CHATEAUGAY POWER STATION INSULATING OIL ANALYSIS

For

ReENERGY BIOMASS, LLC

Chateaugay, NY

2015



April 22, 2015

Mr. Mark Aanderud ReEnergy Biomass, LLC P.O. Box 24 7019 State Route 374 Chateaugay, NY 12920

Re: Chateaugay Power Station – Insulating Oil Analysis: Main GSU & Station Service HMT Job Number: 2370-15026

Dear Mark:

Enclosed for your records please find the reports documenting the insulating oil analysis performed for the Main GSU and Station Service transformers at your Chateaugay, NY facility. Historical data and trend graphs have been included in this report.

Insulating oil analysis results for both transformers were within normal limits.

Thank you for this opportunity to be of service.

Sincerely,

HMT, Inc.

Paul W. Kolodzie

Electrical Project Engineer

PWK/bwolff

WEIDMANN

HMT Inc

WEIDMANN ELECTRICAL TECHNOLOGY

3430 PROGRESS DRIVE, UNIT B + BENSALEM, PA + 19020

215 639 8599 + 215 639 8577 WWW.WEIDMANN-DIAGNOSTICS.COM

Mfr: GENERAL

Serial#: M162426A

TEST REPORT 01-6746311-464189-00

Control#: 6746311

Page 1 of 2

					ELECTRIC		
		Location:	CHATEAUGAY POWER	1	«V: 34.5	Order#:	464189
			TRANSFORMER		/A: 21000	Account:	
CICERO, NY 1303	9 US		MAIN(BOTTOM)	Year M		Received:	
ATTN: RON PEN		Breathing:		Syringe	ID: 09267	Reported:	
PO#: 2370-15026-	01		Phase: 3	Bottle			
		USGal: 1860	Sampled By: JS				
Customer ID: MAI					,		
		Lab Control Number	: 6746311	6297179	6255778	THE COLUMN STREET, SALES STREE	
		Date Sampled		06/02/2011	02/10/2011		
		Order Number		364814	356182		
		Oil Temp		18	60		
Dissolved Gas Ar	nalysis (DGA)	Hydrogen (H2) (ppm		14	15		
ASTM		Wethane (CH4) (ppm)	1	20	27		
D-36121		Ethane (C2H6) (ppm		19	26		
		hylene (C2H4) (ppm		9	12		
		etylene (C2H2) (ppm		<1	<1		
		Monoxide (CO) (ppm		169	236		
		Dioxide (CO2) (ppm	1	7447	11109		
		Nitrogen (N2) (ppm		60712	76438		
		Oxygen (O2) (ppm		1249	<500		
	Total Dissolv	ved Gas (TDG) (ppm	1	69639	88361		
Total		le Gas (TDCG) (ppm	97.37.000.00.00	231	316		
			100				
. 3141			0.1124	0.2458	0.2637		
8	**************************************	Equivalent TCG (%		0.2458	0.2637		-
DGA	DGA Keys Gas	Equivalent TCG (%) Interpretive Method	: Hydrogen within conditi	ion 1 limits (100 p	pm).		2
DGA	DGA Keys Gas	Equivalent TCG (%) / Interpretive Method R IEEE C57.104-200	I: Hydrogen within condition	ion 1 limits (100 p on 1 limits (120 pp	pm). m).		
DGA	DGA Keys Gas	Equivalent TCG (%) / Interpretive Method R IEEE C57.104-200	Hydrogen within condition Methane within condition Ethane within condition	ion 1 limits (100 p on 1 limits (120 pp 1 limits (65 ppm)	pm). m).		
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DGA Diagnostics Comment: General Oil Qualit D-15331 D-9741	DGA Keys Gas A PE DGA TDCG Rate PE (tw. DGA Cellulo: WDS R WDS R ty (GOQ) Moisture in Oil	Equivalent TCG (%) Interpretive Method R IEEE C57.104-200 (most recent sample) Interpretive Method R IEEE C57.104-200 O most recent sample Se (Paper) Insulation DGA Condition Code ecommended Action (ppm)	Hydrogen within condition Hydrogen within condition Ethane within condition Ethylene within condition Acetylene within condition Carbon Monoxide within Carbon Dioxide: Condition TDCG within condition Retest Annually. 1-Continue normal ope CO2/CO Ratio not appl NORMAL Continue normal opera	ion 1 limits (100 p on 1 limits (120 pp on 1 limits (65 ppm) on 1 limits (50 ppm) on 1 limits (1 ppm on condition 1 limit cion 3 Significant I 1 limits (720 ppm) ration. icable - at least of tion. Resample fo	pm). m). n). n). s (350 ppm). ndications of overhea	d its limit.	ation (4000
