ONTARIOPOWER GENERATION

Internal Use Only

Unit: 0	USI: 39340	Device: 0-39340-L2300-D1ANB
Date: 15 November 2013		Work Order: 2910095

Darlington Nuclear

WORKPLAN

NK38-WPL-39340-0458036-REV 000

TIE-IN TO TRF FEED AND PRODUCT

Unit(s): 0 (TRF)

Usage Classification: Reference

Master EC 118880

Mechanical EC 120448

Project #:16-31555

RCMT Project # 13720

MASTER COPY OF WORKPLAN TO BE KEPT AT TRF WORK CONTROL AREA (WCA) D-118

Work Order: 2910095		
Work Plan Number: NK38-WPL-39340-0458036	Rev: 000	Page 2 of 32
Usage Classification: Reference	Unit: 0/TRF	
Title 0-39340-DESIGN-MECH-TIE-IN TO TRF FEED AND PRODUCT		

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Usage Classification: Reference	Unit: 0/TRF	
Title 0-39340-DESIGN-MECH-TIE-IN TO TRF FEED AND PRODUCT		

APPROVAL SHEET

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Work Order: 2910095		
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Title: 0-39340-DESIGN-MECH-TIE-IN TO TRF FEED AND PRODUCT		

FILENAME:	UNIT : 0 / TRF	USI/SCI 39340	SYSTEM: TRF PRODUCT AND FEED SYSTEM	WORK ORDER #: 2910095	REV: 000	Page 6

ROUTING SEQUENCE:		SIGNATURE:	DATE:	UNIT CONDITION: Any Condition	Master EC# 118880 Mech. EC# 120448
1. PREPARED: Lew Saldanha (RCMT)				TITLE: 0-39340-DESIGN-MECH-TIE-IN TO TRF FEED AND PRODUCT	IPTE: YES ☐ NO ☐
2. VERIFIED: Al Wiseman (RCMT)					
3. REVIEWS (as required)	RADIATION/CONVENTIONAL HIGH HAZARD WORK ☒				
☐ Nuclear Safety				OBJECTIVE: To install a tie-in connection to enable the transfer of D_2O from 0-39340-TK1201 and TK1203 to the new HWMB (Heavy Water Management Building), West Annex.	
☒ Radiation Protection – ALARA					
☒ Engineering					
☒ Conventional Safety					
☐ Reactor Physics					
☒ Chemistry					
☐ Outage SS				SELF CHECK ✓	DATE ISSUED: ISSUED BY: LOCATION/PHONE #:
☐					
☒ ZONE 3 WORK - DRAFT COPY TO *RADIATION CONTROL - ALARA* FOR INFORMATION - reference N-PROC-RA-0027					

4. ASSESSMENT (as required)... ☐ REPEAT WORKPLAN Previously Assessed Under WO#

Assessment *Required*	Work Group	Worker Numbers #	hrs/worker	Work Protection *Required*	Material *Required*	PRINT NAME AND INITIAL	DATE
☒ Operator	OP			☐	☐		
☐ Planning	PL			☐	☐		
☐ Control Mtce	MC			☐	☐		
☒ Mechanical Mtce.	MM			☐	☐		
☐ Civil Mtce	MS			☐	☐		
☒ Modifications	B			☐	☐		
☐ ERT				☐	☐		
☐				☐	☐		

DISTRIBUTION COPIES	ATTACHMENT	LOCATION
☒ Work Control	☐	
☐ Shift Production Clerk	☐	
☐ MC	☐	
☐ MM	☐	
☐ MSS	☐	
☒ OP	☐	
☒ Modifications	☐	
☐ Assessing Clerk	☐	
☒ TRF Work Control	☐	
☐	☐	
☐	☐	
☐	☐	
☐ Vault Coordinator	☐	

APPENDIX/ATTACHMENT
A. ☐
B. ☐
C. ☐
D. ☐
E. ☐
F. ☐
G. ☐
H. ☐
I. ☐

5. APPROVAL
☒ SECTION MANAGER:

*Refer to N-INS-08120-10011, "Workplan Preparation and Development Process" for Authorization Requirement

6. AUTHORIZATION
☒ DIRECTOR OF OPERATIONS AND MAINTENANCE

Work Order: 2910095		
Work Plan Number: NK38-WPL-39340-0458036	Rev: 000	Page 7 of 32
Usage Classification Reference	Unit: 0/TRF	
Title: 0-39340-DESIGN-MECH-TIE-IN TO TRF FEED AND PRODUCT		

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1.0 PURPOSE

1.1 Objective

To fabricate and install a tie-in connection to enable the transfer of D_2O from TRF Feed and Product System 0-39340-TK1201 and 0-39340-TK1203 to the new HWMB (Heavy Water Management Building), West Annex.

