

Document Number: NK38-REP-09701-10130	Usage Classification
Sheet Number: N/A	Revision: R001

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

© Ontario Power Generation Inc., 2013. This document has been produced and distributed for Ontario Power Generation Inc. purposes only. No part of this document may be reproduced, published, converted, or stored in any data retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise) without the prior written permission of Ontario Power Generation Inc.

Contracting Strategy For Fuel Handling - Refurbishment

NK38-REP-09701-10130-01
2013-11-22

Order Number: N/A
Other Reference Number:

OPG Confidential
Commercially Sensitive

Recommended by:


Sorin Marinescu
Project Manager
Nuclear Refurbishment

Date

Nov 22, 2013


Concurred by:


Janice Ding
Acting Project Director
Contract Management
Nuclear Projects

Date

Nov 22, 2013

Approved by:


Dietmar Reiner
Senior Vice President
Nuclear Refurbishment

Date

Nov 23, 2013

Report

OPG Confidential Commercially Sensitive		
Document Number:	Usage Classification:	
NK38-REP-09701-10130		
Sheet Number:	Revision Number:	Page:
N/A	R001	2 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**Table of Contents**

	Page
Revision Summary	4
1.0 EXECUTIVE SUMMARY	5
2.0 INTRODUCTION	6
2.1 Background Information	6
2.1.1 Scoping Process	6
2.1.2 Fuel Handling	7
2.1.3 Fuel Handling Refurbishment	7
2.2 Pre-Refurbishment	7
2.3 Fuel Handling Refurbishment Work	8
3.0 PROJECT OBJECTIVES	9
3.1 Purpose	9
3.2 Development Process	10
3.3 Stakeholder Identification	10
4.0 CONTRACTING CONSIDERATIONS	10
4.1 Vendor/Marketplace Capabilities, Restrictions	12
4.2 Contracting Alternatives Analysis	12
4.2.1 Bundling of Work	12
4.2.2 Contracting Models	12
4.2.3 Work Packaging and Vendor Fit	12
4.2.3.1 Refurbishment Work	12
4.3 Decision Options and Constraints	15
5.0 RECOMMENDED CONTRACTING STRATEGY	16
6.0 CHOICE OF PRICING MODEL	17
7.0 INTERFACE OR INTEGRATION ISSUES WITH OTHER CONTRACTING STRATEGIES/ MAJOR CONTRACTS FOR THE DARLINGTON REFURBISHMENT WORK	18

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 3 of 31

Title: CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

8.0	KEY RISKS AND PROPOSED MITIGATION.....	18
9.0	SUCCESS CRITERIA/PERFORMANCE INDICATORS.....	19
10.0	IMPLEMENTATION PLAN.....	19
	Appendix A: Recommended Sourcing Approach.....	21
	Appendix B: Commercial Principles.....	22
	Appendix C: Vendor/Marketplace Capabilities, Restrictions	24
	Appendix D: EOI Results - Summary Memorandum	26
	Appendix E: Bundling of Work.....	28
	Appendix F: Contracting Models	29

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130		Usage Classification:
Sheet Number: N/A	Revision Number: R001	Page: 4 of 31

Title: CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Revision Summary

Revision Number	Date	Comments
R000	2013-11-22	Initial issue.
R001	2013-11-22	Revised to reflect current status.

Report

**OPG Confidential
Commercially Sensitive**

Document Number:

NK38-REP-09701-10130

Usage Classification:

Sheet Number:

N/A

Revision Number:

R001

Page:

5 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**1.0 EXECUTIVE SUMMARY**

The Darlington Refurbishment (“**DR**”) Program Commercial Strategy identifies a need to establish separate contracting strategies for each of the major projects under the DR Program (each a “**Contracting Strategy**”).

This document is an update to revision 001 of the Contracting Strategy for the refurbishment of the Fuel Handling (“**FH**”) equipment (“**Refurbishment Work**”)¹, dated November 16, 2012. The Contracting Strategy for the Defuelling Work² is found in NK38-REP-09701-10020.

Revision 001 of the Contracting Strategy recommended unbundling the Defuelling Work from the Refurbishment Work. Revision 001 also recommended further unbundling the Refurbishment Work as shown in the table below. The recommended option provided the best alignment with OPG’s current core values (accountability, transparency and value for money) with each portion of the Refurbishment Work scope.

Contract	Scope	Recommended Sourcing Approaches
C1	1.Main FH Refurbishment 2.FH optional scope	Competitive (request for proposals (“RFP”))
C2	Irradiated fuel bay (“IFB”) fuel inspection tooling	Competitive (using extended services master services agreement (“ESMSA”) vendors)
C3	FH control system refurbishment	Competitive (RFP or ESMSA)
C4	Reactor area bridges and carriages refurbishment	Amendment to the existing RFR contract
C5	Fuelling machine (“FM”) head overhaul	Single-source to GE-Hitachi Nuclear Energy Canada Inc. (“GEH-C”)
C6	IFB Heat Exchanger Replacement	Projects and Modifications and Station Execution⁴
Total		

¹ Refurbishment Work is refurbishment of Fuel Handling equipment installed on individual units, common equipment installed on East and West Fuelling Facilities Areas, and equipment in the Central Service Area. The work includes pre-refurbishment work, refurbishment work and post-refurbishment work.

