS3	1	67,081	E6BTU	PM10-FIL	0.0902	LB	E6BTU	08		U	9/98	C	3.0
FS3	1	67,081	E6BTU	PM25-PRI	0.0760	LB	E6BTU	08		U	9/98	C	2.5
FS3	1	67,081	E6BTU	PM25-FIL	0.0660	LB	E6BTU	08		U	9/98	C	2.2
FS3	1	67,081	E6BTU	7439921	1.01E-05	LB	E6BTU	08		U	9/98	C	3.38E-04
FS3	2	4,709	E6BTU	SO2	0.00423	LB	E6BTU	03		U			0.0100
FS3	2	4,709	E6BTU	NOX	0.208	LB	E6BTU	08		U	10/96	E	0.4897
FS3	2	4,709	E6BTU	CO	0.0350	LB	E6BTU	08		U	10/96	E	0.0824
FS3	2	4,709	E6BTU	VOC	0.00546	LB	E6BTU	08		U	10/96	E	0.0129
FS3	2	4,709	E6BTU	PM-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0285
FS3	2	4,709	E6BTU	PM-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0154
FS3	2	4,709	E6BTU	PM-CON	0.00559	LB	E6BTU	08		U	7/98	D	0.0132
FS3	2	4,709	E6BTU	PM10-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0285
FS3	2	4,709	E6BTU	PM10-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0154
FS3	2	4,709	E6BTU	PM25-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0285
FS3	2	4,709	E6BTU	PM25-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0154
FS4	1	72,377	E6BTU	SO2	1.898	LB	E6BTU	03		U			68.7
FS4	1	72,377	E6BTU	NOX	0.313	LB	E6BTU	08		U	9/98	A	11.3
FS4	1	72,377	E6BTU	CO	0.0333	LB	E6BTU	08		U	9/98	A	1.2
FS4	1	72,377	E6BTU	VOC	0.00507	LB	E6BTU	08		U	9/98	A	0.2
FS4	1	72,377	E6BTU	PM-PRI	0.137	LB	E6BTU	08		U	9/98	A	5.0
FS4	1	72,377	E6BTU	PM-FIL	0.1270	LB	E6BTU	08		U	9/98	C	4.6
FS4	1	72,377	E6BTU	PM-CON	0.0100	LB	E6BTU	08		U	9/98	D	0.4
FS4	1	72,377	E6BTU	PM10-PRI	0.1002	LB	E6BTU	08		U	9/98	C	3.6

FS4	1	72,377	E6BTU	PM10-FIL	0.0902	LB	E6BTU	08		U	9/98	C	3.3
FS4	1	72,377	E6BTU	PM25-PRI	0.0760	LB	E6BTU	08		U	9/98	C	2.8
FS4	1	72,377	E6BTU	PM25-FIL	0.0660	LB	E6BTU	08		U	9/98	C	2.4
FS4	1	72,377	E6BTU	7439921	1.01E-05	LB	E6BTU	08		U	9/98	C	3.64E-04
FS4	2	5,037	E6BTU	SO2	0.00423	LB	E6BTU	03		U			0.0107
FS4	2	5,037	E6BTU	NOX	0.208	LB	E6BTU	08		U	10/96	E	0.5238
FS4	2	5,037	E6BTU	CO	0.0350	LB	E6BTU	08		U	10/96	E	0.0881
FS4	2	5,037	E6BTU	VOC	0.00548	LB	E6BTU	08		U	10/96	E	0.0138
FS4	2	5,037	E6BTU	PM-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0305
FS4	2	5,037	E6BTU	PM-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0165
FS4	2	5,037	E6BTU	PM-CON	0.00559	LB	E6BTU	08		U	7/98	D	0.0141
FS4	2	5,037	E6BTU	PM10-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0305
FS4	2	5,037	E6BTU	PM10-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0165
FS4	2	5,037	E6BTU	PM25-PRI	0.01210	LB	E6BTU	08		U	10/96, 7/98	E, D	0.0305
FS4	2	5,037	E6BTU	PM25-FIL	0.00656	LB	E6BTU	08		U	10/96	E	0.0165

2004 HAWAII EMISSIONS INVENTORY REPORT
FACILITY GENERAL INFORMATION FORM

FIPS State-County-Facility ID: 1500100013

DATA REPRESENTATIVE OF JANUARY 1, 2004 - DECEMBER 31, 2004
(Form instructions are located on the Facility General Information Form Instructions)

1) Facility Name: HELCO - Keahole Power Plant

2) Permit No(s).: PSD HI 88-01, 0007-01-C & 0256-01-C

3) Physical Facility Address:

Street: 73-4249 Queen Kaahumanu Highway

City: Kailua-Kona Zip Code: 96740

4) Emissions Inventory Contact Person Information:

Contact Name:	Phone # + ext:	Fax #	Internet (E-mail) Address:
Michael Watanabe	808-543-4517	808-543-4511	michael.watanabe@heco.com
Mailing Address:	**Mailing City:**	**State:**	**Zip Code:**
P.O. Box 2750	Honolulu	HI	96840

5) Identify CERR source type (CERR thresholds found on the first page of the General Instructions):
(select one) Type A: _____ Type B: X Neither: _____

6) SIC Code (Primary / Secondary): 4911 / _____ 7) NAICS Code: 221112

8) Principal Product: Electrical Generation

9) Facility UTM coordinates (m): Horizontal (x): 811293 (Easting (m)) Vertical (y): 2184955 (Northing (m))

Zone: 4 (Zone 4 or 5) Datum: Old Hawaiian (e.g., NAD 83, NAD 27, or Old Hawaiian)

10) When the 2003 Hawaii Emissions Inventory Report has been completed, please sign and date below.

I certify that I have knowledge of the facts herein set forth, that the same are true, accurate and complete to the best of my knowledge and belief, and that all information not identified by me as confidential in nature shall be treated by the Department of Health as public record.

Signature: _____

Name: Dan V. Giovanni Date: _____
Responsible Official

Title: Production Manager

FD18	1	Diesel Generator D-18	No. 2 Fuel Oil	58	20100102	137.819	E6BTU	E3GAL	0.16		2.5	27.4	E6BTU	HR	0000	24	7	52	0	0	0	100	52.139	0.143	E3GAL
FD19	1	Diesel Generator D-19	No. 2 Fuel Oil	58	20100102	137.819	E6BTU	E3GAL	0.16		2.5	27.4	E6BTU	HR	0000	24	7	52	0	0	0	100	28.412	0.078	E3GAL
FD20	1	Diesel Generator D-20	No. 2 Fuel Oil	58	20100102	137.819	E6BTU	E3GAL	0.16		2.5	28.1	E6BTU	HR	0000	24	7	52	0	0	0	100	0.026	0.000	E3GAL
FD21	1	Diesel Generator D-21	No. 2 Fuel Oil	58	20100102	137.819	E6BTU	E3GAL	0.16		2.5	28.1	E6BTU	HR	0000	24	7	52	54	1	1	44	119.598	0.328	E3GAL
FD22	1	Diesel Generator D-22	No. 2 Fuel Oil	58	20100102	137.819	E6BTU	E3GAL	0.16		2.5	28.1	E6BTU	HR	0000	24	7	52	19	12	23	46	94.700	0.259	E3GAL
FD23	1	Diesel Generator D-23	No. 2 Fuel Oil	58	20100102	137.819	E6BTU	E3GAL	0.16		2.5	28.1	E6BTU	HR	0000	24	7	52	22	16	32	31	128.687	0.353	E3GAL
FCT2	1	Combustion Turbine 2	No. 2 Fuel Oil	58	20100101	137.819	E6BTU	E3GAL	0.16		20	196	E6BTU	HR	0000	24	7	52	39	14	13	34	3,368.970	9.2	E3GAL
FB8	1	Blackstart Unit	No. 2 Fuel Oil	58	20100102	137.819	E6BTU	E3GAL	0.16		0.5	5.57	E6BTU	HR	0000	24	7	52	0	14	29	57	0.279	0.0008	E3GAL
FCT4	1	Combustion Turbine 4	No. 2 Fuel Oil	58	20100101	137.819	E6BTU	E3GAL	0.16		24.66	275	E6BTU	HR	0000	24	7	52	21	41	24	14	3,283.415	8.9	E3GAL
FCT5	1	Combustion Turbine 5	No. 2 Fuel Oil	58	20100101	137.819	E6BTU	E3GAL	0.16		24.66	275	E6BTU	HR	0000	24	7	52	0	37	60	3	2,460.034	6.6	E3GAL

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☒ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

Deviations from the normal operating schedule
FD18 Unit retired 2/12/2004
FD19 Unit retired 2/12/2004
FD20 Unit retired 5/5/2004
FD21 Unit suspended for fuel meter installation 8/2 - 11/10/2004.
FD22 Unit on forced outage due to generator failure 6/2 -7/8/2004
FCT4 Unit initially started on 3/18/2004 Unit put on outage to complete noise abatement work all of 8/9 - 10/10/2004.
FCT5 Unit initially started on 5/1/2004.

Emission Unit ID	Process ID No. (Subpart)	Process ID Type	Unit Description	Process Rated Capacity	Process Material Throughput	Process Fuel Type	Process Fuel Consumption	Process Operating Time (Hr/Yr)	Process Operating Time (Hr/Day)	Process Operating Time (Days/Wk)	Process Operating Time (Wks/Yr)	Process Operating Time (Hrs/Day)	Process Operating Time (Days/Wk)	Process Operating Time (Wks/Yr)	Process Operating Time (Hrs/Day)	Process Operating Time (Days/Wk)	Process Operating Time (Wks/Yr)	Process Operating Time (Hrs/Day)	Process Operating Time (Days/Wk)	Process Operating Time (Wks/Yr)	Process Operating Time (Hrs/Day)	Process Operating Time (Days/Wk)	Process Operating Time (Wks/Yr)	Process Operating Time (Hrs/Day)	Process Operating Time (Days/Wk)	Process Operating Time (Wks/Yr)

Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

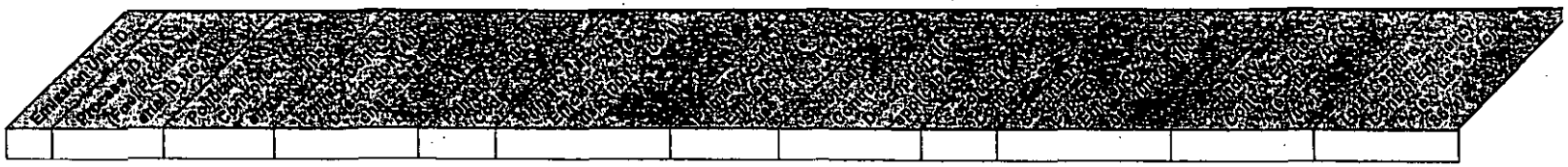
Deviation in Operating Schedules for Calendar Year 2004:

Did any emissions unit significantly deviate from the normal operating schedule for more than a one month period (e.g., downtime for maintenance, equipment breakdown; or deviate due to low demand, from a normal schedule of 24 hrs/day, 7 days/wk, & 52 wks/yr to a low demand schedule of 8 hrs/day, 5 days/wk) for more than one month?

☐ Yes ☐ No

If YES, list on a separate attachment the emission unit; reason for the deviation; and deviation period, schedule, and month(s).

18	FD18	1	Diesel Generator D-18	02		811,260	2,184,906	4	Old Hawaiian	40.0	3.0	60.0	759	411
19	FD19	1	Diesel Generator D-19	02		811,258	2,184,899	4	Old Hawaiian	40.0	3.0	60.0	759	411
20	FD20	1	Diesel Generator D-20	02		811,257	2,184,891	4	Old Hawaiian	40.0	3.0	60.0	759	411
21	FD21	1	Diesel Generator D-21	02		811,255	2,184,884	4	Old Hawaiian	40.0	3.0	60.0	759	411
22	FD22	1	Diesel Generator D-22	02		811,253	2,184,874	4	Old Hawaiian	40.0	3.0	60.0	759	411
23	FD23	1	Diesel Generator D-23	02		811,251	2,184,869	4	Old Hawaiian	40.0	3.0	60.0	759	411
CT2	FCT2	1	Combustion Turbine 2	02		811,250	2,184,848	4	Old Hawaiian	69.9	11.2	65.0	705	6,348
BS1	FBS	1	Blackstart Unit	02		811,250	2,184,848	4	Old Hawaiian	69.9	0.7	204.1	1150	69
CT4	FCT4	1	Combustion Turbine 4	02		811,293	2,184,955	4	Old Hawaiian	103.3	8.0	126.3	1018	6,357
CT5	FCT5	1	Combustion Turbine 5	02		811,293	2,184,955	4	Old Hawaiian	103.3	8.0	126.3	1018	6,357



Emission Unit ID	Process ID	Annual Process Rate (Tons/Year)	Unit Code	Pollutant ID	Emission Factor	Emission Factor Unit	EF Indicator	Method Code	Pollutant Code	Control Equipment Code	Control Equipment Efficiency	Applicable NSPS Subpart	Annual Emissions (Tons/Year)
FD18	1	7,186	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.6
FD18	1	7,186	E6BTU	NOX	3.20	LB	E6BTU	08		U	10/96	B	11.5
FD18	1	7,186	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	3.1
FD18	1	7,186	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.3
FD18	1	7,186	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.3
FD18	1	7,186	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.2
FD18	1	7,186	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.028
FD18	1	7,186	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.2
FD18	1	7,186	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.2
FD18	1	7,186	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.2
FD18	1	7,186	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.2
FD18	1	7,186	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	5.03E-05
FD19	1	3,916	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.3
FD19	1	3,916	E6BTU	NOX	3.20	LB	E6BTU	08		U	10/96	B	6.3
FD19	1	3,916	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	1.7
FD19	1	3,916	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.2
FD19	1	3,916	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.1
FD19	1	3,916	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.1
FD19	1	3,916	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.015
FD19	1	3,916	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.1
FD19	1	3,916	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.1
FD19	1	3,916	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.1
FD19	1	3,916	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.1
FD19	1	3,916	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	2.74E-05
FD20	1	4	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.0
FD20	1	4	E6BTU	NOX	1.79	LB	E6BTU	04		U			0.0
FD20	1	4	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	0.0
FD20	1	4	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.0
FD20	1	4	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.0

FD20	1	4	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.0
FD20	1	4	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.000
FD20	1	4	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.0
FD20	1	4	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.0
FD20	1	4	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.0
FD20	1	4	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.0
FD20	1	4	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	2.51E-08
FD21	1	16,483	E6BTU	SO2	0.163	LB	E6BTU	03		U			1.3
FD21	1	16,483	E6BTU	NOX	1.75	LB	E6BTU	04		U			14.4
FD21	1	16,483	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	7.0
FD21	1	16,483	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.7
FD21	1	16,483	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.6
FD21	1	16,483	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.5
FD21	1	16,483	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.1
FD21	1	16,483	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.5
FD21	1	16,483	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.4
FD21	1	16,483	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.5
FD21	1	16,483	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.4
FD21	1	16,483	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	1.15E-04
FD22	1	13,051	E6BTU	SO2	0.163	LB	E6BTU	03		U			1.1
FD22	1	13,051	E6BTU	NOX	1.47	LB	E6BTU	04		U			9.6
FD22	1	13,051	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	5.5
FD22	1	13,051	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.5
FD22	1	13,051	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.5
FD22	1	13,051	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.4
FD22	1	13,051	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.1
FD22	1	13,051	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.4
FD22	1	13,051	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.3
FD22	1	13,051	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.4

FD22	1	13,051	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.3
FD22	1	13,051	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	9.14E-05
FD23	1	17,736	E6BTU	SO2	0.163	LB	E6BTU	03		U			1.4
FD23	1	17,736	E6BTU	NOX	2.17	LB	E6BTU	04		U			19.2
FD23	1	17,736	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	7.5
FD23	1	17,736	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.7
FD23	1	17,736	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.6
FD23	1	17,736	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.5
FD23	1	17,736	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.1
FD23	1	17,736	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.5
FD23	1	17,736	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.4
FD23	1	17,736	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.5
FD23	1	17,736	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.4
FD23	1	17,736	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	1.24E-04
FCT2	1	464,308	E6BTU	SO2	0.163	LB	E6BTU	03		U			37.8
FCT2	1	464,308	E6BTU	NOX	0.133	LB	E6BTU	04		U			30.9
FCT2	1	464,308	E6BTU	CO	0.0040	LB	E6BTU	04		U			0.9
FCT2	1	464,308	E6BTU	VOC	0.00060	LB	E6BTU	04		U			0.1
FCT2	1	464,308	E6BTU	PM-PRI	0.02552	LB	E6BTU	05		U			5.9
FCT2	1	464,308	E6BTU	PM-FIL	0.01832	LB	E6BTU	04		U			4.3
FCT2	1	464,308	E6BTU	PM-CON	0.00720	LB	E6BTU	08		U	4/00	C	1.7
FCT2	1	464,308	E6BTU	PM10-PRI	0.02186	LB	E6BTU	05		U			5.1
FCT2	1	464,308	E6BTU	PM10-FIL	0.01466	LB	E6BTU	05		U			3.4
FCT2	1	464,308	E6BTU	PM25-PRI	0.02135	LB	E6BTU	05		U			5.0
FCT2	1	464,308	E6BTU	PM25-FIL	0.01415	LB	E6BTU	05		U			3.3
FCT2	1	464,308	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	3.25E-03
FBS	1	38	E6BTU	SO2	0.163	LB	E6BTU	03		U			0.003
FBS	1	38	E6BTU	NOX	3.20	LB	E6BTU	08		U	10/96	B	0.061
FBS	1	38	E6BTU	CO	0.850	LB	E6BTU	08		U	10/96	C	0.016