A new 1" stainless steel tie-in line with an isolation valve and pipe supports, will be installed on line between 0-39340-V2066 and 0-39340-V2067 at elv 101.290m.

1.2 Applicability

This Workplan applies to the following line and component:

Unit	System (USI/SCI)	Line Number	Component	Elevation and Location
0	39340	L1298-1		101.290m TK1201 & TK1203
0	39340	L2300-D1ANB (tie-in line)	V2893	101.290m TR-102 (VPCE Room 1st floor)

Verify the proper field equipment nomenclature prior to field device manipulation (UNIT-SCI-DEVICE)

2.0 PRECAUTIONS, CONSIDERATIONS, LIMITATIONS

2.1 Preliminary Considerations

OP&P 1.5.7.1 – Permanent Changes (Change Control). Senior Manager Plant Design approval has been received for this permanent change as per approved EC. Director of Operations and Maintenance approval has been received for installation of this permanent change as indicated by signature on this workplan.

Sampling, and purging if required, will be performed on TRF Product Storage System before and after maintenance to ensure no explosive mixture of gases are formed.

An up to date master copy of workplan to be kept and maintained in TRF Work Control Area (D-118).
Steps to be signed-off/marked-off in the master copy at the end of shift.

A copy of this workplan is to be available at the work location and should be referred to periodically or as often as necessary to confirm that the correct document steps have been performed.

Place keeping and procedure usage are to be followed as per N-STD-AS-0002, Procedure Use and Adherence.

Black & McDonald (B&M) to prepare Job Safety Analysis (JSA).

Inspection and Test Plans (ITP) to be prepared as per B&M QA Program, containing adequate steps to verify modification meets Design EC requirements.

2.2 Reactor Safety

N/A

2.3 Radiological Safety

All radiological safety processes and procedures must be followed as well as ALARA principles and techniques.

For radiological details affecting the EC, refer to Radiological Exposure Permit (REP) listed in Passport work order task, permits and requirements section.

2.4 Conventional Safety

Work to be performed as per OPG Corporate Safety Rules and Occupational Health and Safety Act (OHSA). Review work to be executed and walk down work site to identify additional potential hazards.

Pre-job briefing shall be conducted.

B&M to ensure relevant procedures, safe work practices and pre-job briefings are followed.

2.4.1 Explosive Hazard (Systems Containing Hydrogen Isotopes)

Refer to D-INS-09106-10004 Work on Tritium Removal Facility Systems Containing Hydrogen Isotopes.

2.4.2 Monitoring Equipment

Monitoring equipment required for working in Systems Containing Hydrogen Isotopes listed in D-INS-09106-10004.

2.4.3 Safe Work Area

Safe work areas and warning signs shall be established.

2.4.4 Body Mechanics

Work requires manual handling of heavy objects. Use proper body mechanics when moving large weights. Use lifting aids when feasible.

2.4.5 Mechanical Hazards

During installation and commissioning, there is potential for various mechanical hazard injuries. Ensure use of proper hand protection and employ active situational awareness.

2.4.6 Electrical Hazards

Electrical work shall be carried out as per N-INS-08965-10021, Electrical Safety and N-MAN-08965-10001 Sec A5.2, Electrical Safe Work Practices And PPE Task Matrix - Darlington.

Temporary power cables shall be CSA certified. Refer to N-STC-09070-10000, Installation and Control Of Temporary Cables.

All extension cords, portable power tools and temporary lighting shall be equipped with ground fault circuit interrupter (GFCI).

2.4.7 Working at Heights

Work above rotating equipment must be performed such that personnel cannot fall onto or into rotating equipment.

2.4.8 Hot Work

Hazards exist due to the requirement for hot work. Approved procedures and personal protective equipment shall be used.

2.4.9 Falling Objects

Potential falling object hazard exists. All falling object hazards must be eliminated or controlled before work begins.

2.4.10 Foreign Material Exclusion (FME):

Ensure proper FME and housekeeping practices maintained.

2.4.11 Hoisting and Rigging

Lifting to be performed as per OPG Hoisting and Rigging Handbook.

2.4.12 Heat and Cold Stress

Supervisor and workers should be aware of work site ambient dry and wet bulb temperatures.

2.4.13 Hearing Protection

Hearing protection shall be worn as required.

2.4.14 Drilling

Drilling activities shall comply with the requirements of N-GUID-01983-10001, Excavation Concrete Drilling And Anchoring Processes.