² Defuelling Work is defined as defuelling of the reactors prior to retube and feeder replacement (“RFR”).

⁴ This is a change to the Recommended Sourcing Approach. Previously the Recommended Sourcing Approach was Competitive ESMSA. This work scope is a maintenance activity rather than a modification and as a result, the execution must be performed by OPG using PWU.

Report

OPG Confidential Commercially Sensitive		
Document Number:	Usage Classification:	
NK38-REP-09701-10130		
Sheet Number:	Revision Number:	Page:
N/A	R001	6 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

In late summer 2013, scope reviews were undertaken that identified removing approximately [REDACTED] of work from the Refurbishment Work project, and transferring it to the Darlington station. The work removed from the Refurbishment Work scope is work that will be executed using station funding as part of the lifecycle window (i.e. as part of on-going maintenance and operation), rather than Refurbishment. As of the date of this Contracting Strategy, further reviews are being undertaken which may impact on the scope of the Refurbishment Work.

2.0 INTRODUCTION**2.1 Background Information****2.1.1 Scoping Process**

In early 2008, OPG began the Initiation Phase of the DR Program. The objective and focus of the DR Program was on ensuring the scope, schedule and cost of the project was realistic and achievable. In order to achieve the objective, scope needed to be defined and managed in order to avoid the risk of failing to meet business objectives and schedule. Comprehensive inputs were gathered from the Darlington Station and other key stakeholders as part of the preliminary planning phase. Scope was assessed based on 4 categories: Core scope (musts), non-core scope (needs), value enhancing scope (wants) and performance improvement scope. Core scope set the lower boundary for the cost estimate and included work that was required as part of regulatory and licensing requirements, necessary to start the reactor and funded by the DR Program. Revision 001 of the Contracting Strategy reflected the FH Refurbishment Work approved by the Scope Review Board ("**SRB**") on July 23, 2012

[REDACTED]

In the summer of 2013, a team of senior station and refurbishment managers, including the Refurbishment Project Managers, was established to do a detailed review of the Refurbishment scope request or Darlington scope requests ("**DSR**"). Each Refurbishment DSR was reviewed to confirm that the work was actually necessary for life extension and, if it was, that the conditions or duration of the refurbishment outages were required to accomplish the work (i.e. did the work need to be done in a defuelled, dewatered state, and did it require a refurbishment outage). If not, the work was moved to a 'life extension window' (the period from now until the first maintenance outage after completion of the unit 4 refurbishment outage). The proposed scope changes must go through the SRB to get approval to remove scope from the DR Program and add them to other organizations for completion in the life extension window. This is expected to be completed in Q4 2013.

⁵ The scope identified for potential removal includes: (1) FH Air Auxiliary System (replacement of the trolley compressors, air dryers and after coolers), (2) FH D20 Auxiliaries System (replacement of the D20 pumps and motors, and the replacement/rebuilding of the system pneumatic and solenoid valves), (3) FH Flow Injection System (replacement of the system valves as well as the remote connector actuator motor), (4) FH Trolley System (replacement of the trolley's main components including fixed power and signal cables, trolley drive motors, trolley rectifiers and service area bridge refurbishment), and transfer of C3 and C5 from the table above.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 7 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

The results of the FH scope review identified approximately [REDACTED] worth of work to be removed from the Refurbishment Work and transferred to the Darlington station (to be completed in the life extension window). Details of the change are provided in the various sections below. As of the date of this Contracting Strategy, further reviews are being undertaken which may impact on the scope of the Refurbishment Work.

2.1.2 Fuel Handling

There are three different designs of FH systems. The FH system at Darlington and Bruce are unique because they are the only stations with a design that uses 3 trolleys that move up and down to fuel all 4 reactors, with continuous fuelling on-line, 24 hours per day. It differs from the Candu 660 design (at Pt. Lepreau, Gentilly and sold overseas) that uses one FH system for each reactor and has no trolley or carriage that moves up and down. Other Candu systems, including Pickering has unitized access for fuelling.

2.1.3 Fuel Handling Refurbishment

The objective of the Refurbishment Work is to repair, replace or install new equipment to support the overall DR Program objective to extend the life of the station for 30 years.

The initial Contracting Strategy for the FH Project (the “**Project**”) focused largely on contracting the entire FH scope (Defuelling Work and Refurbishment Work) to GEH-C or to GEH-C with a partner (for the Refurbishment Work). In the event that negotiations were not successful in that scenario, an alternative plan was developed which sought to minimize the scope that was required to be performed by GEH-C. This alternative, which limits the scope that was to be single sourced to GEH-C to the Defuelling Work and potentially some other smaller scopes of work, was preferred by both the Fuel Handling Team and management, and it is the recommended approach.

