Hawkesbury Hydro

Stations Inspections, IR Scanning and Oil Sampling

at 44KV Tessier M.S. & 115KV Main St. W. T.S.

Hydro Ottawa
July 15, 2022

Contents

44KV Station (Tessier St.) - Q1/Q2 Inspections

Recommendations for Corrective Actions

- Ground connection on the fence can be repaired during next inspection/maintenance. (Refer to Q1/Q2 inspection reports attached)
- Further investigation required to determine the cause of fan failure. Parts may need to be ordered to make repairs. (Refer to Q1/Q2 inspection reports attached)
- Cleaning and tightening of equipment causing hot spots required. (Refer to IR inspection report attached)
- Re-Sample the oil from the 43T1 & 43T2 to verify the dielectric breakdown of the oil as recommended by Stark International. (Refer to the oil report attached)

STATION INSPECTION

TYPE: MAINTENANCE | STATION: MS #2 | ISSUE DATE:

SUBSTATION ADDRESS: Tessier St. | COMPLETED DATE: May 17, 2022

FEEDER/NOMENCLATURE: | AMBIENT TEMPERATURE: °C | TESTED BY: BEN BOILEAU

WORK ORDER #: 680819 | TEST STATUS: | TESTED BY: BRAD FRASER

Procedure

- ☑ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☑ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☑ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I	YARD	
☑ G ☐ P ☐ C ☐ I	BUILDING EXTERIOR	
☑ G ☐ P ☐ C ☐ I	BUILDING INTERIOR	
☑ G ☐ P ☐ C ☐ I	BASEMENT	
☑ G ☐ P ☐ C ☐ I	DC SYSTEMS	
☑ G ☐ P ☐ C ☐ I	STATION RTU	
☑ G ☐ P ☐ C ☐ I	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I	POWER TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I	CIRCUIT BREAKERS / RECLOSERS	
☑ G ☐ P ☐ C ☐ I	VOLTAGE REGULATORS	
☑ G ☐ P ☐ C ☐ I	SWITCHGEAR ASSEMBLIES	
☑ G ☐ P ☐ C ☐ I	CIRCUIT SWITCHERS	
☑ G ☐ P ☐ C ☐ I	GROUND GRID	
☑ G ☐ P ☐ C ☐ I	STATION IDENTIFICATION SIGN	
☑ G ☐ P ☐ C ☐ I	PPE SIGN	
☑ G ☐ P ☐ C ☐ I	SITE SAFETY NOTICE SIGN	
☐ G ☐ P ☐ C ☐ I	CONTAINMENT PIT	
☐ G ☐ P ☐ C ☐ I	SUMP PIT / OIL WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN
☐ G ☐ P ☐ C ☐ I	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I	KELMAN FILTER CLEANED	
☐ G ☐ P ☐ C ☐ I	VERIFY ATS OPERATION	
☐ G ☐ P ☐ C ☐ I	VERIFY DC ALARMS & ANALOGS	

Tessier St.

G = ITEMS FOUND IN SATISFACTORY CONDITION

P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION

C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION

I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS: 43T1 fans not working

DEFICIENCIES:

STATION INSPECTION

HydroOttawa

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER: Ferranti-Packard | SERIAL NO.: 0308401001

YEAR: 1985 | KVA: 10,000 / 13,300 / 16,700 | TYPE: 43T1 | CLASS: ONAN/ONAF/ONAF

PHASE: 3 | TEMPERATURE RISE: 65 °C | IMPEDANCE: 6.96 % | B.I.L. RATING: 250 kV PRI. / 95 kV SEC.

COOLANT: OIL | CAPACITY: | TOTAL WEIGHT: 31397

WINDING POLARITY: | WINDING MATERIAL: Copper | K FACTOR: nan

PRIMARY VOLTAGE: 44,000 / | (●) DELTA ( ) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

SECONDARY VOLTAGE: 12,470 / 7,200 | ( ) DELTA (●) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

TAP VOLTAGES	45,100	44,000	42,900	41,800	40,700			
TAP CONNECTIONS	1	2	3	4	5			

TAP SETTING: 3 | 42,900 Volts | # FANS: 6 | TAP CHANGER: (●) INTERNAL ( ) EXTERNAL [ ] DRY TYPE

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max	75	AS FOUND	35
OIL TEMPERATURE	MIN		Max	70	AS FOUND	35
TRANSFORMER OIL LEVEL	0%		100%		AS FOUND	55
BUSHING OIL LEVEL	0%		100%		AS FOUND	
TRANSFORMER PRESSURE			☑ KPA ☐ PSI		AS FOUND	
GAS RELAY					AS FOUND	

TAP CHANGER

MANUFACTURER: | MODEL:

SERIAL NO.: | YEAR: | GALLONS:

TAP CHANGER OIL TEMP	MIN		Max		AS FOUND	
TAP CHANGER OIL LEVEL	MIN		Max		AS FOUND	
TAP POSITION	MIN		Max		AS FOUND	
COUNTER					AS FOUND	
DIVERTOR OIL LEVEL	MIN		Max		AS FOUND	
HEATER CONDITION						
BANDWIDTH	MIN			Max		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I					

VISUAL

CONDITION	INSPECTION ITEM
☑ G ☐ P ☐ C ☐ I	BUSHINGS
☑ G ☐ P ☐ C ☐ I	SUPPORT INSULATORS
☑ G ☐ P ☐ C ☐ I	CONNECTIONS
☑ G ☐ P ☐ C ☐ I	PAINT
☑ G ☐ P ☐ C ☐ I	RADIATORS
☑ G ☐ P ☐ C ☐ I	FANS
☑ G ☐ P ☐ C ☐ I	NO-LOAD TAP CHANGER
☑ G ☐ P ☐ C ☐ I	OIL LEAKS
☑ G ☐ P ☐ C ☐ I	COOLING PUMP
☑ G ☐ P ☐ C ☐ I	HEATER CONDITION
☑ G ☐ P ☐ C ☐ I	CONTROL CABINET CONDITION
☑ G ☐ P ☐ C ☐ I	EXPLOSION VENT
☑ G ☐ P ☐ C ☐ I	SILICA GEL BREATHER
☑ G ☐ P ☐ C ☐ I	GROUND CONDUCTOR CONDITION

OIL FILTRATION PUMP PSI: 0 | FILTER TYPE: | FILTER CHANGE DATE: | HOURS:

STATION INSPECTION

HydroOttawa

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER: Pioneer Transformers | SERIAL NO.: G16194-1

YEAR: 2012 | KVA: 10,000 / 13,300 / 16,670 | TYPE: 43T2 | CLASS: ONAN/ONAF/ONAF

PHASE: 3 | TEMPERATURE RISE: 65 °C | IMPEDANCE: 6.91 % | B.I.L. RATING: kV PRI. / kV SEC.

COOLANT: Mineral Oil, Non-PCB, Class A, Type 2 | CAPACITY: 800:5 ct | TOTAL WEIGHT: 28880 kg

WINDING POLARITY: | WINDING MATERIAL: Copper | K FACTOR: nan

PRIMARY VOLTAGE: 44,000 / | (●) DELTA ( ) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

SECONDARY VOLTAGE: 12,470 / 7,200 | ( ) DELTA (●) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

TAP VOLTAGES	48,402	46,938	45,474	44,376	44,010	42,545	41,081	39,617
TAP CONNECTIONS	1	5	9	12	13	17	21	25

TAP SETTING: 12 | 44,376 Volts | # FANS: 6 | TAP CHANGER: ( ) INTERNAL (●) EXTERNAL | DRY TYPE [ ]

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max	40	AS FOUND	20
OIL TEMPERATURE	MIN		Max	40	AS FOUND	20
TRANSFORMER OIL LEVEL	0%		100%		AS FOUND	45
BUSHING OIL LEVEL	0%		100%		AS FOUND	
TRANSFORMER PRESSURE			[x] KPA [ ] PSI		AS FOUND	
GAS RELAY					AS FOUND	

TAP CHANGER

MANUFACTURER: ABB | MODEL: UZERT 250/300

SERIAL NO.: 1ZSC8714910 | YEAR: 2012 | GALLONS: 580 L

TAP CHANGER OIL TEMP	MIN		Max		AS FOUND	
TAP CHANGER OIL LEVEL	MIN		Max		AS FOUND	40
TAP POSITION	MIN	12	Max	12	AS FOUND	12
COUNTER					AS FOUND	
DIVERTOR OIL LEVEL	MIN		Max		AS FOUND	
HEATER CONDITION						
BANDWIDTH	MIN				Max	
RELIEF VENT	[x] G [ ] P [ ] C [ ] I					

VISUAL

CONDITION	INSPECTION ITEM
[x] G [ ] P [ ] C [ ] I	BUSHINGS
[x] G [ ] P [ ] C [ ] I	SUPPORT INSULATORS
[x] G [ ] P [ ] C [ ] I	CONNECTIONS
[x] G [ ] P [ ] C [ ] I	PAINT
[x] G [ ] P [ ] C [ ] I	RADIATORS
[x] G [ ] P [ ] C [ ] I	FANS
[x] G [ ] P [ ] C [ ] I	NO-LOAD TAP CHANGER
[x] G [ ] P [ ] C [ ] I	OIL LEAKS
[x] G [ ] P [ ] C [ ] I	COOLING PUMP
[x] G [ ] P [ ] C [ ] I	HEATER CONDITION
[x] G [ ] P [ ] C [ ] I	CONTROL CABINET CONDITION
[x] G [ ] P [ ] C [ ] I	EXPLOSION VENT
[x] G [ ] P [ ] C [ ] I	SILICA GEL BREATHER
[x] G [ ] P [ ] C [ ] I	GROUND CONDUCTOR CONDITION

OIL FILTRATION PUMP PSI: 0 | FILTER TYPE: | FILTER CHANGE DATE: | HOURS:

STATION INSPECTION

HydroOttawa

TYPE: MAINTENANCE | STATION: MS #2 | ISSUE DATE:
COMPLETED DATE: 2022-06-27
SUBSTATION ADDRESS: Tessier St. | TESTED BY: JULIE STEWART
FEEDER/NOMENCLATURE: Hawkesbury | AMBIENT TEMPERATURE: °C | TESTED BY: BRAD FRASER
WORK ORDER #: 680819 | TEST STATUS:

Procedure

- ☑ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☑ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☑ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I	YARD	
☐ G ☐ P ☐ C ☐ I	BUILDING EXTERIOR	
☐ G ☐ P ☐ C ☐ I	BUILDING INTERIOR	
☐ G ☐ P ☐ C ☐ I	BASEMENT	
☐ G ☐ P ☐ C ☐ I	DC SYSTEMS	
☐ G ☐ P ☐ C ☐ I	STATION RTU	
☐ G ☐ P ☐ C ☐ I	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I	POWER TRANSFORMERS	
☐ G ☐ P ☐ C ☐ I	CIRCUIT BREAKERS / RECLOSERS	
☐ G ☐ P ☐ C ☐ I	VOLTAGE REGULATORS	
☐ G ☐ P ☐ C ☐ I	SWITCHGEAR ASSEMBLIES	
☐ G ☐ P ☐ C ☐ I	CIRCUIT SWITCHERS	
☑ G ☐ P ☐ C ☐ I	GROUND GRID	
☑ G ☐ P ☐ C ☐ I	STATION IDENTIFICATION SIGN	
☐ G ☐ P ☐ C ☐ I	PPE SIGN	
☑ G ☐ P ☐ C ☐ I	SITE SAFETY NOTICE SIGN	
☑ G ☐ P ☐ C ☐ I	CONTAINMENT PIT	
☐ G ☐ P ☐ C ☐ I	SUMP PIT / OIL-WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN
☐ G ☐ P ☐ C ☐ I	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I	KELMAN FILTER CLEANED	
☐ G ☐ P ☐ C ☐ I	VERIFY ATS OPERATION	
☐ G ☐ P ☐ C ☐ I	VERIFY DC ALARMS & ANALOGS	

G = ITEMS FOUND IN SATISFACTORY CONDITION
P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION
C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION
I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS:

DEFICIENCIES:

Station - Ground connection on fence requires repair on north side of station
43T1 - Stage 1 and stage 2 fans do not turn on, contactor picks up
43T1 - Pressure guage unreadable, yellow film on inside of guage

STATION INSPECTION

HydroOttawa

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER: Ferranti-Packard | SERIAL NO.: 0308401001

YEAR: 1985 | KVA: 10,000 / 13,300 / 16,700 | TYPE: 43T1 | CLASS: ONAN/ONAF/ONAF

PHASE: 3 | TEMPERATURE RISE: 65 °C | IMPEDANCE: 6.96 % | B.I.L. RATING: 250 kV PRI. / 95 kV SEC.

COOLANT: OIL | CAPACITY: | TOTAL WEIGHT: 31397 kg

WINDING POLARITY: | WINDING MATERIAL: Copper | K FACTOR: nan

PRIMARY VOLTAGE: 44,000 / | (●) DELTA ( ) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

SECONDARY VOLTAGE: 12,470 / 7,200 | ( ) DELTA (●) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

TAP VOLTAGES	45,100	44,000	42,900	41,800	40,700			
TAP CONNECTIONS	1	2	3	4	5			

TAP SETTING: 3 | 42,900 Volts | # FANS: 6 | TAP CHANGER: (●) INTERNAL ( ) EXTERNAL [ ] DRY TYPE

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max	75	AS FOUND	50
OIL TEMPERATURE	MIN		Max	70	AS FOUND	50
TRANSFORMER OIL LEVEL	0%		100%		AS FOUND	60
BUSHING OIL LEVEL	0%		100%		AS FOUND	
TRANSFORMER PRESSURE			☑ KPA ☐ PSI		AS FOUND	
GAS RELAY					AS FOUND	

TAP CHANGER

MANUFACTURER: | MODEL:

SERIAL NO.: | YEAR: | GALLONS:

TAP CHANGER OIL TEMP	MIN		Max		AS FOUND	
TAP CHANGER OIL LEVEL	MIN		Max		AS FOUND	
TAP POSITION	MIN		Max		AS FOUND	
COUNTER					AS FOUND	
DIVERTOR OIL LEVEL	MIN		Max		AS FOUND	
HEATER CONDITION						
BANDWIDTH	MIN			Max		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I					

VISUAL

CONDITION	INSPECTION ITEM
☑ G ☐ P ☐ C ☐ I	BUSHINGS
☑ G ☐ P ☐ C ☐ I	SUPPORT INSULATORS
☑ G ☐ P ☐ C ☐ I	CONNECTIONS
☑ G ☐ P ☐ C ☐ I	PAINT
☑ G ☐ P ☐ C ☐ I	RADIATORS
☐ G ☑ P ☐ C ☐ I	FANS
☑ G ☐ P ☐ C ☐ I	NO-LOAD TAP CHANGER
☑ G ☐ P ☐ C ☐ I	OIL LEAKS
☐ G ☐ P ☐ C ☐ I	COOLING PUMP
☑ G ☐ P ☐ C ☐ I	HEATER CONDITION
☑ G ☐ P ☐ C ☐ I	CONTROL CABINET CONDITION
☐ G ☐ P ☐ C ☐ I	EXPLOSION VENT
☐ G ☐ P ☐ C ☐ I	SILICA GEL BREATHER
☑ G ☐ P ☐ C ☐ I	GROUND CONDUCTOR CONDITION

OIL FILTRATION PUMP PSI: 0 | FILTER TYPE: | FILTER CHANGE DATE: | HOURS:

STATION INSPECTION

HydroOttawa

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER: Pioneer Transfomers | SERIAL NO.: G16194-1

YEAR: 2012 | KVA: 10,000 / 13,330 / 16,670 | TYPE: 43T2 | CLASS: ONAN/ONAF/ONAF

PHASE: 3 | TEMPERATURE RISE: 65 °C | IMPEDANCE: 6.91 % | B.I.L. RATING: kV PRI. / kV SEC.