Emission Unit ID	Process ID	Fuel Input Activity	Annual Fuel Input (TON)	Annual Fuel Input Units	Pollutant	Emission Factor	Unit	EF Unit Numerator	EF Unit Denominator	Method	Date	Rating	Emissions
FBS	1	38	E6BTU	VOC	0.0819	LB	E6BTU	08		U	10/96	E	0.002
FBS	1	38	E6BTU	PM-PRI	0.0697	LB	E6BTU	08		U	10/96	E	0.001
FBS	1	38	E6BTU	PM-FIL	0.0620	LB	E6BTU	08		U	10/96	E	0.001
FBS	1	38	E6BTU	PM-CON	0.0077	LB	E6BTU	08		U	10/96	E	0.0001
FBS	1	38	E6BTU	PM10-PRI	0.0573	LB	E6BTU	08		U	10/96	E	0.001
FBS	1	38	E6BTU	PM10-FIL	0.0496	LB	E6BTU	08		U	10/96	E	0.001
FBS	1	38	E6BTU	PM25-PRI	0.0556	LB	E6BTU	08		U	10/96	E	0.001
FBS	1	38	E6BTU	PM25-FIL	0.0479	LB	E6BTU	08		U	10/96	E	0.001
FBS	1	38	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	2.66E-07
FCT4	1	449,761	E6BTU	SO2	0.163	LB	E6BTU	03		U			36.7
FCT4	1	449,761	E6BTU	NOX	0.150	LB	E6BTU	04		U			33.7
FCT4	1	449,761	E6BTU	CO	0.0235	LB	E6BTU	04		U			5.3
FCT4	1	449,761	E6BTU	VOC	0.00173	LB	E6BTU	04		U			0.4
FCT4	1	449,761	E6BTU	PM-PRI	0.01994	LB	E6BTU	05		U			4.5
FCT4	1	449,761	E6BTU	PM-FIL	0.01274	LB	E6BTU	08		U	C	C	2.9
FCT4	1	449,761	E6BTU	PM-CON	0.00720	LB	E6BTU	08		U	C	C	1.6
FCT4	1	449,761	E6BTU	PM10-PRI	0.01739	LB	E6BTU	05		U			3.9
FCT4	1	449,761	E6BTU	PM10-FIL	0.01019	LB	E6BTU	05		U			2.3
FCT4	1	449,761	E6BTU	PM25-PRI	0.01704	LB	E6BTU	05		U			3.8
FCT4	1	449,761	E6BTU	PM25-FIL	0.00984	LB	E6BTU	05		U			2.2
FCT4	1	449,761	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	D	D	3.15E-03
FCT5	1	341,796	E6BTU	SO2	0.163	LB	E6BTU	03		U			27.9
FCT5	1	341,796	E6BTU	NOX	0.138	LB	E6BTU	04		U			23.5
FCT5	1	341,796	E6BTU	CO	0.0381	LB	E6BTU	04		U			6.5
FCT5	1	341,796	E6BTU	VOC	0.00058	LB	E6BTU	04		U			0.1
FCT5	1	341,796	E6BTU	PM-PRI	0.02395	LB	E6BTU	05		U			4.1
FCT5	1	341,796	E6BTU	PM-FIL	0.01675	LB	E6BTU	08		U	4/00	C	2.9
FCT5	1	341,796	E6BTU	PM-CON	0.00720	LB	E6BTU	08		U	4/00	C	1.2
FCT5	1	341,796	E6BTU	PM10-PRI	0.02060	LB	E6BTU	05		U			3.5

FCT5	1	341,796	E6BTU	PM10-FIL	0.01340	LB	E6BTU	05		U			2.3
FCT5	1	341,796	E6BTU	PM25-PRI	0.02014	LB	E6BTU	05		U			3.4
FCT5	1	341,796	E6BTU	PM25-FIL	0.01294	LB	E6BTU	05		U			2.2
FCT5	1	341,796	E6BTU	7439921	1.40E-05	LB	E6BTU	08		U	4/00	D	2.39E-03

Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

CAA-2.2 (HELCO)

April 30, 2003

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Annual Emissions Fees for Operations in Calendar Year 2002
Hawaii Electric Light Company, Inc. (HELCO)

Dear Mr. Nagamine:

In accordance with a letter issued by the Department of Health (DoH) on January 7, 2003, enclosed are the emission fees payable for calendar year 2002. On January 22, 2003, Hawaiian Electric Company, Inc. requested a deadline extension to pay the 2002 emission fees. On February 3, 2003, the DoH granted the deadline extension to May 1, 2003. Please find the attached emission fees and calculation for the following HELCO facilities:

Hill-Kanoelehua Generating Station	Waimea Generating Station
Puna Generating Station	Shipman Generating Station
Keahole Generating Station	

The following are provided with this submittal:

- Check No. 33255 in the amount of $224,967.33 payable to Clean Air Special Fund-COV.
- Check No. 33256 in the amount of $54,733.97 payable to Clean Air Special Fund-NON.
- Forms F-1 and F-2, if required, Annual Emission Fee and Summary for Covered Sources
- Calculations, emissions factors and assumption worksheets.

If you have any question, please call Michael Watanabe at 543-4517.

Sincerely,

Sherri-Ann Loo
Manager, Environmental Department

Enclosures
cc (w/o encl): T. Simmons

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

HAWAII ELECTRIC LIGHT CO., INC.

[redacted]

⑈033256⑈ ⑆121301028⑆ 0081⑉032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

33256

HAWAII ELECTRIC LIGHT CO. INC.

[redacted]

⑈033255⑈ ⑆121301028⑆ 0081⑈032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

33255

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

FORM F-1
2003 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2002)

[redacted]

1. Facility Information (PLEASE PRINT)

A. Facility Name:	Hill-Kanoelehua Generating Station	B. Location:	Hilo	C. Island:	Hawaii
D. Mailing Address:	PO Box 1027	E. City: Hilo	F. State: Hawaii	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J: Telephone No.:	(808) 543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.:	(808) 969-0421
N. Signature: Dan V. Giovanni		Date: 4/16/03			

2. CALCULATED EMISSIONS (CALCULATE AND REPORT EMISSIONS TO THE NEAREST TENTH OF A TON (Line 2.B.) AND TOTAL ANNUAL EMISSIONS (Line 2.C) SUBJECT TO FEES WITHOUT THE FRACTION(S) OF A TON)

Equipment Stack Number or Unit Number	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (Please specify)												Annual Total
	TSP	PM_{10}	SO_2	CO	NO_x	VOC	Pb						
Hill 5	63.5	45.0	939.2	17.2	162.0	2.6	0.0						
Hill 6	114.6	81.4	1696.3	31.2	292.6	4.7	0.0						
CT-1	0.1	0.1	0.7	0.0	4.5	0.0	0.0						
A. Supplement A	1.8	1.4	3.4	22.1	83.0	2.1	0.0						
B. Total Report Emissions	180.0	127.9	2639.6	70.5	542.1	9.4	0.0						
C. Total Emissions Subject to Fees	180		2639		542	9							D. 3370

3. 2003 ANNUAL FEE CALCULATION (USE THE TOTAL EMISSIONS SUBJECT TO FEES CALCULATED IN BLOCK 2.D)

	Total Annual Emissions Subject to Fees	Times	2003 $/ton	Times	Consumer Price Index Adjustment (2.7% increase from '99 to '01)	Equal	
Fee payable to: Clean Air Special Fund - COV	A. 3370	X	39.00	X	1.027	=	B. $134,978.61
Clean Air Special Fund - NON	C. 3370	X	9.50	X	1.027	=	D. $ 32,879.41
						Total	E. $167,858.02

Note: 2003 $/ton charge payable to Clean Air Special Fund - COV = $39.00 x 1.027 = $40.05/ton.
2003 $/ton charge payable to Clean Air Special Fund - NON = $9.50 x 1.027 = $9.76/ton.
If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500 with a check or money order made payable to the "Clean Air Special Fund - COV."
If the summed amount found in 3.E is greater than $500, then pay fee amounts found in 3.B & 3.D. with two separate checks or money payable to the "Clean Air Special Fund - COV" & Clean Air Special Fund - NON," respectively

1/7/2003

FORM F-2
SUPPLEMENT A
2003 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2002)

1. Facility Information (PLEASE PRINT)

A. Facility Name:	Hill-Kanoelehua Generating Station	B. Location:	Hilo	C. Island:	Hawaii
D. Responsible Official:	Dan V. Giovanni	E. Title:	Production Manager	F. Telephone No.:	(808) 969-0421
G. Signature:		Date:	9/16/03		

2. CALCULATED EMISSIONS (CALCULATE AND REPORT EMISSIONS TO THE NEAREST TENTH OF A TON)

Equipment Stack Number or Unit Number	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (Please specify)												
	TSP	PM_{10}	SO_2	CO	NO_x	VOC	Pb						
D-11	0.0	0.0	0.0	0.2	0.7	0.0	0.0						
D-15	0.2	0.1	0.3	2.2	8.2	0.2	0.0						
D-16	0.5	0.4	1.0	8.3	23.6	0.6	0.0						
D-17	1.1	0.9	2.1	13.4	50.5	1.3	0.0						
Supplement _____													
Total Report Emissions	1.8	1.4	3.4	22.1	83.0	2.1	0.0						

1/7/2003

Hill 5 No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	6,864,690	150,556	1,033,520	1.817	M	939.0
NOX	6,864,690	150,556	1,033,520	0.313	A	161.7
CO	6,864,690	150,556	1,033,520	0.0333	A	17.2
VOC	6,864,690	150,556	1,033,520	0.00507	A	2.6
TSP	6,864,690	150,556	1,033,520	0.1227	A	63.4
PM10	6,864,690	150,556	1,033,520	0.0871	A	45.0
Acetaldehyde	6,864,690	150,556	1,033,520		A	
Acrolein	6,864,690	150,556	1,033,520		A	
Antimony Compounds	6,864,690	150,556	1,033,520	3.50E-05	A	1.81E-02
Arsenic Compounds	6,864,690	150,556	1,033,520	8.80E-06	A	4.55E-03
Benzene	6,864,690	150,556	1,033,520	1.43E-06	A	7.37E-04
Beryllium Compounds	6,864,690	150,556	1,033,520	1.85E-07	A	9.58E-05
1,3-Butadiene	6,864,690	150,556	1,033,520		A	
Cadmium Compounds	6,864,690	150,556	1,033,520	2.65E-06	A	1.37E-03
Chromium Compounds	6,864,690	150,556	1,033,520	5.63E-06	A	2.91E-03
Cobalt Compounds	6,864,690	150,556	1,033,520	4.01E-05	A	2.07E-02
Ethylbenzene	6,864,690	150,556	1,033,520	4.24E-07	A	2.19E-04
Formaldehyde	6,864,690	150,556	1,033,520	4.07E-04	A	2.10E-01
Hydrochloric Acid	6,864,690	150,556	1,033,520		A	
Lead Compounds	6,864,690	150,556	1,033,520	1.01E-05	A	5.20E-03
Manganese Compounds	6,864,690	150,556	1,033,520	2.00E-05	A	1.03E-02
Mercury Compounds	6,864,690	150,556	1,033,520	7.53E-07	A	3.89E-04
Nickel Compounds	6,864,690	150,556	1,033,520	5.63E-04	A	2.91E-01
Naphthalene	6,864,690	150,556	1,033,520	7.53E-06	A	3.89E-03
Phosphorus	6,864,690	150,556	1,033,520	6.31E-05	A	3.26E-02
POM	6,864,690	150,556	1,033,520	8.67E-06	A	4.48E-03
Selenium Compounds	6,864,690	150,556	1,033,520	4.55E-06	A	2.35E-03
Toluene	6,864,690	150,556	1,033,520	4.13E-05	A	2.14E-02
Xylene	6,864,690	150,556	1,033,520		A	
o-Xylene	6,864,690	150,556	1,033,520	7.27E-07	A	3.76E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	10,110	137,899	1,394	0.132	M	0.092
NOX	10,110	137,899	1,394	0.171	A	0.119
CO	10,110	137,899	1,394	0.0357	A	0.025
VOC	10,110	137,899	1,394	0.00143	A	0.001
TSP	10,110	137,899	1,394	0.0143	A	0.010
PM10	10,110	137,899	1,394	0.0071	A	0.005
Acetaldehyde	10,110	137,899	1,394		A	
Acrolein	10,110	137,899	1,394		A	
Antimony Compounds	10,110	137,899	1,394	3.75E-05	A	2.61E-05
Arsenic Compounds	10,110	137,899	1,394	9.43E-06	A	6.57E-06
Benzene	10,110	137,899	1,394	1.53E-06	A	1.07E-06
Beryllium Compounds	10,110	137,899	1,394	1.99E-07	A	1.38E-07
1,3-Butadiene	10,110	137,899	1,394		A	
Cadmium Compounds	10,110	137,899	1,394	2.84E-06	A	1.98E-06
Chromium Compounds	10,110	137,899	1,394	6.04E-06	A	4.21E-06
Cobalt Compounds	10,110	137,899	1,394	4.30E-05	A	3.00E-05
Ethylbenzene	10,110	137,899	1,394	4.54E-07	A	3.17E-07
Formaldehyde	10,110	137,899	1,394	4.36E-04	A	3.04E-04
Hydrochloric Acid	10,110	137,899	1,394		A	
Lead Compounds	10,110	137,899	1,394	1.08E-05	A	7.52E-06
Manganese Compounds	10,110	137,899	1,394	2.14E-05	A	1.49E-05
Mercury Compounds	10,110	137,899	1,394	8.07E-07	A	5.63E-07
Nickel Compounds	10,110	137,899	1,394	6.04E-04	A	4.21E-04
Naphthalene	10,110	137,899	1,394	8.07E-06	A	5.63E-06
Phosphorus	10,110	137,899	1,394	6.76E-05	A	4.71E-05
POM	10,110	137,899	1,394	9.29E-06	A	6.47E-06
Selenium Compounds	10,110	137,899	1,394	4.88E-06	A	3.40E-06
Toluene	10,110	137,899	1,394	4.43E-05	A	3.09E-05
Xylene	10,110	137,899	1,394		A	
o-Xylene	10,110	137,899	1,394	7.79E-07	A	5.43E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	1,750	91,500	160	0.00423	M	0.0003
NOX	1,750	91,500	160	0.208	A	0.0167
CO	1,750	91,500	160	0.035	A	0.0028
VOC	1,750	91,500	160	0.00546	A	0.0004
TSP	1,750	91,500	160	0.00656	A	0.0005
PM10	1,750	91,500	160	0.00656	A	0.0005
Acetaldehyde	1,750	91,500	160		A	
Acrolein	1,750	91,500	160		A	
Antimony Compounds	1,750	91,500	160		A	
Arsenic Compounds	1,750	91,500	160		A	
Benzene	1,750	91,500	160		A	
Beryllium Compounds	1,750	91,500	160		A	
1,3-Butadiene	1,750	91,500	160		A	
Cadmium Compounds	1,750	91,500	160		A	
Chromium Compounds	1,750	91,500	160		A	
Cobalt Compounds	1,750	91,500	160		A	
Ethylbenzene	1,750	91,500	160		A	
Formaldehyde	1,750	91,500	160		A	
Hydrochloric Acid	1,750	91,500	160		A	
Lead Compounds	1,750	91,500	160		A	
Manganese Compounds	1,750	91,500	160		A	
Mercury Compounds	1,750	91,500	160		A	
Nickel Compounds	1,750	91,500	160		A	
Naphthalene	1,750	91,500	160		A	
Phosphorus	1,750	91,500	160		A	
POM	1,750	91,500	160		A	
Selenium Compounds	1,750	91,500	160		A	
Toluene	1,750	91,500	160		A	
Xylene	1,750	91,500	160		A	
o-Xylene	1,750	91,500	160		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Spec Used Oil

Pollutant	Annual Fuel Use (gal/yr)	Emission Factor (lb/10⁴ gal)	EF Ref	Annual Emissions (tons/yr)
SO2	4,871	30.3	A	0.0739
NOX	4,871	47	A	0.1145
CO	4,871	5.0	A	0.0122
VOC	4,871	0.76	A	0.0019
TSP	4,871	21.6	A	0.0526
PM10	4,871	15.3	A	0.0373
Acetaldehyde	4,871		A	
Acrolein	4,871		A	
Antimony Compounds	4,871		A	
Arsenic Compounds	4,871	1.10E-01	A	2.68E-04
Benzene	4,871		A	
Beryllium Compounds	4,871		A	
1,3-Butadiene	4,871		A	
Cadmium Compounds	4,871	9.30E-03	A	2.27E-05
Chromium Compounds	4,871	2.00E-02	A	4.87E-05
Cobalt Compounds	4,871	2.10E-04	A	5.11E-07
Ethylbenzene	4,871		A	
Formaldehyde	4,871		A	
Hydrochloric Acid	4,871	3.30E-02	A	8.04E-05
Lead Compounds	4,871	5.50E-01	A	1.34E-03
Manganese Compounds	4,871	6.80E-02	A	1.66E-04
Mercury Compounds	4,871		A	
Nickel Compounds	4,871	1.10E-02	A	2.68E-05
Naphthalene	4,871		A	
Phosphorus	4,871		A	
POM	4,871		A	
Selenium Compounds	4,871		A	
Toluene	4,871		A	
Xylene	4,871		A	
o-Xylene	4,871		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 5 Total