Plan B was developed to address risks that could arise if the competitive procurement process for the main refurbishment bundle was not successful (i.e., if proponents do not submit proposals or if proposals submitted by proponents do not meet OPG’s requirements). Even though there is no ‘specialized’ FH-type work, there is a risk that proponents might feel disadvantaged because of the original equipment manufacturer (“**OEM**”)’s participation in the RFP process.

2.2 Pre-Refurbishment

OPG engaged GEH-C to provide preliminary engineering (design and engineering), including pre-refurbishment engineering projects (studies, modification outlines and scoping determinations). This preliminary engineering work was awarded to GEH-C in April 2011 under an existing purchase order (“**PO**”) (PO No. [REDACTED]), which was created under the terms of the existing FH Services Agreement with GEH-C.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130		Usage Classification:
Sheet Number: N/A	Revision Number: R001	Page: 8 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**2.3 Fuel Handling Refurbishment Work**

As noted, the SRB approved the scope for the FH Refurbishment Work [REDACTED] on July 23, 2012. This scope was reflected in NK38-SOW-35000-10000 R01. Revision 001 of the Contracting Strategy recommended unbundling the Refurbishment Work into 6 sub-bundles to allow for the best sourcing options:

- a) Main FH Refurbishment [REDACTED]
- b) IFB fuel inspection tooling [REDACTED]
- c) FH control system refurbishment [REDACTED]
- d) Reactor area bridges and carriages refurbishment [REDACTED] and
- e) FM head overhaul [REDACTED]
- f) IFB heat exchanger replacement [REDACTED]

The recommendation to unbundle the work into 6 sub-bundles was based on a number of factors: (i) each of the pieces of work are being done at different times, (ii) each of the work packages are independent of the other, (iii) the potential vendors for each are different, (iv) the work is not in the same geographic location within the plant, (v) the timing for contract award for each are different, (vi) there is no cost advantage associated with bundling one or more sub-bundles together, (vii) there are no vendor management co-ordination activities between the 6 sub-bundles, (viii) there is no negative consequences associated with separating the sub-bundles, and (ix) unbundling reduces risk. Unbundling of the work allows for 5 of the 6 sub-bundles to be procured on a competitive basis. Details are contained in **Appendix A**. With the work being moved from Refurbishment to the lifecycle window, this allows for work to be executed at different periods of time in different windows.

The Main FH Refurbishment work will be executed during the period when either units 1&2 or units 3&4 are shutdown in parallel in order to minimize the impact on the fuelling operations of the running units. Once engineering is completed (e.g., development of technical specifications where none currently exist for replacing components), procurement will be completed with parts staged prior to unit outages. Field execution activities are not expected to require extensive engineering or technical support.

The reactor area bridges and carriages refurbishment will be done during each unit outage when there is unrestricted access to the reactor vault area. Due to the fact that the RFR contractor will have control over the reactor vault area during refurbishment, it is of benefit to move the reactor area bridges and carriages refurbishment scope into the RFR scope of work. Removal of the bridge, carriage and ball screws is required for the installation of the RFR work platforms which will allow replacement of the bridge components outside of the vault in a lower dose environment and off critical path.

The replacement of the IFB heat exchangers will be done prior to start of Darlington Refurbishment.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 9 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**3.0 PROJECT OBJECTIVES**

The key objective of the DR Program is to extend the life of the plant for 30 years. DR activities must be focused on ensuring reliability and improving performance and maintainability. Investments in refurbishment must deliver value for money and be aimed at improving reliability while lowering production costs.

In addition to the objectives for the DR Program, specific objectives were identified for the Refurbishment Work. These include:

- a) Eliminate any nuclear and safety related risk associated with the refurbishment of the FH systems;
- b) Seamlessly integrate potential equipment replacement/upgrades with existing FH systems to minimize disruption to the fuelling of running units;
- c) Maintain or enhance the reliability of the FH equipment and system to meet performance objectives post-refurbishment, particularly forced loss rate ("FLR");
- d) Ensure availability of parts required to maintain the FH equipment and system post-refurbishment;
- e) Ensure compliance with the technical and quality assurance requirements;
- f) Minimize impact on Operations and Maintenance staff (e.g., retraining post-refurbishment); and
- g) Complete the Refurbishment Work within the approved funding limits and on schedule.

Kepner-Tregoe ("**KT**") decision analyses were performed for the Refurbishment Work. The KT analyses include additional commercial objectives for the Contracting Strategy.

3.1 Purpose

The purpose of this Contracting Strategy is to:

- Identify the contracting alternatives suitable for the Refurbishment Work;
- Document considerations taken during assessment of the contracting alternatives; and
- Recommend a Contracting Strategy (including strategy around sourcing and pricing).