COOLANT: Mineral Oil, Non-PCB, Class A, Type 2 | CAPACITY: 800:5 ct | TOTAL WEIGHT: 28880 kg

WINDING POLARITY: | WINDING MATERIAL: Copper | K FACTOR: nan

PRIMARY VOLTAGE: 44,000 / | (●) DELTA ( ) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

SECONDARY VOLTAGE: 12,470 / 7,200 | ( ) DELTA (●) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

TAP VOLTAGES	48,402	46,938	45,474	44,376	44,010	42,545	41,081	39,617
TAP CONNECTIONS	1	5	9	12	13	17	21	25

TAP SETTING: 12 | 44,376 Volts | # FANS: 6 | TAP CHANGER: ( ) INTERNAL (●) EXTERNAL DRY TYPE [ ]

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max	40	AS FOUND	30
OIL TEMPERATURE	MIN		Max	40	AS FOUND	30
TRANSFORMER OIL LEVEL	0%		100%		AS FOUND	50
BUSHING OIL LEVEL	0%		100%		AS FOUND	50
TRANSFORMER PRESSURE			☑ KPA ☐ PSI		AS FOUND	0
GAS RELAY					AS FOUND	

TAP CHANGER

MANUFACTURER: ABB | MODEL: UZERT 250/300

SERIAL NO.: 1ZSC 8714 910 | YEAR: 2012 | GALLONS: 580 L

TAP CHANGER OIL TEMP	MIN		Max		AS FOUND	
TAP CHANGER OIL LEVEL	MIN		Max		AS FOUND	45
TAP POSITION	MIN	12	Max	12	AS FOUND	12
COUNTER					AS FOUND	2,586
DIVERTOR OIL LEVEL	MIN		Max		AS FOUND	
HEATER CONDITION						
BANDWIDTH	MIN				Max	
RELIEF VENT	☑ G ☐ P ☐ C ☐ I					

VISUAL

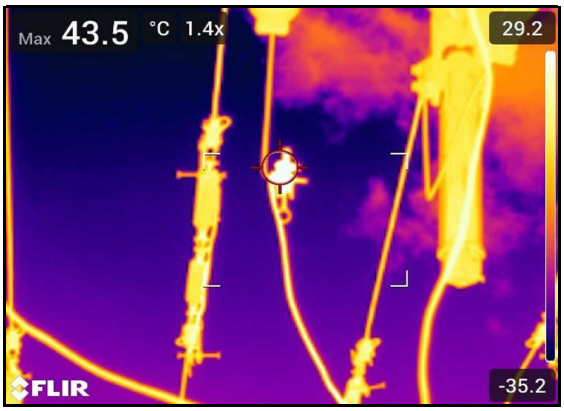
CONDITION	INSPECTION ITEM
☑ G ☐ P ☐ C ☐ I	BUSHINGS
☑ G ☐ P ☐ C ☐ I	SUPPORT INSULATORS
☑ G ☐ P ☐ C ☐ I	CONNECTIONS
☑ G ☐ P ☐ C ☐ I	PAINT
☑ G ☐ P ☐ C ☐ I	RADIATORS
☑ G ☐ P ☐ C ☐ I	FANS
☐ G ☐ P ☐ C ☐ I	NO-LOAD TAP CHANGER
☑ G ☐ P ☐ C ☐ I	OIL LEAKS
☐ G ☐ P ☐ C ☐ I	COOLING PUMP
☑ G ☐ P ☐ C ☐ I	HEATER CONDITION
☑ G ☐ P ☐ C ☐ I	CONTROL CABINET CONDITION
☑ G ☐ P ☐ C ☐ I	EXPLOSION VENT
☐ G ☐ P ☐ C ☐ I	SILICA GEL BREATHER
☑ G ☐ P ☐ C ☐ I	GROUND CONDUCTOR CONDITION

OIL FILTRATION PUMP PSI: 0 | FILTER TYPE: | FILTER CHANGE DATE: | HOURS:

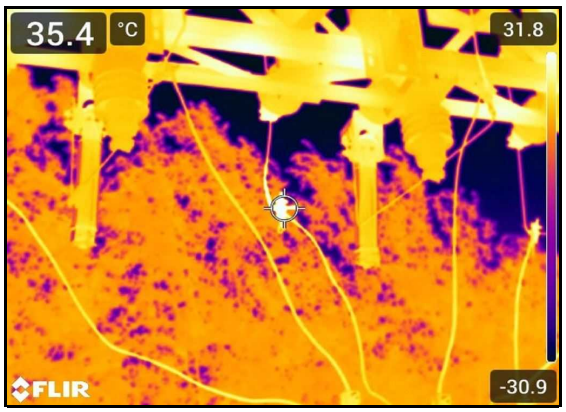
Infrared Inspection

TYPE: MAINTENANCE | STATION: MS #2 | ISSUE DATE:
COMPLETED DATE: 2022-06-27
SUBSTATION ADDRESS:
TESTED BY: BRAD FRASER
FEEDER/NOMENCLATURE: 43F1, 43F2 | AMBIENT TEMPERATURE: °C
TESTED BY: JULIE STEWART
WORK ORDER #: 680827 | TEST STATUS:

INFRARED IMAGES:



ASSET DESCRIPTION: 43F1 red phase line clamp, 43F1 white phase line clamp,
TEST POINT:
NOTES:



ASSET DESCRIPTION: 43F2 white phase line clamp
TEST POINT:
NOTES:

COMMENTS:
DEFICIENCIES:

115KV Station (Main St. W.) - Q1/Q2 Inspections

Recommendations for Corrective Actions

- As mentioned in the reports equipment nameplates were impossible to read from the ground. May be possible to obtain more information during maintenance.
- Ground connection on fence behind P&C shed to be repaired during next inspection/maintenance. (Refer to Q1/Q2 inspection reports attached)
- P&C Room emergency lighting to be repaired during maintenance.
- Cleaning and tightening of equipment causing hot spots required. (Refer to IR inspection report attached)

STATION INSPECTION

TYPE MAINTENANCE STATION _____ ISSUE DATE _____

COMPLETED DATE May 17, 2022

SUBSTATION ADDRESS Main St. West TESTED BY BEN BOILEAU

FEEDER/NOMENCLATURE MTS #1 AMBIENT TEMPERATURE _____ °C TESTED BY BRAD FRASER

WORK ORDER # _____ TEST STATUS _____

Procedure

- ☐ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☐ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☐ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I	YARD	
☑ G ☐ P ☐ C ☐ I	BUILDING EXTERIOR	
☑ G ☐ P ☐ C ☐ I	BUILDING INTERIOR	
☑ G ☐ P ☐ C ☐ I	BASEMENT	
☑ G ☐ P ☐ C ☐ I	DC SYSTEMS	
☑ G ☐ P ☐ C ☐ I	STATION RTU	
☑ G ☐ P ☐ C ☐ I	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I	POWER TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I	CIRCUIT BREAKERS / RECLOSERS	
☑ G ☐ P ☐ C ☐ I	VOLTAGE REGULATORS	
☑ G ☐ P ☐ C ☐ I	SWITCHGEAR ASSEMBLIES	
☑ G ☐ P ☐ C ☐ I	CIRCUIT SWITCHERS	
☑ G ☐ P ☐ C ☐ I	GROUND GRID	
☑ G ☐ P ☐ C ☐ I	STATION IDENTIFICATION SIGN	
☑ G ☐ P ☐ C ☐ I	PPE SIGN	
☑ G ☐ P ☐ C ☐ I	SITE SAFETY NOTICE SIGN	
☐ G ☐ P ☐ C ☐ I	CONTAINMENT PIT	
☐ G ☐ P ☐ C ☐ I	SUMP PIT / OIL-WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN
☐ G ☐ P ☐ C ☐ I	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I	KELMAN FILTER CLEANED	
☐ G ☐ P ☐ C ☐ I	VERIFY ATS OPERATION	
☐ G ☐ P ☐ C ☐ I	VERIFY DC ALARMS & ANALOGS	

G = ITEMS FOUND IN SATISFACTORY CONDITION

P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION

C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION

I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS:

DEFICIENCIES: P&C room emegency light not working

STATION INSPECTION

HydroOttawa

PAGE _____

CIRCUIT SWITCHER

NOMENCLATURE: 55T2-L

NAMEPLATE DATA

MANUFACTURER _____ MODEL NO. _____ TYPE _____

CATALOG NO. _____ AMPACITY _____ VOLTAGE _____ CONTROL VOLTAGE _____

SERIAL NUMBER _____ INTERRUPT CAPACITY RMS MOMENTARY _____ Other _____

INTERRUPT CAPACITY 1 SECOND _____

VISUAL & MECHANICAL INSPECTION	CONDITION
INSPECT PHYSICAL & MECHANICAL CONDITION	
INSPECT ANCHORAGE, ALIGNMENT & CLEARANCES	☑ G ☐ P ☐ C ☐ I
INSPECT GROUNDING	☑ G ☐ P ☐ C ☐ I
VERIFY HEATER OPERATION	☑ G ☐ P ☐ C ☐ I
POSITION INDICATORS	☑ G ☐ P ☐ C ☐ I
GAS PRESSURE SF6 ☑ KPA ☐	60
COUNTER	16

CIRCUIT SWITCHER

NOMENCLATURE: 55T3-L

NAMEPLATE DATA

MANUFACTURER _____ MODEL NO. _____ TYPE _____

CATALOG NO. _____ AMPACITY _____ VOLTAGE _____ CONTROL VOLTAGE _____

SERIAL NUMBER _____ INTERRUPT CAPACITY RMS MOMENTARY _____ Other _____

INTERRUPT CAPACITY 1 SECOND _____

VISUAL & MECHANICAL INSPECTION	CONDITION
INSPECT PHYSICAL & MECHANICAL CONDITION	
INSPECT ANCHORAGE, ALIGNMENT & CLEARANCES	☑ G ☐ P ☐ C ☐ I
INSPECT GROUNDING	☑ G ☐ P ☐ C ☐ I
VERIFY HEATER OPERATION	☑ G ☐ P ☐ C ☐ I
POSITION INDICATORS	☑ G ☐ P ☐ C ☐ I
GAS PRESSURE SF6 ☑ KPA ☐	70
COUNTER	57

STATION INSPECTION

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER 55T3 SERIAL NO.

YEAR KVA / / TYPE CLASS

PHASE 3 TEMPERATURE RISE °C IMPEDANCE % B.I.L. RATING kV PRI. kV SEC.

COOLANT CAPACITY TOTAL WEIGHT

WINDING POLARITY WINDING MATERIAL K FACTOR nan

PRIMARY VOLTAGE / ○ DELTA ○ WYE ☐ ZIGZAG RATED CURRENT / / AMPERES

SECONDARY VOLTAGE / ○ DELTA ○ WYE ☐ ZIGZAG RATED CURRENT / / AMPERES

TAP VOLTAGES

TAP CONNECTIONS

TAP SETTING Volts # FANS TAP CHANGER: ○ INTERNAL ○ EXTERNAL DRY TYPE ☐

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND	25
OIL TEMPERATURE	MIN	Max	AS FOUND	25
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND	50
BUSHING OIL LEVEL	0%	100%	AS FOUND	
TRANSFORMER PRESSURE		☐ KPA ☐ PSI	AS FOUND	
GAS RELAY			AS FOUND	

TAP CHANGER

MANUFACTURER MODEL

SERIAL NO. YEAR GALLONS

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND	20
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND	50
TAP POSITION	MIN 8	Max 15	AS FOUND	12
COUNTER			AS FOUND	
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND	
HEATER CONDITION				
BANDWIDTH	MIN	Max		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I			

VISUAL

CONDITION	INSPECTION ITEM
☑ G ☐ P ☐ C ☐ I	BUSHINGS
☑ G ☐ P ☐ C ☐ I	SUPPORT INSULATORS
☑ G ☐ P ☐ C ☐ I	CONNECTIONS
☑ G ☐ P ☐ C ☐ I	PAINT
☑ G ☐ P ☐ C ☐ I	RADIATORS
☑ G ☐ P ☐ C ☐ I	FANS
☑ G ☐ P ☐ C ☐ I	NO-LOAD TAP CHANGER
☑ G ☐ P ☐ C ☐ I	OIL LEAKS
☑ G ☐ P ☐ C ☐ I	COOLING PUMP
☑ G ☐ P ☐ C ☐ I	HEATER CONDITION
☑ G ☐ P ☐ C ☐ I	CONTROL CABINET CONDITION
☑ G ☐ P ☐ C ☐ I	EXPLOSION VENT
☑ G ☐ P ☐ C ☐ I	SILICA GEL BREATHER
☐ G ☐ P ☐ C ☐ I	GROUND CONDUCTOR CONDITION

OIL FILTRATION PUMP PSI: 0 FILTER TYPE: FILTER CHANGE DATE: HOURS:

STATION INSPECTION

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER 55T2 SERIAL NO.

YEAR KVA / / TYPE CLASS

PHASE 3 TEMPERATURE RISE °C IMPEDANCE % B.I.L. RATING kV PRI. kV SEC.

COOLANT CAPACITY TOTAL WEIGHT

WINDING POLARITY WINDING MATERIAL K FACTOR nan

PRIMARY VOLTAGE / ○ DELTA ○ WYE ☐ ZIGZAG RATED CURRENT / / AMPERES

SECONDARY VOLTAGE / ○ DELTA ○ WYE ☐ ZIGZAG RATED CURRENT / / AMPERES

TAP VOLTAGES

TAP CONNECTIONS

TAP SETTING Volts # FANS TAP CHANGER: ○ INTERNAL ○ EXTERNAL DRY TYPE ☐

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND 30
OIL TEMPERATURE	MIN	Max	AS FOUND 38
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND 50
BUSHING OIL LEVEL	0%	100%	AS FOUND
TRANSFORMER PRESSURE		☐ KPA ☐ PSI	AS FOUND
GAS RELAY			AS FOUND

TAP CHANGER

MANUFACTURER MODEL

SERIAL NO. YEAR GALLONS

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND 50
TAP POSITION	MIN 5	Max 10	AS FOUND 7
COUNTER			AS FOUND
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND
HEATER CONDITION			
BANDWIDTH	MIN	Max	
RELIEF VENT	☐ G ☐ P ☐ C ☐ I		

VISUAL

CONDITION	INSPECTION ITEM
☑ G ☐ P ☐ C ☐ I	BUSHINGS
☑ G ☐ P ☐ C ☐ I	SUPPORT INSULATORS
☑ G ☐ P ☐ C ☐ I	CONNECTIONS
☑ G ☐ P ☐ C ☐ I	PAINT
☑ G ☐ P ☐ C ☐ I	RADIATORS
☑ G ☐ P ☐ C ☐ I	FANS
☑ G ☐ P ☐ C ☐ I	NO-LOAD TAP CHANGER
☑ G ☐ P ☐ C ☐ I	OIL LEAKS
☑ G ☐ P ☐ C ☐ I	COOLING PUMP
☑ G ☐ P ☐ C ☐ I	HEATER CONDITION
☑ G ☐ P ☐ C ☐ I	CONTROL CABINET CONDITION
☑ G ☐ P ☐ C ☐ I	EXPLOSION VENT
☑ G ☐ P ☐ C ☐ I	SILICA GEL BREATHER
☑ G ☐ P ☐ C ☐ I	GROUND CONDUCTOR CONDITION

OIL FILTRATION PUMP PSI: 0 FILTER TYPE: FILTER CHANGE DATE: HOURS:

STATION INSPECTION

HydroOttawa

TYPE: MAINTENANCE | STATION: MS #2 | ISSUE DATE:
COMPLETED DATE: 2022-06-27
SUBSTATION ADDRESS: Main St. West | TESTED BY: JULIE STEWART
FEEDER/NOMENCLATURE: Hawkesbury | AMBIENT TEMPERATURE: °C | TESTED BY: BRAD FRASER
WORK ORDER #: 680819 | TEST STATUS:

Procedure

- ☑ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☑ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☑ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I	YARD	
☐ G ☐ P ☐ C ☐ I	BUILDING EXTERIOR	
☐ G ☐ P ☐ C ☐ I	BUILDING INTERIOR	
☐ G ☐ P ☐ C ☐ I	BASEMENT	
☐ G ☐ P ☐ C ☐ I	DC SYSTEMS	
☐ G ☐ P ☐ C ☐ I	STATION RTU	
☐ G ☐ P ☐ C ☐ I	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I	POWER TRANSFORMERS	
☐ G ☐ P ☐ C ☐ I	CIRCUIT BREAKERS / RECLOSERS	
☐ G ☐ P ☐ C ☐ I	VOLTAGE REGULATORS	
☐ G ☐ P ☐ C ☐ I	SWITCHGEAR ASSEMBLIES	
☐ G ☐ P ☐ C ☐ I	CIRCUIT SWITCHERS	
☑ G ☐ P ☐ C ☐ I	GROUND GRID	
☑ G ☐ P ☐ C ☐ I	STATION IDENTIFICATION SIGN	
☐ G ☐ P ☐ C ☐ I	PPE SIGN	
☑ G ☐ P ☐ C ☐ I	SITE SAFETY NOTICE SIGN	
☑ G ☐ P ☐ C ☐ I	CONTAINMENT PIT	
☐ G ☐ P ☐ C ☐ I	SUMP PIT / OIL-WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN
☐ G ☐ P ☐ C ☐ I	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I	KELMAN FILTER CLEANED	
☐ G ☐ P ☐ C ☐ I	VERIFY ATS OPERATION	
☐ G ☐ P ☐ C ☐ I	VERIFY DC ALARMS & ANALOGS	

G = ITEMS FOUND IN SATISFACTORY CONDITION
P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION
C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION
I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS:

DEFICIENCIES:

Station - Ground connection on fence requires repair on north side of station
43T1 - Stage 1 and stage 2 fans do not turn on, contactor picks up
43T1 - Pressure guage unreadable, yellow film on inside of guage

STATION INSPECTION

HydroOttawa

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER: Ferranti-Packard | SERIAL NO.: 0308401001

YEAR: 1985 | KVA: 10,000 / 13,300 / 16,700 | TYPE: 43T1 | CLASS: ONAN/ONAF/ONAF

PHASE: 3 | TEMPERATURE RISE: 65 °C | IMPEDANCE: 6.96 % | B.I.L. RATING: 250 kV PRI. / 95 kV SEC.