	Annual Emissions				
Pollutant	No 6 Fuel Oil (tons/yr)	No 2 Fuel Oil (tons/yr)	Propane (tons/yr)	Spec Used Oil (tons/yr)	Total (tons/yr)
SO2	939	0.092	0.0003	0.0739	939.2
NOX	161.7	0.119	0.0167	0.1145	162.0
CO	17.2	0.025	0.0028	0.0122	17.2
VOC	2.6	0.001	0.0004	0.0019	2.6
TSP	63.4	0.010	0.0005	0.0526	63.5
PM10	45.0	0.005	0.0005	0.0373	45.0
Acetaldehyde					
Acrolein					
Antimony Compounds	1.81E-02	2.61E-05			1.81E-02
Arsenic Compounds	4.55E-03	6.57E-06		2.68E-04	4.82E-03
Benzene	7.37E-04	1.07E-06			7.38E-04
Beryllium Compounds	9.58E-05	1.38E-07			9.59E-05
1,3-Butadiene					
Cadmium Compounds	1.37E-03	1.98E-06		2.27E-05	1.40E-03
Chromium Compounds	2.91E-03	4.21E-06		4.87E-05	2.96E-03
Cobalt Compounds	2.07E-02	3.00E-05		5.11E-07	2.08E-02
Ethylbenzene	2.19E-04	3.17E-07			2.19E-04
Formaldehyde	2.10E-01	3.04E-04			2.10E-01
Hydrochloric Acid				8.04E-05	8.04E-05
Lead Compounds	5.20E-03	7.52E-06		1.34E-03	6.55E-03
Manganese Compounds	1.03E-02	1.49E-05		1.66E-04	1.05E-02
Mercury Compounds	3.89E-04	5.63E-07			3.90E-04
Nickel Compounds	2.91E-01	4.21E-04		2.68E-05	2.92E-01
Naphthalene	3.89E-03	5.63E-06			3.90E-03
Phosphorus	3.26E-02	4.71E-05			3.26E-02
POM	4.48E-03	6.47E-06			4.49E-03
Selenium Compounds	2.35E-03	3.40E-06			2.36E-03
Toluene	2.14E-02	3.09E-05			2.14E-02
Xylene					
o-Xylene	3.76E-04	5.43E-07			3.76E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	12,399,240	150,556	1,866,780	1.817	M	1696.0
NOX	12,399,240	150,556	1,866,780	0.313	A	292.2
CO	12,399,240	150,556	1,866,780	0.0333	A	31.1
VOC	12,399,240	150,556	1,866,780	0.00507	A	4.7
TSP	12,399,240	150,556	1,866,780	0.1227	A	114.5
PM10	12,399,240	150,556	1,866,780	0.0871	A	81.3
Acetaldehyde	12,399,240	150,556	1,866,780		A	
Acrolein	12,399,240	150,556	1,866,780		A	
Antimony Compounds	12,399,240	150,556	1,866,780	3.50E-05	A	3.27E-02
Arsenic Compounds	12,399,240	150,556	1,866,780	8.80E-06	A	8.21E-03
Benzene	12,399,240	150,556	1,866,780	1.43E-06	A	1.33E-03
Beryllium Compounds	12,399,240	150,556	1,866,780	1.85E-07	A	1.73E-04
1,3-Butadiene	12,399,240	150,556	1,866,780		A	
Cadmium Compounds	12,399,240	150,556	1,866,780	2.65E-06	A	2.48E-03
Chromium Compounds	12,399,240	150,556	1,866,780	5.63E-06	A	5.26E-03
Cobalt Compounds	12,399,240	150,556	1,866,780	4.01E-05	A	3.75E-02
Ethylbenzene	12,399,240	150,556	1,866,780	4.24E-07	A	3.96E-04
Formaldehyde	12,399,240	150,556	1,866,780	4.07E-04	A	3.80E-01
Hydrochloric Acid	12,399,240	150,556	1,866,780		A	
Lead Compounds	12,399,240	150,556	1,866,780	1.01E-05	A	9.40E-03
Manganese Compounds	12,399,240	150,556	1,866,780	2.00E-05	A	1.87E-02
Mercury Compounds	12,399,240	150,556	1,866,780	7.53E-07	A	7.03E-04
Nickel Compounds	12,399,240	150,556	1,866,780	5.63E-04	A	5.26E-01
Naphthalene	12,399,240	150,556	1,866,780	7.53E-06	A	7.03E-03
Phosphorus	12,399,240	150,556	1,866,780	6.31E-05	A	5.89E-02
POM	12,399,240	150,556	1,866,780	8.67E-06	A	8.09E-03
Selenium Compounds	12,399,240	150,556	1,866,780	4.55E-06	A	4.25E-03
Toluene	12,399,240	150,556	1,866,780	4.13E-05	A	3.86E-02
Xylene	12,399,240	150,556	1,866,780		A	
o-Xylene	12,399,240	150,556	1,866,780	7.27E-07	A	6.78E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	17,849	137,899	2,461	0.132	M	0.162
NOX	17,849	137,899	2,461	0.171	A	0.210
CO	17,849	137,899	2,461	0.0357	A	0.044
VOC	17,849	137,899	2,461	0.00143	A	0.002
TSP	17,849	137,899	2,461	0.0143	A	0.018
PM10	17,849	137,899	2,461	0.0071	A	0.009
Acetaldehyde	17,849	137,899	2,461		A	
Acrolein	17,849	137,899	2,461		A	
Antimony Compounds	17,849	137,899	2,461	3.75E-05	A	4.62E-05
Arsenic Compounds	17,849	137,899	2,461	9.43E-06	A	1.16E-05
Benzene	17,849	137,899	2,461	1.53E-06	A	1.88E-06
Beryllium Compounds	17,849	137,899	2,461	1.99E-07	A	2.44E-07
1,3-Butadiene	17,849	137,899	2,461		A	
Cadmium Compounds	17,849	137,899	2,461	2.84E-06	A	3.50E-06
Chromium Compounds	17,849	137,899	2,461	6.04E-06	A	7.43E-06
Cobalt Compounds	17,849	137,899	2,461	4.30E-05	A	5.29E-05
Ethylbenzene	17,849	137,899	2,461	4.54E-07	A	5.59E-07
Formaldehyde	17,849	137,899	2,461	4.36E-04	A	5.36E-04
Hydrochloric Acid	17,849	137,899	2,461		A	
Lead Compounds	17,849	137,899	2,461	1.08E-05	A	1.33E-05
Manganese Compounds	17,849	137,899	2,461	2.14E-05	A	2.64E-05
Mercury Compounds	17,849	137,899	2,461	8.07E-07	A	9.93E-07
Nickel Compounds	17,849	137,899	2,461	6.04E-04	A	7.43E-04
Naphthalene	17,849	137,899	2,461	8.07E-06	A	9.93E-06
Phosphorus	17,849	137,899	2,461	6.76E-05	A	8.32E-05
POM	17,849	137,899	2,461	9.29E-06	A	1.14E-05
Selenium Compounds	17,849	137,899	2,461	4.88E-06	A	6.00E-06
Toluene	17,849	137,899	2,461	4.43E-05	A	5.45E-05
Xylene	17,849	137,899	2,461		A	
o-Xylene	17,849	137,899	2,461	7.79E-07	A	9.58E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 Spec Used Oil

Pollutant	Annual Spec Oil Use (gal/yr)	Emission Factor (lb/10⁴ gal)	EF Ref	Annual Emissions (tons/yr)
SO2	8,598	30.3	A	0.1304
NOX	8,598	47	A	0.2021
CO	8,598	5.0	A	0.0215
VOC	8,598	0.76	A	0.0033
TSP	8,598	21.6	A	0.0929
PM10	8,598	15.3	A	0.0658
Acetaldehyde	8,598		A	
Acrolein	8,598		A	
Antimony Compounds	8,598		A	
Arsenic Compounds	8,598	1.10E-01	A	4.73E-04
Benzene	8,598		A	
Beryllium Compounds	8,598		A	
1,3-Butadiene	8,598		A	
Cadmium Compounds	8,598	9.30E-03	A	4.00E-05
Chromium Compounds	8,598	2.00E-02	A	8.60E-05
Cobalt Compounds	8,598	2.10E-04	A	9.03E-07
Ethylbenzene	8,598		A	
Formaldehyde	8,598		A	
Hydrochloric Acid	8,598	3.30E-02	A	1.42E-04
Lead Compounds	8,598	5.50E-01	A	2.36E-03
Manganese Compounds	8,598	6.80E-02	A	2.92E-04
Mercury Compounds	8,598		A	
Nickel Compounds	8,598	1.10E-02	A	4.73E-05
Naphthalene	8,598		A	
Phosphorus	8,598		A	
POM	8,598		A	
Selenium Compounds	8,598		A	
Toluene	8,598		A	
Xylene	8,598		A	
o-Xylene	8,598		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Hill 6 Total

	Annual Emissions			
Pollutant	No 6 Fuel Oil (tons/yr)	No 6 Fuel Oil (tons/yr)	Spec Used Oil (tons/yr)	Total (tons/yr)
SO2	1696	0.162	0.13	1696.3
NOX	292.2	0.210	0.20	292.6
CO	31.1	0.044	0.02	31.2
VOC	4.7	0.002	0.003	4.7
TSP	114.5	0.018	0.09	114.6
PM10	81.3	0.009	0.07	81.4
Acetaldehyde				
Acrolein				
Antimony Compounds	3.27E-02	4.62E-05		3.27E-02
Arsenic Compounds	8.21E-03	1.16E-05	4.73E-04	8.70E-03
Benzene	1.33E-03	1.88E-06		1.33E-03
Beryllium Compounds	1.73E-04	2.44E-07		1.73E-04
1,3-Butadiene				
Cadmium Compounds	2.48E-03	3.50E-06	4.00E-05	2.52E-03
Chromium Compounds	5.26E-03	7.43E-06	8.60E-05	5.35E-03
Cobalt Compounds	3.75E-02	5.29E-05	9.03E-07	3.75E-02
Ethylbenzene	3.96E-04	5.59E-07		3.96E-04
Formaldehyde	3.80E-01	5.36E-04		3.80E-01
Hydrochloric Acid			1.42E-04	1.42E-04
Lead Compounds	9.40E-03	1.33E-05	2.36E-03	1.18E-02
Manganese Compounds	1.87E-02	2.64E-05	2.92E-04	1.90E-02
Mercury Compounds	7.03E-04	9.93E-07		7.04E-04
Nickel Compounds	5.26E-01	7.43E-04	4.73E-05	5.27E-01
Naphthalene	7.03E-03	9.93E-06		7.04E-03
Phosphorus	5.89E-02	8.32E-05		5.89E-02
POM	8.09E-03	1.14E-05		8.10E-03
Selenium Compounds	4.25E-03	6.00E-06		4.26E-03
Toluene	3.86E-02	5.45E-05		3.86E-02
Xylene				
o-Xylene	6.78E-04	9.58E-07		6.79E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	73,501	137,899	10,136	0.132	M	0.67
NOX	73,501	137,899	10,136	0.88	A	4.46
CO	73,501	137,899	10,136	0.0033	A	0.02
VOC	73,501	137,899	10,136	0.00041	A	0.002
TSP	73,501	137,899	10,136	0.012	A	0.06
PM10	73,501	137,899	10,136	0.012	A	0.06
Acetaldehyde	73,501	137,899	10,136	2.52E-05	A	1.28E-04
Acrolein	73,501	137,899	10,136	7.88E-06	A	3.99E-05
Antimony Compounds	73,501	137,899	10,136		A	
Arsenic Compounds	73,501	137,899	10,136	1.10E-05	A	5.57E-05
Benzene	73,501	137,899	10,136	5.50E-05	A	2.79E-04
Beryllium Compounds	73,501	137,899	10,136	3.10E-07	A	1.57E-06
1,3-Butadiene	73,501	137,899	10,136	1.60E-05	A	8.11E-05
Cadmium Compounds	73,501	137,899	10,136	4.80E-06	A	2.43E-05
Chromium Compounds	73,501	137,899	10,136	1.10E-05	A	5.57E-05
Cobalt Compounds	73,501	137,899	10,136		A	
Ethylbenzene	73,501	137,899	10,136		A	
Formaldehyde	73,501	137,899	10,136	2.80E-04	A	1.42E-03
Hydrochloric Acid	73,501	137,899	10,136		A	
Lead Compounds	73,501	137,899	10,136	1.40E-05	A	7.10E-05
Manganese Compounds	73,501	137,899	10,136	7.90E-04	A	4.00E-03
Mercury Compounds	73,501	137,899	10,136	1.20E-06	A	6.08E-06
Nickel Compounds	73,501	137,899	10,136	4.60E-06	A	2.33E-05
Naphthalene	73,501	137,899	10,136	3.50E-05	A	1.77E-04
Phosphorus	73,501	137,899	10,136		A	
POM	73,501	137,899	10,136	4.00E-05	A	2.03E-04
Selenium Compounds	73,501	137,899	10,136	2.50E-05	A	1.27E-04
Toluene	73,501	137,899	10,136	2.81E-04	A	1.42E-03
Xylene	73,501	137,899	10,136	1.93E-04	A	9.78E-04
o-Xylene	73,501	137,899	10,136		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-11

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	3,142	137,899	433	0.132	M	0.03
NOX	3,142	137,899	433	3.2	A	0.69
CO	3,142	137,899	433	0.85	A	0.18
VOC	3,142	137,899	433	0.0819	A	0.02
TSP	3,142	137,899	433	0.0697	A	0.02
PM10	3,142	137,899	433	0.0573	A	0.01
Acetaldehyde	3,142	137,899	433	2.52E-05	A	5.46E-06
Acrolein	3,142	137,899	433	7.88E-06	A	1.71E-06
Antimony Compounds	3,142	137,899	433		A	
Arsenic Compounds	3,142	137,899	433	1.10E-05	A	2.38E-06
Benzene	3,142	137,899	433	7.76E-04	A	1.68E-04
Beryllium Compounds	3,142	137,899	433	3.10E-07	A	6.72E-08
1,3-Butadiene	3,142	137,899	433	1.60E-05	A	3.47E-06
Cadmium Compounds	3,142	137,899	433	4.80E-06	A	1.04E-06
Chromium Compounds	3,142	137,899	433	1.10E-05	A	2.38E-06
Cobalt Compounds	3,142	137,899	433		A	
Ethylbenzene	3,142	137,899	433		A	
Formaldehyde	3,142	137,899	433	7.89E-05	A	1.71E-05
Hydrochloric Acid	3,142	137,899	433		A	
Lead Compounds	3,142	137,899	433	1.40E-05	A	3.03E-06
Manganese Compounds	3,142	137,899	433	7.90E-04	A	1.71E-04
Mercury Compounds	3,142	137,899	433	1.20E-06	A	2.60E-07
Nickel Compounds	3,142	137,899	433	4.60E-06	A	9.97E-07
Naphthalene	3,142	137,899	433	1.30E-04	A	2.82E-05
Phosphorus	3,142	137,899	433		A	
POM	3,142	137,899	433	2.12E-04	A	4.59E-05
Selenium Compounds	3,142	137,899	433	2.50E-05	A	5.42E-06
Toluene	3,142	137,899	433	2.81E-04	A	6.09E-05
Xylene	3,142	137,899	433	1.93E-04	A	4.18E-05
o-Xylene	3,142	137,899	433		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-15

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	37,081	137,899	5,113	0.132	M	0.3
NOX	37,081	137,899	5,113	3.2	A	8.2
CO	37,081	137,899	5,113	0.85	A	2.2
VOC	37,081	137,899	5,113	0.0819	A	0.2
TSP	37,081	137,899	5,113	0.0697	A	0.2
PM10	37,081	137,899	5,113	0.0573	A	0.1
Acetaldehyde	37,081	137,899	5,113	2.52E-05	A	6.44E-05
Acrolein	37,081	137,899	5,113	7.88E-06	A	2.01E-05
Antimony Compounds	37,081	137,899	5,113		A	
Arsenic Compounds	37,081	137,899	5,113	1.10E-05	A	2.81E-05
Benzene	37,081	137,899	5,113	7.76E-04	A	1.98E-03
Beryllium Compounds	37,081	137,899	5,113	3.10E-07	A	7.93E-07
1,3-Butadiene	37,081	137,899	5,113	1.60E-05	A	4.09E-05
Cadmium Compounds	37,081	137,899	5,113	4.80E-06	A	1.23E-05
Chromium Compounds	37,081	137,899	5,113	1.10E-05	A	2.81E-05
Cobalt Compounds	37,081	137,899	5,113		A	
Ethylbenzene	37,081	137,899	5,113		A	
Formaldehyde	37,081	137,899	5,113	7.89E-05	A	2.02E-04
Hydrochloric Acid	37,081	137,899	5,113		A	
Lead Compounds	37,081	137,899	5,113	1.40E-05	A	3.58E-05
Manganese Compounds	37,081	137,899	5,113	7.90E-04	A	2.02E-03
Mercury Compounds	37,081	137,899	5,113	1.20E-06	A	3.07E-06
Nickel Compounds	37,081	137,899	5,113	4.60E-06	A	1.18E-05
Naphthalene	37,081	137,899	5,113	1.30E-04	A	3.32E-04
Phosphorus	37,081	137,899	5,113		A	
POM	37,081	137,899	5,113	2.12E-04	A	5.42E-04
Selenium Compounds	37,081	137,899	5,113	2.50E-05	A	6.39E-05
Toluene	37,081	137,899	5,113	2.81E-04	A	7.18E-04
Xylene	37,081	137,899	5,113	1.93E-04	A	4.93E-04
o-Xylene	37,081	137,899	5,113		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-16