N-FORM-10427, Concrete Drilling And Anchor Card (CDAC) also known as Drill Cards, must be used where applicable.

2.4.15 Silica Hazard

This is a designated substance. Concrete cutting, drilling, grinding or jackhammering can produce airborne crystalline silica dust. Ensure proper respiratory protection used.

2.5 Environmental Safety

N/A

2.6 Backout Provisions

Work area and equipment must be left in a "safe state" before leaving at the end of day/shift or during a station alarm/emergency, fire or personal injury.

Backout Conditions to be included in JSA:

Backout conditions, for work in Class 1, Div 2 Group B Room apply (Hydrogen hazard). Refer to D-INS-09106-10004 Work on Tritium Removal Facility Systems Containing Hydrogen Isotopes

Backout conditions for FAATM (Fixed Area Alarming Tritium Monitor) alarm in Class 1, Div 2 Group B Room.

D_2O spills.

Hot work is being performed the concentration of flammable gas or vapour must be negligible, (less than or equal to 2% of LEL in case of H_2 Gas).

Radiation backout conditions as specified on REP.

Fire or personal injury: Call 911

Workers shall:

- Stop work.
- Evacuate the area, leaving all equipment and materials in a safe state.
- If an injury occurs, quarantine/preserve work area for possible investigation.
- Have Contract Administrator (CA)/Contract Monitor (CM) and Contract Management Office (CMO) notify Shift Manager (x4500).
- Notify TRF/HWMB MCR (x4800).
- Wait for authorization to return to work.

Station Alarm/Emergency:

Stop work, listen, and follow instructions given on the public address system.

3.0 PREREQUISITES

3.1 Measuring and Test Equipment, Special Tools and Materials

3.1.1 Tools:

Description	Number/size/quantity
Monitoring equipment for Hydrogen detection.	
Catchment basins	
Bung for 1" SS pipe (tie-in location)	
Rubber gasket material and gear clamps for 1" pipe	

3.1.2 All measuring and test equipment shall be calibrated as per B&M QA program.

3.1.3 Materials used as specified by Design Bill of Materials (DBOM).

3.2 Performance References

3.2.1 Engineering Change

Document Number	Title
Master EC 118880	0-38000-Master-DNGS Heavy Water Management Building West Annex Process Systems, Service Tie-Ins, Power Supply, Interface, Relocation/Removal of Interferences, and Auxiliary Support System
Design EC 120448	0-39340-Design-Mech-Tie-In to TRF Feed and Product

3.2.2 Drawings:

Document Number	Title
NK38-D0E-39419-0211	Piping VPCE Room Ground Floor EL 100.00 P1 (0-106. 083.084)
NK38-D0E-39419-0218	Piping Section VPCE Room S2 S3 (0-106.083.741)
NK38-D0E-39419-0219	Piping Section VPCE Room S5 (0-106.100.706)
NK38-D0E-39419-0229	Piping Section S7 Product Tanks TK1201 TK1203 (0-106.101.084)
NK38-D0E-39419-0230	Piping Plan P1 Product Tanks TK1201 TK1203 (0-106 .083.739)
NK38-SCL-39340-10001	TRF Storage Tanks Feed and Product Storage System
NK38-DCS-39340-10001	Detailed Commissioning Specification: Tie-In Design to TRF Product

NOTE: Refer to EC change papers for affected drawings

3.2.3 Bill of Materials (BOM):

Document Number	Title
NK38-BOM-39340-10001	DBOM for NK38-DOE-39419-0229-EC120408 Tie Into TRF Feed and Product System for HWMB West Annex

3.2.4 Flowsheets:

Document Number	Title
NK38-FEX-39340-0501	Tritium Removal Facility – Feed and Product Storage Tanks
NK38-FXX-39320-0502	Tritium Removal Facility Vapor Phase Catalytic Exchange 11

3.2.5 Forms:

Document Number	Title
N-FORM-11482	Safety Certification For Contractors Equipment
N-FORM-10427	Concrete Drilling And Anchor Card(CDAC)
N-FORM-10241	Ignition Source Permit
N-FORM-11113	Unconditional Transfer Permit (Large Articles and Liquids)
N-FORM-10036	Foreign Material Exclusion Plan
N-FORM-10353	Job Safety Analysis