COOLANT: OIL | CAPACITY: | TOTAL WEIGHT: 31397 kg

WINDING POLARITY: | WINDING MATERIAL: Copper | K FACTOR: nan

PRIMARY VOLTAGE: 44,000 / | (●) DELTA ( ) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

SECONDARY VOLTAGE: 12,470 / 7,200 | ( ) DELTA (●) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

TAP VOLTAGES	45,100	44,000	42,900	41,800	40,700			
TAP CONNECTIONS	1	2	3	4	5			

TAP SETTING: 3 | 42,900 Volts | # FANS: 6 | TAP CHANGER: (●) INTERNAL ( ) EXTERNAL [ ] DRY TYPE

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max	75	AS FOUND	50
OIL TEMPERATURE	MIN		Max	70	AS FOUND	50
TRANSFORMER OIL LEVEL	0%		100%		AS FOUND	60
BUSHING OIL LEVEL	0%		100%		AS FOUND	
TRANSFORMER PRESSURE			☑ KPA ☐ PSI		AS FOUND	
GAS RELAY					AS FOUND	

TAP CHANGER

MANUFACTURER: | MODEL:

SERIAL NO.: | YEAR: | GALLONS:

TAP CHANGER OIL TEMP	MIN		Max		AS FOUND	
TAP CHANGER OIL LEVEL	MIN		Max		AS FOUND	
TAP POSITION	MIN		Max		AS FOUND	
COUNTER					AS FOUND	
DIVERTOR OIL LEVEL	MIN		Max		AS FOUND	
HEATER CONDITION						
BANDWIDTH	MIN			Max		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I					

VISUAL

CONDITION	INSPECTION ITEM
☑ G ☐ P ☐ C ☐ I	BUSHINGS
☑ G ☐ P ☐ C ☐ I	SUPPORT INSULATORS
☑ G ☐ P ☐ C ☐ I	CONNECTIONS
☑ G ☐ P ☐ C ☐ I	PAINT
☑ G ☐ P ☐ C ☐ I	RADIATORS
☐ G ☑ P ☐ C ☐ I	FANS
☑ G ☐ P ☐ C ☐ I	NO-LOAD TAP CHANGER
☑ G ☐ P ☐ C ☐ I	OIL LEAKS
☐ G ☐ P ☐ C ☐ I	COOLING PUMP
☑ G ☐ P ☐ C ☐ I	HEATER CONDITION
☑ G ☐ P ☐ C ☐ I	CONTROL CABINET CONDITION
☐ G ☐ P ☐ C ☐ I	EXPLOSION VENT
☐ G ☐ P ☐ C ☐ I	SILICA GEL BREATHER
☑ G ☐ P ☐ C ☐ I	GROUND CONDUCTOR CONDITION

OIL FILTRATION PUMP PSI: 0 | FILTER TYPE: | FILTER CHANGE DATE: | HOURS:

STATION INSPECTION

HydroOttawa

PAGE

TRANSFORMER NAMEPLATE DATA

MANUFACTURER: Pioneer Transfomers | SERIAL NO.: G16194-1

YEAR: 2012 | KVA: 10,000 / 13,330 / 16,670 | TYPE: 43T2 | CLASS: ONAN/ONAF/ONAF

PHASE: 3 | TEMPERATURE RISE: 65 °C | IMPEDANCE: 6.91 % | B.I.L. RATING: kV PRI. / kV SEC.

COOLANT: Mineral Oil, Non-PCB, Class A, Type 2 | CAPACITY: 800:5 ct | TOTAL WEIGHT: 28880 kg

WINDING POLARITY: | WINDING MATERIAL: Copper | K FACTOR: nan

PRIMARY VOLTAGE: 44,000 / | (●) DELTA ( ) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

SECONDARY VOLTAGE: 12,470 / 7,200 | ( ) DELTA (●) WYE [ ] ZIGZAG | RATED CURRENT: / / AMPERES

TAP VOLTAGES	48,402	46,938	45,474	44,376	44,010	42,545	41,081	39,617
TAP CONNECTIONS	1	5	9	12	13	17	21	25

TAP SETTING: 12 | 44,376 Volts | # FANS: 6 | TAP CHANGER: ( ) INTERNAL (●) EXTERNAL DRY TYPE [ ]

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max	40	AS FOUND	30
OIL TEMPERATURE	MIN		Max	40	AS FOUND	30
TRANSFORMER OIL LEVEL	0%		100%		AS FOUND	50
BUSHING OIL LEVEL	0%		100%		AS FOUND	50
TRANSFORMER PRESSURE			☑ KPA ☐ PSI		AS FOUND	0
GAS RELAY					AS FOUND	

TAP CHANGER

MANUFACTURER: ABB | MODEL: UZERT 250/300

SERIAL NO.: 1ZSC 8714 910 | YEAR: 2012 | GALLONS: 580 L

TAP CHANGER OIL TEMP	MIN		Max		AS FOUND	
TAP CHANGER OIL LEVEL	MIN		Max		AS FOUND	45
TAP POSITION	MIN	12	Max	12	AS FOUND	12
COUNTER					AS FOUND	2,586
DIVERTOR OIL LEVEL	MIN		Max		AS FOUND	
HEATER CONDITION						
BANDWIDTH	MIN				Max	
RELIEF VENT	☑ G ☐ P ☐ C ☐ I					

VISUAL

CONDITION	INSPECTION ITEM
☑ G ☐ P ☐ C ☐ I	BUSHINGS
☑ G ☐ P ☐ C ☐ I	SUPPORT INSULATORS
☑ G ☐ P ☐ C ☐ I	CONNECTIONS
☑ G ☐ P ☐ C ☐ I	PAINT
☑ G ☐ P ☐ C ☐ I	RADIATORS
☑ G ☐ P ☐ C ☐ I	FANS
☐ G ☐ P ☐ C ☐ I	NO-LOAD TAP CHANGER
☑ G ☐ P ☐ C ☐ I	OIL LEAKS
☐ G ☐ P ☐ C ☐ I	COOLING PUMP
☑ G ☐ P ☐ C ☐ I	HEATER CONDITION
☑ G ☐ P ☐ C ☐ I	CONTROL CABINET CONDITION
☑ G ☐ P ☐ C ☐ I	EXPLOSION VENT
☐ G ☐ P ☐ C ☐ I	SILICA GEL BREATHER
☑ G ☐ P ☐ C ☐ I	GROUND CONDUCTOR CONDITION

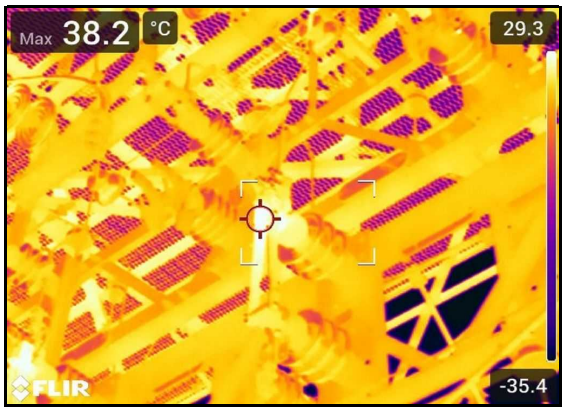
OIL FILTRATION PUMP PSI: 0 | FILTER TYPE: | FILTER CHANGE DATE: | HOURS:

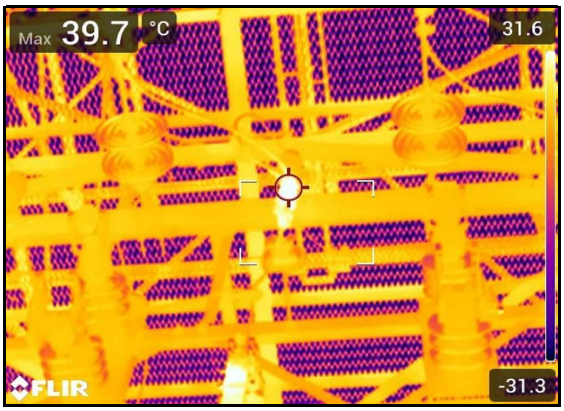
Infrared Inspection

HydroOttawa

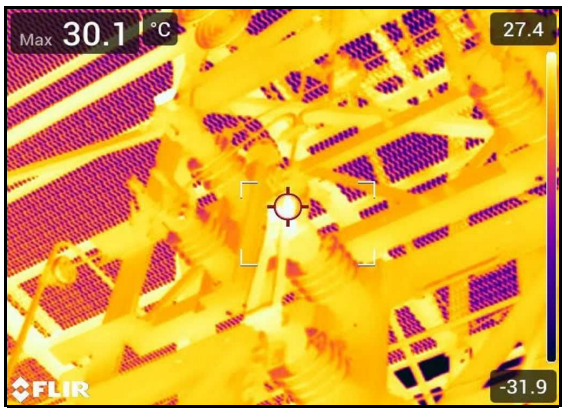
TYPE	MAINTENANCE	STATION	MS #3	ISSUE DATE	
				COMPLETED DATE	2022-06-29
SUBSTATION ADDRESS				TESTED BY	JULIE STEWART
FEEDER/NOMENCLATURE	Hawkesbury	AMBIENT TEMPERATURE	°C	TESTED BY	BRAD FRASER
WORK ORDER #	680827			TEST STATUS	

INFRARED IMAGES:





ASSET DESCRIPTION: 55F1-L white phase top of switch and line clamp, 55F1-X white phase line clamp
TEST POINT:
NOTES:



ASSET DESCRIPTION: 55F2-L red phase top of switch
TEST POINT:
NOTES:

COMMENTS:
DEFICIENCIES:

113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

June 8, 2022

Samantha Evelyn
Hydro Ottawa
2711 Hunt Club Road
Ottawa, ON
K1G 3S4

RE: Transformer Assessment Report

Mr. Webster:

STARK has reviewed the laboratory analysis results for seven samples drawn on May 17, 2022, at the Hawkesbury facility. We are pleased to provide you with this assessment report containing our maintenance recommendations and brief diagnostic summary for each unit.

For your convenience, we present the following prioritized list of recommendations:

1. Re-sample to verify the reportedly low dielectric breakdown voltage:

   43T1, SN: 0308401001
   43T2, SN: G16194-1

2. Continue sampling the following units on an annual basis:

   SST2
   SST2 TC
   SST3, SN: C-09062-5-1
   SST3 TC, SN: C-09062-5-1
   43T2 TC, SN: 1ZSC 8714 910

113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

Oil Diagnostic Summaries

SST2

Moisture (25 ppm) and interfacial tension (29.7 dynes/cm) are questionable.
All other oil quality properties and dissolved gas levels are within acceptable limits.

Recommendation

Continue sampling on an annual basis.

SST2 TC

All oil quality properties and dissolved gas levels are within acceptable limits.

Recommendation

Continue sampling on an annual basis.

SST3, SN: C-09062-5-1

Carbon monoxide (395 ppm) is slightly elevated.
Moisture (28 ppm) is questionable.
All other oil quality properties and dissolved gas levels are within acceptable limits.

Recommendation

Continue sampling on an annual basis.

SST3 TC, SN: C-09062-5-1

All oil quality properties and dissolved gas levels are within acceptable limits.

Recommendation

Continue sampling on an annual basis.

113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

43T1, SN: 0308401001

Carbon monoxide (970 ppm) is slightly elevated.
Moisture (25 ppm) and dielectric breakdown voltage (20 kV) are questionable.
All other oil quality properties and dissolved gas levels are within acceptable limits.

Recommendation

Gases are normal for the age of the unit.

However, we recommend resampling to verify the dielectric breakdown voltage.

43T2, SN: G16194-1

Dielectric breakdown voltage (17 kV) is unacceptable.
All other oil quality properties and dissolved gas levels are within acceptable limits.

Recommendation

We recommend resampling to verify dielectric breakdown voltage.

43T2 TC, SN: 1ZSC 8714 910

Dielectric breakdown voltage (19.5 kV) is questionable. All other oil quality properties and dissolved gas levels are within acceptable limits.

Recommendation

Continue sampling on an annual basis.

113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

Please find the attached Oil Diagnostics Reports and Oil Data Charts provided for your ease in review of the testing results.

We trust this information will be of benefit to your transformer maintenance planning. If you have any questions or comments regarding this report, please do not hesitate to contact us.