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	107,002	137,899	14,755	0.132	M	1.0
NOX	107,002	137,899	14,755	3.2	A	23.6
CO	107,002	137,899	14,755	0.85	A	6.3
VOC	107,002	137,899	14,755	0.0819	A	0.6
TSP	107,002	137,899	14,755	0.0697	A	0.5
PM10	107,002	137,899	14,755	0.0573	A	0.4
Acetaldehyde	107,002	137,899	14,755	2.52E-05	A	1.86E-04
Acrolein	107,002	137,899	14,755	7.88E-06	A	5.81E-05
Antimony Compounds	107,002	137,899	14,755		A	
Arsenic Compounds	107,002	137,899	14,755	1.10E-05	A	8.12E-05
Benzene	107,002	137,899	14,755	7.76E-04	A	5.73E-03
Beryllium Compounds	107,002	137,899	14,755	3.10E-07	A	2.29E-06
1,3-Butadiene	107,002	137,899	14,755	1.60E-05	A	1.18E-04
Cadmium Compounds	107,002	137,899	14,755	4.80E-06	A	3.54E-05
Chromium Compounds	107,002	137,899	14,755	1.10E-05	A	8.12E-05
Cobalt Compounds	107,002	137,899	14,755		A	
Ethylbenzene	107,002	137,899	14,755		A	
Formaldehyde	107,002	137,899	14,755	7.89E-05	A	5.82E-04
Hydrochloric Acid	107,002	137,899	14,755		A	
Lead Compounds	107,002	137,899	14,755	1.40E-05	A	1.03E-04
Manganese Compounds	107,002	137,899	14,755	7.90E-04	A	5.83E-03
Mercury Compounds	107,002	137,899	14,755	1.20E-06	A	8.85E-06
Nickel Compounds	107,002	137,899	14,755	4.60E-06	A	3.39E-05
Naphthalene	107,002	137,899	14,755	1.30E-04	A	9.59E-04
Phosphorus	107,002	137,899	14,755		A	
POM	107,002	137,899	14,755	2.12E-04	A	1.56E-03
Selenium Compounds	107,002	137,899	14,755	2.50E-05	A	1.84E-04
Toluene	107,002	137,899	14,755	2.81E-04	A	2.07E-03
Xylene	107,002	137,899	14,755	1.93E-04	A	1.42E-03
o-Xylene	107,002	137,899	14,755		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-17

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	229,091	137,899	31,591	0.132	M	2.1
NOX	229,091	137,899	31,591	3.2	A	50.5
CO	229,091	137,899	31,591	0.85	A	13.4
VOC	229,091	137,899	31,591	0.0819	A	1.3
TSP	229,091	137,899	31,591	0.0697	A	1.1
PM10	229,091	137,899	31,591	0.0573	A	0.9
Acetaldehyde	229,091	137,899	31,591	2.52E-05	A	3.98E-04
Acrolein	229,091	137,899	31,591	7.88E-06	A	1.24E-04
Antimony Compounds	229,091	137,899	31,591		A	
Arsenic Compounds	229,091	137,899	31,591	1.10E-05	A	1.74E-04
Benzene	229,091	137,899	31,591	7.76E-04	A	1.23E-02
Beryllium Compounds	229,091	137,899	31,591	3.10E-07	A	4.90E-06
1,3-Butadiene	229,091	137,899	31,591	1.60E-05	A	2.53E-04
Cadmium Compounds	229,091	137,899	31,591	4.80E-06	A	7.58E-05
Chromium Compounds	229,091	137,899	31,591	1.10E-05	A	1.74E-04
Cobalt Compounds	229,091	137,899	31,591		A	
Ethylbenzene	229,091	137,899	31,591		A	
Formaldehyde	229,091	137,899	31,591	7.89E-05	A	1.25E-03
Hydrochloric Acid	229,091	137,899	31,591		A	
Lead Compounds	229,091	137,899	31,591	1.40E-05	A	2.21E-04
Manganese Compounds	229,091	137,899	31,591	7.90E-04	A	1.25E-02
Mercury Compounds	229,091	137,899	31,591	1.20E-06	A	1.90E-05
Nickel Compounds	229,091	137,899	31,591	4.60E-06	A	7.27E-05
Naphthalene	229,091	137,899	31,591	1.30E-04	A	2.05E-03
Phosphorus	229,091	137,899	31,591		A	
POM	229,091	137,899	31,591	2.12E-04	A	3.35E-03
Selenium Compounds	229,091	137,899	31,591	2.50E-05	A	3.95E-04
Toluene	229,091	137,899	31,591	2.81E-04	A	4.44E-03
Xylene	229,091	137,899	31,591	1.93E-04	A	3.05E-03
o-Xylene	229,091	137,899	31,591		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)							
	Hill 5	Hill 6	CT-1	D-11	D-15	D-16	D-17	Total
SO2	939.2	1696.3	0.7	0.0	0.3	1.0	2.1	2,639.6
NOX	162.0	292.6	4.5	0.7	8.2	23.6	50.5	542.1
CO	17.2	31.2	0.0	0.2	2.2	6.3	13.4	70.5
VOC	2.6	4.7	0.0	0.0	0.2	0.6	1.3	9.4
TSP	63.5	114.6	0.1	0.0	0.2	0.5	1.1	180.0
PM10	45.0	81.4	0.1	0.0	0.1	0.4	0.9	127.9
Acetaldehyde			1.28E-04	5.46E-06	6.44E-05	1.86E-04	3.98E-04	0.0008
Acrolein			3.99E-05	1.71E-06	2.01E-05	5.81E-05	1.24E-04	0.0002
Antimony Compounds	1.81E-02	3.27E-02						0.0508
Arsenic Compounds	4.82E-03	8.70E-03	5.57E-05	2.38E-06	2.81E-05	8.12E-05	1.74E-04	0.0139
Benzene	7.38E-04	1.33E-03	2.79E-04	1.68E-04	1.98E-03	5.73E-03	1.23E-02	0.0225
Beryllium Compounds	9.59E-05	1.73E-04	1.57E-06	6.72E-08	7.93E-07	2.29E-06	4.90E-06	0.0003
1,3-Butadiene			8.11E-05	3.47E-06	4.09E-05	1.18E-04	2.53E-04	0.0005
Cadmium Compounds	1.40E-03	2.52E-03	2.43E-05	1.04E-06	1.23E-05	3.54E-05	7.58E-05	0.0041
Chromium Compounds	2.96E-03	5.35E-03	5.57E-05	2.38E-06	2.81E-05	8.12E-05	1.74E-04	0.0087
Cobalt Compounds	2.08E-02	3.75E-02						0.0583
Ethylbenzene	2.19E-04	3.96E-04						0.0006
Formaldehyde	2.10E-01	3.80E-01	1.42E-03	1.71E-05	2.02E-04	5.82E-04	1.25E-03	0.5940
Hydrochloric Acid	8.04E-05	1.42E-04						0.0002
Lead Compounds	6.55E-03	1.18E-02	7.10E-05	3.03E-06	3.58E-05	1.03E-04	2.21E-04	0.0188
Manganese Compounds	1.05E-02	1.90E-02	4.00E-03	1.71E-04	2.02E-03	5.83E-03	1.25E-02	0.0540
Mercury Compounds	3.90E-04	7.04E-04	6.08E-06	2.60E-07	3.07E-06	8.85E-06	1.90E-05	0.0011
Nickel Compounds	2.92E-01	5.27E-01	2.33E-05	9.97E-07	1.18E-05	3.39E-05	7.27E-05	0.8183
Naphthalene	3.90E-03	7.04E-03	1.77E-04	2.82E-05	3.32E-04	9.59E-04	2.05E-03	0.0145
Phosphorus	3.26E-02	5.89E-02						0.0916
POM	4.49E-03	8.10E-03	2.03E-04	4.59E-05	5.42E-04	1.56E-03	3.35E-03	0.0183
Selenium Compounds	2.36E-03	4.26E-03	1.27E-04	5.42E-06	6.39E-05	1.84E-04	3.95E-04	0.0074
Toluene	2.14E-02	3.86E-02	1.42E-03	6.09E-05	7.18E-04	2.07E-03	4.44E-03	0.0687
Xylene			9.78E-04	4.18E-05	4.93E-04	1.42E-03	3.05E-03	0.0060
o-Xylene	3.76E-04	6.79E-04						0.0011
Total HAPS	6.34E-01	1.14E+00	9.10E-03	5.59E-04	6.60E-03	1.90E-02	4.08E-02	1.8546

CAA-2.2 (HELCO)

April 30, 2003

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Annual Emissions Fees for Operations in Calendar Year 2002
Hawaii Electric Light Company, Inc. (HELCO)

Dear Mr. Nagamine:

In accordance with a letter issued by the Department of Health (DoH) on January 7, 2003, enclosed are the emission fees payable for calendar year 2002. On January 22, 2003, Hawaiian Electric Company, Inc. requested a deadline extension to pay the 2002 emission fees. On February 3, 2003, the DoH granted the deadline extension to May 1, 2003. Please find the attached emission fees and calculation for the following HELCO facilities:

Hill-Kanoelehua Generating Station
Puna Generating Station
Keahole Generating Station
Waimea Generating Station
Shipman Generating Station

The following are provided with this submittal:

- Check No. 33255 in the amount of $224,967.33 payable to Clean Air Special Fund-COV.
- Check No. 33256 in the amount of $54,733.97 payable to Clean Air Special Fund-NON.
- Forms F-1 and F-2, if required, Annual Emission Fee and Summary for Covered Sources
- Calculations, emissions factors and assumption worksheets.

If you have any question, please call Michael Watanabe at 543-4517.

Sincerely,

Sherri-Ann Loo
Manager, Environmental Department

Enclosures
cc (w/o encl): T. Simmons

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

HAWAII ELECTRIC LIGHT CO., INC.

[redacted]

⑈033256⑈ ⑆121301028⑆ 0081⑉032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

33256

HAWAII ELECTRIC LIGHT CO., INC.

[redacted]

⑈033255⑈ ⑆121301028⑆ 0081⑉032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

33255

FORM F-1
2003 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2002)

1. Facility Information (PLEASE PRINT)

A. Facility Name:	Puna Generating Station	B. Location:	Keaau	C. Island:	Hawaii
D. Mailing Address:	PO Box 1027	E. City: Hilo	F. State: Hawaii	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J. Telephone No.:	(808) 543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.:	(808) 969-0421
N. Signature:	Dan V. Giovanni	Date:	4/22/03		

2. CALCULATED EMISSIONS (CALCULATE AND REPORT EMISSIONS TO THE NEAREST TENTH OF A TON (Line 2.B.) AND TOTAL ANNUAL EMISSIONS (Line 2.C) SUBJECT TO FEES WITHOUT THE FRACTION(S) OF A TON)

Equipment Stack Number or Unit Number	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (Please specify)												Annual Total
	TSP	PM_{10}	SO_2	CO	NO_x	VOC	Pb						
Boiler	70.7	50.2	1047.1	19.2	180.5	2.9	0.0						
CT-3	32.3	32.3	62.8	23.8	62.3	0.0	0.0						
PBSG1	0.0	0.0	0.1	0.4	1.4	0.0	0.0						
A. Supplement ____													
B. Total Report Emissions	103.0	82.5	1110.0	43.4	244.2	2.9	0.0						
C. Total Emissions Subject to Fees	103		1110		244	2							D. 1459

3. 2003 ANNUAL FEE CALCULATION (USE THE TOTAL EMISSIONS SUBJECT TO FEES CALCULATED IN BLOCK 2.D)

	Total Annual Emissions Subject to Fees	Times	2003 $/ton	Times	Consumer Price Index Adjustment (2.7% increase from '00 to '01)	Equal	
Fee payable to: Clean Air Special Fund - COV	A. 1459	X	39.00	X	1.027	=	B. $ 58,437.33
Clean Air Special Fund - NON	C. 1459	X	9.50	X	1.027	=	D. $ 14,234.73
						Total	E. $ 72,672.06

Note: 2003 $/ton charge payable to Clean Air Special Fund - COV = $39.00 x 1.027 = $40.05/ton.

2003 $/ton charge payable to Clean Air Special Fund - NON = $9.50 x 1.027 = $9.76/ton.

If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500 with a check or money order made payable to the "Clean Air Special Fund - COV."

If the summed amount found in 3.E is greater than $500, then pay fee amounts found in 3.B. & 3.D. with two separate checks or money payable to the "Clean Air Special Fund - COV" & Clean Air Special Fund - NON," respectively.

1/7/2003

Boiler No 6 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	7,654,962	150,556	1,152,500	1.817	M	1047.0
NOX	7,654,962	150,556	1,152,500	0.313	A	180.4
CO	7,654,962	150,556	1,152,500	0.0333	A	19.2
VOC	7,654,962	150,556	1,152,500	0.00507	A	2.9
TSP	7,654,962	150,556	1,152,500	0.1227	A	70.7
PM10	7,654,962	150,556	1,152,500	0.0871	A	50.2
Acetaldehyde	7,654,962	150,556	1,152,500		A	
Acrolein	7,654,962	150,556	1,152,500		A	
Antimony Compounds	7,654,962	150,556	1,152,500	3.50E-05	A	2.02E-02
Arsenic Compounds	7,654,962	150,556	1,152,500	8.80E-06	A	5.07E-03
Benzene	7,654,962	150,556	1,152,500	1.43E-06	A	8.22E-04
Beryllium Compounds	7,654,962	150,556	1,152,500	1.85E-07	A	1.07E-04
1,3-Butadiene	7,654,962	150,556	1,152,500		A	
Cadmium Compounds	7,654,962	150,556	1,152,500	2.65E-06	A	1.53E-03
Chromium Compounds	7,654,962	150,556	1,152,500	5.63E-06	A	3.25E-03
Cobalt Compounds	7,654,962	150,556	1,152,500	4.01E-05	A	2.31E-02
Ethylbenzene	7,654,962	150,556	1,152,500	4.24E-07	A	2.44E-04
Formaldehyde	7,654,962	150,556	1,152,500	4.07E-04	A	2.34E-01
Hydrochloric Acid	7,654,962	150,556	1,152,500		A	
Lead Compounds	7,654,962	150,556	1,152,500	1.01E-05	A	5.80E-03
Manganese Compounds	7,654,962	150,556	1,152,500	2.00E-05	A	1.15E-02
Mercury Compounds	7,654,962	150,556	1,152,500	7.53E-07	A	4.34E-04
Nickel Compounds	7,654,962	150,556	1,152,500	5.63E-04	A	3.25E-01
Naphthalene	7,654,962	150,556	1,152,500	7.53E-06	A	4.34E-03
Phosphorus	7,654,962	150,556	1,152,500	6.31E-05	A	3.63E-02
POM	7,654,962	150,556	1,152,500	8.67E-06	A	4.99E-03
Selenium Compounds	7,654,962	150,556	1,152,500	4.55E-06	A	2.62E-03
Toluene	7,654,962	150,556	1,152,500	4.13E-05	A	2.38E-02
Xylene	7,654,962	150,556	1,152,500		A	
o-Xylene	7,654,962	150,556	1,152,500	7.27E-07	A	4.19E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler No 2 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	11,402	137,899	1,572	0.132	M	0.1038
NOX	11,402	137,899	1,572	0.171	A	0.1344
CO	11,402	137,899	1,572	0.0357	A	0.0281
VOC	11,402	137,899	1,572	0.00143	A	0.0011
TSP	11,402	137,899	1,572	0.0143	A	0.0112
PM10	11,402	137,899	1,572	0.0071	A	0.0056
Acetaldehyde	11,402	137,899	1,572		A	
Acrolein	11,402	137,899	1,572		A	
Antimony Compounds	11,402	137,899	1,572	3.75E-05	A	2.95E-05
Arsenic Compounds	11,402	137,899	1,572	9.43E-06	A	7.41E-06
Benzene	11,402	137,899	1,572	1.53E-06	A	1.20E-06
Beryllium Compounds	11,402	137,899	1,572	1.99E-07	A	1.56E-07
1,3-Butadiene	11,402	137,899	1,572		A	
Cadmium Compounds	11,402	137,899	1,572	2.84E-06	A	2.23E-06
Chromium Compounds	11,402	137,899	1,572	6.04E-06	A	4.75E-06
Cobalt Compounds	11,402	137,899	1,572	4.30E-05	A	3.38E-05
Ethylbenzene	11,402	137,899	1,572	4.54E-07	A	3.57E-07
Formaldehyde	11,402	137,899	1,572	4.36E-04	A	3.43E-04
Hydrochloric Acid	11,402	137,899	1,572		A	
Lead Compounds	11,402	137,899	1,572	1.08E-05	A	8.48E-06
Manganese Compounds	11,402	137,899	1,572	2.14E-05	A	1.68E-05
Mercury Compounds	11,402	137,899	1,572	8.07E-07	A	6.35E-07
Nickel Compounds	11,402	137,899	1,572	6.04E-04	A	4.75E-04
Naphthalene	11,402	137,899	1,572	8.07E-06	A	6.35E-06
Phosphorus	11,402	137,899	1,572	6.76E-05	A	5.31E-05
POM	11,402	137,899	1,572	9.29E-06	A	7.30E-06
Selenium Compounds	11,402	137,899	1,572	4.88E-06	A	3.84E-06
Toluene	11,402	137,899	1,572	4.43E-05	A	3.48E-05
Xylene	11,402	137,899	1,572		A	
o-Xylene	11,402	137,899	1,572	7.79E-07	A	6.12E-07