Report

OPG Confidential Commercially Sensitive		
Document Number:	Usage Classification:	
NK38-REP-09701-10130		
Sheet Number:	Revision Number:	Page:
N/A	R001	10 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**3.2 Development Process**

The Fuel Handling Team was initially established in February 2011 with support provided as required by Faithful+Gould Inc. and OPG's Law Division. A smaller working group was established which included Project Management, Refurb Supply Chain and Contract Management (formerly Commercial Strategy and Nuclear Commercial Development). The Team then identified and analyzed potential options around work packaging, contracting approaches/models and pricing options.

As the scope of work became understood, the decision was made in August 2012 to focus on the Defuelling Work ahead of the Refurbishment Work because the two scopes of work are mutually independent and are driven by different DR project execution timelines. A decision was also made at that time to further unbundle the Refurbishment Work into 6 separate sub-bundles.

3.3 Stakeholder Identification

Revision 001 of the FH Refurbishment Contracting Strategy included a list of stakeholder groups that were involved in the development of the Contracting Strategy.

4.0 CONTRACTING CONSIDERATIONS

In developing the Contracting Strategy for the Refurbishment Work, OPG considered how the work will be contracted and executed in order to ensure the achievement of OPG's core business objectives and values of safety, including nuclear safety, accountability, fairness, transparency and value for money.

- **Refurbishment Risks**

The FH systems will be removed, overhauled and placed back in service immediately following unit refurbishment. The equipment will be expected to perform flawlessly in a high temperature, high pressure, and radioactive environment. There is a risk of integration issues with OEM and non-OEM parts used on the FM head rebuild.

Separation of the Refurbishment Work scope into 6 sub-bundles was done to limit, to the greatest extent possible, the scope that requires single-sourcing which helps to meet one of the guiding DR commercial principles. **Appendix A** includes a table that identifies the recommended sourcing approach for each of the 6 sub-bundles. The table also includes details on when each of the sub-bundles of work will be executed (i.e. pre-refurbishment or during refurbishment), timing for contracts, rationale for bundling and risks associated with each.

Other risks associated with the Refurbishment Work are primarily oriented around schedule.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 11 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

- Removal of the bridges is required for installation of the RFR work platforms. Any delays to schedule will have significant impact on the entire DR Program.
- A single point of accountability for bridges and carriages part of the Refurbishment Work execution is preferred to ensure proper oversight, jobsite work coordination and flexibility of implementation.
- Critical timing is required for the procurement and execution stages for the portion of FH work that will be performed during the period when either units 1&2 or units 3&4 are shutdown in parallel. This will minimize the impact on the fuelling operations of the in-service units.
- Business Drivers:
 - (i) Major modification and refurbishment projects to align as far as possible and practical with the engineering, procurement and construction (“EPC”) contracting model.
 - (ii) Utilize existing master services agreements as much as possible and practical, insofar as the service provider’s skill set matches the services required.
 - (iii) Ensure post-refurbishment reliability and serviceability of the station’s FMs by making use of existing technical expertise, where appropriate, and limiting any non-OEM integration issues.
 - (iv) OPG’s future business direction:
 - Smaller fleet, fewer staff, more strategic labour and contracting strategies, improved long-term inspection and maintenance strategy, different outage strategy (longer periods between subsequent outages, develop vendor capabilities for future services and support).
 - Operate in a safe, efficient and cost effective manner, with prudent investments to improve reliability and lower production costs.
 - Nuclear Refurbishment to work collaboratively with Darlington station to support its objective of striving toward top global decile performance post refurbishment.
 - (v) Cost and schedule related considerations:
 - Completion of the full scope of work⁶ within the approved and released Refurbishment Work budget.
 - Completion of the full scope of work within the approved schedule.
- Commercial Principles

⁶ Full scope of work in this context means all work approved by the Scope Review Board.

Report

OPG Confidential Commercially Sensitive		
Document Number:	NK38-REP-09701-10130	
Sheet Number:	Revision Number:	Page:
N/A	R001	12 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

The guiding commercial principles from the DR Commercial Strategy were considered in developing and evaluating the contracting options. A list of the principles considered is contained in **Appendix B**. A review of the applicability of these principles will be performed prior to negotiations and drafting of the contracts.

4.1 Vendor/Marketplace Capabilities, Restrictions

The initial vendor analysis is attached in **Appendix C**.

In order to obtain more information about potential vendors for the Main FH Refurbishment bundle, OPG issued a request for expressions of interest ("EOI"). The EOI was sent to eight prospective proponents [REDACTED]

[REDACTED] The results of the EOI are documented in a memorandum, a copy of which is attached in **Appendix D**.

4.2 Contracting Alternatives Analysis

4.2.1 Bundling of Work

Revision 001 of the Contracting Strategy included analysis of the Refurbishment Work packages and identified potential options for bundling of the work. These included: (i) bundling all the work together, (ii) bundling by type of work, and (iii) bundling by scope of work. Full details of the options considered can be found in **Appendix E**.

4.2.2 Contracting Models

Revision 001 of the Contracting Strategy included analysis of various contracting models that were considered in developing and evaluating the contracting options. A list of the models considered is contained in **Appendix F**.