3.2.6 Work Order Number:

Document Number	Title
2910095	DEC: 120448 TIE-IN to TRF Feed and Product

3.2.7 Procedures:

Document Number	Title
NK38-OM-33920-04.05	Shutdown Procedure
NK38-OM-39310.05.04.02	Startup Procedures
NK38-OM-39310.05.04.03	FTS\LCS Cover Gas Purge
NK38-OM-39450-04.03.02.04	Sampling Product Tanks TK1201 or TK1203
NK38-WPM-08400.11-00001-AWPP-109	Use Of Pneumatic Valve Actuator Spring Force To Provide Isolation
N-INS-08400.11-10002	Work Protection Administrative Requirements
N-INS-08960-10001	Working at Heights

Document Number	Title
N-MAN-08965-10000	Conventional Safety Training Basis
N-INS-08965-10013	Warning Signs and Barricades for Conventional Safety Hazards
N-INS-08965-10014	Job Safety Analysis Process
N-INS-08965-10035	Falling Object Prevention
N-INS-08965-10042	Material Handling Planning
N-MAN-08965-10000 Sec A.14.08	Personal Protective Equipment – Welding & Grinding
NK38-MMP-76550-06	Assembly and Disassembly of Bolted Joints and Gasketed Closures
N-GUID-01983-10001	Excavation Concrete Drilling And Anchoring Processes
N-INS-09070-10001	Space Allocation for Transient Material and Extended Storage of Material and Equipment
D-INS-09106-10004	Work on Tritium Removal Facility Systems Containing Hydrogen Isotopes
N-INS-09100-10005	Correct Component Verification
N-INS-09180-10012	Lifting Equipment Inspection And Maintenance
N-INS-09180-10015	Lift Planning
N-PROC-MA-0018	Foreign Material Exclusion
N-PROC-OP-0034	Equipment Labelling
N-PROC-MA-0012	Work Protection
N-PROC-OP-0005	Pre-Job Briefing And Post-Job Debriefing
N-PROC-OP-0007	Authorization of Work
N-PROC-OP-0043	Waste Management
N-PROC-RA-0057	Control of Ignition Sources and Hot Work Activities
N-STD-AS-0002	Procedure Use and Adherence
N-STD-MA-0008	Station Materiel Condition And Housekeeping
N-STC-09070-10000	Installation and Control of Temporary Cables
N-INS-08965-10021	Electrical Safety
OPG Website	OPG Corporate Safety Rules

3.3 Developmental References

Document Number	Title
NK38-SOW-38000-10004	Scope of Work for EPC Contract for the Darlington Heavy Water Management Building West Annex
N-STD-MA-0004	Post Maintenance Testing
N-STD-MA-0006	Scaffolds and Temporary Work Structures
N-STD-RA-0017	Segregation and Handling of Radioactive Waste
N-STD-RA-0018	Controlling Exposure as Low as Reasonably Achievable
D-INS-09071-10013	Radiation Protection Procedure for the Tritium Removal Facility
N-STM-01110-10001	Nuclear Construction Requirements Manual

3.4 Special Instructions

N/A

3.5 Installation Pre-Requisites

WARNING

The adjacent systems contain hydrogen isotopes and monitoring is required in the VPCE room per D-INS-09106-10004.

NOTE

Section 3.5 steps can be completed in any logical order.
Steps in Section 3.5, 3.6 and 3.7 can be done in parallel.

3.5.1 **BM**: SUBMIT PC1-N ..... ☐

NOTE

Valve to be installed, 0-39340-V2893, is to remain closed until the piping is pressure tested when the new West Annex systems are tied-in via EC 120421 and EC 120422.

3.5.2 **OTFD**: PREPARE TCR for 0-39340-V2893 (Ensure Closed) ..... ☐

3.5.3 **BM**: ENSURE JSA is prepared and includes:

- Hydrogen and D_2O spill hazards ..... ☐
- PPE associated with work in Class 1, Div 2 Group B Room ..... ☐

3.5.4 **OTFD**: ENSURE work protection is prepared ..... ☐

3.5.5 **BM:** ENSURE Radiation Exposure Permit (REP) is read, discussed and understood by all work groups ..... ☐

3.5.6 **BM**: ENSURE ITPs/CWPs prepared and issued ..... ☐

3.5.7 **BM**: ENSURE workers have reviewed and understand all applicable documentation (procedures, ITPs, and drawings) prior to installation ..... ☐

3.5.8 **TRD:** PROVIDE RP support (Green Man) for installation of tie-ins, Commissioning and AFS activities, as required ..... ☐

3.5.9 **BM**: ENSURE all personnel are familiar with all tooling and components prior to installation ..... ☐

3.5.10 **BM:** ENSURE walkdowns have been conducted prior to installation ..... ☐

3.5.11 **BM:** IF required,
THEN ENSURE craning/hoisting equipment staged and available for use,
reference N-INS-09180-10015, Lift Planning ..... N/A ☐ or ☐

