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Final Project Report:

4/27/2010 – 6/5/2010

High Velocity Chemical Cleaning and System Decontamination and Purification On Guillotine High Pressure Hydraulic System Large Canadian Power Plant Western Canada

Prepared For:

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Date: 7/12/2010



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1.0 EXECUTIVE SUMMARY

CAN-AK is providing this Final Project Report as a way to demonstrate the complete success of the job by outlining the primary objects and scope of the job; the methodology used in performing the job; and the key benefits provided to the Canadian Power Plant.

2.0 INTRODUCTION

CAN-AK was requested by the Canadian Power Plant to perform a High Velocity Chemical Cleaning and in addition they were requested to perform a System Purification and Decontamination on the Canadian Power Plants' Guillotine High Pressure Hydraulic Systems using a proprietary chemical cleaning method at the Western Canada location. Provided here are details on the project, customer and site.

Company Name:	Canadian Power Plant	Asset Location:	Western Canada
Account Number:	*****	Primary Asset ID:	High Pressure Guillotine System
Site Location:	Western Canada	Alternate Asset ID:	N/A
Primary Contact:	Withheld	Asset Description:	High Pressure Guillotine System
Primary Contact Title:	Turn Around Planning Supervisor	Reservoir Capacity:	Approx. 600 USG
Street Address:	N/A	Estimated Fluid Volume:	Approx. 750 USG
City:	N/A	Fluid Manufacturer:	Exxon Mobil
Province:	Alberta	Fluid Type:	FIREXX HF-DU 46
Postal Code:	N/A	Fluid Grade:	ISO 46
Primary Contact Phone:	N/A	Service Number:	*****
Primary Contact Email:	N/A	Date of Service:	6/3/2010

3.0 PRIMARY OBJECTIVES

- CAN-AK was to restore their systems back to, or surpassing the industry standards, OEM specifications and the Canadian Power Plants' requirements.
- This to be verified when the final oil ISO Code was brought to 16/14/11, as per the proposal.
- This to be verified with a complete clean screen, witnessed by the Canadian Power Plant.

4.0 PROJECT SCOPE

- CAN-AK provided their own tools, equipment and manpower required for every aspect of the job.
- CAN-AK performed all necessary connections and disconnections into the systems.
- CAN-AK safely administered all of their cleaning on all systems.
- CAN-AK provided real time onsite verification through particle counts and screens with independent third party analysis.

5.0 METHODOLOGY

CAN-AK chose to use a three stage process in order to maximize the effectiveness of their cleaning methods for superior results. The first stage required the evacuation of all contaminated fluid from the system and the introduction of a water-based cleaning solution to be circulated for 48 hours through the multi-stage filtration system; allowing all residual contamination to be dissolved into the solution and filtered out. The second stage CAN-AK thoroughly rinsed the reservoir with clean, fresh water after the 48 hour cycle time eliminating all chemical residues and the system was drained empty. The third stage CAN-AK decontaminated the reservoir using proprietary chemicals and degreasers that ensured the highest level of cleanliness in the system. CAN-AK then recharged the system with new operating fluid and ran it through their multi-stage filtration unit and vacuum distillation unit to eliminate any lingering water or particulate from the system.

6.0 KEY BENEFITS

- Extended life of the systems
- Ensured fluid and system cleanliness
- Minimization of future maintenance and repair costs

7.0 TIMELINE

4/27/2010	CAN-AK equipment retained during a stand down period.
5/10/2010	CAN-AK mobilized personnel and resources to the job site.
5/10/2010	CAN-AK and the Canadian Power Plant performed a mandatory Project Update Meeting. Determination was made by the Canadian Power Plant to switch priority from TG-1 to HGS-10 due to asset availability.
5/10/2010	CAN-AK began Guillotine System Decontamination.
5/23/2010	CAN-AK continued the Guillotine System Decontamination. The system was now being cycled through with operating oil.
5/31/2010	CAN-AK completed the chemical cleaning of the Guillotine System.
5/31/2010	CAN-AK then began another project for the Canadian Power Plant to provide fluid purification for the Guillotine Systems 20 and 30.
6/4/2010	CAN-AK completed the fluid purification for the Guillotine Systems 20 and 30.
6/5/2010	CAN-AK performed site demobilization in preparation for shipment of equipment after job completion. The job is now successfully completed

8.0 EQUIPMENT SET UP



CAN-AK vacuum distillation unit and holding tote.



Multi-stage filter housing in line with system.



Holding tote pump and return lines with solution.




External view of Guillotine 20 Reservoir.



External view of Guillotine 30 Reservoir.