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Boiler Total

Pollutant	Annual Emissions Fuel Oil (tons/yr)	Spec Oil (tons/yr)	Total (tons/yr)
SO2	1,047.0	0.1038	1047.1
NOX	180.4	0.1344	180.5
CO	19.2	0.0281	19.2
VOC	2.9	0.0011	2.9
TSP	70.7	0.0112	70.7
PM10	50.2	0.0056	50.2
Acetaldehyde			
Acrolein			
Antimony Compounds	2.02E-02	2.95E-05	2.02E-02
Arsenic Compounds	5.07E-03	7.41E-06	5.08E-03
Benzene	8.22E-04	1.20E-06	8.23E-04
Beryllium Compounds	1.07E-04	1.56E-07	1.07E-04
1,3-Butadiene			
Cadmium Compounds	1.53E-03	2.23E-06	1.53E-03
Chromium Compounds	3.25E-03	4.75E-06	3.25E-03
Cobalt Compounds	2.31E-02	3.38E-05	2.32E-02
Ethylbenzene	2.44E-04	3.57E-07	2.45E-04
Formaldehyde	2.34E-01	3.43E-04	2.35E-01
Hydrochloric Acid			
Lead Compounds	5.80E-03	8.48E-06	5.81E-03
Manganese Compounds	1.15E-02	1.68E-05	1.15E-02
Mercury Compounds	4.34E-04	6.35E-07	4.35E-04
Nickel Compounds	3.25E-01	4.75E-04	3.25E-01
Naphthalene	4.34E-03	6.35E-06	4.35E-03
Phosphorus	3.63E-02	5.31E-05	3.64E-02
POM	4.99E-03	7.30E-06	5.00E-03
Selenium Compounds	2.62E-03	3.84E-06	2.63E-03
Toluene	2.38E-02	3.48E-05	2.39E-02
Xylene			
o-Xylene	4.19E-04	6.12E-07	4.19E-04

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-3

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	6,902,276	137,899	951,817	0.132	M	62.8
NOX	6,902,276	137,899	951,817	0.131	S	62.3
CO	6,902,276	137,899	951,817	0.05	S	23.8
VOC	6,902,276	137,899	951,817	0.0000439	S	0.02
TSP	6,902,276	137,899	951,817	0.0679	S	32.3
PM10	6,902,276	137,899	951,817	0.0679	S	32.3
Acetaldehyde	6,902,276	137,899	951,817	2.52E-05	A	1.20E-02
Acrolein	6,902,276	137,899	951,817	7.88E-06	A	3.75E-03
Antimony Compounds	6,902,276	137,899	951,817		A	
Arsenic Compounds	6,902,276	137,899	951,817	1.10E-05	A	5.23E-03
Benzene	6,902,276	137,899	951,817	5.50E-05	A	2.62E-02
Beryllium Compounds	6,902,276	137,899	951,817	3.10E-07	A	1.48E-04
1,3-Butadiene	6,902,276	137,899	951,817	1.60E-05	A	7.61E-03
Cadmium Compounds	6,902,276	137,899	951,817	4.80E-06	A	2.28E-03
Chromium Compounds	6,902,276	137,899	951,817	1.10E-05	A	5.23E-03
Cobalt Compounds	6,902,276	137,899	951,817		A	
Ethylbenzene	6,902,276	137,899	951,817		A	
Formaldehyde	6,902,276	137,899	951,817	2.80E-04	A	1.33E-01
Hydrochloric Acid	6,902,276	137,899	951,817		A	
Lead Compounds	6,902,276	137,899	951,817	1.40E-05	A	6.66E-03
Manganese Compounds	6,902,276	137,899	951,817	7.90E-04	A	3.76E-01
Mercury Compounds	6,902,276	137,899	951,817	1.20E-06	A	5.71E-04
Nickel Compounds	6,902,276	137,899	951,817	4.60E-06	A	2.19E-03
Naphthalene	6,902,276	137,899	951,817	3.50E-05	A	1.67E-02
Phosphorus	6,902,276	137,899	951,817		A	
POM	6,902,276	137,899	951,817	4.00E-05	A	1.90E-02
Selenium Compounds	6,902,276	137,899	951,817	2.50E-05	A	1.19E-02
Toluene	6,902,276	137,899	951,817	2.81E-04	A	1.34E-01
Xylene	6,902,276	137,899	951,817	1.93E-04	A	9.19E-02
o-Xylene	6,902,276	137,899	951,817		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

PBSG1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	6,135	137,899	846	0.132	M	0.06
NOX	6,135	137,899	846	3.2	A	1.35
CO	6,135	137,899	846	0.85	A	0.36
VOC	6,135	137,899	846	0.0819	A	0.03
TSP	6,135	137,899	846	0.0697	A	0.03
PM10	6,135	137,899	846	0.0573	A	0.02
Acetaldehyde	6,135	137,899	846	2.52E-05	A	1.07E-05
Acrolein	6,135	137,899	846	7.88E-06	A	3.33E-06
Antimony Compounds	6,135	137,899	846		A	
Arsenic Compounds	6,135	137,899	846	1.10E-05	A	4.65E-06
Benzene	6,135	137,899	846	7.76E-04	A	3.28E-04
Beryllium Compounds	6,135	137,899	846	3.10E-07	A	1.31E-07
1,3-Butadiene	6,135	137,899	846	1.60E-05	A	6.77E-06
Cadmium Compounds	6,135	137,899	846	4.80E-06	A	2.03E-06
Chromium Compounds	6,135	137,899	846	1.10E-05	A	4.65E-06
Cobalt Compounds	6,135	137,899	846		A	
Ethylbenzene	6,135	137,899	846		A	
Formaldehyde	6,135	137,899	846	7.89E-05	A	3.34E-05
Hydrochloric Acid	6,135	137,899	846		A	
Lead Compounds	6,135	137,899	846	1.40E-05	A	5.92E-06
Manganese Compounds	6,135	137,899	846	7.90E-04	A	3.34E-04
Mercury Compounds	6,135	137,899	846	1.20E-06	A	5.08E-07
Nickel Compounds	6,135	137,899	846	4.60E-06	A	1.95E-06
Naphthalene	6,135	137,899	846	1.30E-04	A	5.50E-05
Phosphorus	6,135	137,899	846		A	
POM	6,135	137,899	846	2.12E-04	A	8.97E-05
Selenium Compounds	6,135	137,899	846	2.50E-05	A	1.06E-05
Toluene	6,135	137,899	846	2.81E-04	A	1.19E-04
Xylene	6,135	137,899	846	1.93E-04	A	8.16E-05
o-Xylene	6,135	137,899	846		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)			
	Boiler	CT-3	PBSG1	Total
SO2	1047.1	62.8	0.1	1,110.0
NOX	180.5	62.3	1.4	244.2
CO	19.2	23.8	0.4	43.4
VOC	2.9	0.0	0.0	3.0
TSP	70.7	32.3	0.0	103.0
PM10	50.2	32.3	0.0	82.5
Acetaldehyde		1.20E-02	1.07E-05	0.0120
Acrolein		3.75E-03	3.33E-06	0.0038
Antimony Compounds	2.02E-02			0.0202
Arsenic Compounds	5.08E-03	5.23E-03	4.65E-06	0.0103
Benzene	8.23E-04	2.62E-02	3.28E-04	0.0273
Beryllium Compounds	1.07E-04	1.48E-04	1.31E-07	0.0003
1,3-Butadiene		7.61E-03	6.77E-06	0.0076
Cadmium Compounds	1.53E-03	2.28E-03	2.03E-06	0.0038
Chromium Compounds	3.25E-03	5.23E-03	4.65E-06	0.0085
Cobalt Compounds	2.32E-02			0.0232
Ethylbenzene	2.45E-04			0.0002
Formaldehyde	2.35E-01	1.33E-01	3.34E-05	0.3680
Hydrochloric Acid				
Lead Compounds	5.81E-03	6.66E-03	5.92E-06	0.0125
Manganese Compounds	1.15E-02	3.76E-01	3.34E-04	0.3878
Mercury Compounds	4.35E-04	5.71E-04	5.08E-07	0.0010
Nickel Compounds	3.25E-01	2.19E-03	1.95E-06	0.3273
Naphthalene	4.35E-03	1.67E-02	5.50E-05	0.0211
Phosphorus	3.64E-02			0.0364
POM	5.00E-03	1.90E-02	8.97E-05	0.0241
Selenium Compounds	2.63E-03	1.19E-02	1.06E-05	0.0145
Toluene	2.39E-02	1.34E-01	1.19E-04	0.1577
Xylene		9.19E-02	8.16E-05	0.0919
o-Xylene	4.19E-04			0.0004
Total HAPS	7.05E-01	8.54E-01	1.09E-03	1.5599

CAA-2.2 (HELCO)

April 30, 2003

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Annual Emissions Fees for Operations in Calendar Year 2002
Hawaii Electric Light Company, Inc. (HELCO)

Dear Mr. Nagamine:

In accordance with a letter issued by the Department of Health (DoH) on January 7, 2003, enclosed are the emission fees payable for calendar year 2002. On January 22, 2003, Hawaiian Electric Company, Inc. requested a deadline extension to pay the 2002 emission fees. On February 3, 2003, the DoH granted the deadline extension to May 1, 2003. Please find the attached emission fees and calculation for the following HELCO facilities:

Hill-Kanoelehua Generating Station
Puna Generating Station
Keahole Generating Station
Waimea Generating Station
Shipman Generating Station

The following are provided with this submittal:

- Check No. 33255 in the amount of $224,967.33 payable to Clean Air Special Fund-COV.
- Check No. 33256 in the amount of $54,733.97 payable to Clean Air Special Fund-NON.
- Forms F-1 and F-2, if required, Annual Emission Fee and Summary for Covered Sources
- Calculations, emissions factors and assumption worksheets.

If you have any question, please call Michael Watanabe at 543-4517.

Sincerely,

Sherri-Ann Loo
Manager, Environmental Department

Enclosures
cc (w/o encl): T. Simmons

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

HAWAII ELECTRIC LIGHT CO. INC.

THIRTY-FOUR THOUSAND SEVEN HUNDRED AND THIRTY-THREE DOLLARS AND 97 CENTS

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

⑈033256⑈ ⑆121301028⑆ 0081⑈032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

33256

HAWAII ELECTRIC LIGHT CO. INC.

[redacted]

⑈033255⑈ ⑆121301028⑆ 0081⑈032768⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

33255

FORM F-1
2003 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2002)

1. Facility Information (PLEASE PRINT)

A. Facility Name:	Keahole Generating Station	B. Location:	Kailua-Kona	C. Island:	Hawaii
D. Mailing Address:	PO Box 1027	E. City: Hilo	F. State: Hawaii	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J: Telephone No.:	(808) 543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.:	(808) 969-0421
N. Signature:	Dan V. Giovanni	Date: 1/16/03			

2. CALCULATED EMISSIONS (CALCULATE AND REPORT EMISSIONS TO THE NEAREST TENTH OF A TON (Line 2.B.) AND TOTAL ANNUAL EMISSIONS (Line 2.C) SUBJECT TO FEES WITHOUT THE FRACTION(S) OF A TON)

Equipment Stack Number or Unit Number	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (Please specify)												Annual Total
	TSP	PM_{10}	SO_2	CO	NO_x	VOC	Pb						
D-18	0.6	0.5	1.1	7.2	27.1	0.7	0.0						
D-19	0.5	0.4	1.0	6.7	25.1	0.6	0.0						
D-20	0.3	0.2	0.5	3.5	8.6	0.3	0.0						
A. Supplement A	5.3	4.7	50.6	53.1	142.8	4.3	0.0						
B. Total Report Emissions	6.7	5.8	53.2	70.5	203.6	5.9	0.0						
C. Total Emissions Subject to Fees	6		53		203	5							D. 267

3. 2003 ANNUAL FEE CALCULATION (USE THE TOTAL EMISSIONS SUBJECT TO FEES CALCULATED IN BLOCK 2.D)

	Total Annual Emissions Subject to Fees	Times	2003 $/ton	Times	Consumer Price Index Adjustment (2.7% increase from '00 to '01)	Equal	
Fee payable to: Clean Air Special Fund - COV	A. 267	X	39.00	X	1.027	=	B. $ 10,694.15
Clean Air Special Fund - NON	C. 267	X	9.50	X	1.027	=	D. $ 2,604.99
						Total	E. $ 13,299.14

Note: 2003 $/ton charge payable to Clean Air Special Fund - COV = $39.00 x 1.027 = $40.05/ton.

2003 $/ton charge payable to Clean Air Special Fund - NON = $9.50 x 1.027 = $9.76/ton

If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500 with a check or money order made payable to the "Clean Air Special Fund - COV."

If the summed amount found in 3.E is greater than $500, then pay fee amounts found in 3.B. & 3.D. with two separate checks or money payable to the "Clean Air Special Fund - COV" & Clean Air Special Fund - NON," respectively.

1/7/2003

FORM F-2
SUPPLEMENT A
2003 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2002)

1. Facility Information (PLEASE PRINT)

A. Facility Name:	Keahole Generating Station	B. Location:	Kailua-Kona	C. Island:	Hawaii
D. Responsible Official:	Dan V. Giovanni	E. Title:	Production Manager	F. Telephone No.:	(808) 969-0421
G. Signature:		Date:	4/16/03		

2. CALCULATED EMISSIONS (CALCULATE AND REPORT EMISSIONS TO THE NEAREST TENTH OF A TON)

Equipment Stack Number or Unit Number	Air Pollutant Emissions (tons/yr)											
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (Please specify)											
	TSP	PM_{10}	SO_2	CO	NO_x	VOC	Pb					
D-21	1.0	0.8	1.9	12.1	27.4	1.2	0.0					
D-22	1.2	1.0	2.3	14.8	31.8	1.4	0.0					
D-23	1.1	0.9	2.0	13.1	31.1	1.3	0.0					
CT-2	2.0	2.0	44.4	13.1	52.5	0.4	0.0					
BS-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0					
Supplement ____												
Total Report Emissions	5.3	4.7	50.6	53.1	142.8	4.3	0.0					

1/7/03

D-18

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	122,958	137,899	16,956	0.132	M	1.1
NOX	122,958	137,899	16,956	3.2	A	27.1
CO	122,958	137,899	16,956	0.85	A	7.2
VOC	122,958	137,899	16,956	0.0819	A	0.7
TSP	122,958	137,899	16,956	0.0697	A	0.6
PM10	122,958	137,899	16,956	0.0573	A	0.5
Acetaldehyde	122,958	137,899	16,956	2.52E-05	A	2.14E-04
Acrolein	122,958	137,899	16,956	7.88E-06	A	6.68E-05
Antimony Compounds	122,958	137,899	16,956		A	
Arsenic Compounds	122,958	137,899	16,956	1.10E-05	A	9.33E-05
Benzene	122,958	137,899	16,956	7.76E-04	A	6.58E-03
Beryllium Compounds	122,958	137,899	16,956	3.10E-07	A	2.63E-06
1,3-Butadiene	122,958	137,899	16,956	1.60E-05	A	1.36E-04
Cadmium Compounds	122,958	137,899	16,956	4.80E-06	A	4.07E-05
Chromium Compounds	122,958	137,899	16,956	1.10E-05	A	9.33E-05
Cobalt Compounds	122,958	137,899	16,956		A	
Ethylbenzene	122,958	137,899	16,956		A	
Formaldehyde	122,958	137,899	16,956	7.89E-05	A	6.69E-04
Hydrochloric Acid	122,958	137,899	16,956		A	
Lead Compounds	122,958	137,899	16,956	1.40E-05	A	1.19E-04
Manganese Compounds	122,958	137,899	16,956	7.90E-04	A	6.70E-03
Mercury Compounds	122,958	137,899	16,956	1.20E-06	A	1.02E-05
Nickel Compounds	122,958	137,899	16,956	4.60E-06	A	3.90E-05
Naphthalene	122,958	137,899	16,956	1.30E-04	A	1.10E-03
Phosphorus	122,958	137,899	16,956		A	
POM	122,958	137,899	16,956	2.12E-04	A	1.80E-03
Selenium Compounds	122,958	137,899	16,956	2.50E-05	A	2.12E-04
Toluene	122,958	137,899	16,956	2.81E-04	A	2.38E-03
Xylene	122,958	137,899	16,956	1.93E-04	A	1.64E-03
o-Xylene	122,958	137,899	16,956		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-19