4.2.3 Work Packaging and Vendor Fit

4.2.3.1 Refurbishment Work

Refurbishment Work is the maintenance work to be performed on the Darlington Nuclear Generating Station ("DNGS") FH equipment once the reactor has been defuelled.

- **Main FH Refurbishment** [REDACTED]

This portion of the overall Refurbishment Work involves the replacement of the Powertrack including modifications to improve reliability. The Main FH Refurbishment Work includes approximately [REDACTED] of optional work including:

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 13 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

- FH Air Auxiliary System (replacement of the trolley compressors, air dryers and after coolers),
- FH D2O Auxiliaries System (replacement of the D2O pumps and motors, and the replacement/rebuilding of the system pneumatic and solenoid valves),
- FH Flow Injection System (replacement of the system valves as well as the remote connector actuator motor), and
- FH Trolley System (replacement of the trolley's main components including fixed power and signal cables, trolley drive motors, trolley rectifiers and service area bridge refurbishment).
- condition based optional scope which is dependent on field inspections which will be completed in 2014.

Since this work is not unique to FH and requires limited specialty knowledge or training, it can be performed by the contractors qualified on the Approved Supplier List ("ASL") to perform this work. Competition for this work will allow OPG to maximize the value for money, allow for an open, fair and transparent process and minimize the handoffs required during the different aspects of this sub-bundle by having one contractor accountable for the entire work.

This conclusion was fully supported by the Main FH Refurbishment KT analysis (see Revision 001 of the Contracting Strategy).

- **IFB Fuel Inspection Tooling** [REDACTED]

This portion of the Refurbishment Work includes replacement of the fuel inspection bay module unloader in the East Fuelling Facilities Auxiliary Area ("EFFAA") and installation of new fuel inspection equipment in the West Fuelling Facilities Auxiliary Area ("WFFAA"). This work is a smaller piece of work that is mostly mechanical in nature and involves minor modifications. This work is required to support CNSC mandated fuel inspections until end of life.

This work is ideally suited to the ESMSA suppliers because it is non-FH-specialty work that the ESMSA suppliers have the capability of performing. The relatively small dollar amount also makes going with the ESMSA suppliers the least cost option for this portion of the Refurbishment Work as OPG can capitalize on the existing contracts. This decision is also supported by the results of the KT analysis (see Revision 001 of the Contracting Strategy).

- **FH Control System** [REDACTED]

Revision 001 of the Contracting Strategy included this bundle of work. As a result of the scope review in late summer 2013, a decision was made to move this work to the Darlington station. This is work that can be done as part of outage work. This work is

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130		Usage Classification:
Sheet Number: N/A	Revision Number: R001	Page: 14 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

unique and is unrelated to the Main FH Refurbishment and IFB Fuel Inspection Tooling bundles.

The FH control subsystem supports the FH control computer in controlling and monitoring the mechanical and process equipment of the FH system. The FH control subsystem equipment includes the Input/Output ("I/O") subsystems, auxiliary control equipment, disk drive interface, Ethernet interface and associated degraded components. These electronic components are obsolete and close to end of life.

Replacement of obsolete FH control system components will allow for a more reliable and robust FH system. The equipment being replaced under this part of the Refurbishment Work is not unique to FH and hence can be performed by any contractor on the ASL.

- **Bridges and Carriages** [REDACTED]

The reactor area bridges and carriages refurbishment work is located in the FM vault which is also the prime location for the bulk of the RFR work. The bridge, carriage and ball screws must be removed to allow for the installation of the RFR work platforms. Rather than having one contractor remove the bridge, carriage and ball screws then turning the work area over to the RFR contractor (and the reverse at the end of the RFR project), the Team recognized this overlap early on and realized that the safest (with minimal handoffs) and most cost effective way with the least risk to schedule adherence was to include this work in the RFR scope of work by amending the RFR contract.

The Fuel Handling Team worked closely with the RFR team to ensure this was the best fit for both projects. Based on contractor access and the location of the work, placing this work with the RFR contractor is the most cost-effective and schedule-effective option. The results of the KT analysis also supported the conclusion that combining this work with the RFR work is the preferred option.

- **FM Head** [REDACTED]

Revision 001 of the Contracting Strategy included this bundle of work. As a result of the scope review in late summer 2013, a decision was made to move this work to the Darlington station and execute the work as part of the lifecycle window. This work is primarily engineering and supply of improved FM overhaul kits.

The FH systems at DNGS move approximately 40,000 (new and irradiated) fuel bundles per year. The FM head is the critical component used for exchanging the new and irradiated fuel bundles in the fuel channels. The FM heads require complete overhaul to ensure continued safe and reliable operation after refurbishment until the end of station life.

Design changes and modifications that are required to the complex and unique components on the FM head can only be done by GEH-C, the original designer and manufacturer of the DNGS FH system. GEH-C is in the best position to ensure that

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 15 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

the required changes or modifications are compatible with the existing FH and station systems, eliminate the risks associated with mating OEM and non-OEM components and to seamlessly integrate the changes and modifications on the existing FM heads.