DGA Diagnostics Comment: General Oil Qualit D-1533¹ D-971¹ D-974¹ D-1500¹	DGA Keys Gas A PE DGA TDCG Rate PE (tw. DGA Cellulo: WDS R WDS R ty (GOQ) Moisture in Oil Interfacial Tension	Equivalent TCG (%) Interpretive Method R IEEE C57.104-200 (most recent sample) Interpretive Method R IEEE C57.104-200 O most recent sample Se (Paper) Insulation DGA Condition Code ecommended Action (ppm) (dynes/cm)	Hydrogen within condition Hydrogen within condition Ethane within condition Ethylene within condition Acetylene within condition Carbon Monoxide within Carbon Dioxide: Condition TDCG within condition Retest Annually. 1-Continue normal ope CO2/CO Ratio not appl CONTINUE CONTINUE CONTINUE NORMAL Continue normal opera	ion 1 limits (100 pon 1 limits (120 ppn 1 limits (65 ppm) on 1 limits (50 ppm) on 1 limits (50 ppm) on 1 limits (1 ppm n condition 1 limits (1 ppm) on 3 Significant I limits (720 ppm) or ation. Compared to the compared	pm). m). n). n). s (350 ppm). ndications of overhea ne gas doesn't exceed	d its limit.	ation (4000
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DGA Diagnostics Comment: General Oil Qualif D-1533 ¹ D-971 ¹ D-974 ¹ D-1500 ¹ D-1524 ¹ D-1524 ¹	DGA Keys Gas A PE DGA TDCG Rate PE (tw. DGA Cellulo: WDS R WDS R ty (GOQ) Moisture in Oil Interfacial Tension Acid Number Color Number Visual Exam.	Equivalent TCG (%) Interpretive Method R IEEE C57.104-200 (most recent sample) Interpretive Method R IEEE C57.104-200 on most recent sample se (Paper) Insulation DGA Condition Code ecommended Action (ppm) (dynes/cm) (mg KOH/g) (Relative) (Relative) (Relative)	Hydrogen within condition Methane within condition Ethane within condition Ethylene within condition Acetylene within condition Carbon Monoxide within Carbon Dioxide: Condition TDCG within condition Retest Annually. 1-Continue normal ope Dioxide: CO2/CO Ratio not appl	ion 1 limits (100 p on 1 limits (120 pp on 1 limits (65 ppm) on 1 limits (50 ppm) on 1 limits (50 ppm) on 1 limits (1 ppm on condition 1 limit tion 3 Significant I 1 limits (720 ppm) ration. icable - at least on tion. Resample fo 12 39.4 0.013 0.5 CLR&SPRK	pm). m). n). n). s (350 ppm). ndications of overhea ne gas doesn't exceed r testing within one yea 43.9 0.004 L0.5 H2O	d its limit.	ation (4000
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Notations: 1. Analysis is ISO/IEC 17025:2005 accredited, L-A-B Accredited Certificate Number L2303.02 2. This test is conducted by a subcontracted laboratory, 3. Subcontracted laboratory has received ISO Standard 17025 accreditation for this test. 5. This test is conducted by Weidmann Laboratory other than Primary Lab. 6. Weidmann Laboratory has received ISO Standard 17025 accreditation for this test. 7. Imported Sample: WEIDMANN Electrical Technology accepts no responsibility for these results; accreditation status does not apply to these results. 8. Imported Equipment

Accreditation applies to current analysis only. The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. WEIDMANN Electrical Technology does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgment of WEIDMANN Electrical Technology. WEIDMANN Electrical Technology assumes no responsibility. Betavior and makes no warranty or representation, expressed to the condition, productivity or proper operation of any equipment or other property for which this report may be used or relied upon for any reason whatsoever. This test report shall not be reproduced except in full, without written approval of the laboratory.