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	113,581	137,899	15,663	0.132	M	1.0
NOX	113,581	137,899	15,663	3.2	A	25.1
CO	113,581	137,899	15,663	0.85	A	6.7
VOC	113,581	137,899	15,663	0.0819	A	0.6
TSP	113,581	137,899	15,663	0.0697	A	0.5
PM10	113,581	137,899	15,663	0.0573	A	0.4
Acetaldehyde	113,581	137,899	15,663	2.52E-05	A	1.97E-04
Acrolein	113,581	137,899	15,663	7.88E-06	A	6.17E-05
Antimony Compounds	113,581	137,899	15,663		A	
Arsenic Compounds	113,581	137,899	15,663	1.10E-05	A	8.61E-05
Benzene	113,581	137,899	15,663	7.76E-04	A	6.08E-03
Beryllium Compounds	113,581	137,899	15,663	3.10E-07	A	2.43E-06
1,3-Butadiene	113,581	137,899	15,663	1.60E-05	A	1.25E-04
Cadmium Compounds	113,581	137,899	15,663	4.80E-06	A	3.76E-05
Chromium Compounds	113,581	137,899	15,663	1.10E-05	A	8.61E-05
Cobalt Compounds	113,581	137,899	15,663		A	
Ethylbenzene	113,581	137,899	15,663		A	
Formaldehyde	113,581	137,899	15,663	7.89E-05	A	6.18E-04
Hydrochloric Acid	113,581	137,899	15,663		A	
Lead Compounds	113,581	137,899	15,663	1.40E-05	A	1.10E-04
Manganese Compounds	113,581	137,899	15,663	7.90E-04	A	6.19E-03
Mercury Compounds	113,581	137,899	15,663	1.20E-06	A	9.40E-06
Nickel Compounds	113,581	137,899	15,663	4.60E-06	A	3.60E-05
Naphthalene	113,581	137,899	15,663	1.30E-04	A	1.02E-03
Phosphorus	113,581	137,899	15,663		A	
POM	113,581	137,899	15,663	2.12E-04	A	1.66E-03
Selenium Compounds	113,581	137,899	15,663	2.50E-05	A	1.96E-04
Toluene	113,581	137,899	15,663	2.81E-04	A	2.20E-03
Xylene	113,581	137,899	15,663	1.93E-04	A	1.51E-03
o-Xylene	113,581	137,899	15,663		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-20

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	59,444	137,899	8,197	0.132	M	0.5
NOX	59,444	137,899	8,197	2.11	S	8.6
CO	59,444	137,899	8,197	0.85	A	3.5
VOC	59,444	137,899	8,197	0.0819	A	0.3
TSP	59,444	137,899	8,197	0.0697	A	0.3
PM10	59,444	137,899	8,197	0.0573	A	0.2
Acetaldehyde	59,444	137,899	8,197	2.52E-05	A	1.03E-04
Acrolein	59,444	137,899	8,197	7.88E-06	A	3.23E-05
Antimony Compounds	59,444	137,899	8,197		A	
Arsenic Compounds	59,444	137,899	8,197	1.10E-05	A	4.51E-05
Benzene	59,444	137,899	8,197	7.76E-04	A	3.18E-03
Beryllium Compounds	59,444	137,899	8,197	3.10E-07	A	1.27E-06
1,3-Butadiene	59,444	137,899	8,197	1.60E-05	A	6.56E-05
Cadmium Compounds	59,444	137,899	8,197	4.80E-06	A	1.97E-05
Chromium Compounds	59,444	137,899	8,197	1.10E-05	A	4.51E-05
Cobalt Compounds	59,444	137,899	8,197		A	
Ethylbenzene	59,444	137,899	8,197		A	
Formaldehyde	59,444	137,899	8,197	7.89E-05	A	3.23E-04
Hydrochloric Acid	59,444	137,899	8,197		A	
Lead Compounds	59,444	137,899	8,197	1.40E-05	A	5.74E-05
Manganese Compounds	59,444	137,899	8,197	7.90E-04	A	3.24E-03
Mercury Compounds	59,444	137,899	8,197	1.20E-06	A	4.92E-06
Nickel Compounds	59,444	137,899	8,197	4.60E-06	A	1.89E-05
Naphthalene	59,444	137,899	8,197	1.30E-04	A	5.33E-04
Phosphorus	59,444	137,899	8,197		A	
POM	59,444	137,899	8,197	2.12E-04	A	8.69E-04
Selenium Compounds	59,444	137,899	8,197	2.50E-05	A	1.02E-04
Toluene	59,444	137,899	8,197	2.81E-04	A	1.15E-03
Xylene	59,444	137,899	8,197	1.93E-04	A	7.91E-04
o-Xylene	59,444	137,899	8,197		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-21

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	207,171	137,899	28,569	0.132	M	1.9
NOX	207,171	137,899	28,569	1.92	S	27.4
CO	207,171	137,899	28,569	0.85	A	12.1
VOC	207,171	137,899	28,569	0.0819	A	1.2
TSP	207,171	137,899	28,569	0.0697	A	1.0
PM10	207,171	137,899	28,569	0.0573	A	0.8
Acetaldehyde	207,171	137,899	28,569	2.52E-05	A	3.60E-04
Acrolein	207,171	137,899	28,569	7.88E-06	A	1.13E-04
Antimony Compounds	207,171	137,899	28,569		A	
Arsenic Compounds	207,171	137,899	28,569	1.10E-05	A	1.57E-04
Benzene	207,171	137,899	28,569	7.76E-04	A	1.11E-02
Beryllium Compounds	207,171	137,899	28,569	3.10E-07	A	4.43E-06
1,3-Butadiene	207,171	137,899	28,569	1.60E-05	A	2.29E-04
Cadmium Compounds	207,171	137,899	28,569	4.80E-06	A	6.86E-05
Chromium Compounds	207,171	137,899	28,569	1.10E-05	A	1.57E-04
Cobalt Compounds	207,171	137,899	28,569		A	
Ethylbenzene	207,171	137,899	28,569		A	
Formaldehyde	207,171	137,899	28,569	7.89E-05	A	1.13E-03
Hydrochloric Acid	207,171	137,899	28,569		A	
Lead Compounds	207,171	137,899	28,569	1.40E-05	A	2.00E-04
Manganese Compounds	207,171	137,899	28,569	7.90E-04	A	1.13E-02
Mercury Compounds	207,171	137,899	28,569	1.20E-06	A	1.71E-05
Nickel Compounds	207,171	137,899	28,569	4.60E-06	A	6.57E-05
Naphthalene	207,171	137,899	28,569	1.30E-04	A	1.86E-03
Phosphorus	207,171	137,899	28,569		A	
POM	207,171	137,899	28,569	2.12E-04	A	3.03E-03
Selenium Compounds	207,171	137,899	28,569	2.50E-05	A	3.57E-04
Toluene	207,171	137,899	28,569	2.81E-04	A	4.01E-03
Xylene	207,171	137,899	28,569	1.93E-04	A	2.76E-03
o-Xylene	207,171	137,899	28,569		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-22

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	251,754	137,899	34,717	0.132	M	2.3
NOX	251,754	137,899	34,717	1.83	S	31.8
CO	251,754	137,899	34,717	0.85	A	14.8
VOC	251,754	137,899	34,717	0.0819	A	1.4
TSP	251,754	137,899	34,717	0.0697	A	1.2
PM10	251,754	137,899	34,717	0.0573	A	1.0
Acetaldehyde	251,754	137,899	34,717	2.52E-05	A	4.37E-04
Acrolein	251,754	137,899	34,717	7.88E-06	A	1.37E-04
Antimony Compounds	251,754	137,899	34,717		A	
Arsenic Compounds	251,754	137,899	34,717	1.10E-05	A	1.91E-04
Benzene	251,754	137,899	34,717	7.76E-04	A	1.35E-02
Beryllium Compounds	251,754	137,899	34,717	3.10E-07	A	5.38E-06
1,3-Butadiene	251,754	137,899	34,717	1.60E-05	A	2.78E-04
Cadmium Compounds	251,754	137,899	34,717	4.80E-06	A	8.33E-05
Chromium Compounds	251,754	137,899	34,717	1.10E-05	A	1.91E-04
Cobalt Compounds	251,754	137,899	34,717		A	
Ethylbenzene	251,754	137,899	34,717		A	
Formaldehyde	251,754	137,899	34,717	7.89E-05	A	1.37E-03
Hydrochloric Acid	251,754	137,899	34,717		A	
Lead Compounds	251,754	137,899	34,717	1.40E-05	A	2.43E-04
Manganese Compounds	251,754	137,899	34,717	7.90E-04	A	1.37E-02
Mercury Compounds	251,754	137,899	34,717	1.20E-06	A	2.08E-05
Nickel Compounds	251,754	137,899	34,717	4.60E-06	A	7.98E-05
Naphthalene	251,754	137,899	34,717	1.30E-04	A	2.26E-03
Phosphorus	251,754	137,899	34,717		A	
POM	251,754	137,899	34,717	2.12E-04	A	3.68E-03
Selenium Compounds	251,754	137,899	34,717	2.50E-05	A	4.34E-04
Toluene	251,754	137,899	34,717	2.81E-04	A	4.88E-03
Xylene	251,754	137,899	34,717	1.93E-04	A	3.35E-03
o-Xylene	251,754	137,899	34,717		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-23

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	223,270	137,899	30,789	0.132	M	2.0
NOX	223,270	137,899	30,789	2.02	S	31.1
CO	223,270	137,899	30,789	0.85	A	13.1
VOC	223,270	137,899	30,789	0.0819	A	1.3
TSP	223,270	137,899	30,789	0.0697	A	1.1
PM10	223,270	137,899	30,789	0.0573	A	0.9
Acetaldehyde	223,270	137,899	30,789	2.52E-05	A	3.88E-04
Acrolein	223,270	137,899	30,789	7.88E-06	A	1.21E-04
Antimony Compounds	223,270	137,899	30,789		A	
Arsenic Compounds	223,270	137,899	30,789	1.10E-05	A	1.69E-04
Benzene	223,270	137,899	30,789	7.76E-04	A	1.19E-02
Beryllium Compounds	223,270	137,899	30,789	3.10E-07	A	4.77E-06
1,3-Butadiene	223,270	137,899	30,789	1.60E-05	A	2.46E-04
Cadmium Compounds	223,270	137,899	30,789	4.80E-06	A	7.39E-05
Chromium Compounds	223,270	137,899	30,789	1.10E-05	A	1.69E-04
Cobalt Compounds	223,270	137,899	30,789		A	
Ethylbenzene	223,270	137,899	30,789		A	
Formaldehyde	223,270	137,899	30,789	7.89E-05	A	1.21E-03
Hydrochloric Acid	223,270	137,899	30,789		A	
Lead Compounds	223,270	137,899	30,789	1.40E-05	A	2.16E-04
Manganese Compounds	223,270	137,899	30,789	7.90E-04	A	1.22E-02
Mercury Compounds	223,270	137,899	30,789	1.20E-06	A	1.85E-05
Nickel Compounds	223,270	137,899	30,789	4.60E-06	A	7.08E-05
Naphthalene	223,270	137,899	30,789	1.30E-04	A	2.00E-03
Phosphorus	223,270	137,899	30,789		A	
POM	223,270	137,899	30,789	2.12E-04	A	3.26E-03
Selenium Compounds	223,270	137,899	30,789	2.50E-05	A	3.85E-04
Toluene	223,270	137,899	30,789	2.81E-04	A	4.33E-03
Xylene	223,270	137,899	30,789	1.93E-04	A	2.97E-03
o-Xylene	223,270	137,899	30,789		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

CT-2

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	4,878,332	137,899	672,717	0.132	M	44.4
NOX	4,878,332	137,899	672,717	0.156	S	52.5
CO	4,878,332	137,899	672,717	0.0389	S	13.1
VOC	4,878,332	137,899	672,717	0.00109	S	0.4
TSP	4,878,332	137,899	672,717	0.0058	S	2.0
PM10	4,878,332	137,899	672,717	0.0058	S	2.0
Acetaldehyde	4,878,332	137,899	672,717	2.52E-05	A	8.48E-03
Acrolein	4,878,332	137,899	672,717	7.88E-06	A	2.65E-03
Antimony Compounds	4,878,332	137,899	672,717		A	
Arsenic Compounds	4,878,332	137,899	672,717	1.10E-05	A	3.70E-03
Benzene	4,878,332	137,899	672,717	5.50E-05	A	1.85E-02
Beryllium Compounds	4,878,332	137,899	672,717	3.10E-07	A	1.04E-04
1,3-Butadiene	4,878,332	137,899	672,717	1.60E-05	A	5.38E-03
Cadmium Compounds	4,878,332	137,899	672,717	4.80E-06	A	1.61E-03
Chromium Compounds	4,878,332	137,899	672,717	1.10E-05	A	3.70E-03
Cobalt Compounds	4,878,332	137,899	672,717		A	
Ethylbenzene	4,878,332	137,899	672,717		A	
Formaldehyde	4,878,332	137,899	672,717	2.80E-04	A	9.42E-02
Hydrochloric Acid	4,878,332	137,899	672,717		A	
Lead Compounds	4,878,332	137,899	672,717	1.40E-05	A	4.71E-03
Manganese Compounds	4,878,332	137,899	672,717	7.90E-04	A	2.66E-01
Mercury Compounds	4,878,332	137,899	672,717	1.20E-06	A	4.04E-04
Nickel Compounds	4,878,332	137,899	672,717	4.60E-06	A	1.55E-03
Naphthalene	4,878,332	137,899	672,717	3.50E-05	A	1.18E-02
Phosphorus	4,878,332	137,899	672,717		A	
POM	4,878,332	137,899	672,717	4.00E-05	A	1.35E-02
Selenium Compounds	4,878,332	137,899	672,717	2.50E-05	A	8.41E-03
Toluene	4,878,332	137,899	672,717	2.81E-04	A	9.45E-02
Xylene	4,878,332	137,899	672,717	1.93E-04	A	6.49E-02
o-Xylene	4,878,332	137,899	672,717		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

BS-1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	197	137,899	27	0.132	M	
NOX	197	137,899	27	3.2	A	
CO	197	137,899	27	0.85	A	
VOC	197	137,899	27	0.0819	A	
TSP	197	137,899	27	0.0697	A	
PM10	197	137,899	27	0.0573	A	
Acetaldehyde	197	137,899	27	2.52E-05	A	3.42E-07
Acrolein	197	137,899	27	7.88E-06	A	1.07E-07
Antimony Compounds	197	137,899	27		A	
Arsenic Compounds	197	137,899	27	1.10E-05	A	1.49E-07
Benzene	197	137,899	27	7.76E-04	A	1.05E-05
Beryllium Compounds	197	137,899	27	3.10E-07	A	4.21E-09
1,3-Butadiene	197	137,899	27	1.60E-05	A	2.17E-07
Cadmium Compounds	197	137,899	27	4.80E-06	A	6.52E-08
Chromium Compounds	197	137,899	27	1.10E-05	A	1.49E-07
Cobalt Compounds	197	137,899	27		A	
Ethylbenzene	197	137,899	27		A	
Formaldehyde	197	137,899	27	7.89E-05	A	1.07E-06
Hydrochloric Acid	197	137,899	27		A	
Lead Compounds	197	137,899	27	1.40E-05	A	1.90E-07
Manganese Compounds	197	137,899	27	7.90E-04	A	1.07E-05
Mercury Compounds	197	137,899	27	1.20E-06	A	1.63E-08
Nickel Compounds	197	137,899	27	4.60E-06	A	6.25E-08
Naphthalene	197	137,899	27	1.30E-04	A	1.77E-06
Phosphorus	197	137,899	27		A	
POM	197	137,899	27	2.12E-04	A	2.88E-06
Selenium Compounds	197	137,899	27	2.50E-05	A	3.40E-07
Toluene	197	137,899	27	2.81E-04	A	3.82E-06
Xylene	197	137,899	27	1.93E-04	A	2.62E-06
o-Xylene	197	137,899	27		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)								
	D-18	D-19	D-20	D-21	D-22	D-23	CT-2	BS-1	Total
SO2	1.1	1.0	0.5	1.9	2.3	2.0	44.4		53.2
NOX	27.1	25.1	8.6	27.4	31.8	31.1	52.5		203.6
CO	7.2	6.7	3.5	12.1	14.8	13.1	13.1		70.5
VOC	0.7	0.6	0.3	1.2	1.4	1.3	0.4		5.9
TSP	0.6	0.5	0.3	1.0	1.2	1.1	2.0		6.7
PM10	0.5	0.4	0.2	0.8	1.0	0.9	2.0		5.8
Acetaldehyde	2.14E-04	1.97E-04	1.03E-04	3.60E-04	4.37E-04	3.88E-04	8.48E-03	3.42E-07	0.0102
Acrolein	6.68E-05	6.17E-05	3.23E-05	1.13E-04	1.37E-04	1.21E-04	2.65E-03	1.07E-07	0.0032
Antimony Compounds									
Arsenic Compounds	9.33E-05	8.61E-05	4.51E-05	1.57E-04	1.91E-04	1.69E-04	3.70E-03	1.49E-07	0.0044
Benzene	6.58E-03	6.08E-03	3.18E-03	1.11E-02	1.35E-02	1.19E-02	1.85E-02	1.05E-05	0.0708
Beryllium Compounds	2.63E-06	2.43E-06	1.27E-06	4.43E-06	5.38E-06	4.77E-06	1.04E-04	4.21E-09	0.0001
1,3-Butadiene	1.36E-04	1.25E-04	6.56E-05	2.29E-04	2.78E-04	2.46E-04	5.38E-03	2.17E-07	0.0065
Cadmium Compounds	4.07E-05	3.76E-05	1.97E-05	6.86E-05	8.33E-05	7.39E-05	1.61E-03	6.52E-08	0.0019
Chromium Compounds	9.33E-05	8.61E-05	4.51E-05	1.57E-04	1.91E-04	1.69E-04	3.70E-03	1.49E-07	0.0044
Cobalt Compounds									
Ethylbenzene									
Formaldehyde	6.69E-04	6.18E-04	3.23E-04	1.13E-03	1.37E-03	1.21E-03	9.42E-02	1.07E-06	0.0995
Hydrochloric Acid									
Lead Compounds	1.19E-04	1.10E-04	5.74E-05	2.00E-04	2.43E-04	2.16E-04	4.71E-03	1.90E-07	0.0057
Manganese Compounds	6.70E-03	6.19E-03	3.24E-03	1.13E-02	1.37E-02	1.22E-02	2.66E-01	1.07E-05	0.3190
Mercury Compounds	1.02E-05	9.40E-06	4.92E-06	1.71E-05	2.08E-05	1.85E-05	4.04E-04	1.63E-08	0.0005
Nickel Compounds	3.90E-05	3.60E-05	1.89E-05	6.57E-05	7.98E-05	7.08E-05	1.55E-03	6.25E-08	0.0019
Naphthalene	1.10E-03	1.02E-03	5.33E-04	1.86E-03	2.26E-03	2.00E-03	1.18E-02	1.77E-06	0.0205
Phosphorus									
POM	1.80E-03	1.66E-03	8.69E-04	3.03E-03	3.68E-03	3.26E-03	1.35E-02	2.88E-06	0.0278
Selenium Compounds	2.12E-04	1.96E-04	1.02E-04	3.57E-04	4.34E-04	3.85E-04	8.41E-03	3.40E-07	0.0101
Toluene	2.38E-03	2.20E-03	1.15E-03	4.01E-03	4.88E-03	4.33E-03	9.45E-02	3.82E-06	0.1135
Xylene	1.64E-03	1.51E-03	7.91E-04	2.76E-03	3.35E-03	2.97E-03	6.49E-02	2.62E-06	0.0779
Total HAPS	2.19E-02	2.02E-02	1.06E-02	3.69E-02	4.48E-02	3.97E-02	6.04E-01	3.51E-05	7.78E-01