- **IFB Heat Exchanger** [REDACTED]

Degraded IFB cooling has existed at DNGS for some time and is caused primarily by rising lake temperatures and degraded equipment condition. The existing equipment performance cannot meet design basis and needs to be restored. Existing equipment performance also cannot meet the anticipated needs of the DNGS Refurbishment Project during core defuelling. DNGS should replace the existing IFB heat exchangers prior to 2016 in order to restore design cooling capacity. This pre-refurbishment work involves replacement of the old with new to restore design cooling capacity.

Initially this work was to be competitively bid using the ESMSA suppliers because it was non-FH-specialty work that the ESMSA suppliers have the capability of performing. Because this work is a maintenance activity and not a modification, the execution must be done by OPG Power Workers Union (PWU) staff. The engineering and procurement work will be managed by Projects and Modifications.

4.3 Decision Options and Constraints

The probability of success of the Refurbishment Work is maximized with participation from GEH-C in the preliminary engineering and FH head overhaul because GEH-C is the designer of the FH equipment and OPG does not have the internal design capability to perform the engineering work for FH.

In revision 001 of the Contracting Strategy, OPG had determined that GEH-C's participation in the Refurbishment Work would be influenced by negotiations for the Defuelling Work. OPG has successfully negotiated an agreement with GEH-C for the Defuelling Work and, as a result, GEH-C was invited to participate in the RFP for the Main FH Refurbishment Work.

Unbundling of the Refurbishment Work into 6 sub-bundles allows for optimization of the work and reduces reliance on GEH-C.

Report

OPG Confidential Commercially Sensitive		
Document Number:	NK38-REP-09701-10130	
Sheet Number:	Revision Number:	Page:
N/A	R001	16 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**5.0 RECOMMENDED CONTRACTING STRATEGY**

Unbundling the Refurbishment Work provides the best alignment with OPG's current core values (accountability, transparency and value for money) with each portion of the Refurbishment Work. The recommended contracting type for each sub-bundle is stipulated below.

a) Main FH Refurbishment [REDACTED]

Since this work is not unique to FH and requires limited specialty knowledge or training, this work can be performed by the contractors qualified in the ASL to perform this work.

b) IFB fuel inspection tooling [REDACTED]

This work is non-specialized and OPG's most cost effective contracting method is to engage the ESMSA suppliers through a competitive procurement process (i.e., secondary compete).

c) FH control system refurbishment [REDACTED]

The FH control system components are not unique. This work can be performed by the contractors qualified in the ASL to perform this work.

d) Reactor area bridges and carriages refurbishment [REDACTED]

Due to overlapping work and work area with the RFR contractor, the safest and most cost effective way with the least risk to schedule adherence is to include this work in the RFR scope of work by amending the RFR contract.

e) FM head overhaul [REDACTED]

The original designer and manufacturer of the DNGS FH system, GEH-C, is the only company that can perform this work in order to eliminate modification and integration risks.

It is recommended that the FM head work be single-sourced to GHHEC, as the OEM, to avoid costly integration issues with OEM and non-OEM parts for the life of the station.

Report**OPG Confidential
Commercially Sensitive**

Document Number:

NK38-REP-09701-10130

Usage Classification:

Sheet Number:

N/A

Revision Number:

R001

Page:

17 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENTf) IFB heat exchangers [REDACTED]

This is maintenance work and will be done as a maintenance activity rather than a modification. The execution piece of this work must be done by OPG PWU staff. Engineering and procurement work associated with this bundle will be managed by OPG Projects and Modifications.

6.0 CHOICE OF PRICING MODEL

Contract	Scope	Pricing Model
C1	1. Main FH Refurbishment 2. FH condition based optional scope and optional scope	Fixed/Firm Pricing
C2	IFB fuel inspection tooling	Fixed/Firm Pricing
C3	FH control system refurbishment	Target Price or Fixed/Firm Pricing
C4	Reactor area bridges and carriages refurbishment	Cost-reimbursable Target Price model with Fixed fee and incentive/disincentive components.
C5	FM head overhaul	Fixed/Firm Pricing
C6	IFB heat exchanger replacement	Fixed Price

Team discussions with respect to pricing models determined that the FH scope (except reactor bridge and carriage work) is adequately defined and known to consider fixed and/or firm pricing where appropriate (where "firm" is a "fixed" price with economic price adjustments over a prolonged execution window). In general, development phase work that will be performed once and early in the project will be recommended as fixed, while execution elements that will be spread over a number of years will be recommended as firm.

The reactor bridge and carriage work should be priced as cost-reimbursable target price model with fixed fee and incentive/disincentive components as recommended in the RFR Contracting Strategy.

Report

OPG Confidential Commercially Sensitive		
Document Number:	NK38-REP-09701-10130	
Sheet Number:	Revision Number:	Page:
N/A	R001	18 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

The replacement of the IFB heat exchangers will be a fixed price for engineering and procurement, as the scope of work is well defined.