My Regards,

Jody MacKenzie
Oil Diagnostics Technician

Oil Diagnostics Report

Samantha Evelyn
Hydro Ottawa
2711 Hunt Club Road
Ottawa, ON K1G 3S4

STARK International Inc.
113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

Toll Free: 1-877-875-2775 Fax: (902) 755-2949

8-Jun-22

Unit ID	**SST2**	Power Rating (MVA)	
Serial Number		Voltage	**15 kV**
Location	**Hawkesbury**	Fluid Volume	
Manufacturer		Fluid Type	
Year of Manufacture	**1965**	Preservation	**Conservator**

	Sample Date	**17-May-22**
	Laboratory No.	**189**
	Container No.	**37141**
	Temperature (ºC)	**25**
H_2	Hydrogen (ppm)	**6**
CH_4	Methane (ppm)	**2**
C_2H_6	Ethane (ppm)	**<1**
C_2H_4	Ethylene (ppm)	**15**
C_2H_2	Acetylene (ppm)	**<1**
CO	Carbon monoxide (ppm)	**256**
CO_2	Carbon dioxide (ppm)	**1920**
N_2	Nitrogen (ppm)	**78870**
O_2	Oxygen (ppm)	**33520**
	Total Gas (ppm)	**114589**
	Total Combustible Gas (ppm)	**279**
D1533	Moisture (ppm)	**25**
D971	Interfacial Tension (dynes/cm)	**29.7**
D974	Acid Number (mg KOH/g)	**0.020**
D1500	Color Number	**<1.5**
D1524	Visual Examination	**Clear & Bright**
D877	Dielectric BV (kV)	
D1816 1mm	Dielectric BV (kV)	**24**
D924	Power Factor (% at 25 ºC)	**0.015**
D924	Power Factor (% at 100 ºC)	
D2668	Oxidation Inhibitor (%)	
D1298	Specific Gravity	**0.856**
D88	Viscosity (SUS)	
D97	Pour Point (ºC)	
D92	Flash Point (ºC)	
D92	Fire Point (ºC)	
D1807	Refractive Index	
D1275	Corrosive Sulfur	
	PCB Content (ppm)	
	Degree of Polymerization	
	Estimated % Life Remaining	

Interpretation: ***Moisture (25 ppm) and interfacial tension (29.7 dynes/cm) are questionable. All other oil quality properties and dissolved gas levels are within acceptable limits.***

Recommendation: ***Continue sampling on an annual basis.***

Oil Diagnostics Report

Samantha Evelyn
Hydro Ottawa
2711 Hunt Club Road
Ottawa, ON K1G 3S4

STARK International Inc.
113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

Toll Free: 1-877-875-2775 Fax: (902) 755-2949

8-Jun-22

Unit ID	**SST2 TC**	Power Rating (MVA)	
Serial Number		Voltage	
Location	**Hawkesbury**	Fluid Volume	
Manufacturer		Fluid Type	
Year of Manufacture	**1965**	Preservation	

	Sample Date	**17-May-22**
	Laboratory No.	**185**
	Container No.	**37029**
	Temperature (ºC)	
H_2	Hydrogen (ppm)	**15**
CH_4	Methane (ppm)	**39**
C_2H_6	Ethane (ppm)	**40**
C_2H_4	Ethylene (ppm)	**342**
C_2H_2	Acetylene (ppm)	**935**
CO	Carbon monoxide (ppm)	**78**
CO_2	Carbon dioxide (ppm)	**728**
N_2	Nitrogen (ppm)	**85681**
O_2	Oxygen (ppm)	**37309**
	Total Gas (ppm)	**125167**
	Total Combustible Gas (ppm)	**1449**
D1533	Moisture (ppm)	**28**
D971	Interfacial Tension (dynes/cm)	**40.0**
D974	Acid Number (mg KOH/g)	**0.005**
D1500	Color Number	**<2.5**
D1524	Visual Examination	**Clear & Bright**
D877	Dielectric BV (kV)	
D1816 1mm	Dielectric BV (kV)	**22**
D924	Power Factor (% at 25 ºC)	**0.030**
D924	Power Factor (% at 100 ºC)	
D2668	Oxidation Inhibitor (%)	
D1298	Specific Gravity	**0.871**
D88	Viscosity (SUS)	
D97	Pour Point (ºC)	
D92	Flash Point (ºC)	
D92	Fire Point (ºC)	
D1807	Refractive Index	
D1275	Corrosive Sulfur	
	PCB Content (ppm)	
	Degree of Polymerization	
	Estimated % Life Remaining	

Interpretation: ***All oil quality properties and dissolved gas levels are within acceptable limits.***

Recommendation: ***Continue sampling on an annual basis.***

Oil Diagnostics Report

Samantha Evelyn
Hydro Ottawa
2711 Hunt Club Road
Ottawa, ON K1G 3S4

STARK International Inc.
113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

Toll Free: 1-877-875-2775 Fax: (902) 755-2949

8-Jun-22

Unit ID	**SST3**	Power Rating (MVA)	
Serial Number	**C-09062-5-1**	Voltage	**15kV**
Location	**Hawkesbury**	Fluid Volume	**18665 L**
Manufacturer	**PT**	Fluid Type	**Mineral Oil**
Year of Manufacture	**2014**	Preservation	**Conservator**

	Sample Date	**17-May-22**
	Laboratory No.	**187**
	Container No.	**37176**
	Temperature (ºC)	**25**
H_2	Hydrogen (ppm)	**17**
CH_4	Methane (ppm)	**3**
C_2H_6	Ethane (ppm)	**<1**
C_2H_4	Ethylene (ppm)	**1**
C_2H_2	Acetylene (ppm)	**<1**
CO	Carbon monoxide (ppm)	**395**
CO_2	Carbon dioxide (ppm)	**1258**
N_2	Nitrogen (ppm)	**93742**
O_2	Oxygen (ppm)	**24381**
	Total Gas (ppm)	**119797**
	Total Combustible Gas (ppm)	**416**
D1533	Moisture (ppm)	**28**
D971	Interfacial Tension (dynes/cm)	**43.1**
D974	Acid Number (mg KOH/g)	**0.003**
D1500	Color Number	**<0.5**
D1524	Visual Examination	**Clear & Bright**
D877	Dielectric BV (kV)	
D1816 1mm	Dielectric BV (kV)	**24**
D924	Power Factor (% at 25 ºC)	**0.009**
D924	Power Factor (% at 100 ºC)	
D2668	Oxidation Inhibitor (%)	
D1298	Specific Gravity	**0.879**
D88	Viscosity (SUS)	
D97	Pour Point (ºC)	
D92	Flash Point (ºC)	
D92	Fire Point (ºC)	
D1807	Refractive Index	
D1275	Corrosive Sulfur	
	PCB Content (ppm)	
	Degree of Polymerization	
	Estimated % Life Remaining	

Interpretation: ***Carbon monoxide (395 ppm) is slightly elevated. Moisture (28 ppm) is questionable. All other oil quality properties and dissolved gas levels are within acceptable limits.***

Recommendation: ***Continue sampling on an annual basis.***

Oil Diagnostics Report

Samantha Evelyn
Hydro Ottawa
2711 Hunt Club Road
Ottawa, ON K1G 3S4

STARK International Inc.
113 Archimedes Street
New Glasgow, Nova Scotia
B2H 2T3

Toll Free: 1-877-875-2775 Fax: (902) 755-2949

8-Jun-22

Unit ID	**SST3 TC**	Power Rating (MVA)	
Serial Number	**C-09062-5-1**	Voltage	
Location	**Hawkesbury**	Fluid Volume	
Manufacturer		Fluid Type	
Year of Manufacture		Preservation	

	Sample Date	**17-May-22**
	Laboratory No.	**188**
	Container No.	**37001**
	Temperature (ºC)	**20**
H_2	Hydrogen (ppm)	**<1**
CH_4	Methane (ppm)	**<1**
C_2H_6	Ethane (ppm)	**<1**
C_2H_4	Ethylene (ppm)	**<1**
C_2H_2	Acetylene (ppm)	**<1**
CO	Carbon monoxide (ppm)	**10**
CO_2	Carbon dioxide (ppm)	**202**
N_2	Nitrogen (ppm)	**57278**
O_2	Oxygen (ppm)	**20637**
	Total Gas (ppm)	**78127**
	Total Combustible Gas (ppm)	**10**
D1533	Moisture (ppm)	**22**
D971	Interfacial Tension (dynes/cm)	**44.8**
D974	Acid Number (mg KOH/g)	**0.003**
D1500	Color Number	**<0.5**
D1524	Visual Examination	**Clear & Bright**
D877	Dielectric BV (kV)	
D1816 1mm	Dielectric BV (kV)	**32**
D924	Power Factor (% at 25 ºC)	**0.002**
D924	Power Factor (% at 100 ºC)	
D2668	Oxidation Inhibitor (%)	
D1298	Specific Gravity	**0.879**
D88	Viscosity (SUS)	
D97	Pour Point (ºC)	
D92	Flash Point (ºC)	
D92	Fire Point (ºC)	
D1807	Refractive Index	
D1275	Corrosive Sulfur	
	PCB Content (ppm)	
	Degree of Polymerization	
	Estimated % Life Remaining	

Interpretation: ***All oil quality properties and dissolved gas levels are within acceptable limits.***

Recommendation: ***Continue sampling on an annual basis.***

Oil Diagnostics Report

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8-Jun-22

Unit ID	**43T1**	Power Rating (MVA)	**16.7**
Serial Number	**0308401001**	Voltage	**44kV/12.4kV**
Location	**Hawkesbury DS**	Fluid Volume	**7185 L**
Manufacturer	**General Electric**	Fluid Type	
Year of Manufacture	**1985**	Preservation	**Sealed**

	Sample Date	**17-May-22**
	Laboratory No.	**184**
	Container No.	**37172**
	Temperature (ºC)	**35**
H_2	Hydrogen (ppm)	**9**
CH_4	Methane (ppm)	**6**
C_2H_6	Ethane (ppm)	**<1**
C_2H_4	Ethylene (ppm)	**13**
C_2H_2	Acetylene (ppm)	**<1**
CO	Carbon monoxide (ppm)	**970**
CO_2	Carbon dioxide (ppm)	**4019**
N_2	Nitrogen (ppm)	**99448**
O_2	Oxygen (ppm)	**15332**
	Total Gas (ppm)	**119797**
	Total Combustible Gas (ppm)	**998**
D1533	Moisture (ppm)	**25**
D971	Interfacial Tension (dynes/cm)	**41.1**
D974	Acid Number (mg KOH/g)	**0.004**
D1500	Color Number	**<0.5**
D1524	Visual Examination	**Clear & Bright**
D877	Dielectric BV (kV)	
D1816 1mm	Dielectric BV (kV)	**20**
D924	Power Factor (% at 25 ºC)	**0.006**
D924	Power Factor (% at 100 ºC)	
D2668	Oxidation Inhibitor (%)	
D1298	Specific Gravity	**0.865**
D88	Viscosity (SUS)	
D97	Pour Point (ºC)	
D92	Flash Point (ºC)	
D92	Fire Point (ºC)	
D1807	Refractive Index	
D1275	Corrosive Sulfur	
	PCB Content (ppm)	
	Degree of Polymerization	
	Estimated % Life Remaining	

Interpretation: ***Carbon monoxide (970 ppm) is slightly elevated. Moisture (25 ppm) and dielectric breakdown voltage (20 kV) are questionable. All other oil quality properties and dissolved gas levels are within acceptable limits.***

Recommendation: ***Gases are normal for the age of the unit. However, we recommend resampling to verify the dielectric breakdown voltage.***

Oil Diagnostics Report

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8-Jun-22

Unit ID	**43T2**	Power Rating (MVA)	**16.7**
Serial Number	**G16194-1**	Voltage	**44kV/12.4kV**
Location	**Hawkesbury DS**	Fluid Volume	**10020 L**
Manufacturer	**Pioneer**	Fluid Type	**Mineral Oil**
Year of Manufacture	**2012**	Preservation	**Sealed**

	Sample Date	**17-May-22**
	Laboratory No.	**186**
	Container No.	**37006**
	Temperature (ºC)	
H_2	Hydrogen (ppm)	**1**
CH_4	Methane (ppm)	**2**
C_2H_6	Ethane (ppm)	**<1**
C_2H_4	Ethylene (ppm)	**1**
C_2H_2	Acetylene (ppm)	**2**
CO	Carbon monoxide (ppm)	**68**
CO_2	Carbon dioxide (ppm)	**575**
N_2	Nitrogen (ppm)	**54334**
O_2	Oxygen (ppm)	**17012**
	Total Gas (ppm)	**71995**
	Total Combustible Gas (ppm)	**74**
D1533	Moisture (ppm)	**19**
D971	Interfacial Tension (dynes/cm)	**41.7**
D974	Acid Number (mg KOH/g)	**0.003**
D1500	Color Number	**<0.5**
D1524	Visual Examination	**Clear & Bright**
D877	Dielectric BV (kV)	
D1816 1mm	Dielectric BV (kV)	**17**
D924	Power Factor (% at 25 ºC)	**0.020**
D924	Power Factor (% at 100 ºC)	
D2668	Oxidation Inhibitor (%)	
D1298	Specific Gravity	**0.846**
D88	Viscosity (SUS)	
D97	Pour Point (ºC)	
D92	Flash Point (ºC)	
D92	Fire Point (ºC)	
D1807	Refractive Index	
D1275	Corrosive Sulfur	
	PCB Content (ppm)	
	Degree of Polymerization	
	Estimated % Life Remaining	

Interpretation: ***Dielectric breakdown voltage (17 kV) is unacceptable. All other oil quality properties and dissolved gas levels are within acceptable limits.***

Recommendation: ***We recommend resampling to verify dielectric breakdown voltage.***

Oil Diagnostics Report

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8-Jun-22

Unit ID	**43T2 TC**	Power Rating (MVA)	
Serial Number	**1ZSC 8714 910**	Voltage	
Location	**Hawkesbury**	Fluid Volume	
Manufacturer	**ABB**	Fluid Type	**Mineral Oil**
Year of Manufacture	**2013**	Preservation	

	Sample Date	**17-May-22**
	Laboratory No.	**183**
	Container No.	**37066**
	Temperature (ºC)	
H_2	Hydrogen (ppm)	**4**
CH_4	Methane (ppm)	**1**
C_2H_6	Ethane (ppm)	**<1**
C_2H_4	Ethylene (ppm)	**<1**
C_2H_2	Acetylene (ppm)	**<1**
CO	Carbon monoxide (ppm)	**18**
CO_2	Carbon dioxide (ppm)	**442**
N_2	Nitrogen (ppm)	**64922**
O_2	Oxygen (ppm)	**30865**
	Total Gas (ppm)	**96252**
	Total Combustible Gas (ppm)	**23**
D1533	Moisture (ppm)	**23**
D971	Interfacial Tension (dynes/cm)	**40.1**
D974	Acid Number (mg KOH/g)	**0.003**
D1500	Color Number	**<0.5**
D1524	Visual Examination	**Clear & Bright**
D877	Dielectric BV (kV)	
D1816 1mm	Dielectric BV (kV)	**19.5**
D924	Power Factor (% at 25 ºC)	**0.006**
D924	Power Factor (% at 100 ºC)	
D2668	Oxidation Inhibitor (%)	
D1298	Specific Gravity	**0.857**
D88	Viscosity (SUS)	
D97	Pour Point (ºC)	
D92	Flash Point (ºC)	
D92	Fire Point (ºC)	
D1807	Refractive Index	
D1275	Corrosive Sulfur	
	PCB Content (ppm)	
	Degree of Polymerization	
	Estimated % Life Remaining	

Interpretation: ***Dielectric breakdown voltage (19.5 kV) is questionable. All other oil quality properties and dissolved gas levels are within acceptable limits.***

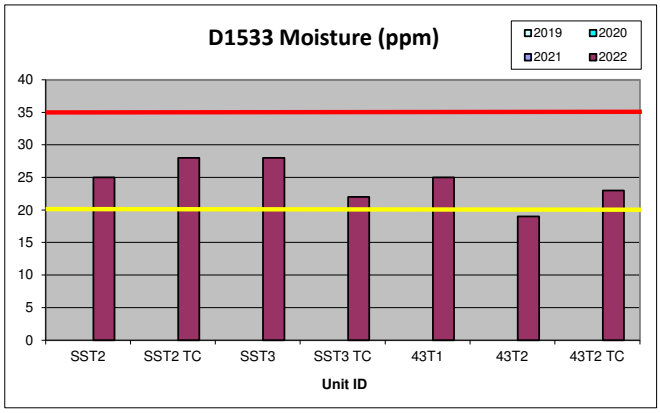
Recommendation: ***Continue sampling on an annual basis.***