CAA-2.2 (HELCO)

April 30, 2003

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Annual Emissions Fees for Operations in Calendar Year 2002
Hawaii Electric Light Company, Inc. (HELCO)

Dear Mr. Nagamine:

In accordance with a letter issued by the Department of Health (DoH) on January 7, 2003, enclosed are the emission fees payable for calendar year 2002. On January 22, 2003, Hawaiian Electric Company, Inc. requested a deadline extension to pay the 2002 emission fees. On February 3, 2003, the DoH granted the deadline extension to May 1, 2003. Please find the attached emission fees and calculation for the following HELCO facilities:

Hill-Kanoelehua Generating Station
Puna Generating Station
Keahole Generating Station
Waimea Generating Station
Shipman Generating Station

The following are provided with this submittal:

- Check No. 33255 in the amount of $224,967.33 payable to Clean Air Special Fund-COV.
- Check No. 33256 in the amount of $54,733.97 payable to Clean Air Special Fund-NON.
- Forms F-1 and F-2, if required, Annual Emission Fee and Summary for Covered Sources
- Calculations, emissions factors and assumption worksheets.

If you have any question, please call Michael Watanabe at 543-4517.

Sincerely,

Sherri-Ann Loo
Manager, Environmental Department

Enclosures
cc (w/o encl): T. Simmons

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

HAWAII ELECTRIC LIGHT CO., INC.

PAY TO THE ORDER OF

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

⑈033256⑈ ⑆121301028⑆ 0081⑈032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

33256

HAWAII ELECTRIC LIGHT CO., INC.

⑈033255⑈ ⑆121301028⑆ 0081⑉032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

33255

FORM F-1
2003 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2002)

[redacted]

1. Facility Information (PLEASE PRINT)

A. Facility Name:	Waimea Generating Station	B. Location:	Kamuela	C. Island:	Hawaii
D. Mailing Address:	PO Box 1027	E. City: Hilo	F. State: Hawaii	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J: Telephone No.:	(808) 543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.:	(808) 969-0421
N. Signature:	Dan V. Giovanni	Date:	4/16/03		

2. CALCULATED EMISSIONS (CALCULATE AND REPORT EMISSIONS TO THE NEAREST TENTH OF A TON (Line 2.B.) AND TOTAL ANNUAL EMISSIONS (Line 2.C) SUBJECT TO FEES WITHOUT THE FRACTION(S) OF A TON)

Equipment Stack Number or Unit Number	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (Please specify)												Annual Total
	TSP	PM_{10}	SO_2	CO	NO_x	VOC	Pb						
D-12	1.1	0.9	2.2	14.0	52.6	1.3	0.0						
D-13	0.7	0.6	1.3	8.4	31.8	0.8	0.0						
D-14	1.3	1.0	2.4	15.4	58.2	1.5	0.0						
A. Supplement ___													
B. Total Report Emissions	3.1	2.5	5.9	37.8	142.6	3.6	0.0						
C. Total Emissions Subject to Fees	3		5		142	3							D. 153

3. 2003 ANNUAL FEE CALCULATION (USE THE TOTAL EMISSIONS SUBJECT TO FEES CALCULATED IN BLOCK 2.D)

	Total Annual Emissions Subject to Fees	Times	2003 $/ton	Times	Consumer Price Index Adjustment (2.7% increase from '00 to '01)	Equal	
Fee payable to: Clean Air Special Fund - COV	A. 153	X	39.00	X	1.027	=	B. $ 6,128.11
Clean Air Special Fund - NON	C. 153	X	9.50	X	1.027	=	D. $ 1,492.74
						Total	E. $ 7,620.85

Note: 2003 $/ton charge payable to Clean Air Special Fund - COV = $39.00 x 1.027 = $40.05/ton.

2003 $/ton charge payable to Clean Air Special Fund - NON = $9.50 x 1.027 = $9.76/ton.

If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500 with a check or money order made payable to the "Clean Air Special Fund - COV."

If the summed amount found in 3.E is greater than $500, then pay fee amounts found in 3.B. & 3.D. with two separate checks or money payable to the "Clean Air Special Fund - COV" & Clean Air Special Fund - NON," respectively.

1/17/2003

D-12

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	238,480	137,899	32,886	0.132	M	2.2
NOX	238,480	137,899	32,886	3.2	A	52.6
CO	238,480	137,899	32,886	0.85	A	14.0
VOC	238,480	137,899	32,886	0.0819	A	1.3
TSP	238,480	137,899	32,886	0.0697	A	1.1
PM10	238,480	137,899	32,886	0.0573	A	0.9
Acetaldehyde	238,480	137,899	32,886	2.52E-05	A	4.14E-04
Acrolein	238,480	137,899	32,886	7.88E-06	A	1.30E-04
Antimony Compounds	238,480	137,899	32,886		A	
Arsenic Compounds	238,480	137,899	32,886	1.10E-05	A	1.81E-04
Benzene	238,480	137,899	32,886	7.76E-04	A	1.28E-02
Beryllium Compounds	238,480	137,899	32,886	3.10E-07	A	5.10E-06
1,3-Butadiene	238,480	137,899	32,886	1.60E-05	A	2.63E-04
Cadmium Compounds	238,480	137,899	32,886	4.80E-06	A	7.89E-05
Chromium Compounds	238,480	137,899	32,886	1.10E-05	A	1.81E-04
Cobalt Compounds	238,480	137,899	32,886		A	
Ethylbenzene	238,480	137,899	32,886		A	
Formaldehyde	238,480	137,899	32,886	7.89E-05	A	1.30E-03
Hydrochloric Acid	238,480	137,899	32,886		A	
Lead Compounds	238,480	137,899	32,886	1.40E-05	A	2.30E-04
Manganese Compounds	238,480	137,899	32,886	7.90E-04	A	1.30E-02
Mercury Compounds	238,480	137,899	32,886	1.20E-06	A	1.97E-05
Nickel Compounds	238,480	137,899	32,886	4.60E-06	A	7.56E-05
Naphthalene	238,480	137,899	32,886	1.30E-04	A	2.14E-03
Phosphorus	238,480	137,899	32,886		A	
POM	238,480	137,899	32,886	2.12E-04	A	3.49E-03
Selenium Compounds	238,480	137,899	32,886	2.50E-05	A	4.11E-04
Toluene	238,480	137,899	32,886	2.81E-04	A	4.62E-03
Xylene	238,480	137,899	32,886	1.93E-04	A	3.17E-03
o-Xylene	238,480	137,899	32,886		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-13

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	144,178	137,899	19,882	0.132	M	1.3
NOX	144,178	137,899	19,882	3.2	A	31.8
CO	144,178	137,899	19,882	0.85	A	8.4
VOC	144,178	137,899	19,882	0.0819	A	0.8
TSP	144,178	137,899	19,882	0.0697	A	0.7
PM10	144,178	137,899	19,882	0.0573	A	0.6
Acetaldehyde	144,178	137,899	19,882	2.52E-05	A	2.51E-04
Acrolein	144,178	137,899	19,882	7.88E-06	A	7.83E-05
Antimony Compounds	144,178	137,899	19,882		A	
Arsenic Compounds	144,178	137,899	19,882	1.10E-05	A	1.09E-04
Benzene	144,178	137,899	19,882	7.76E-04	A	7.71E-03
Beryllium Compounds	144,178	137,899	19,882	3.10E-07	A	3.08E-06
1,3-Butadiene	144,178	137,899	19,882	1.60E-05	A	1.59E-04
Cadmium Compounds	144,178	137,899	19,882	4.80E-06	A	4.77E-05
Chromium Compounds	144,178	137,899	19,882	1.10E-05	A	1.09E-04
Cobalt Compounds	144,178	137,899	19,882		A	
Ethylbenzene	144,178	137,899	19,882		A	
Formaldehyde	144,178	137,899	19,882	7.89E-05	A	7.84E-04
Hydrochloric Acid	144,178	137,899	19,882		A	
Lead Compounds	144,178	137,899	19,882	1.40E-05	A	1.39E-04
Manganese Compounds	144,178	137,899	19,882	7.90E-04	A	7.85E-03
Mercury Compounds	144,178	137,899	19,882	1.20E-06	A	1.19E-05
Nickel Compounds	144,178	137,899	19,882	4.60E-06	A	4.57E-05
Naphthalene	144,178	137,899	19,882	1.30E-04	A	1.29E-03
Phosphorus	144,178	137,899	19,882		A	
POM	144,178	137,899	19,882	2.12E-04	A	2.11E-03
Selenium Compounds	144,178	137,899	19,882	2.50E-05	A	2.49E-04
Toluene	144,178	137,899	19,882	2.81E-04	A	2.79E-03
Xylene	144,178	137,899	19,882	1.93E-04	A	1.92E-03
o-Xylene	144,178	137,899	19,882		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

D-14

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	263,583	137,899	36,348	0.132	M	2.4
NOX	263,583	137,899	36,348	3.2	A	58.2
CO	263,583	137,899	36,348	0.85	A	15.4
VOC	263,583	137,899	36,348	0.0819	A	1.5
TSP	263,583	137,899	36,348	0.0697	A	1.3
PM10	263,583	137,899	36,348	0.0573	A	1.0
Acetaldehyde	263,583	137,899	36,348	2.52E-05	A	4.58E-04
Acrolein	263,583	137,899	36,348	7.88E-06	A	1.43E-04
Antimony Compounds	263,583	137,899	36,348		A	
Arsenic Compounds	263,583	137,899	36,348	1.10E-05	A	2.00E-04
Benzene	263,583	137,899	36,348	7.76E-04	A	1.41E-02
Beryllium Compounds	263,583	137,899	36,348	3.10E-07	A	5.63E-06
1,3-Butadiene	263,583	137,899	36,348	1.60E-05	A	2.91E-04
Cadmium Compounds	263,583	137,899	36,348	4.80E-06	A	8.72E-05
Chromium Compounds	263,583	137,899	36,348	1.10E-05	A	2.00E-04
Cobalt Compounds	263,583	137,899	36,348		A	
Ethylbenzene	263,583	137,899	36,348		A	
Formaldehyde	263,583	137,899	36,348	7.89E-05	A	1.43E-03
Hydrochloric Acid	263,583	137,899	36,348		A	
Lead Compounds	263,583	137,899	36,348	1.40E-05	A	2.54E-04
Manganese Compounds	263,583	137,899	36,348	7.90E-04	A	1.44E-02
Mercury Compounds	263,583	137,899	36,348	1.20E-06	A	2.18E-05
Nickel Compounds	263,583	137,899	36,348	4.60E-06	A	8.36E-05
Naphthalene	263,583	137,899	36,348	1.30E-04	A	2.36E-03
Phosphorus	263,583	137,899	36,348		A	
POM	263,583	137,899	36,348	2.12E-04	A	3.85E-03
Selenium Compounds	263,583	137,899	36,348	2.50E-05	A	4.54E-04
Toluene	263,583	137,899	36,348	2.81E-04	A	5.11E-03
Xylene	263,583	137,899	36,348	1.93E-04	A	3.51E-03
o-Xylene	263,583	137,899	36,348		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)			
	D-12	D-13	D-14	Total
SO2	2.2	1.3	2.4	5.9
NOX	52.6	31.8	58.2	142.6
CO	14.0	8.4	15.4	37.8
VOC	1.3	0.8	1.5	3.6
TSP	1.1	0.7	1.3	3.1
PM10	0.9	0.6	1.0	2.5
Acetaldehyde	4.14E-04	2.51E-04	4.58E-04	0.0011
Acrolein	1.30E-04	7.83E-05	1.43E-04	0.0004
Antimony Compounds				
Arsenic Compounds	1.81E-04	1.09E-04	2.00E-04	0.0005
Benzene	1.28E-02	7.71E-03	1.41E-02	0.0346
Beryllium Compounds	5.10E-06	3.08E-06	5.63E-06	0.0000
1,3-Butadiene	2.63E-04	1.59E-04	2.91E-04	0.0007
Cadmium Compounds	7.89E-05	4.77E-05	8.72E-05	0.0002
Chromium Compounds	1.81E-04	1.09E-04	2.00E-04	0.0005
Cobalt Compounds				
Ethylbenzene				
Formaldehyde	1.30E-03	7.84E-04	1.43E-03	0.0035
Hydrochloric Acid				
Lead Compounds	2.30E-04	1.39E-04	2.54E-04	0.0006
Manganese Compounds	1.30E-02	7.85E-03	1.44E-02	0.0352
Mercury Compounds	1.97E-05	1.19E-05	2.18E-05	0.0001
Nickel Compounds	7.56E-05	4.57E-05	8.36E-05	0.0002
Naphthalene	2.14E-03	1.29E-03	2.36E-03	0.0058
Phosphorus				
POM	3.49E-03	2.11E-03	3.85E-03	0.0094
Selenium Compounds	4.11E-04	2.49E-04	4.54E-04	0.0011
Toluene	4.62E-03	2.79E-03	5.11E-03	0.0125
Xylene	3.17E-03	1.92E-03	3.51E-03	0.0086
o-Xylene				
Total HAPS	4.25E-02	2.57E-02	4.69E-02	0.1150

CAA-2.2 (HELCO)

April 30, 2003

Mr. Wilfred K. Nagamine
Manager, Clean Air Branch
Hawaii State Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Subject: Annual Emissions Fees for Operations in Calendar Year 2002
Hawaii Electric Light Company, Inc. (HELCO)

Dear Mr. Nagamine:

In accordance with a letter issued by the Department of Health (DoH) on January 7, 2003, enclosed are the emission fees payable for calendar year 2002. On January 22, 2003, Hawaiian Electric Company, Inc. requested a deadline extension to pay the 2002 emission fees. On February 3, 2003, the DoH granted the deadline extension to May 1, 2003. Please find the attached emission fees and calculation for the following HELCO facilities:

Hill-Kanoelehua Generating Station
Puna Generating Station
Keahole Generating Station
Waimea Generating Station
Shipman Generating Station

The following are provided with this submittal:

- Check No. 33255 in the amount of $224,967.33 payable to Clean Air Special Fund-COV.
- Check No. 33256 in the amount of $54,733.97 payable to Clean Air Special Fund-NON.
- Forms F-1 and F-2, if required, Annual Emission Fee and Summary for Covered Sources
- Calculations, emissions factors and assumption worksheets.

If you have any question, please call Michael Watanabe at 543-4517.

Sincerely,

Sherri-Ann Loo
Manager, Environmental Department

Enclosures
cc (w/o encl): T. Simmons

WINNER OF THE EDISON AWARD
FOR DISTINGUISHED INDUSTRY LEADERSHIP

HAWAII ELECTRIC LIGHT CO., INC.

FOUR THOUSAND SEVEN HUNDRED AND THIRTY-THREE DOLLARS AND 00 CENTS

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

⑈033256⑈ ⑆121301028⑆ 0081⑈032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - NON
P.O. BOX 3378
HONOLULU HI 96801

33256

HAWAII ELECTRIC LIGHT CO., INC.