7.0 INTERFACE OR INTEGRATION ISSUES WITH OTHER CONTRACTING STRATEGIES/ MAJOR CONTRACTS FOR THE DARLINGTON REFURBISHMENT WORK

The following interface or integration issues have been identified:

- Defuelling and Refurbishment Work will have some interface with resources and equipment supporting the running units.

This area will be continually assessed as the definition phase progresses further for all other DR projects including Fuel Handling.

8.0 KEY RISKS AND PROPOSED MITIGATION

Key risks and proposed mitigation are contained in the Risk Register.

Risks associated with Refurbishment Work sourcing options were included in the KT analyses (see Revision 001 of the Contracting Strategy). No high/high risks were identified in any of the Refurbishment Work KT analyses.

There is a risk that the proponents invited to the RFP for the Main FH Refurbishment bundle may not be interested in participating in this RFP because of a perception that GEH-C could have significant competitive advantage over other proponents. To address this risk, OPG issued the EOI to determine possible proponents for the RFP. The EOI demonstrated sufficient interest in this work among the potential proponents. Had the result of the EOI determined that there were no interested proponents, OPG would not have issued the RFP for the entire bundle and would have instead sourced the engineering portion of the work to GEH-C and competitively sourced the balance (P and C).

There is a risk that GEH-C will be the only proponent to submit a proposal. Should this risk materialize, OPG will assess the GEH-C proposal and determine if we will proceed to enter into negotiations on a single source basis. OPG will use costing estimates as part of the assessment (i.e. to see whether pricing is in line or outside of the basis of estimates). In the event that OPG determines not to enter into negotiations or, in the event that negotiations are unsuccessful, OPG will proceed with Plan B.

Under Plan B, OPG would split all engineering and procurement work from the construction work.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 19 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**9.0 SUCCESS CRITERIA/PERFORMANCE INDICATORS**

The critical success factors for the entire Project during the Darlington Refurbishment include:

- **Meet Regulatory Requirements:** meet all required standards for safety, environmental compliance and the CNSC/other applicable quality standards.
- **Maintain OPG Control:** OPG has ultimate accountability for delivering the DR Program as the program manager.
- **Minimize Impact on Existing Units:** minimize disruption to operating units where safety of the units is involved and where production is potentially disrupted.
- **Achievable Schedule and Budget:** schedule and budget are to be realistic and achievable. Cost recovery and financing methods must be in place.
- **Demonstrate Success:** demonstrate to the public and shareholder that the DR Program is a success. The RPET have defined success through the following program critical success factors:
 - (i) Sustain current plant performance and support, where feasible, initiatives to achieve top decile performance post refurbishment;
 - (ii) Program implemented on budget, on schedule (measured against release quality estimate baseline); and
 - (iii) Return plant back to DNGS.

10.0 IMPLEMENTATION PLAN

Since each of the sub-bundles of the Refurbishment Work has a different recommended contracting strategy based on the skill set required, value for money and/or logical placement with existing DR contractors, the implementation plan for each sub-bundle is spelled out below.

a) Main FH Refurbishment

OPG issued an RFP to potential proponents based on the results of the EOI. As of the date of this Contracting Strategy, the scope of work is being revised to move core scope into optional work (as described in this Contracting Strategy) and the RFP process has been suspended pending further analysis on the execution strategy of the revised scope and impact to schedule. OPG will re-engage in the RFP process once OPG completes the analysis.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130		Usage Classification:
Sheet Number: N/A	Revision Number: R001	Page: 20 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

The initial target date to finalize an agreement for this work was December 10, 2013. The schedule has been impacted by decisions related to un-lapping of the units and scope reviews.

b) IFB Fuel Inspection Tooling

A secondary competition with the ESMSA vendors will be conducted for the IFB fuel inspection tooling work.

Agreement sign-off TCD: January 31, 2014

c) FH Control System Refurbishment

This work is moved to the Darlington station and is no longer included in Refurbishment Work.

d) Reactor area bridges and carriages refurbishment

Completion of an amendment to the RFR contract to add the reactor area bridges and carriages refurbishment work to the RFR scope of work is in progress.

Amendment sign-off TCD: December 20, 2013

e) FM Head Overhaul

This work is moved to the Darlington station and is no longer included in Refurbishment Work.

f) IFB Heat Exchanger Replacement

Projects and Modifications will be responsible for engineering and procurement. Execution will be performed by OPG PWU staff. No agreement will be required.