WEIDMANN

WEIDMANN ELECTRICAL TECHNOLOGY

3430 PROGRESS DRIVE, UNIT B + BENSALEM, PA + 19020

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TEST REPORT 01-6746311-464189-00

Page 2 of 2

HMT Inc Serial#: M162426A

Mfr: GENERAL **ELECTRIC** Control#: 6746311

CICERO, NY 13039 US

Location: CHATEAUGAY POWER **Equipment: TRANSFORMER**

kV: 34.5 kVA: 21000 Order#: 464189

ATTN: RON PENNOCK

Compartment: MAIN(BOTTOM)

Year Mf'd:

Account: 3122 Received: 02/02/2015

PO#: 2370-15026-01

Breathing: SEAL Bank: Phase: 3 Syringe ID: 09267

Reported: 02/06/2015

Project ID: REENERGY CHATEAUGAY

Fluid: MIN USGal: 1860

Bottle ID: Sampled By: JS

Customer ID: MAIN GSU

Lab Control Number: **Date Sampled: Order Number:**

6746311 01/23/2015 464189

6297179 06/02/2011 364814 18

6255778 02/10/2011 356182 60

(most recent sample)

Oil Temp:

Acid Number: Acceptable for in-service oil (0.2 mg KOH/g max). Color Number and Visual: Diagnostic not applicable. Diagnostic not applicable.

Dielectric Breakdown D-877: Diagnostic not applicable.

Comment:

End of Test Report

Authorized By:

KENNETH COCCIA LABORATORY SUPERVISOR

Notations: 1. Analysis is ISO/IEC 17025:2005 accredited, L-A-B Accredited Certificate Number L2303.02 2. This test is conducted by a subcontracted laboratory. 3. Subcontracted laboratory has received ISO Standard 17025 accreditation for this test. 5. This test is conducted by Weidmann Laboratory other than Primary Lab. 6. Weidmann Laboratory has received ISO Standard 17025 accreditation for this test. 7. Imported Sample; WEIDMANN Electrical Technology accepts no responsibility for these results; accreditation status does not apply to these results. 8. Imported Equipment



High Voltage Maintenance & Technical Services

Customer:

ReEnergy

Location:

Weather:

Chateaugay, NY

Equipment Location:

Main Sub

Job No.: Technician: 2370-15026

JS 1/23/2015

Date: Humidity:

Equipment ID:

MAIN GSU

Mfr:

GENERAL ELECTRIC

S/N:

M162426A

kV: kVA: 34.5 21000

Fluid Type:

MINERAL OIL

INSULATING FLUID DISSOLVED GAS ANALYSIS

SAMPLE DATE	9/24/2003	10/15/2004	5/8/2009	<u>2/10/2011</u>	<u>6/2/2011</u>	<u>1/23/2015</u>
Hydrogen (H2)	33	76	17	15	14	12
Methane (CH4)	24	22	18	27	20	17
Ethane (C2H6)	11	9.2	14	26	19	17
Ethylene (C2H4)	2.4	0	1	12	9	6
Acetylene (C2H2)	0	0	0	0	0	0
Carbon Monoxide (CO)	190	116	67	236	169	87
Carbon Dioxide (CO2)	9590	9730	8920	11109	7447	8095
Nitrogen (N2)	129200	92900	90000	76438	60712	76251
Oxygen (O2)	1420	537	306	498	1249	3756
Total (PPM)	140470.4	103390.2	99343	88361	69639	88241
TDCG (PPM)	260	223	117	316	231	139

INSULATING FLUID QUALITY & MOISTURE

Moisture (ppm)	7	10	12	6
Interf. Tension (dynes/cm)	40	43.9	39.4	38.92
Acid Number (mg KOH/g)	0.02	0.004	0.013	0.022
Color Number	L0.5	L0.5	L0.5	L1.0
Dielectric BV (kv)	54	43	32	44
Specific Gravity	0.877	0.879	0.878	0.8753
Visual Exam.	CLR&SPRK	H20	CLR&SPRK	CLR&SPRK