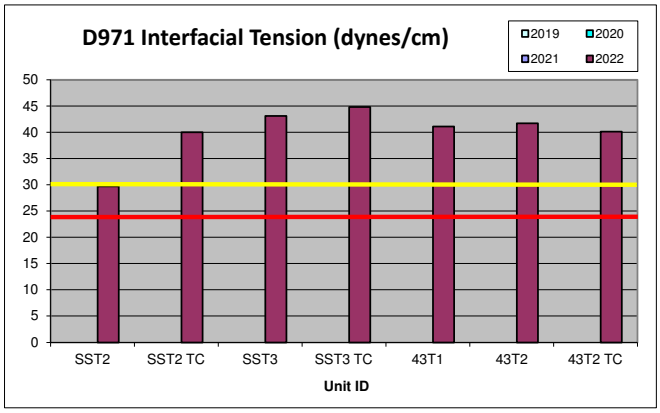
Hawkesbury

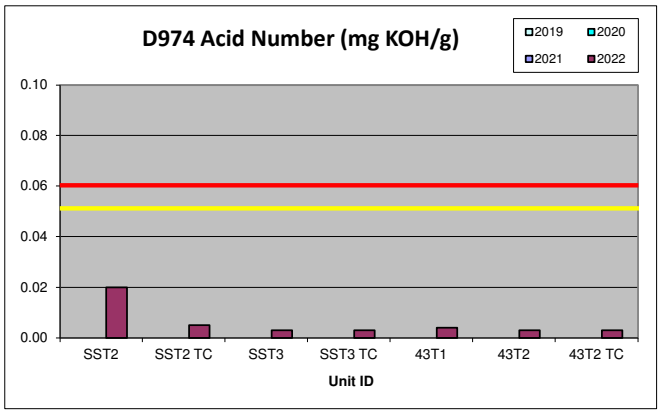
Unit ID	SST2	SST2 TC	SST3	SST3 TC	43T1	43T2	43T2 TC
Serial Number			C-09062-5-1	C-09062-5-1	0308401001	G16194-1	1ZSC 8714 910
Location	Hawkesbury	Hawkesbury	Hawkesbury	Hawkesbury	Hawkesbury DS	Hawkesbury DS	Hawkesbury
Manufacturer			PT		General Electric	Pioneer	ABB
Year of Manufacture	1965	1965	2014		1985	2012	2013
Power Rating (MVA)					16.70	16.67	
Voltage	15 kV		15kV		44kV/12.4kV	44kV/12.4kV	
Fluid Volume			18665 L		7185 L	10020 L	
Fluid Type			Mineral Oil			Mineral Oil	Mineral Oil
Breathing	Conservator		Conservator		Sealed	Sealed	
Sample Date	17-May-22	17-May-22	17-May-22	17-May-22	17-May-22	17-May-22	17-May-22
Laboratory No.	189	185	187	188	184	186	183
Container No.	37141	37029	37176	37001	37172	37006	37066
Temperature (C)	25		25	20	35		
H2 - Hydrogen (ppm)	6	15	17	<1	9	1	4
CH4 - Methane (ppm)	2	39	3	<1	6	2	1
C2H6 - Ethane (ppm)	<1	40	<1	<1	<1	<1	<1
C2H4 - Ethylene (ppm)	15	342	1	<1	13	1	<1
C2H2 - Acetylene (ppm)	<1	935	<1	<1	<1	2	<1
CO - Carbon monoxide (ppm)	256	78	395	10	970	68	18
CO2 - Carbon dioxide (ppm)	1920	728	1258	202	4019	575	442
N2 - Nitrogen (ppm)	78870	85681	93742	57278	99448	54334	64922
O2 - Oxygen (ppm)	33520	37309	24381	20637	15332	17012	30865
Total (ppm)	114589	125167	119797	78127	119797	71995	96252
TDCG (ppm)	279	1449	416	10	998	74	23
D1533 Moisture (ppm)	25	28	28	22	25	19	23
D971 Interfacial Tension (dynes/cm)	29.7	40.0	43.1	44.8	41.1	41.7	40.1
D974 Acid Number (mg KOH/g)	0.020	0.005	0.003	0.003	0.004	0.003	0.003
D1500 Color Number	<1.5	<2.5	<0.5	<0.5	<0.5	<0.5	<0.5
D1524 Visual Examination	Clear & Bright	Clear & Bright	Clear & Bright	Clear & Bright	Clear & Bright	Clear & Bright	Clear & Bright
D1816 Dielectric BV (kV)	24	22	24	32	20	17	20
D924 Power Factor (% at 25 C)	0.015	0.030	0.009	0.002	0.006	0.020	0.006
D2668 Oxidation Inhibitor (%)							
D1298 Specific Gravity	0.856	0.871	0.879	0.879	0.865	0.846	0.857
Furans dP							
% Life Remaining							

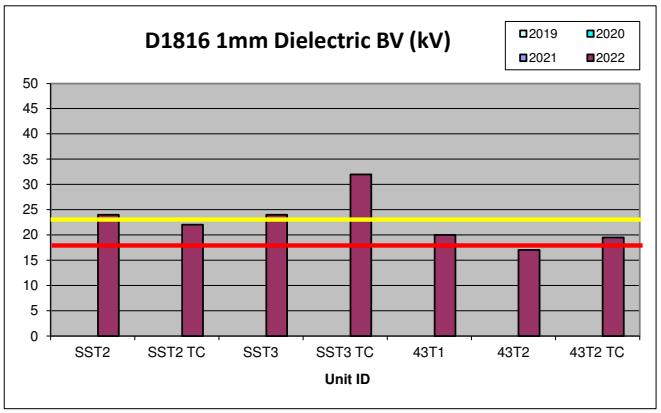
Hawkesbury

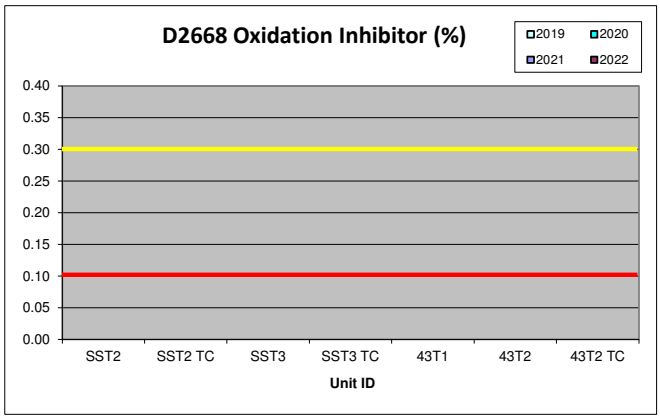
Min
Oil

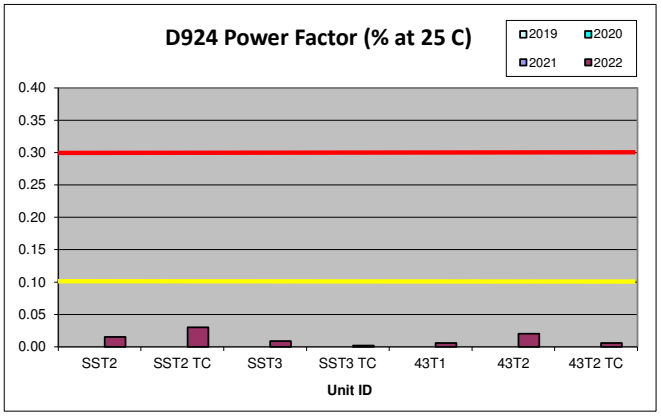


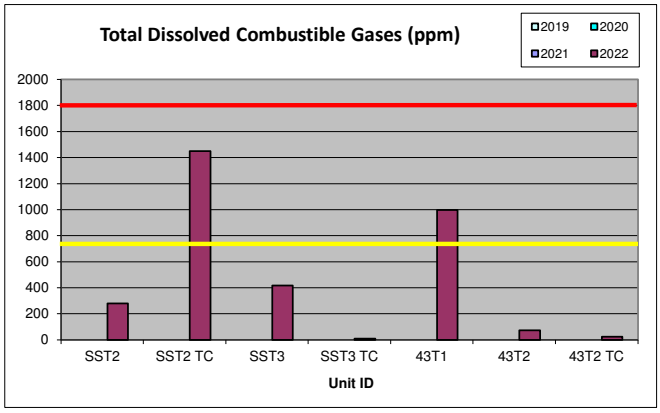












Warning Level

Acceptance

Hawkesbury Hydro

Q3 Station Inspections

at 44KV Tessier M.S. & 115KV Main St. W. T.S.

Hydro Ottawa
Sept. 7th, 2022

Contents

44KV Station (Tessier St.) - Q3 Inspection

Q1/Q2 Corrective Actions

- Upon further inspection fans were found to be in working condition. Low voltage supply breaker to fans was found turned off.

Recommendations for Corrective Actions

- Crews did not report any new deficiencies during this inspection. No new recommendations to report at this time.

STATION INSPECTION

HydroOttawa

TYPE: MAINTENANCE | STATION: MS #2 | ISSUE DATE:
COMPLETED DATE: 8/29/2022
SUBSTATION ADDRESS:
TESTED BY: DOMINIQUE RIVET
FEEDER/NOMENCLATURE: TESSIER | AMBIENT TEMPERATURE: 25 °C | TESTED BY: BEN BOILEAU
WORK ORDER #: 680819 | TEST STATUS:

PROCEDURE

- ☑ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☑ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☑ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I ☐ N/A	YARD (fence, gate, grounds, stone...)	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OVERALL BUILDING CONDITION	
☐ G ☐ P ☐ C ☐ I ☑ N/A	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SWITCHGEAR / RECLOSERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION IDENTIFICATION SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	PPE SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SITE SAFETY NOTICE SIGN	
☐ G ☐ P ☐ C ☐ I ☑ N/A	CONTAINMENT PIT	
☐ G ☐ P ☐ C ☐ I ☑ N/A	SUMP PIT / OIL WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN ☐ SCADA STATUS OK
☐ G ☐ P ☐ C ☐ I ☑ N/A	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I ☑ N/A	DGA SERVICE LIGHTS	
☐ G ☐ P ☐ C ☐ I ☑ N/A	VERIFY ATS OPERATION	

G = ITEMS FOUND IN SATISFACTORY CONDITION
P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION
C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION
I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS: FANS ARE OK ON TRANSFORMER . BREAKER WAS OFF.
DEFICIENCIES:

ALARMS & GREEN TAGS (SYSTEM OFFICE CHECK)

ALARM OR GREEN TAG	AS FOUND	AS LEFT	NOTES
N/A	N/A	N/A	N/A

AUTOMATIC TRANSFER SWITCH

OPERATION	PASS / FAIL	NOTES
VERIFY OPERTION BY OPENING NORMAL FEED	PASS	N/A
CONFIRM STATUS WITH SYSTEM OFFICE	PASS	N/A
CONFIRM STATUS WITH SYSTEM OFFICE	PASS	N/A
CONFIRM STATUS WITH SYSTEM OFFICE		

STATION INSPECTION

STATION BATTERIES AND CHARGER	
NUMBER OF CELLS	10
SPECIFIED VOLTAGE PER CELL	12

DC SYSTEM	PASS / FAIL	NOTES
VERIFY NO ALARMS ON CHARGER	PASS	
VERIFY GROUNDING CONTINUITY	PASS	
VERIFY CORROSION	PASS	
VERIFY WATER LEVELS (top-up if required)	PASS	

DC VOLTAGE	Volts	ACCEPTABLE RANGE
CHARGER DISPLAY VOLTAGE	132	125V to 130V
MEASURED BANK VOLTAGE (disconnect charger)		> 90% OF (SPECIFIED CELL VOLTAGE x NUMBER OF CELLS)
MEASURED BANK VOLTAGE (disconnect charger)		> 90% OF (SPECIFIED CELL VOLTAGE x NUMBER OF CELLS)

SUMP PUMP	
Operation	**PASS / FAIL**
RUN FOR 1 MIN TO CONFIRM OPERATION	PASS

STATION INSPECTION

HydroOttawa

PAGE _____

TRANSFORMER

MANUFACTURER	FERRANTI-PACKARD	KVA	10,000 / 13,300 / 16,700
SERIAL NUMBER	0308401001	PRIMARY VOLTAGE	44,000 / DELTA
YEAR	1985	SECONDARY VOLTAGE	12,470 / 7,200 WYE
TYPE	SEALED	OIL VOLUME	L
IMPEDANCE	6.96 %	TOTAL WEIGHT	31397 KG
TEMPERATURE RISE	65 °C	# OF FANS	6
HV BIL	250	TAP CHANGER	INTERNAL
LV BIL	95		

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND
OIL TEMPERATURE	MIN	Max	AS FOUND 50
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND 60
BUSHING OIL LEVEL	0%	100%	AS FOUND
TRANSFORMER PRESSURE		☐ KPA ☐ PSI	AS FOUND
GAS RELAY			AS FOUND

TAP CHANGER

MANUFACTURER _____ MODEL _____

SERIAL NO. _____ YEAR _____ GALLONS _____

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND
TAP POSITION	MIN	Max	AS FOUND
COUNTER			AS FOUND
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND
HEATER CONDITION	☐ G ☐ P ☐ C ☐ I		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I		

OIL FILTRATION PUMP PSI: _____ FILTER TYPE: _____ FILTER CHANGE DATE: _____ HOURS: _____

STATION INSPECTION

PAGE

TRANSFORMER

MANUFACTURER	PIONEER TRANSFORMERS	KVA	10,000 / 13,330 / 16,670
SERIAL NUMBER	G16194-1	PRIMARY VOLTAGE	44,000 / DELTA
YEAR	2012	SECONDARY VOLTAGE	12,470 / 7,200 DELTA
TYPE	SEALED	OIL VOLUME	L
IMPEDANCE	6.91 %	TOTAL WEIGHT	28880
TEMPERATURE RISE	65 °C	# OF FANS	6
HV BIL		TAP CHANGER	EXTERNAL
LV BIL			

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max		AS FOUND 30
OIL TEMPERATURE	MIN		Max		AS FOUND 30
TRANSFORMER OIL LEVEL	0%		100%		AS FOUND 50
BUSHING OIL LEVEL	0%		100%		AS FOUND 50
TRANSFORMER PRESSURE			☐ KPA ☑ PSI		AS FOUND 0
GAS RELAY					AS FOUND

TAP CHANGER

MANUFACTURER ABB MODEL UZERT 250/300

SERIAL NO. 1ZSC 8714 910 YEAR 2013 GALLONS

TAP CHANGER OIL TEMP	MIN		Max		AS FOUND 30
TAP CHANGER OIL LEVEL	MIN		Max		AS FOUND 50
TAP POSITION	MIN	12	Max	12	AS FOUND 12
COUNTER					AS FOUND 2,895
DIVERTOR OIL LEVEL	MIN		Max		AS FOUND
HEATER CONDITION	☑ G ☐ P ☐ C ☐ I				
RELIEF VENT	☑ G ☐ P ☐ C ☐ I				

OIL FILTRATION PUMP PSI: 0 FILTER TYPE: FILTER CHANGE DATE: HOURS: 9:59

115KV Station (Main St. W.) - Q3 Inspection

Q1/Q2 Corrective Actions

- Crews replaced the battery pack in the emergency lighting in the P&C Shed.

Recommendations for Corrective Actions

- Crews did not report any new deficiencies during this inspection. No new recommendations to report at this time.