⑈033255⑈ ⑆121301028⑆ 0081⑈032718⑈

SEE REVERSE SIDE FOR OPENING INSTRUCTIONS

Hawaii Electric Light Co., Inc.
PO Box 1027 Hilo, HI 96721-1027
HELCO-AC

HAWAII STATE DEPT. OF HEALTH
CLEAN AIR SPECIAL FUND - COV
P.O. BOX 3378
HONOLULU HI 96801

33255

FORM F-1
2003 ANNUAL FEE SUMMARY FOR COVERED SOURCES
(FOR AIR POLLUTANTS EMITTED DURING CALENDAR YEAR 2002)

[redacted]

1. Facility Information (PLEASE PRINT)

A. Facility Name:	Shipman Generating Station	B. Location:	Hilo	C. Island:	Hawaii
D. Mailing Address:	PO Box 1027	E. City: Hilo	F. State: Hawaii	G. Zip Code:	96721
H. Contact Person:	Michael Watanabe	I. Title:	Senior Environmental Scientist	J: Telephone No.:	(808) 543-4517
K. Responsible Official:	Dan V. Giovanni	L. Title:	Production Manager	M. Telephone No.:	(808) 969-0421
N. Signature:		Date:	4/16/03		

2. CALCULATED EMISSIONS (CALCULATE AND REPORT EMISSIONS TO THE NEAREST TENTH OF A TON (Line 2.B.) AND TOTAL ANNUAL EMISSIONS (Line 2.C) SUBJECT TO FEES WITHOUT THE FRACTION(S) OF A TON)

Equipment Stack Number or Unit Number	Air Pollutant Emissions (tons/yr)												
	Other Regulated Air Pollutants Including Hazardous Air Pollutants (Please specify)												Annual Total
	TSP	PM_{10}	SO_2	CO	NO_x	VOC	Pb						
S-1	0.0	0.0	0.0	0.0	0.0	0.0	0.0						
S-3	9.0	6.4	132.5	2.4	23.0	0.4	0.0						
S-4	10.8	7.7	159.7	2.9	27.7	0.4	0.0						
A. Supplement _____													
B. Total Report Emissions	19.8	14.1	292.2	5.3	50.7	0.8	0.0						
C. Total Emissions Subject to Fees	19		292		50	0							D. 361

3. 2003 ANNUAL FEE CALCULATION (USE THE TOTAL EMISSIONS SUBJECT TO FEES CALCULATED IN BLOCK 2.D)

	Total Annual Emissions Subject to Fees	Times	2003 $/ton	Times	Consumer Price Index Adjustment (2.7% increase from '00 to '01)	Equal	
Fee payable to: Clean Air Special Fund - COV	A. 361	X	39.00	X	1.027	=	B. $ 14,459.13
Clean Air Special Fund - NON	C. 361	X	9.50	X	1.027	=	D. $ 3,522.10
						Total	E. $ 17,981.23

Note: 2003 $/ton charge payable to Clean Air Special Fund - COV = $39.00 x 1.027 = $40.05/ton.

2003 $/ton charge payable to Clean Air Special Fund - NON = $9.50 x 1.027 = $9.76/ton.

If the summed amount found in 3.E is less than $500, then pay the minimum amount of $500 with a check or money order made payable to the "Clean Air Special Fund - COV."

If the summed amount found in 3.E is greater than $500, then pay fee amounts found in 3.B. & 3.D. with two separate checks or money payable to the "Clean Air Special Fund - COV" & Clean Air Special Fund - NON," respectively

1/7/2003

S-1

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2		150,556		1.817	M	
NOX		150,556		0.367	A	
CO		150,556		0.0333	A	
VOC		150,556		0.00187	A	
TSP		150,556		0.123	A	
PM10		150,556		0.106	A	
Acetaldehyde		150,556			A	
Acrolein		150,556			A	
Antimony Compounds		150,556		3.50E-05	A	
Arsenic Compounds		150,556		8.80E-06	A	
Benzene		150,556		1.43E-06	A	
Beryllium Compounds		150,556		1.85E-07	A	
1,3-Butadiene		150,556			A	
Cadmium Compounds		150,556		2.65E-06	A	
Chromium Compounds		150,556		5.63E-06	A	
Cobalt Compounds		150,556		4.01E-05	A	
Ethylbenzene		150,556		4.24E-07	A	
Formaldehyde		150,556		4.07E-04	A	
Hydrochloric Acid		150,556			A	
Lead Compounds		150,556		1.01E-05	A	
Manganese Compounds		150,556		2.00E-05	A	
Mercury Compounds		150,556		7.53E-07	A	
Nickel Compounds		150,556		5.63E-04	A	
Naphthalene		150,556		7.53E-06	A	
Phosphorus		150,556		6.31E-05	A	
POM		150,556		8.67E-06	A	
Selenium Compounds		150,556		4.55E-06	A	
Toluene		150,556		4.13E-05	A	
Xylene		150,556			A	
o-Xylene		150,556		7.27E-07	A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-3 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	968,646	150,556	145,835	1.817	M	132.5
NOX	968,646	150,556	145,835	0.313	A	22.8
CO	968,646	150,556	145,835	0.0333	A	2.4
VOC	968,646	150,556	145,835	0.00507	A	0.4
TSP	968,646	150,556	145,835	0.123	A	9.0
PM10	968,646	150,556	145,835	0.0873	A	6.4
Acetaldehyde	968,646	150,556	145,835		A	
Acrolein	968,646	150,556	145,835		A	
Antimony Compounds	968,646	150,556	145,835	3.50E-05	A	2.55E-03
Arsenic Compounds	968,646	150,556	145,835	8.80E-06	A	6.42E-04
Benzene	968,646	150,556	145,835	1.43E-06	A	1.04E-04
Beryllium Compounds	968,646	150,556	145,835	1.85E-07	A	1.35E-05
1,3-Butadiene	968,646	150,556	145,835		A	
Cadmium Compounds	968,646	150,556	145,835	2.65E-06	A	1.93E-04
Chromium Compounds	968,646	150,556	145,835	5.63E-06	A	4.11E-04
Cobalt Compounds	968,646	150,556	145,835	4.01E-05	A	2.93E-03
Ethylbenzene	968,646	150,556	145,835	4.24E-07	A	3.09E-05
Formaldehyde	968,646	150,556	145,835	4.07E-04	A	2.97E-02
Hydrochloric Acid	968,646	150,556	145,835		A	
Lead Compounds	968,646	150,556	145,835	1.01E-05	A	7.34E-04
Manganese Compounds	968,646	150,556	145,835	2.00E-05	A	1.46E-03
Mercury Compounds	968,646	150,556	145,835	7.53E-07	A	5.49E-05
Nickel Compounds	968,646	150,556	145,835	5.63E-04	A	4.11E-02
Naphthalene	968,646	150,556	145,835	7.53E-06	A	5.49E-04
Phosphorus	968,646	150,556	145,835	6.31E-05	A	4.60E-03
POM	968,646	150,556	145,835	8.67E-06	A	6.32E-04
Selenium Compounds	968,646	150,556	145,835	4.55E-06	A	3.32E-04
Toluene	968,646	150,556	145,835	4.13E-05	A	3.01E-03
Xylene	968,646	150,556	145,835		A	
o-Xylene	968,646	150,556	145,835	7.27E-07	A	5.30E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-3 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	19,725	91,500	1,805	0.00423	M	0.0038
NOX	19,725	91,500	1,805	0.208	A	0.1877
CO	19,725	91,500	1,805	0.0350	A	0.0316
VOC	19,725	91,500	1,805	0.00546	A	0.0049
TSP	19,725	91,500	1,805	0.00656	A	0.0059
PM10	19,725	91,500	1,805	0.00656	A	0.0059
Acetaldehyde	19,725	91,500	1,805		A	
Acrolein	19,725	91,500	1,805		A	
Antimony Compounds	19,725	91,500	1,805		A	
Arsenic Compounds	19,725	91,500	1,805		A	
Benzene	19,725	91,500	1,805		A	
Beryllium Compounds	19,725	91,500	1,805		A	
1,3-Butadiene	19,725	91,500	1,805		A	
Cadmium Compounds	19,725	91,500	1,805		A	
Chromium Compounds	19,725	91,500	1,805		A	
Cobalt Compounds	19,725	91,500	1,805		A	
Ethylbenzene	19,725	91,500	1,805		A	
Formaldehyde	19,725	91,500	1,805		A	
Hydrochloric Acid	19,725	91,500	1,805		A	
Lead Compounds	19,725	91,500	1,805		A	
Manganese Compounds	19,725	91,500	1,805		A	
Mercury Compounds	19,725	91,500	1,805		A	
Nickel Compounds	19,725	91,500	1,805		A	
Naphthalene	19,725	91,500	1,805		A	
Phosphorus	19,725	91,500	1,805		A	
POM	19,725	91,500	1,805		A	
Selenium Compounds	19,725	91,500	1,805		A	
Toluene	19,725	91,500	1,805		A	
Xylene	19,725	91,500	1,805		A	
o-Xylene	19,725	91,500	1,805		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-3 Total

Pollutant	Annual Emissions Fuel Oil (tons/yr)	Propane (tons/yr)	Total (tons/yr)
SO2	132.5	0.0038	132.5
NOX	22.8	0.1877	23.0
CO	2.4	0.0316	2.4
VOC	0.4	0.0049	0.4
TSP	9	0.0059	9.0
PM10	6.4	0.0059	6.4
Acetaldehyde			
Acrolein			
Antimony Compounds	2.55E-03		2.55E-03
Arsenic Compounds	6.42E-04		6.42E-04
Benzene	1.04E-04		1.04E-04
Beryllium Compounds	1.35E-05		1.35E-05
1,3-Butadiene			
Cadmium Compounds	1.93E-04		1.93E-04
Chromium Compounds	4.11E-04		4.11E-04
Cobalt Compounds	2.93E-03		2.93E-03
Ethylbenzene	3.09E-05		3.09E-05
Formaldehyde	2.97E-02		2.97E-02
Hydrochloric Acid			
Lead Compounds	7.34E-04		7.34E-04
Manganese Compounds	1.46E-03		1.46E-03
Mercury Compounds	5.49E-05		5.49E-05
Nickel Compounds	4.11E-02		4.11E-02
Naphthalene	5.49E-04		5.49E-04
Phosphorus	4.60E-03		4.60E-03
POM	6.32E-04		6.32E-04
Selenium Compounds	3.32E-04		3.32E-04
Toluene	3.01E-03		3.01E-03
Xylene			
o-Xylene	5.30E-05		5.30E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 FO

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	1,167,558	150,556	175,783	1.817	M	159.7
NOX	1,167,558	150,556	175,783	0.313	A	27.5
CO	1,167,558	150,556	175,783	0.0333	A	2.9
VOC	1,167,558	150,556	175,783	0.00507	A	0.40
TSP	1,167,558	150,556	175,783	0.123	A	10.8
PM10	1,167,558	150,556	175,783	0.0873	A	7.7
Acetaldehyde	1,167,558	150,556	175,783		A	
Acrolein	1,167,558	150,556	175,783		A	
Antimony Compounds	1,167,558	150,556	175,783	3.50E-05	A	3.08E-03
Arsenic Compounds	1,167,558	150,556	175,783	8.80E-06	A	7.73E-04
Benzene	1,167,558	150,556	175,783	1.43E-06	A	1.25E-04
Beryllium Compounds	1,167,558	150,556	175,783	1.85E-07	A	1.63E-05
1,3-Butadiene	1,167,558	150,556	175,783		A	
Cadmium Compounds	1,167,558	150,556	175,783	2.65E-06	A	2.33E-04
Chromium Compounds	1,167,558	150,556	175,783	5.63E-06	A	4.95E-04
Cobalt Compounds	1,167,558	150,556	175,783	4.01E-05	A	3.53E-03
Ethylbenzene	1,167,558	150,556	175,783	4.24E-07	A	3.73E-05
Formaldehyde	1,167,558	150,556	175,783	4.07E-04	A	3.57E-02
Hydrochloric Acid	1,167,558	150,556	175,783		A	
Lead Compounds	1,167,558	150,556	175,783	1.01E-05	A	8.85E-04
Manganese Compounds	1,167,558	150,556	175,783	2.00E-05	A	1.76E-03
Mercury Compounds	1,167,558	150,556	175,783	7.53E-07	A	6.62E-05
Nickel Compounds	1,167,558	150,556	175,783	5.63E-04	A	4.95E-02
Naphthalene	1,167,558	150,556	175,783	7.53E-06	A	6.62E-04
Phosphorus	1,167,558	150,556	175,783	6.31E-05	A	5.54E-03
POM	1,167,558	150,556	175,783	8.67E-06	A	7.62E-04
Selenium Compounds	1,167,558	150,556	175,783	4.55E-06	A	4.00E-04
Toluene	1,167,558	150,556	175,783	4.13E-05	A	3.63E-03
Xylene	1,167,558	150,556	175,783		A	
o-Xylene	1,167,558	150,556	175,783	7.27E-07	A	6.39E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 Propane

Pollutant	Annual Fuel Use (gal/yr)	Fuel Heat Content (Btu/gal)	Annual Fuel Use (MMBtu/yr)	Emission Factor (lb/MMBtu)	EF Ref	Annual Emissions (tons/yr)
SO2	23,776	91,500	2,176	0.00423	M	0.0046
NOX	23,776	91,500	2,176	0.208	A	0.2263
CO	23,776	91,500	2,176	0.0350	A	0.0381
VOC	23,776	91,500	2,176	0.00546	A	0.0059
TSP	23,776	91,500	2,176	0.00656	A	0.0071
PM10	23,776	91,500	2,176	0.00656	A	0.0071
Acetaldehyde	23,776	91,500	2,176		A	
Acrolein	23,776	91,500	2,176		A	
Antimony Compounds	23,776	91,500	2,176		A	
Arsenic Compounds	23,776	91,500	2,176		A	
Benzene	23,776	91,500	2,176		A	
Beryllium Compounds	23,776	91,500	2,176		A	
1,3-Butadiene	23,776	91,500	2,176		A	
Cadmium Compounds	23,776	91,500	2,176		A	
Chromium Compounds	23,776	91,500	2,176		A	
Cobalt Compounds	23,776	91,500	2,176		A	
Ethylbenzene	23,776	91,500	2,176		A	
Formaldehyde	23,776	91,500	2,176		A	
Hydrochloric Acid	23,776	91,500	2,176		A	
Lead Compounds	23,776	91,500	2,176		A	
Manganese Compounds	23,776	91,500	2,176		A	
Mercury Compounds	23,776	91,500	2,176		A	
Nickel Compounds	23,776	91,500	2,176		A	
Naphthalene	23,776	91,500	2,176		A	
Phosphorus	23,776	91,500	2,176		A	
POM	23,776	91,500	2,176		A	
Selenium Compounds	23,776	91,500	2,176		A	
Toluene	23,776	91,500	2,176		A	
Xylene	23,776	91,500	2,176		A	
o-Xylene	23,776	91,500	2,176		A	

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

S-4 Total

Pollutant	Annual Emissions Fuel Oil (tons/yr)	Propane (tons/yr)	Total (tons/yr)
SO2	159.7	0.0046	159.7
NOX	27.5	0.2263	27.7
CO	2.9	0.0381	2.9
VOC	0.40	0.0059	0.4
TSP	10.8	0.0071	10.8
PM10	7.7	0.0071	7.7
Acetaldehyde			
Acrolein			
Antimony Compounds	3.08E-03		3.08E-03
Arsenic Compounds	7.73E-04		7.73E-04
Benzene	1.25E-04		1.25E-04
Beryllium Compounds	1.63E-05		1.63E-05
1,3-Butadiene			
Cadmium Compounds	2.33E-04		2.33E-04
Chromium Compounds	4.95E-04		4.95E-04
Cobalt Compounds	3.53E-03		3.53E-03
Ethylbenzene	3.73E-05		3.73E-05
Formaldehyde	3.57E-02		3.57E-02
Hydrochloric Acid			
Lead Compounds	8.85E-04		8.85E-04
Manganese Compounds	1.76E-03		1.76E-03
Mercury Compounds	6.62E-05		6.62E-05
Nickel Compounds	4.95E-02		4.95E-02
Naphthalene	6.62E-04		6.62E-04
Phosphorus	5.54E-03		5.54E-03
POM	7.62E-04		7.62E-04
Selenium Compounds	4.00E-04		4.00E-04
Toluene	3.63E-03		3.63E-03
Xylene			
o-Xylene	6.39E-05		6.39E-05

Notes:
M - Mass Balance
P - Permit Limit
A - AP-42 Emission Factor
S - Stack Test Data

Summary

Pollutant	Annual Emissions (tons/year)			
	S-1	S-3	S-4	Total
SO2		132.5	159.7	292.2
NOX		23.0	27.7	50.7
CO		2.4	2.9	5.3
VOC		0.4	0.4	0.8
TSP		9.0	10.8	19.8
PM10		6.4	7.7	14.1
Acetaldehyde				
Acrolein				
Antimony Compounds		2.55E-03	3.08E-03	5.63E-03
Arsenic Compounds		6.42E-04	7.73E-04	1.42E-03
Benzene		1.04E-04	1.25E-04	2.29E-04
Beryllium Compounds		1.35E-05	1.63E-05	2.98E-05
1,3-Butadiene				
Cadmium Compounds		1.93E-04	2.33E-04	4.27E-04
Chromium Compounds		4.11E-04	4.95E-04	9.06E-04
Cobalt Compounds		2.93E-03	3.53E-03	6.45E-03
Ethylbenzene		3.09E-05	3.73E-05	6.82E-05
Formaldehyde		2.97E-02	3.57E-02	6.54E-02
Hydrochloric Acid				
Lead Compounds		7.34E-04	8.85E-04	1.62E-03
Manganese Compounds		1.46E-03	1.76E-03	3.22E-03
Mercury Compounds		5.49E-05	6.62E-05	1.21E-04
Nickel Compounds		4.11E-02	4.95E-02	9.06E-02
Naphthalene		5.49E-04	6.62E-04	1.21E-03
Phosphorus		4.60E-03	5.54E-03	1.01E-02
POM		6.32E-04	7.62E-04	1.39E-03
Selenium Compounds		3.32E-04	4.00E-04	7.32E-04
Toluene		3.01E-03	3.63E-03	6.65E-03
Xylene				
o-Xylene		5.30E-05	6.39E-05	1.17E-04
Total HAPS		8.90E-02	1.07E-01	1.96E-01