9.0 PROJECT RESULTS



CAN-AK
IAS CANADA-ALASKA OPERATIONS
SYNCHRONIZING RELIABILITY WITH PRODUCTION

Overall Condition: **NORMAL**

HIGH VELOCITY FLUSHING REPORT

<p>Company Name: [REDACTED] Account Number: [REDACTED] Site Location: [REDACTED] Primary Contact: [REDACTED] Primary Contact Title: [REDACTED] Street Address: [REDACTED] City: [REDACTED] Province: [REDACTED] Postal Code: [REDACTED] Primary Contact Phone: [REDACTED] Primary Contact Email: [REDACTED]</p>	<p>Asset Location: [REDACTED] Primary Asset ID: High Pressure Guillotine System Alternate Asset ID: N/A Asset Description: High Pressure Guillotine System Reservoir Capacity: Approx. 600 USG Estimated Fluid Volume: Approx. 750 USG Fluid Manufacturer: Exxon Mobil Fluid Type: FIREXX HF-DU 46 Fluid Grade: ISO 46 Service Number: [REDACTED] Date of Service: Thursday, June 03, 2010</p>
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FLUSHING PROJECT PARAMETERS

PRIMARY LINE SIZE (STD IN)	0.5 1 1.5 2 2.5 3 4 6 8 10 12 14 16	1.5
FLOW RATE (USGPM)	20 40 60 80 100 120 140 160 180 200 220 240 260	217
FLUID VELOCITY (FPS)	5 10 15 20 25 30 35 40 45 50 55 60 65	36.27
VISCOSITY @ TEMP (SUS)	5 10 15 20 25 30 35 40 45 50 55 60 65	41.2
REYNOLDS NUMBER (Re) <small>(TURBULENT FLOW @ 4,000)</small>	10000 15000 20000 25000 30000 35000 40000 45000 50000 55000 60000 65000 70000	47,398
FLUID TEMPERATURE (°F)	90 100 110 120 130 140 150 160 170 180 190 200 210	180
FLUSH DURATION (HOURS)	16 32 48 64 80 96 112 128 144 160 176 192 208	173
VOLUME CIRCULATED (USG)	250K 500K 750K 1MM 1.25MM 1.5MM 1.75MM 2MM 2.25MM 2.5MM 2.75MM 3MM 3.25MM	2,076,000

FINAL FLUID ANALYSIS	FLUSH START	AFTER FLUSH	START COUNT	END COUNT
Appearance	Chemical Clean	Amber		
System Appearance	Contaminated	Clean		
Large Solids Present	YES	NO		
Small Solids Present	YES	NO		
Water Content	Severe	None		
Laser Particle Count	23 / 22 / 18	16 / 14 / 9	23/22/18	16/14/9
Particle Size Range	Counts / mL Code	Counts / mL Code		
≥ 4 Microns	64745.150 23	329.480 16		
≥ 6 Microns	21695.190 22	125.770 14		
≥ 14 Microns	1716.230 18	3.540 9		
≥ 21 Microns	598.030 16	0.880 7		
≥ 25 Microns	308.200 15	0.440 6		
≥ 38 Microns	60.180 13	0.000 0		
≥ 50 Microns	33.180 12	0.000 0		

2010-05-25 07:04:30 LPA2 #005202
 TEST NUMBER 1
 TEST REF_TRANSALTA 31D-
 TEST TYPE: Continuous
 ISO CODE:-

23/22/18

NAS CLASS **
 SAMPLE VOLUME 15mL

µm(c) / 100ml
 4 64745.15
 6 21695.19
 14 1716.23
 21 598.03
 25 308.20
 38 60.18
 50 33.18
 68 19.02

2010-06-03 10:31:38 LPA2 #005202
 TEST NUMBER 164
 TEST REF_TRANSALTA 31D-68
 TEST TYPE: Continuous
 ISO CODE:-

16/14/9

NAS CLASS 6
 SAMPLE VOLUME 15mL

µm(c) / 100ml
 4 32948
 6 12577
 14 354
 21 88
 25 44
 38 0
 50 0
 68 0

ISO 4406 PARTICLE COUNT ANALYSIS

BEFORE FLUSH (blue bars), AFTER FLUSH (red bars)