3.5.12 **BM:** ESTABLISH Ignition Source Permit as per N-FORM-10241 ..... ☐

3.5.13 **BM**: SET UP hot work area at tie-in location ..... ☐

3.5.14 **BM:** ENSURE SATM permit is entered into electronic database and approved as per N-INS-09070-10001, Space Allocation For Transient Material And Extended Storage Of Material And Equipment ..... ☐

3.5.15 **BM:** SET-UP and IDENTIFY laydown areas with Contact Name/number ..... ☐

3.5.16 **BM**: ENSURE all materials spares, consumables, equipment and tooling are tested and staged in laydown area(s) ..... ☐

3.5.17 **MS:** SETUP rubber area(s)/ rubber change area(s) at tie-in locations ..... ☐

3.5.18 **TRD:** PLACE rubber area(s)/ rubber change area(s) in service ..... ☐

3.5.19 **TRD**: PERFORM frequent smears and Masslin mopping in rubber area until tie-in work is complete and no contamination is detected ..... ☐

3.5.20 **BM:** OBTAIN and STAGE one VACUUM MAX for D_2O liquid collection ..... ☐

3.5.21 **BM:** IF required,
THEN ENSURE temporary 600 V power pack and lighting installed ..... N/A ☐ or ☐

3.5.22 **BM:** ERECT scaffolding at tie-in locations to facilitate installation piping and supports ..... ☐

NOTE
Scans are required for pipe supports and for drilling a hole in the wall for the new tie-in pipe penetration.

3.5.23 **FEC:** ENSURE drill card is prepared as per N-FORM-10427, Concrete Drilling And Anchor Card (CDAC) ..... ☐

3.5.24 **BM/FEC:** MARK potential anchor points for pipe supports and hole in the wall as per NK38-D0E-39419-0229:

- Hole for pipe penetration in wall at T1/TD, elv 102.525m ..... ☐
- Pipe support at elv 101.440m ..... ☐

3.5.25 **FEC:** PERFORM scan at hole/floor locations as per NK38-D0E-39419-0229 ..... ☐

3.5.26 **BM:** SET-UP safe work barriers and signage with contact name/phone number ..... ☐

3.5.27 **BM:** SUBMIT equipment list (in table below) for tag preparation by OPS..... ☐

New Equipment	Nuclear Class	Tie-in Line number
0-39340-V2893	6	0-39340-L2300-D1ANB

3.5.28 **OPS**: MAKE equipment tag for new valve as per NK38-D0H-39419-0229 & NK38-F0E-39340-0202..... ☐

3.5.29 **MTL**: ENSURE TCR initiated for Flowsheet revision ..... ☐

3.6 Pre-Fabrication of Tie-in Piping and Valves

NOTE

- Sections 3.6 and 3.7 can be done in parallel.
- All materials are stainless steel.
- Some pre-fab tie-in piping may require field fabrication, due to length of piping and ease of installation.
- Refer to Drawings listed in Sections 3.2.2.
- Refer to DBOM: NK38-BOM-39340-10001.
- New valve and piping materials are for Class 6 tie-in line.
- Purging will be required for welding.

3.6.1 **BM**: ENSURE no foreign material in piping / fittings / valve..... ☐

3.6.2 **BM**: ASSEMBLE tee/ valve / pipe / cap and WELD, ensuring valve orientation is as per ITP and welded as per manufacturer's directions..... ☐

3.6.3 **BM**: PERFORM NDE weld inspections as per ITP ..... ☐

3.6.4 **BM:** INSTALL equipment tag on 0-39340-V2893 as per N-PROC-OP-0034..... ☐

3.6.5 **BM**: PERFORM hydrostatic pressure test of pre-fabricated piping as per ITP ..... ☐

3.6.6 **BM**: IF there are leaks,
THEN REPAIR leaks and REPEAT hydrostatic test.....N/A ☐ or ☐

3.6.7 **BM:** CONFIRM valve operation as per ITP..... ☐

3.6.8 **BM:** INSTALL FME temporary pipe caps / FME covers on all prefabricated piping before transporting to field location ..... ☐

3.7 Pre-Fabrication of pipe supports

NOTE

Reference Dwg/BOM: NK38-D0E-39419-0029 / NK38-BOM-39340-10001

Some pipe supports may need to be fabricated/welded at site

Exact location of pipe supports will depend on the location of the new line and can be done after line is in position.