High Voltage Maintenance & Technical Services

Customer:

ReEnergy

Location:

Chateaugay, NY

2370-15026

Job No.: Technician:

JS

Equipment Location:

Weather:

Date:

1/23/2015

Humidity:

Equipment ID:

MAIN GSU

Mfr: S/N: GENERAL ELECTRIC

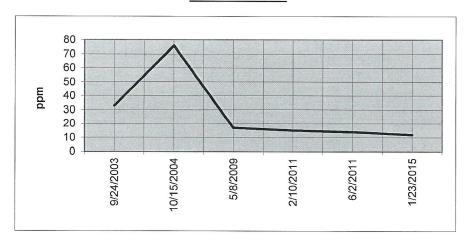
M162426A

KV: MVA: 34.5 21000

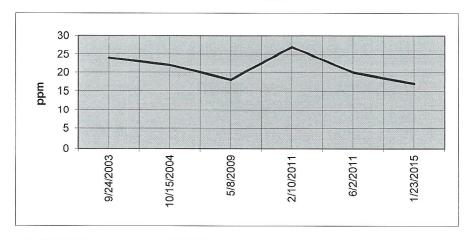
Fluid Type:

MINERAL OIL

HYDROGEN TREND



METHANE TREND





Customer:

ReEnergy

Location:

Weather:

Equipment Location:

Chateaugay, NY

Job No.: Technician: 2370-15026

JS

Date:

1/23/2015

Humidity:

Equipment ID:

MAIN GSU

Mfr: S/N: **GENERAL ELECTRIC**

M162426A

KV:

34.5

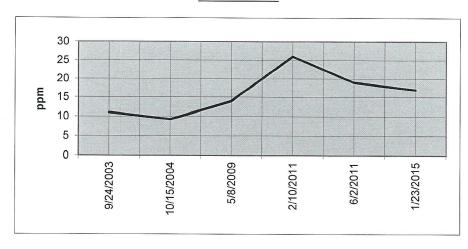
Fluid Type:

MINERAL OIL

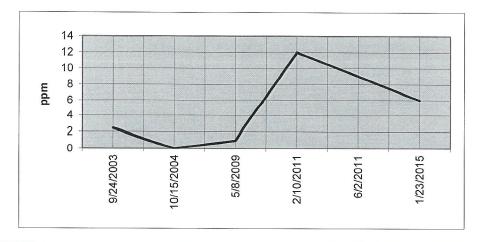
MVA:

21000

ETHANE TREND



ETHYLENE TREND





High Voltage Maintenance & Technical Services

Customer:

ReEnergy

Location:

Chateaugay, NY

Job No.:

2370-15026

Technician:

JS

Equipment Location:

Weather:

Date: Humidity:

1/23/2015

Equipment ID: Mfr:

MAIN GSU

GENERAL ELECTRIC

M162426A

KV: MVA: 34.5

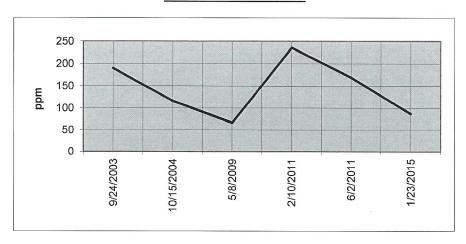
Fluid Type:

S/N:

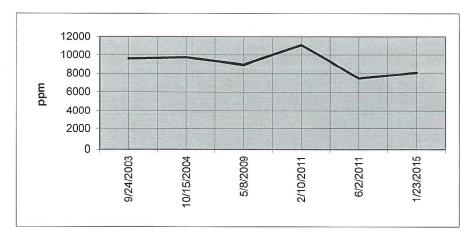
MINERAL OIL

21000

CARBON MONOXIDE TREND



CARBON DIOXIDE TREND





Customer:

ReEnergy

Location: Equipment Location:

Weather:

Chateaugay, NY

Job No.:

2370-15026

1/23/2015

Technician:

JS

Date:

Humidity:

Equipment ID:

MAIN GSU

Mfr: S/N: GENERAL ELECTRIC

M162426A

KV: MVA: 34.5

Fluid Type:

MINERAL OIL

21000

ACETYLENE TREND