STATION INSPECTION

TYPE: MAINTENANCE | STATION: | ISSUE DATE:
COMPLETED DATE: 8/29/2022
SUBSTATION ADDRESS:
TESTED BY: DOMINIQUE RIVET
FEEDER/NOMENCLATURE: HAWKSBURY 115KV | AMBIENT TEMPERATURE: °C
TESTED BY: BEN BOILEAU
WORK ORDER #: 680819 | TEST STATUS:

PROCEDURE

- ☑ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☑ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☑ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I ☐ N/A	YARD (fence, gate, grounds, stone...)	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OVERALL BUILDING CONDITION	
☑ G ☐ P ☐ C ☐ I ☐ N/A	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SWITCHGEAR / RECLOSERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION IDENTIFICATION SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	PPE SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SITE SAFETY NOTICE SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	CONTAINMENT PIT	DRY
☐ G ☐ P ☐ C ☐ I ☑ N/A	SUMP PIT / OIL WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN ☐ SCADA STATUS OK
☐ G ☐ P ☐ C ☐ I ☑ N/A	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I ☑ N/A	DGA SERVICE LIGHTS	
☐ G ☐ P ☐ C ☐ I ☑ N/A	VERIFY ATS OPERATION	

G = ITEMS FOUND IN SATISFACTORY CONDITION
P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION
C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION
I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS:
DEFICIENCIES:

ALARMS & GREEN TAGS (SYSTEM OFFICE CHECK)

ALARM OR GREEN TAG	AS FOUND	AS LEFT	NOTES
N/A	N/A	N/A	

AUTOMATIC TRANSFER SWITCH

OPERATION	PASS / FAIL	NOTES
VERIFY OPERTION BY OPENING NORMAL FEED	PASS	N/A
CONFIRM STATUS WITH SYSTEM OFFICE	PASS	N/A
CONFIRM STATUS WITH SYSTEM OFFICE	PASS	N/A
CONFIRM STATUS WITH SYSTEM OFFICE		

STATION INSPECTION

PAGE _____

STATION BATTERIES AND CHARGER	
NUMBER OF CELLS	10
SPECIFIED VOLTAGE PER CELL	12

DC SYSTEM	PASS / FAIL	NOTES
VERIFY NO ALARMS ON CHARGER	PASS	
VERIFY GROUNDING CONTINUITY	PASS	
VERIFY CORROSION	PASS	
VERIFY WATER LEVELS (top-up if required)	PASS	N/A

DC VOLTAGE	Volts	ACCEPTABLE RANGE
CHARGER DISPLAY VOLTAGE	135	125V to 130V
MEASURED BANK VOLTAGE (disconnect charger)		> 90% OF (SPECIFIED CELL VOLTAGE x NUMBER OF CELLS)
MEASURED BANK VOLTAGE (disconnect charger)		> 90% OF (SPECIFIED CELL VOLTAGE x NUMBER OF CELLS)

SUMP PUMP	
Operation	**PASS / FAIL**
RUN FOR 1 MIN TO CONFIRM OPERATION	PASS

CIRCUIT SWITCHER

NOMENCLATURE: 55T3-L | CURRENT RATING: 1200 AMPERES

MANUFACTURER: SIEMENS | VOLTAGE CLASS: 121 kV

VISUAL IMSPECTION	CONDITION
SF6 LEAKS	☑ A ☐ C ☐ E
TANK & MECHANISM BOX	☑ A ☐ B ☐ C ☐ D ☐ E
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
CONTROL MECHANISM	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E

HEATING BLANKET OPERATION	N/A

◉ PSI ○ KPA	RED	WHITE	BLUE
SF6 GAS PRESSURE	65	65	65

OPERTION COUNTER	60

CIRCUIT SWITCHER

NOMENCLATURE: 55T2-L | CURRENT RATING: 1200 AMPERES

MANUFACTURER: SIEMENS | VOLTAGE CLASS: 121 kV

VISUAL IMSPECTION	CONDITION
SF6 LEAKS	☑ A ☐ C ☐ E
TANK & MECHANISM BOX	☑ A ☐ B ☐ C ☐ D ☐ E
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
CONTROL MECHANISM	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E

HEATING BLANKET OPERATION	N/A

◉ PSI ○ KPA	RED	WHITE	BLUE
SF6 GAS PRESSURE	63	63	63

OPERTION COUNTER	20

STATION INSPECTION

PAGE

SWITCH

NOMENCLATURE 55T3-LBS

VISUAL IMSPECTION	CONDITION
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
DISCONNECT LIVE PARTS	☑ A ☐ B ☐ C ☐ D ☐ E

SWITCH

NOMENCLATURE 55T2-LBS

VISUAL IMSPECTION	CONDITION
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
DISCONNECT LIVE PARTS	☑ A ☐ B ☐ C ☐ D ☐ E

TRANSFORMER

MANUFACTURER	MOLONEY ELECTRIC	KVA	3,500 / 10,000 / 13,500
SERIAL NUMBER	213081	PRIMARY VOLTAGE	110,000 / DELTA
YEAR	1965	SECONDARY VOLTAGE	12,480 / 7,200 WYE
TYPE	CONSERVATOR	OIL VOLUME	L
IMPEDANCE	8.9 %	TOTAL WEIGHT	94850 LBS
TEMPERATURE RISE	°C	# OF FANS	8
HV BIL	550	TAP CHANGER	EXTERNAL
LV BIL	110		

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN		Max	AS FOUND	
OIL TEMPERATURE	MIN		Max	AS FOUND	54
TRANSFORMER OIL LEVEL	0%		100%	AS FOUND	60
BUSHING OIL LEVEL	0%		100%	AS FOUND	
TRANSFORMER PRESSURE			☐ KPA ☐ PSI	AS FOUND	
GAS RELAY				AS FOUND	

TAP CHANGER

MANUFACTURER MOLONEY ELECTRIC MODEL

SERIAL NO. YEAR 1965 GALLONS 400L

TAP CHANGER OIL TEMP	MIN		Max	AS FOUND	40
TAP CHANGER OIL LEVEL	MIN		Max	AS FOUND	25
TAP POSITION	MIN	5	Max	11	AS FOUND 9
COUNTER				AS FOUND	20,382
DIVERTOR OIL LEVEL	MIN		Max	AS FOUND	
HEATER CONDITION	☐ G ☐ P ☐ C ☐ I				
RELIEF VENT	☐ G ☐ P ☐ C ☐ I				

OIL FILTRATION PUMP PSI: 1 FILTER TYPE: FILTER CHANGE DATE: HOURS:

STATION INSPECTION

HydroOttawa

PAGE

TRANSFORMER

MANUFACTURER	PENSYLVANIA TRANSFORMER TECH	KVA	15,000 / 20,000 / 25,000
SERIAL NUMBER	C-09062-5-1	PRIMARY VOLTAGE	110,000 / DELTA
YEAR	2014	SECONDARY VOLTAGE	12,480 / 7,205 WYE
TYPE	CONSERVATOR	OIL VOLUME	18665 L
IMPEDANCE	10.2 %	TOTAL WEIGHT	54735 KG
TEMPERATURE RISE	65 °C	# OF FANS	8
HV BIL	550	TAP CHANGER	EXTERNAL
LV BIL	110		

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND 40
OIL TEMPERATURE	MIN	Max	AS FOUND 50
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND 50
BUSHING OIL LEVEL	0%	100%	AS FOUND 50
TRANSFORMER PRESSURE		☐ KPA ☐ PSI	AS FOUND
GAS RELAY			AS FOUND

TAP CHANGER

MANUFACTURER REINHAUSSEN MODEL MD1-I

SERIAL NO. 1400253 YEAR 2013 GALLONS

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND 34
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND 50
TAP POSITION	MIN 9	Max 17	AS FOUND 15
COUNTER			AS FOUND 34,559
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND
HEATER CONDITION	☑ G ☐ P ☐ C ☐ I		
RELIEF VENT	☑ G ☐ P ☐ C ☐ I		

OIL FILTRATION PUMP PSI: FILTER TYPE: FILTER CHANGE DATE: HOURS:

Hawkesbury Hydro

Q4 Station Inspections
&
Transformer Maintenance (55T3)

at 44KV Tessier M.S. & 115KV Main St. W. T.S.

Hydro Ottawa
Dec. 14th, 2022

Contents

44KV Station (Tessier St.) - Q4 Inspection

Recommendations for Corrective Actions

- Crews did not report any new deficiencies during this inspection. No new recommendations to report at this time.

STATION INSPECTION

TYPE: ROUTINE INSPECTION | STATION: HAWKESBURY MS | ISSUE DATE:
COMPLETED DATE: 11/9/2022
SUBSTATION ADDRESS: TESSIER ST | TESTED BY: BEN BOILEAU
FEEDER/NOMENCLATURE: TESSIER | AMBIENT TEMPERATURE: °C | TESTED BY: JAMES ZLOTY
WORK ORDER #: 680819 | TEST STATUS: Pass

PROCEDURE

- ☐ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☐ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☐ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I ☐ N/A	YARD (fence, gate, grounds, stone...)	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OVERALL BUILDING CONDITION	
☐ G ☐ P ☐ C ☐ I ☑ N/A	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SWITCHGEAR / RECLOSERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION IDENTIFICATION SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	PPE SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SITE SAFETY NOTICE SIGN	
☐ G ☐ P ☐ C ☐ I ☑ N/A	CONTAINMENT PIT	
☐ G ☐ P ☐ C ☐ I ☑ N/A	SUMP PIT / OIL WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN ☐ SCADA STATUS OK
☐ G ☐ P ☐ C ☐ I ☑ N/A	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I ☑ N/A	DGA SERVICE LIGHTS	
☐ G ☐ P ☐ C ☐ I ☑ N/A	VERIFY ATS OPERATION	

G = ITEMS FOUND IN SATISFACTORY CONDITION
P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION
C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION
I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS:
DEFICIENCIES:

ALARMS & GREEN TAGS (SYSTEM OFFICE CHECK)

ALARM OR GREEN TAG	AS FOUND	AS LEFT	NOTES

AUTOMATIC TRANSFER SWITCH

OPERATION	PASS / FAIL	NOTES
VERIFY OPERTION BY OPENING NORMAL FEED	PASS	
CONFIRM STATUS WITH SYSTEM OFFICE	PASS	

STATION INSPECTION

PAGE _____

STATION BATTERIES AND CHARGER	
NUMBER OF CELLS	
SPECIFIED VOLTAGE PER CELL	

DC SYSTEM	PASS / FAIL	NOTES
VERIFY NO ALARMS ON CHARGER	PASS	
VERIFY GROUNDING CONTINUITY	PASS	
VERIFY CORROSION	PASS	
VERIFY WATER LEVELS (top-up if required)	PASS	

DC VOLTAGE	Volts	ACCEPTABLE RANGE
CHARGER DISPLAY VOLTAGE		125V to 130V
MEASURED BANK VOLTAGE (disconnect charger)		> 90% OF (SPECIFIED CELL VOLTAGE x NUMBER OF CELLS)

SUMP PUMP	
Operation	PASS / FAIL
RUN FOR 1 MIN TO CONFIRM OPERATION	PASS

TRANSFORMER

MANUFACTURER	FERRANTI-PACKARD	KVA	10,000 / 13,300 / 16,700
SERIAL NUMBER	0308401001	PRIMARY VOLTAGE	44,000 / DELTA
YEAR	1985	SECONDARY VOLTAGE	12,470 / 7,200 WYE
TYPE	SEALED	OIL VOLUME	L
IMPEDANCE	6.96 %	TOTAL WEIGHT	31397 KG
TEMPERATURE RISE	65 °C	# OF FANS	6
HV BIL	250	TAP CHANGER	INTERNAL
LV BIL	95		

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND
OIL TEMPERATURE	MIN	Max	AS FOUND 35
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND 50
BUSHING OIL LEVEL	0%	100%	AS FOUND
TRANSFORMER PRESSURE		☐ KPA ☐ PSI	AS FOUND
GAS RELAY			AS FOUND

TAP CHANGER

MANUFACTURER _____ MODEL _____

SERIAL NO. _____ YEAR _____ GALLONS _____

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND
TAP POSITION	MIN	Max	AS FOUND
COUNTER			AS FOUND
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND
HEATER CONDITION	☐ G ☐ P ☐ C ☐ I		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I		

OIL FILTRATION PUMP PSI: _____ FILTER TYPE: _____ FILTER CHANGE DATE: _____ HOURS: _____

STATION INSPECTION

PAGE

TRANSFORMER

MANUFACTURER	PIONEER TRANSFORMERS	KVA	10,000 / 13,330 / 16,670
SERIAL NUMBER	G16194-1	PRIMARY VOLTAGE	44,000 / DELTA
YEAR	2012	SECONDARY VOLTAGE	12,470 / 7,200 DELTA
TYPE	SEALED	OIL VOLUME	L
IMPEDANCE	6.91 %	TOTAL WEIGHT	28880
TEMPERATURE RISE	65 °C	# OF FANS	6
HV BIL		TAP CHANGER	EXTERNAL
LV BIL			

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND 10
OIL TEMPERATURE	MIN	Max	AS FOUND 10
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND 50
BUSHING OIL LEVEL	0%	100%	AS FOUND
TRANSFORMER PRESSURE		☐ KPA ☑ PSI	AS FOUND
GAS RELAY			AS FOUND

TAP CHANGER

MANUFACTURER ABB MODEL UZERT 250/300

SERIAL NO. 1ZSC 8714 910 YEAR 2013 GALLONS

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND 40
TAP POSITION	MIN	Max	AS FOUND
COUNTER			AS FOUND 2,586
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND
HEATER CONDITION	☐ G ☐ P ☐ C ☐ I		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I		

OIL FILTRATION PUMP PSI: FILTER TYPE: FILTER CHANGE DATE: HOURS:

115KV Station (Main St. W.) - Q4 Inspection

Recommendations for Corrective Actions

- Crews did not report any new deficiencies during this inspection. No new recommendations to report at this time.

STATION INSPECTION

TYPE: ROUTINE INSPECTION | STATION: HAWKESBURY MTS | ISSUE DATE:
COMPLETED DATE: 11/9/2022
SUBSTATION ADDRESS: MAIN ST | TESTED BY: BEN BOILEAU
FEEDER/NOMENCLATURE: HAWKSBURY 115KV | AMBIENT TEMPERATURE: °C | TESTED BY: JAMES ZLOTY
WORK ORDER #: 680819 | TEST STATUS: Pass

PROCEDURE

- ☐ FOLLOW WORK PROCEDURES FOR THE LISTED INDIVIDUAL INSPECTIONS AND CHECK APPRORIATE BOX
- ☐ CHECK ALL ITEMS SPECIFIC TO THIS STATION AND COMPLETE ALL PAGES.
- ☐ CALL INTO SYSTEM ANY TARGETS OR FLAGGING AND RESET UPON DEPARTURE

CONDITION	INSPECTION ITEM	REMARKS
☑ G ☐ P ☐ C ☐ I ☐ N/A	YARD (fence, gate, grounds, stone...)	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OVERALL BUILDING CONDITION	
☑ G ☐ P ☐ C ☐ I ☐ N/A	PROTECTION RELAY PANELS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	OUTDOOR STRUCTURES	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION SERVICE TRANSFORMERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SWITCHGEAR / RECLOSERS	
☑ G ☐ P ☐ C ☐ I ☐ N/A	STATION IDENTIFICATION SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	PPE SIGN	
☑ G ☐ P ☐ C ☐ I ☐ N/A	SITE SAFETY NOTICE SIGN	
☐ G ☐ P ☐ C ☐ I ☐ N/A	CONTAINMENT PIT	
☐ G ☐ P ☐ C ☐ I ☐ N/A	SUMP PIT / OIL WATER SEPARATOR	☐ CLEAN WATER ☐ OIL SHEEN ☐ SCADA STATUS OK
☐ G ☐ P ☐ C ☐ I ☐ N/A	SMOKE DETECTOR VERIFICATION	
☐ G ☐ P ☐ C ☐ I ☐ N/A	DGA SERVICE LIGHTS	
☐ G ☐ P ☐ C ☐ I ☐ N/A	VERIFY ATS OPERATION	

G = ITEMS FOUND IN SATISFACTORY CONDITION
P = ITEMS FOUND IN POOR CONDITION AND REQUIRING FUTURE CORRECTIVE ACTION
C = ITEMS REPAIRED OR CORRECTED AND LEFT IN SATISFACTORY CONDITION
I = ITEMS REQUIRING IMMEDIATE CORRECTIVE ACTIONS

COMMENTS:
DEFICIENCIES:

ALARMS & GREEN TAGS (SYSTEM OFFICE CHECK)

ALARM OR GREEN TAG	AS FOUND	AS LEFT	NOTES

AUTOMATIC TRANSFER SWITCH

OPERATION	PASS / FAIL	NOTES
VERIFY OPERTION BY OPENING NORMAL FEED	PASS	
CONFIRM STATUS WITH SYSTEM OFFICE	PASS	

STATION INSPECTION

PAGE _____

STATION BATTERIES AND CHARGER	
NUMBER OF CELLS	
SPECIFIED VOLTAGE PER CELL	

DC SYSTEM	PASS / FAIL	NOTES
VERIFY NO ALARMS ON CHARGER	PASS	
VERIFY GROUNDING CONTINUITY	PASS	
VERIFY CORROSION	PASS	
VERIFY WATER LEVELS (top-up if required)	PASS	

DC VOLTAGE	Volts	ACCEPTABLE RANGE
CHARGER DISPLAY VOLTAGE		125V to 130V
MEASURED BANK VOLTAGE (disconnect charger)		> 90% OF (SPECIFIED CELL VOLTAGE x NUMBER OF CELLS)