3.7.1 **BM**: FABRICATE/WELD pipe supports as per NK38-D0E-39419-0229 and NK38-BOM-39340-10001 ..... ☐

3.7.2 **BM**: PERFORM NDE inspection of pipe support welds ..... ☐

3.8 Install Tie-in piping up to Valve Location

NOTE
The tie-in piping with pipe supports will be installed in the VPCE room up to new valve, 0-39340-V2893 location prior to any permitry application.

3.8.1 **BM**: ENSURE Sections 3.5, 3.6 & 3.7 are complete ..... ☐

3.8.2 **BM:** OBTAIN TRF OPS Section Manager approval to conduct the work as per D-INS-09106-10004, Section 3.21.1 part (c) ..... ☐

3.8.3 **OTFD**: ENSURE that all portable or fixed detectors in the intended classified room are 100% operating and in service as per D-INS-09106-10004, Section 3.21.1 part (a). ..... ☐

3.8.4 **OTFD**: ENSURE that all ventilation systems in the intended classified room are 100% operating and in service as per D-INS-09106-10004, Section 3.21.1 part (b) .. ☐

3.8.5 **BM:** MONITOR H_2 isotopes in the vicinity of the work as per PJB, JSA and D-INS-09106-10004, Section 3.21.1 part (g) and (h) ..... ☐

3.8.6 **BM:** DRILL hole in north wall for new tie-in pipe as per N-GUID-01983-10001 ..... ☐

3.8.7 **TRD:** PERFORM surveys as required, during piping installation ..... ☐

3.8.8 **BM:** REMOVE FME pipe caps / FME covers on prefabricated piping sections ..... ☐

3.8.9 **BM:** INSTALL and WELD prefabricated piping sections as per NK38-DOE-39419-0229 and ITP ..... ☐

3.8.10 **BM**: INSTALL and WELD prefabricated hangers and pipe supports ..... ☐

3.8.11 **BM**: PERFORM NDE inspection of pipe welds and support welds ..... ☐

3.8.12 **BM:** FILL hole in wall around new piping with sealant listed in NK38-BOM-39340-10001 ..... ☐

3.8.13 **BM:** INSTALL FME temporary pipe cap on installed piping ..... ☐

4.0 DETAILED WORKPLAN INSTRUCTIONS

ALARA

- There is a potential for getting wetted at tie-in location due to the System characteristics, double plastics shall be a consideration per REP planning
- There is a potential exposure risk for elemental and oxide tritium, tritium surface contamination (TSC) and changing conditions.
- Line may not be completely drained.
- Potential for loose contamination at tie-in location.
- Cutting activities may generate loose contamination.
- See back out conditions in section 2.6

WARNING

Tie-in work will be done in TR-102 (VPCE Room, 1st floor). This room contains systems with Hydrogen Isotopes.
Monitoring equipment for H_2 will be required during tie-in work.

4.1 Establish Isolation for Tie-In installation

WARNING

Refer to Section 2.6 for backout conditions

4.1.1 **BM:** MONITOR H_2 isotopes in the vicinity of the work as per PJB, JSA and D-INS-09106-10004, Section 3.21.1 part (g) and (h) ..... ☐

4.1.2 **BM:** ENSURE field conditions, FME and CWPs/ITPs plan reviewed and discussed ..... ☐

4.1.3 **BM:** ENSURE PPE/dosimetry specified in REP is worn ..... ☐

NOTE

Sampling helium cover gas as per NK38-OM-39310.05.04.2 (Grab Sampling FTS\LCS Helium Cover Gas), may lead to NK38-OM-39310.05.04.3 based on sample results.

4.1.4 **OTFD**: SAMPLE Feed Treatment System (FTS)/Feed Storage Tank (FST)/Product Storage Tank (PST) helium cover gas as per NK38-OM-39310-05.04.2 ..... ☐

4.1.5 **OTFD**: SETUP sealable catch containment equipment at pump drain valve 0-39340-V2068 and at pump 0-39340-P1203 location ..... ☐

4.1.6 **OTFD/MM/MC:** APPLY work protection ..... ☐

4.1.7 **OTFD:** DISPOSE of catch containment water ..... ☐

4.1.8 **BM:** CONFIRM pipework is drained ..... ☐

4.1.9 **BM:** SIGN on to work protection permit ..... ☐

4.2 Install Tie-In Line 0-39340-L1298-1

ALARA

Pipe should be nicked to release any D_2O held in line.