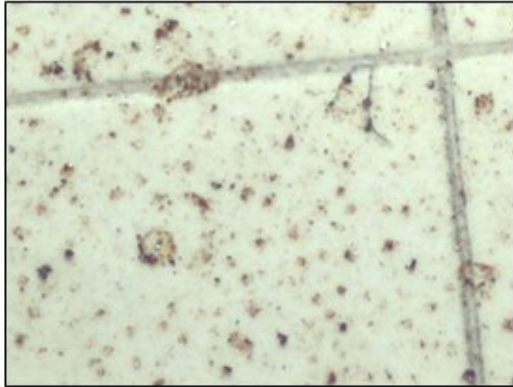
BEFORE FLUSH, TYPICAL NEW OIL, INDUSTRIAL OIL, AEROSPACE FLUID, AFTER FLUSH



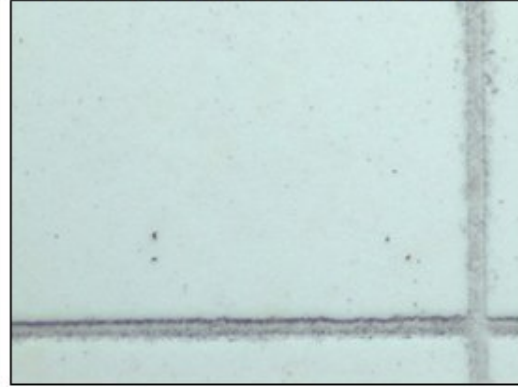
PHOTOGRAPHIC ANALYSIS

FLUID ANALYSIS - DIGITAL MICROPHOTOGRAPH

BEFORE HIGH VELOCITY FLUSHING - 100x

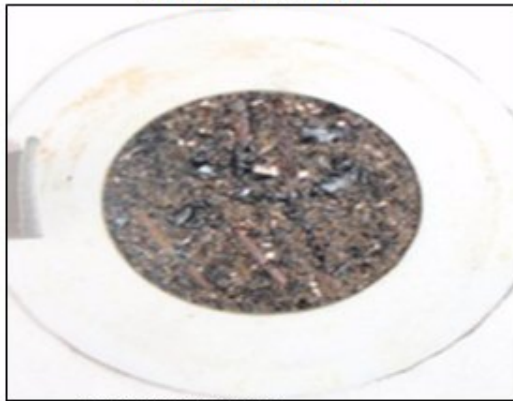


AFTER HIGH VELOCITY FLUSHING - 100x

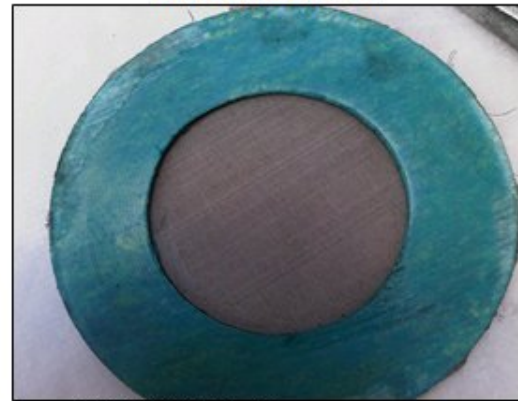


MACROFERROGRAM ANALYSIS - WARRANTY SCREENING RESULTS

INITIAL SCREEN RUN



FINAL SCREEN RUN



SCREEN SIZE: **3 INCH**
LOCATION: **Downstream-Most Return Line Point**
SCREEN MATERIAL: **316L STAINLESS STEEL**
MESH: **100**
MICRON RATING: **149**
DURATION OF RUN: **20 Minutes (Fully Plugged - Zero Flow)**
FLOW RATE (USGPM): **217 USGPM Start, 0 USGPM Ending**
TOTAL FLOW (USG): **868 USG**
NO. OF PARTICLES PSI: **>10,000 SCREEN FULLY PLUGGED**
SCREEN RATING (1-5): **1**
PASS / FAIL: **FAIL**
CUSTOMER WITNESS: **Yes**

SCREEN SIZE: **3 INCH**
LOCATION: **Downstream-Most Return Line Point**
SCREEN MATERIAL: **316L STAINLESS STEEL**
MESH: **100**
MICRON RATING: **149**
DURATION OF RUN: **2 Hours**
FLOW RATE (USGPM): **217 USGPM**
TOTAL FLOW (USG): **26,040**
NO. OF PARTICLES PSI: **0**
SCREEN RATING (1-5): **5**
PASS / FAIL: **PASS**
CUSTOMER WITNESS: **Yes**

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Cleaning solution before chemical cleaning.



Cleaning solution after initial run of cleaning with contaminate in solution.



Cleaning solution after 48 hours run with significantly Less contaminate in solution.



Cleaning solution at end of run with remaining Contaminate in solution.



Guillotine 20 Reservoir, 600 USG, before.



Guillotine 20 Reservoir , 600 USG, after.



Guillotine 30 Reservoir, 600 USG, before.



Guillotine 30 Reservoir, 600 USG, after.

10.0 CONCLUSION

The project was concluded to the specification of the Canadian Power Plants'. All solid contamination and chemical residue was successfully removed from the Guillotine High Pressure Hydraulic System, and the reservoirs were successfully chemically polished to the satisfaction of the Canadian Power Plant. All final inspections- on mesh screens, particle counts and visual- by the Canadian Power Plant met with their approval and confirmed that their systems were cleaned beyond industry standards and OEM specifications.

Respectfully submitted by:
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