SUMP PUMP	
Operation	**PASS / FAIL**
RUN FOR 1 MIN TO CONFIRM OPERATION	PASS

CIRCUIT SWITCHER

NOMENCLATURE: 55T3-L | CURRENT RATING: 1200 AMPERES

MANUFACTURER: SIEMENS | VOLTAGE CLASS: 121 kV

VISUAL IMSPECTION	CONDITION
SF6 LEAKS	☑ A ☐ C ☐ E
TANK & MECHANISM BOX	☑ A ☐ B ☐ C ☐ D ☐ E
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
CONTROL MECHANISM	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
HEATING BLANKET OPERATION	N/A

◉ PSI ○ KPA	RED	WHITE	BLUE
SF6 GAS PRESSURE			

OPERTION COUNTER	70

CIRCUIT SWITCHER

NOMENCLATURE: 55T2-L | CURRENT RATING: 1200 AMPERES

MANUFACTURER: SIEMENS | VOLTAGE CLASS: 121 kV

VISUAL IMSPECTION	CONDITION
SF6 LEAKS	☑ A ☐ C ☐ E
TANK & MECHANISM BOX	☑ A ☐ B ☐ C ☐ D ☐ E
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
CONTROL MECHANISM	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
HEATING BLANKET OPERATION	N/A

○ PSI ○ KPA	RED	WHITE	BLUE
SF6 GAS PRESSURE			

OPERTION COUNTER	21

STATION INSPECTION

PAGE _____

SWITCH

NOMENCLATURE 55T3-LBS

VISUAL IMSPECTION	CONDITION
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
DISCONNECT LIVE PARTS	☑ A ☐ B ☐ C ☐ D ☐ E

SWITCH

NOMENCLATURE 55T2-LBS

VISUAL IMSPECTION	CONDITION
BUSHINGS & INSULATORS	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION, FRAME, GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
DISCONNECT LIVE PARTS	☑ A ☐ B ☐ C ☐ D ☐ E

TRANSFORMER

MANUFACTURER MOLONEY ELECTRIC
SERIAL NUMBER 213081
YEAR 1965
TYPE CONSERVATOR
IMPEDANCE 8.9 %
TEMPERATURE RISE °C
HV BIL 550
LV BIL 110

KVA 3,500 / 10,000 / 13,500
PRIMARY VOLTAGE 110,000 / DELTA
SECONDARY VOLTAGE 12,480 / 7,200 WYE
OIL VOLUME L
TOTAL WEIGHT 94850 LBS
OF FANS 8
TAP CHANGER EXTERNAL

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND 20
OIL TEMPERATURE	MIN	Max	AS FOUND 20
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND 50
BUSHING OIL LEVEL	0%	100%	AS FOUND
TRANSFORMER PRESSURE		☐ KPA ☐ PSI	AS FOUND
GAS RELAY			AS FOUND

TAP CHANGER

MANUFACTURER MOLONEY ELECTRIC MODEL
SERIAL NO. YEAR 1965 GALLONS 400L

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND 14
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND 50
TAP POSITION	MIN	Max	AS FOUND
COUNTER			AS FOUND 35,938
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND
HEATER CONDITION	☐ G ☐ P ☐ C ☐ I		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I		

OIL FILTRATION PUMP PSI: FILTER TYPE: FILTER CHANGE DATE: HOURS:

STATION INSPECTION

PAGE

TRANSFORMER

MANUFACTURER	PENSYLVANIA TRANSFORMER TECH	KVA	15,000 / 20,000 / 25,000
SERIAL NUMBER	C-09062-5-1	PRIMARY VOLTAGE	110,000 / DELTA
YEAR	2014	SECONDARY VOLTAGE	12,480 / 7,205 WYE
TYPE	CONSERVATOR	OIL VOLUME	18665 L
IMPEDANCE	10.2 %	TOTAL WEIGHT	54735 KG
TEMPERATURE RISE	65 °C	# OF FANS	8
HV BIL	550	TAP CHANGER	EXTERNAL
LV BIL	110		

VISUAL INSPECTION	CONDITION
BUSHINGS	☑ A ☐ B ☐ C ☐ D ☐ E
MAIN TANK	☑ A ☐ B ☐ C ☐ D ☐ E
COOLING	☑ A ☐ B ☐ C ☐ D ☐ E
OIL TANK	☑ A ☐ B ☐ C ☐ D ☐ E
FOUNDATION	☑ A ☐ B ☐ C ☐ D ☐ E
GROUNDING	☑ A ☐ B ☐ C ☐ D ☐ E
GASKET & SEALS	☑ A ☐ B ☐ C ☐ D ☐ E
CONNECTORS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEAKS	☑ A ☐ B ☐ C ☐ D ☐ E
OIL LEVEL	☑ A ☐ B ☐ C ☐ D ☐ E
OVERALL	☑ A ☐ B ☐ C ☐ D ☐ E

GAUGES

NOTE: TRANSFORMER OIL LEVEL = 50% @ 25C

WINDING TEMPERATURE	MIN	Max	AS FOUND 38
OIL TEMPERATURE	MIN	Max	AS FOUND 30
TRANSFORMER OIL LEVEL	0%	100%	AS FOUND 50
BUSHING OIL LEVEL	0%	100%	AS FOUND
TRANSFORMER PRESSURE		☐ KPA ☐ PSI	AS FOUND
GAS RELAY			AS FOUND

TAP CHANGER

MANUFACTURER REINHAUSSEN MODEL MD1-I

SERIAL NO. 1400253 YEAR 2013 GALLONS

TAP CHANGER OIL TEMP	MIN	Max	AS FOUND
TAP CHANGER OIL LEVEL	MIN	Max	AS FOUND 40
TAP POSITION	MIN	Max	AS FOUND
COUNTER			AS FOUND 21,714
DIVERTOR OIL LEVEL	MIN	Max	AS FOUND
HEATER CONDITION	☐ G ☐ P ☐ C ☐ I		
RELIEF VENT	☐ G ☐ P ☐ C ☐ I		

OIL FILTRATION PUMP PSI: FILTER TYPE: FILTER CHANGE DATE: HOURS:

TRANSFORMER INSPECTION

TYPE: MAINTENANCE | STATION: HAWKESBURY MTS | ISSUE DATE:
COMPLETED DATE: 10/30/2022
SUBSTATION ADDRESS: MAIN ST | TESTED BY: DOMINIQUE RIVET
FEEDER/NOMENCLATURE: 55T3 | AMBIENT TEMPERATURE: °C | TESTED BY: JAMES ZLOTY
WORK ORDER #: | TEST STATUS: Pass

NAMEPLATE DATA

MANUFACTURER: Pensylvania Transformer | SERIAL NO.: C-09062-5-1
SPECIFICATION NO.: 20162 | KVA: 15,000 / 20,000 / 25,000 | TYPE: LTC | CLASS: ONAN/ONAF/ONAF
PHASE: 3 | TEMPERATURE RISE: 65 °C | IMPEDANCE: 10.2 % | B.I.L. RATING: 550 kV PRI. 110 kV SEC.
COOLANT: oil | CAPACITY: GALLONS | TOTAL WEIGHT: 54735KG
WINDING POLARITY: SUBTRACTIVE | WINDING MATERIAL: Copper | K FACTOR: NA
PRIMARY VOLTAGE: 110,000 | (●) DELTA ( ) WYE | RATED CURRENT: 79 / 105 / 131 AMPERES
SECONDARY VOLTAGE: 12,480 / 7,205 | ( ) DELTA (●) WYE | RATED CURRENT: 694 / 925 / 1,157 AMPERES
TAP VOLTAGES:
TAP CONNECTIONS:
TAP SETTING: Volts | # FANS: 4 | TAP CHANGER: ( ) INTERNAL (●) EXTERNAL | DRY TYPE: ☐

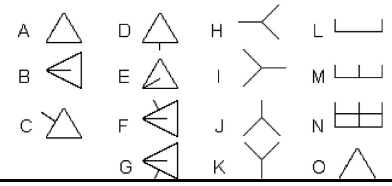
GAUGES:

WINDING TEMPERATURE: °C | MAXIMUM WINDING TEMPERATURE: °C
COOLANT TEMPERATURE: °C | MAXIMUM COOLANT TEMPERATURE: °C | RESET TEMPERATURE GAUGES ☐
COOLANT LEVEL: | PRESSURE VACUUM: # | LCR COUNTER:
OTHER GAUGES:

VISUAL INSPECTION:

BUSHINGS: | SUPPORT INSULATORS: | CONNECTIONS:
PAINT: | RADIATORS: | FANS:
NO-LOAD TAP CHANGER: | LEAKS:
FAN PUMP CONTROLS:
ADDITIONAL EQUIPMENT:
GROUND CONDUCTOR SIZE: AWG/KCM | NO. OF GROUND CONDUCTORS: | GROUND CONDUCTOR CONDITION:

VECTOR DIAGRAM



PRI. VECTOR: E
SEC. VECTOR: I

POST TEST VOLTAGES

NO LOAD SECONDARY VOLTAGE			
X1 - X2	V	X0 - G	V
X1 - X3	V	X0 - X1	V
X2 - X3	V	X0 - X2	V
		X0 - X3	V

COMMENTS:
DEFICIENCIES:

3Ø Winding Resistance and Turns Ratio

TYPE	MAINTENANCE	STATION	HAWKESBURY MTS	ISSUE DATE	
SUBSTATION ADDRESS	MAIN ST			COMPLETED DATE	30/10/2022
FEEDER/NOMENCLATURE	55T3	AMBIENT TEMPERATURE	°C	TESTED BY	JAMES ZLOTY
WORK ORDER #				TESTED BY	DOMINIQUE RIVET
				TEST STATUS	Pass

Nameplate

MFR	Pensylvania Transformer	WEIGHT	63,000 lb	OIL VOLUME	GAL
SER NO	C-09062-5-1	CLASS	ONAN/ONAF/ONAF	COOLANT	OIL
YEAR	2014	BIL	550 kV	IMPEDANCE	10 %
TYPE	SEALED-CONSER				

Dyn1

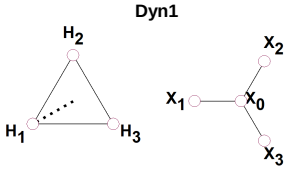


Diagram # 5 (ANSI)

	Voltage (V)		kVA	Rated I	# Taps	Nominal	Tap Changer	Tap Setting	First Tap Voltage	Last Tap Voltage	© Material
	L-L	L-G									
Primary	112,750				5	2	DETC				Cu
Secondary	12,480	7,205			33	17	OLTC		10,614	14,346	Cu

Transformer Test Conditions

AMBIENT TEMP.	°C	OIL TEMP	°C	REASON	
HUMIDITY	%	WINDING TEMP	°C	TEST STATUS	Pass
WEATHER					

Resistance - Secondary

Test Current (A) / Stability (%/Digit) | Measured Resistance | Units: mΩ

#	Tap	$X_1 - X_0$		$X_2 - X_0$		$X_3 - X_0$		Winding Diff Max: 2 %	Make/Break			
45	1	9.9865 / 99.982	13.86	10.0101 / 99.990	13.85	9.9720 / 99.988	13.95	0.718	5 ms	Pass	Pass	Pass
46	2	9.9869 / 99.994	13.66	10.0022 / 99.993	13.62	9.9722 / 99.997	13.66	0.301	5 ms	Pass	Pass	Pass
47	3	9.9873 / 99.989	13.62	9.9994 / 99.995	13.61	9.9723 / 99.986	13.65	0.294	5 ms	Pass	Pass	Pass
48	4	9.9880 / 99.975	13.41	9.9973 / 99.998	13.34	9.9723 / 99.965	13.43	0.653	5 ms	Pass	Pass	Pass
49	5	9.9885 / 99.981	13.37	9.9959 / 99.986	13.35	9.9723 / 99.994	13.44	0.668	5 ms	Pass	Pass	Pass
50	6	9.9896 / 99.987	13.20	9.9948 / 99.992	13.11	9.9728 / 99.999	13.20	0.709	5 ms	Pass	Pass	Pass
51	7	9.9903 / 99.984	13.30	9.9937 / 99.981	13.14	9.9737 / 99.990	13.21	1.216	5 ms	Pass	Pass	Pass
52	8	9.9905 / 99.943	13.39	9.9926 / 99.989	12.95	9.9736 / 99.980	13.10	3.327	5 ms	Pass	Pass	Pass