4.2.1 **BM**: ENSURE gasket material and gear clamps to be available to cover nick in the event isolation is passing ..... ☐

4.2.2 **BM**: NICK pipe at tie-in location as per NK38-D0E-39419-0229 and collect D_2O from pipe into catch containment ..... ☐

4.2.3 **BM:** IF D_2O flow does not stop,
THEN INSTALL gasket material and gear clamps over nick in pipe and INFORM OTFD for resolution ..... N/A ☐ or ☐

4.2.4 **BM**: CUT section of pipe at nick location for tie-in installation ..... ☐

4.2.5 **BM/OTFD:** DISPOSE of catch containment water ..... ☐

4.2.6 **BM:** REMOVE FME pipe caps / FME covers on prefabricated piping/valve ..... ☐

4.2.7 **BM:** WELD prefabricated section as per NK38-DOE-39419-0229 and manufacturer's directions for valve installation ..... ☐

4.2.8 **BM**: COMPLETE welding of tie-in piping installation to piping from north wall ..... ☐

4.2.9 **BM:** CONFIRM valve operation as per requirements in Detailed Commissioning Specification (DCS) NK38-DCS-39340-10001 ..... ☐

4.2.10 **BM**: PERFORM NDE weld inspection as per ITP ..... ☐

4.2.11 **BM**: ENSURE 0-39340-V2893 is closed ..... ☐

4.2.12 **OTFD**: ENSURE 0-39340-V2893 is closed ..... ☐

4.2.13 **OTFD**: INSTALL TCR on 0-39340-V2893 to ensure valve remains closed ..... ☐

TCR#: _____

4.2.14 **BM:** SURRENDER work protection ..... ☐

4.2.15 **OTFD:** REMOVE work protection ..... ☐

4.3 Post Maintenance Testing (PMT)

NOTE

Either 0-39340-TK1201 or 0-39340-TK1203 will be placed on recirculation to expose welds up to 0-39340-V2893 to operational pressure, per the ITP. The tank sampling procedure will be used for this purpose. When BM is satisfied that the welds have passed the test, recirculation of the tank can be terminated. Welds downstream of 0-39340-V2893 will undergo an operational pressure test when the new West Annex systems are tied-in under EC 120421 and EC 120422. A TCR is installed on 0-39340-V2893 to ensure it remains closed.

4.3.1 **OTFD:** NOTIFY B&M QA personnel to ENSURE FE/TSSA are present when the system is first energized ..... ☐

4.3.2 **OTFD:** CONFIRM B&M QA is present for system energization ..... ☐

4.3.3 **OTFD:** PERFORM NK38-OM-39450-04.03.02.04, Sampling Product Tanks TK1201 or TK1203 ..... ☐

4.3.4 **BM/OTFD**: IF there are leaks, THEN RE-ESTABLISH permitry and REPAIR leaks ..... N/A ☐ or ☐

NOTE

Sampling helium cover gas as per NK38-OM-39310.05.04.2 (Grab Sampling FTS\LCS Helium Cover Gas), may lead to NK38-OM-39310.05.04.3 based on sample results.

4.3.5 **OTFD**: SAMPLE Feed Treatment System (FTS)/Feed Storage Tank (FST)/Product Storage Tank (PST) helium cover gas as per NK38-OM-39310-05.04.2 ..... ☐

4.3.6 **BM:** INSTALL banding on new tie-in piping to identify fluid in line (D_2O – Pink bands) as per colour coding in N-STM-01110-10001 (Nuclear Construction Requirements Manual) ..... ☐

4.4 Remove Scaffold and Rubber Area

4.4.1 **BM**: DISPOSE of active waste materials as per N-PROC-RA-0017 ..... ☐

4.4.2 **TRD/BM**: INSPECT and ENSURE all material, tooling removed and work area is left clean ..... ☐

4.4.3 **BM:** REMOVE portable H_2 monitor ..... ☐

4.4.4 **TRD**: CHECK rubber area/rubber change area for contamination before removal..... ☐

4.4.5 **TRD/BM**: IF contamination found within rubber area/rubber change area, THEN DECONTAMINATE equipment/materials in rubber area.....N/A ☐ or ☐

4.4.6 **BM**: REMOVE scaffolding..... ☐

4.4.7 **BM/MS:** REMOVE rubber area(s)/rubber change area(s) ..... ☐

5.0 ACCEPTANCE

5.1 Acceptance Criteria

5.1.1 **BM:** VERIFY ITPs, CWP and WO tasks completed and signed off:

BM: Name:_____ Initials:_____

6.0 RETURN TO NORMAL

The system will be returned to service after installation is completed.

7.0 POST REQUISITES

7.1 Field Post Requisites

7.1.1 **BM:** RETURN copy of completed Master Copy workplan to RCMT MTL ..... ☐

8.0 REQUIREMENTS

N/A

9.0 TERMS AND DEFINITIONS

See OPG N-LIST-08120-10002, Approved Acronym and Abbreviation List for standard OPG acronyms and abbreviations.

Other acronyms and abbreviations used in this Workplan are:

Acronym	Definition
ALARA	As Low As Reasonably Achievable
BM	Black & McDonald Supervisors and field personnel
B&M	Black & McDonald
CA	Contract Administrator
CM	Contract Monitor
CMO	Contract Management Office
CWP	Comprehensive Work Package
CRSS	Control Room Shift Supervisor
DBOM	Design Bill of Materials
DCS	Detailed Commissioning Specification
DEC	Design Engineering Change
D_2O	Deuterium Oxide
ERT	Emergency Response Team
FAATM	Fixed Area Alarming Tritium Monitor
FEC	Field Engineering Civil
FME	Foreign Material Exclusion
FTS	Feed Treatment System
FST	Feed Storage System
H_2	Hydrogen
HOR	Holder of Record
HWMB	Heavy Water Management Building
ITP	Inspection Test Plan
JSA	Job Safety Analysis
MC	Maintenance Control
MM	Mechanical Maintenance (OPG)
MTL	Modification Team Leader
MS	Maintenance Civil (OPG)

N_2	Nitrogen
PA	Protected Area
PJB	Pre Job Briefing
PPE	Personal Protective Equipment
PST	Product Storage Tank
QA	Quality Assurance
OTFD	Operations TRF
PMT	Post Maintenance Testing
QA/QC	Quality Assurance/Quality control
REP	Radiation Exposure Permit
SATM	Space Allocation and Transient Materials
TRD	Radiation Technician
TRF	Tritium Removal Facility
TSC	Tritium Surface Contamination
THM	OPG Chemistry Lab (OPG)
VPCE	Vapour Phase Catalytic Exchange
WCA	Work Control Area

10.0 SUMMARY OF CHANGES

Rev	Summary Of Changes
000	Initial release

11.0 APPENDICES

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Appendix A Reactor Safety Review Checklist..... 32

Work Order: 2910095		
Work Plan Number: NK38-WPL-39340-0458036	Rev: 000	Page 32 of 32
Usage Classification: Reference	Unit: 0/TRF	
Title: 0-39340-DESIGN-MECH-TIE-IN TO TRF FEED AND PRODUCT		

Appendix A

Reactor Safety Review Checklist

The following checklist is to be completed by the author of the workplan prior to submission for review. Refer to the reactor safety review guidelines for detailed description of each step of the checklist. *NA44/NK30/NK38-OPP-03600, Operating Policies and Principles

1. Are there any OP&P considerations associated with this workplan? If yes, OP&P section included in the workplan.	☒ ☒	YES YES	☐	NO
2. Does this plan include backout provisions? (Specific to the plan)	☒	YES	☐	N/A
3. Are workplan prerequisites clearly identified on front of plan?	☒	YES	☐	N/A
4. Does this work affect the in-service or standby heat sinks (See AIM Part A) If yes, all OP&Ps, approvals and recall times have been addressed.	☐ ☐	YES YES	☒	NO
5. Does this work affect containment boundary? If yes, all OP&Ps, approvals and testing have been addressed	☐ ☐	YES YES	☒	NO
6. Is this work on a component or channel of a standby safety system or reactor control system? (See NA44/NK30/NK38-OPP-03600, Appendix A). If yes, all OP&Ps, approvals and testing have been addressed.	☐ ☐	YES YES	☒	NO
7. Have review requirements from Reactor Safety, CNSC and line organization been specified? (for CNSC approvals, Refer To N-PROC-RA-0053, Evaluation of Proposed Changes for Canadian Nuclear Safety Commission Approval or Notification) All approvals attached?	☒ ☒	YES YES	☐	NO
8. For all modified systems or components, approvals have been obtained and all documentation prepared. Seismic requirements considered? Have seismic requirements for installation equipment (eg, cranes, tools, lifts, etc.) been considered (refer to N-PROC-MA-0031)?	☒	YES	☐	N/A
9. Has usage level for this plan been specified?	☒	YES		
10. Pre-Testing and/or Post Maintenance Testing Required? Pass/Fail Criteria Specified? Logic testing considered?	☒ ☒ ☐	YES YES YES	☐	NO
11. For work requiring system opening, has Foreign Material Exclusion been addressed (N-PROC-MA-0018, Foreign Material Exclusion).	☒	YES	☐	N/A
12. For work in steam protected rooms, reference to NK38-SMP-20600-07, Steam Protection Doors Maintenance has been addressed.	☐	YES	☒	N/A