3Ø Winding Resistance and Turns Ratio

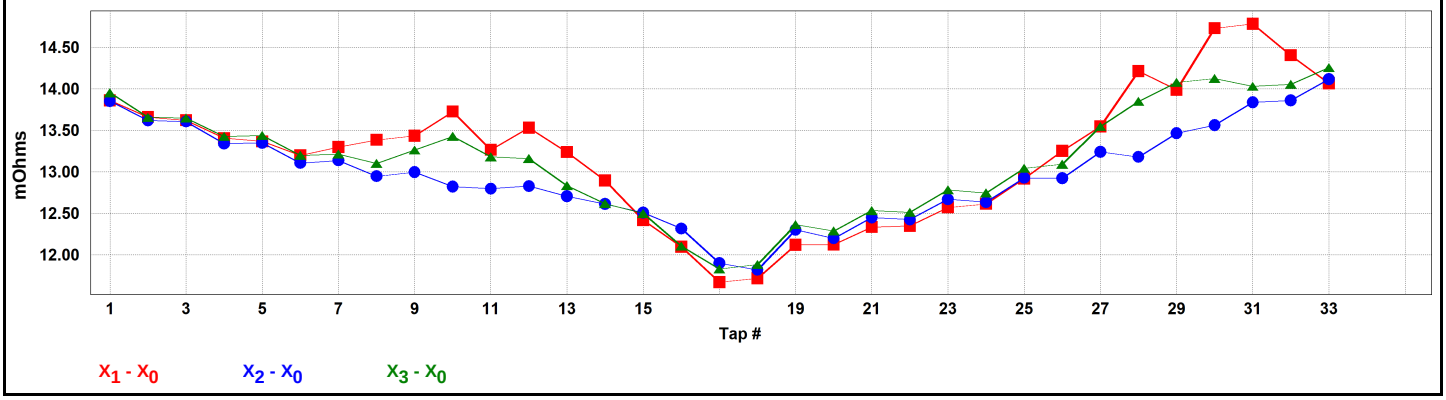
PAGE _____

		Test Current (A) / Stability (%/Digit)		Measured Resistance		Units: mΩ							
#	Tap	$X_1 - X_0$		$X_2 - X_0$		$X_3 - X_0$		Winding Diff Max: 2 %	Make/Break				
53	9	9.9914 / 99.986	13.43	9.9920 / 99.997	13.00	9.9738 / 99.998	13.26	3.314	5 ms	Pass	Pass	Pass
54	10	9.9925 / 99.928	13.73	9.9912 / 99.995	12.82	9.9736 / 99.921	13.43	6.783	5 ms	Pass	Pass	Pass
55	11	9.9924 / 99.935	13.26	9.9904 / 99.995	12.80	9.9737 / 99.974	13.18	3.570	5 ms	Pass	Pass	Pass
56	12	9.9933 / 99.924	13.53	9.9897 / 99.965	12.83	9.9738 / 99.939	13.16	5.335	5 ms	Pass	Pass	Pass
57	13	9.9943 / 99.954	13.24	9.9893 / 99.968	12.71	9.9741 / 99.974	12.83	4.116	5 ms	Pass	Pass	Pass
58	14	9.9951 / 99.929	12.90	9.9886 / 99.990	12.61	9.9741 / 99.940	12.62	2.217	5 ms	Pass	Pass	Pass
59	15	9.9960 / 99.975	12.42	9.9878 / 99.944	12.51	9.9744 / 99.921	12.50	0.716	5 ms	Pass	Pass	Pass
60	16	9.9975 / 99.949	12.10	9.9868 / 99.932	12.32	9.9748 / 99.964	12.10	1.804	5 ms	Pass	Pass	Pass
61	Nominal	9.9984 / 99.984	11.67	9.9860 / 99.988	11.90	9.9752 / 99.934	11.83	1.936	5 ms	Pass	Pass	Pass
62	18	9.9997 / 99.989	11.72	9.9855 / 99.958	11.82	9.9751 / 99.994	11.88	1.394	5 ms	Pass	Pass	Pass
63	19	10.0010 / 99.993	12.12	9.9847 / 99.986	12.30	9.9754 / 99.994	12.36	1.983	5 ms	Pass	Pass	Pass
64	20	10.0023 / 99.994	12.12	9.9840 / 99.990	12.20	9.9756 / 99.958	12.29	1.350	5 ms	Pass	Pass	Pass
65	21	10.0035 / 99.994	12.34	9.9835 / 99.938	12.45	9.9764 / 99.990	12.53	1.590	5 ms	Pass	Pass	Pass
66	22	10.0051 / 99.978	12.35	9.9833 / 99.994	12.43	9.9769 / 99.991	12.51	1.323	5 ms	Pass	Pass	Pass
67	23	10.0066 / 99.994	12.57	9.9824 / 99.978	12.67	9.9776 / 99.987	12.78	1.667	5 ms	Pass	Pass	Pass
68	24	10.0086 / 99.995	12.61	9.9816 / 99.984	12.63	9.9781 / 99.991	12.75	1.044	5 ms	Pass	Pass	Pass
69	25	10.0124 / 99.978	12.92	9.9811 / 99.968	12.93	9.9788 / 99.960	13.04	0.967	5 ms	Pass	Pass	Pass
70	26	10.0145 / 99.880	13.25	9.9806 / 99.992	12.92	9.9796 / 99.994	13.09	2.503	5 ms	Pass	Pass	Pass
71	27	10.0165 / 99.904	13.55	9.9798 / 99.994	13.24	9.9807 / 99.964	13.54	2.280	5 ms	Pass	Pass	Pass
72	28	10.0192 / 99.835	14.21	9.9793 / 99.996	13.18	9.9816 / 99.921	13.85	7.510	5 ms	Pass	Pass	Pass
73	29	10.0215 / 99.868	13.99	9.9781 / 99.989	13.46	9.9830 / 99.952	14.08	4.417	5 ms	Pass	Pass	Pass
74	30	10.0250 / 99.759	14.73	9.9771 / 99.964	13.56	9.9845 / 99.949	14.12	8.257	5 ms	Pass	Pass	Pass
75	31	10.0282 / 99.758	14.78	9.9763 / 99.985	13.84	9.9888 / 99.945	14.03	6.648	5 ms	Pass	Pass	Pass
76	32	10.0337 / 99.952	14.40	9.9757 / 99.981	13.86	9.9925 / 99.964	14.05	3.859	5 ms	Pass	Pass	Pass
77	33	10.0650 / 99.989	14.07	9.9751 / 99.944	14.12	9.9985 / 99.991	14.25	1.325	5 ms	Pass	Pass	Pass

3Ø Winding Resistance and Turns Ratio

PAGE _____

Resistance - Secondary



COMMENTS:	
DEFICIENCIES:	52,53,54,55,56,57,58,70,71,72,73,74,75,76 Failed

TRANSFORMER LOAD TAP CHANGER
TURNS RATIO TEST
3 Phase Test Method

TYPE: MAINTENANCE | STATION: HAWKESBURY MTS | ISSUE DATE:

SUBSTATION ADDRESS: MAIN ST | COMPLETED DATE: 10/30/2022

FEEDER/NOMENCLATURE: 55T3 | AMBIENT TEMPERATURE: °C | TESTED BY: DOMINIQUE RIVET

WORK ORDER #: | TEST STATUS: Pass | TESTED BY: JAMES ZLOTY

NAMEPLATE DATA

MANUFACTURER: Pensylvania Transformer | SERIAL NUMBER: C-09062-5-1

TAP NO.	SECONDARY TAP VOLTAGE (volts)	PRIMARY VOLTAGE (volts)	CALCULATED RATIO	MEASURED RATIO		
				H_1H_3/X_3X_0	H_1H_2/X_1X_0	H_2H_3/X_2X_0
16L	10,614 / 6,128	112,750	18.3992	18.4130	18.3760	18.4040
15L	10,730 / 6,195	112,750	18.2002	18.2340	18.2260	18.2280
14L	10,847 / 6,263	112,750	18.0026	18.0150	18.0020	18.0030
13L	10,964 / 6,330	112,750	17.8120	17.8450	17.8410	17.8420
12L	11,080 / 6,397	112,750	17.6254	17.6370	17.6310	17.6330
11L	11,197 / 6,466	112,750	17.4374	17.4500	17.4670	17.4740
10L	11,314 / 6,532	112,750	17.2612	17.2740	17.2660	17.2680
9L	11,430 / 6,599	112,750	17.0859	17.1180	17.1110	17.1420
8L	11,547 / 6,667	112,750	16.9117	16.9260	16.9200	16.9210
7L	11,664 / 6,734	112,750	16.7434	16.7750	16.7680	16.7760
6L	11,780 / 6,801	112,750	16.5784	16.5750	16.5820	16.5850
5L	11,897 / 6,869	112,750	16.4143	16.4350	16.4370	16.4430
4L	12,013 / 6,936	112,750	16.2558	16.2670	16.2610	16.2540
3L	12,130 / 7,003	112,750	16.1002	16.1320	16.1250	16.1310
2L	12,247 / 7,071	112,750	15.9454	15.9610	15.9530	15.9550
1L	12,363 / 7,138	112,750	15.7957	15.8290	15.8220	15.8260
N	12,480 / 7,205	112,750	15.6489	15.6610	15.6540	15.6540
1R	12,597 / 7,273	112,750	15.5025	15.5350	15.5330	15.5320
2R	12,713 / 7,340	112,750	15.3610	15.3490	15.3660	15.3680
3R	12,830 / 7,407	112,750	15.2221	15.2550	15.2500	15.2540
4R	12,947 / 7,480	112,750	15.0735	15.0950	15.0910	15.0900
5R	13,063 / 7,542	112,750	14.9496	14.9800	14.9770	14.9820
6R	13,180 / 7,609	112,750	14.8180	14.8280	14.8250	14.8250
7R	13,296 / 7,676	112,750	14.6886	14.7170	14.7140	14.7170
8R	13,413 / 7,744	112,750	14.5597	14.5720	14.5660	14.5660
9R	13,530 / 7,811	112,750	14.4348	14.4660	14.4610	14.4640
10R	13,646 / 7,878	112,750	14.3120	14.3180	14.3150	14.3180
11R	13,763 / 7,946	112,750	14.1895	14.2200	14.2150	14.2210
12R	13,880 / 8,014	112,750	14.0691	14.0830	14.0750	14.0750
13R	13,996 / 8,081	112,750	13.9525	13.9830	13.9770	13.9830
14R	14,113 / 8,148	112,750	13.8378	13.8480	13.8440	13.8440
15R	14,230 / 8,216	112,750	13.7232	13.7550	13.7520	13.7560
16R	14,346 / 8,283	112,750	13.6122	13.6170	13.6160	13.6190

COMMENTS:

DEFICIENCIES:

INSULATION TESTS
TWO-WINDING TRANSFORMERS

TYPE	MAINTENANCE	STATION	none	ISSUE DATE	
				COMPLETED DATE	10/30/2022
SUBSTATION ADDRESS	MAIN ST			TESTED BY	DOMINIQUE RIVET
FEEDER/NOMENCLATURE	55T3	AMBIENT TEMPERATURE	5 °C	TESTED BY	JAMES ZLOTY
WORK ORDER #				TEST STATUS	Pass

NAMEPLATE DATA

MFR	Ivania Transformer and E	CLASS	ONAN_ONAF_ONAF	PHASES	3
SER NO	C-09062-5-1	COOLANT	Oil	REASON	
YEAR	2014	TANK TYPE	SEALEDCONSER	WEIGHT	54735 KG
				WINDING MATERIAL	Cu
				OIL VOLUME	22,014 L
				TEMP	5 °C
				IMPEDANCE	%
				WEATHER	Sunny
				BIL	550 kV

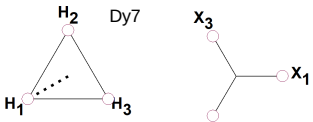


Diagram # 14 (ANSI)

	VOLTAGE (kV)		Undefin	RATED I	# TAPS	NOMINAL	CHANGER	TAP SETTING
	L-L	L-G						
PRIMARY:	110		25	0.13	5	3	DETC	
SECOND:	7.205				1			

COMMENTS:

BUSHING NAMEPLATE

Dsg	SERIAL NUM	MFR.	TYPE/CLASS	kV	AMPS	YEAR
H1	13-151063	PCORE Electric	POC	115	1200	2012
H2	13-151345	PCORE Electric	POC	115	1200	2012
H3	13-151419	PCORE Electric	POC	115	1200	2012
X0	13-280180	PCORE Electric	PRC	15	2000	2012
X1	13-286172	PCORE Electric	PRC	15	2000	2012
X2	13-280162	PCORE Electric	PRC	15	2000	2012
X3	13-280169	PCORE Electric	PRC	15	2000	2012

INSULATION TESTS
TWO-WINDING TRANSFORMERS

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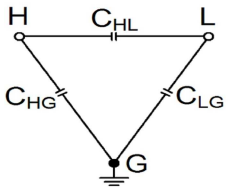
TRANSFORMER OVERALL TEST SET UP									TRANSFORMER OVERALL TEST RESULTS ☐ ITC ☑ Temp Corr. Table							
Test No.	Insulation Tested	Test Mode	Test Lead Connections				TEST kV	DFR	Capacitance C (pF)	POWER FACTOR %			DIRECT		%VDF	IR Auto/Man
			HV	Red	Blue	Gnd				Measured	@ 20°C	Corr Factor	mA	Watts		
1	C_{HG} + C_{HL}	GST-GND	H	L		G	10.00	☐	6,381.24	0.28	0.27	0.982	24.0563	0.6706		Unrated
2	C_{HG}	GSTg-RB	H	L		G	10.00	☐	2,374.15	0.31	0.31	0.982	8.9500	0.2805		Unrated
3	C_{HL}	UST-R	H	L		G	10.00	☐	4,004.92	0.25	0.25	0.982	15.0973	0.3820		Unrated
4	C_{HL}'		Test 1 Minus Test 2						4,007.08				15.1063	0.3900		Valid
5	C_{LG} + C_{HL}	GST-GND	L	H		G	5.00	☐	14,590.10	0.37	0.36	0.982	55.0026	2.0357		Unrated
6	C_{LG}	GSTg-RB	L	H		G	5.00	☐	10,583.50	0.42	0.41	0.982	39.8973	1.6567		Unrated
7	C_{HL}	UST-R	L	H		G	5.00	☐	4,006.34	0.25	0.24	0.982	15.1037	0.3747		Unrated
8	C_{HL}'		Test 5 Minus Test 6						4,006.60				15.1052	0.3789		Valid
9	C_{HG}'		C_{HG} Minus H Bushings						2,374.15				8.9500	0.2805		Unrated
10	C_{LG}'		C_{LG} Minus L Bushings						10,583.50				39.8973	1.6567		Unrated
Oil Test 1	Overall Oil Test	UST-R	L	H		G						1.000				
Oil Test 2	LTC Chamber Oil Test	UST-R	L	H		G						1.000				

NOTE: SHORT EACH WINDING ON ITSELF

INSULATION RATING KEY
- G = GOOD
- D = DETERIORATED
- I = INVESTIGATE
- B = BAD

- H = HIGH VOLTAGE WINDING
- L = LOW VOLTAGE WINDING
- G = GROUND
- N = NEUTRAL BUSHING

EQUIVALENT CIRCUIT



Transformer - Bushing C1 Tests ☐ Apply C1 Correction Factor from First Bushing to All Bushings ☐ ITC ☑ Temp Corr. Table

Test No.	Bushing Nameplate					Test Mode	TEST kV	DFR	Capacitance C (pF)	POWER FACTOR %			DIRECT		%VDF	IR
	Dsg.	SERIAL #	CAT. #	PF	Cap. (pF)					Measured	@ 20°C	Corr Factor	mA	Watts		
11	H1	13-151063	POC550G0800S	0.28	475.00	UST-B	10.00	☐	471.42	0.29	0.29	1.000	1.7772	0.0511		Unrated
12	H2	13-151345	POC550G0800S	0.29	478.00	UST-B	10.00	☐	473.18	0.29			1.7838	0.0525		Unrated
13	H3	13-151419	POC550G0800S	0.29	478.00	UST-B	10.00	☐	473.33	0.31			1.7843	0.0547		Unrated
14	X0	13-280180	B-89123-70	0.68	435.00	UST-B	5.00	☐	453.33	0.65			1.7090	0.1105		Unrated
15	X1	13-286172	B-89123-70	0.67	453.00	UST-B	5.00	☐	449.15	0.66	0.57	0.854	1.6932	0.1123		Unrated
16	X2	13-280162	B-89123-70	0.68	445.00	UST-B	5.00	☐	441.76	0.68			1.6654	0.1128		Unrated
17	X3	13-280169	B-89123-70	0.68	448.00	UST-B	5.00	☐	444.99	0.68			1.6775	0.1134		Unrated
18						UST-R	5.00	☐								
19						UST-R		☐								

INSULATION TESTS
TWO-WINDING TRANSFORMERS

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Transformer - Bushing C2 Tests

Test No.	Bushing Nameplate					Test Mode	TEST kV	Capacitance C (pF)	POWER FACTOR %			DIRECT		%VDF	IR
	Dsg.	SERIAL #	CAT. #	PF	Cap. (pF)				Measured	@ 20°C	Corr Factor	mA	Watts		
20	H1	13-151063		0.30	3,492.00	GST-GND	2.00	3,474.00	0.27	0.27	1.000	13.0964	0.3509		Unrated
21	H2	13-151345	POC550G0800S	0.31	3,296.00	GST-GND	2.00	3,278.33	0.29	0.29	1.000	12.3587	0.3561		Unrated
22	H3	13-151419	POC550G0800S	0.31	3,392.00	GST-GND	2.00	3,374.10	0.29	0.29	1.000	12.7198	0.3733		Unrated
23	X0					GST-GND	2.00				0.854				
24	X1					GST-GND	2.00				0.854				
25	X2					GST-GND	2.00				0.854				
26	X3					GST-GND	2.00				0.854				
27						GST-GND	2.00								

EXCITING CURRENT TESTS

CONNECTIONS:			PHASE A: -				UST-R		PHASE B: -				UST-R		PHASE C: -				UST-R		
	DETC	LTC	TEST kV	L(H) / C (pF)		mA	EQUIV. 10 kV	Watts	TEST kV	L(H) / C (pF)		mA	EQUIV. 10 kV	Watts	TEST kV	L(H) / C (pF)		mA	EQUIV. 10 kV	Watts	IR uto/Ma
47	0	1	10.00		L	7.7841		48.60	10.00		L	7.9189		49.62	10.00		L	3.3754		22.04	Unrated
48	0	6	10.00		L	54.4847		59.06	10.00		L	53.3872		63.59	10.00		L	53.6155		29.75	Unrated
49	0	12	9.99		L	54.5382		63.24	10.00		L	53.4571		69.12	10.00		L	53.7075		32.85	Unrated
50	0	17	10.00		L	7.8040		48.60	10.00		L	7.9086		49.61	10.00		L	3.3704		22.03	Unrated
51	0	22	10.00		L	54.4843		59.19	9.99		L	53.3645		63.45	10.00		L	53.6064		29.87	Unrated
52	0	27	10.00		L	7.8073		48.61	10.01		L	7.9040		49.61	10.00		L	3.3679		22.02	Unrated
53	0	32	10.00		L	54.5686		62.40	10.00		L	53.4456		66.49	10.00		L	53.7077		33.45	Unrated

COMMENTS:

DEFICIENCIES:

EQUIPMENT USED:

#	Manufacturer	Model	Serial / ID Number	Type	Calibration Date	Calibration Due
1	DOBLE	M4100	121732514	INSULATION A	4/2/2018	4/2/2023

115KV Station (Main St. W.) - Transformer Maintenance

Recommendations for Corrective Actions

- While performing our transformer testing the crews have reported a hairline crack in the Secondary White Phase bushing. It tested well and was not considered a concern however this should be monitored and replaced when possible. After further discussion and review it has been recommended that applying Glyptal paint to the crack may be a possible secondary solution to replacing the bushing.