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Appendix A: Recommended Sourcing Approach

Contract	Scope	Recommended Sourcing Approaches	Timing of work	Project Managed by	Comments/Clarification	Risk
C1	1. Main FH Refurbishment	Competitive request for proposals ("RFP")	Powertrack - During refurbishment. Optional Work - in lifecycle window	Darlington Refurbishment FH project	Powertrack will need to be replaced during the refurbishment window when units are shutdown. Optional work, including trolley work, will be done during lifecycle windows.	Access to the area where the construction work is to be done will only be available when these pairs of units are shutdown.
	2. FH condition based optional scope		Pre-refurbishment Field execution window: [REDACTED]	Projects & Modifications	This bundle of work is being done prior to refurbishment to support the fuel inspections in both IFBs that will be required by the Canadian Nuclear Safety Commission ("CNSC") during detubing. Currently, inspections are only done in the west IFB. That equipment is going to be overhauled. The east IFB will have new equipment installed to support continued inspections when the west IFB cannot be accessed due to refurbishment islanding.	This work is divided into two distinct parts with a span of nearly 2 years between field execution of the work. The work involves removing, overhauling/replacing, installing and set-up of equipment 30 ft under water. This work requires special skills to be able to perform the underwater work safely and efficiently.
C2	Irradiated fuel bay ("IFB") fuel inspection tooling	Competitive (using extended services master services agreement ("ESMSA") vendors)	Pre-refurbishment Field execution window: [REDACTED]	TBD - Projects & Modifications if ESMSA, DR FH if competitive RFP	The replacement of computers and computer systems for FH is not unique to FH. The work needs to be done by a vendor with computer/IT skills as opposed to mechanical/electrical skills. This bundle is separated from any of the other FH refurbishment sub-bundles for this reason.	The computer system is to be replaced during fuelling window outages without disruption to the on-line units. The chosen vendor must be highly skilled in the computer/IT industry to avoid any derating of the running units.
C3	FH control system refurbishment	Competitive (RFP or ESMSA)	Pre-refurbishment Field execution window: [REDACTED]	Darlington Refurbishment RFR project	The bridges and carriages are in the reactor vaults in front of the face. They have to be removed prior to reactor feeder tube replacement ("RFR") for that vendor to perform their work. To align the timing of this work and avoid vendor overlap/interface, the decision was made to amend this work into the RFR contract. The RFR vendor will refurbish and reinstall the bridges and carriages upon completion of the RFR work.	Removing the bridges and carriages becomes critical path work after detubing as it is required to begin RFR work.
C4	Reactor area bridges and carriages refurbishment	Amendment to the existing RFR contract	During refurbishment Field execution window: Removal - immediately following bulkhead installation in every unit outage. Installation - immediately following RFR in every unit outage.	Darlington Refurbishment RFR project	This work must be sourced from GEH-C as the OEM. This bundle of work is supply FM head overhaul kits. If required, the FM heads will be overhauled by station staff prior to refurbishment in order to give the best chance of no refurbishment delays due to FM head breakdowns.	The FM head overhaul kits are currently bought from the OEM (GEH-C). The I/P belongs to the OEM. Introducing another vendor to provide these kits introduces a reverse-engineering risk.
C5	Fuelling machine ("FM") head overhaul	Single-source to GE-Hiachi Nuclear Energy Canada Inc. ("GEH-C")	Pre-refurbishment Field execution window: [REDACTED]	Darlington Refurbishment FH project	The IFB HXs are being replaced prior to refurbishment in anticipation of the additional heat load that detubing will place on the IFB.	New heat exchangers are being purchased and the old ones replaced.
C6	IFB Heat Exchanger Replacement	Projects and Modifications and Station Execution	Pre-refurbishment Field execution window: [REDACTED]	Projects & Modifications		

OPG Confidential Commercially Sensitive	
Document Number: NK38-REP-09701-10130	Usage Classification:
Sheet Number: N/A	Revision: R001

Title:
CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Appendix B: Commercial Principles

Principle	Comments
Early Communication with OPG Stakeholders	There were open and active discussions with senior management and other important stakeholders (e.g., Law, DR Program Level CFST etc.) to make them aware of the Refurbishment Work and obtain their input on the Team's recommended Contracting Strategy.
Early Engagement for Market Due Diligence	The Fuel Handling Team drew from review of past & present FH projects and commercial agreements, OPG ASL database, operational experience ("OPEX") around FH work primarily within DNGS, and the Team's knowledge base to gather market intelligence for FH work.
Competition	The Fuel Handling Team's approach was that competition is the preferred method of procurement and benefits of competition must be considered. The option of sourcing via competition was incorporated in packaging the scope of work, the analysis of the contracting approach and the overall sourcing strategy.
Acceptance by Marketplace	A review of the marketplace for contractors experienced in FH system work, specifically, trolley-based FH system work as found at DNGS & Bruce Power was completed and reviewed by the Fuel Handling Team.
Compliance with Applicable Internal Policies and Procedures	The Fuel Handling Team's view is that the proposed Contracting Strategy complies with the requirements in applicable OPG's internal policies and procedures.
Scope Definition and Work Packaging	The strategy development considers optimal bundling of the scope of work taking into account acceptable risk thresholds associated with integration activities.
Timing of Contract Award	Consideration for cost and schedule when deciding the contract award timing for all 6 sub-bundles of the Refurbishment Work. Consideration is also given to pre-refurbishment work and long lead items.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130	Usage Classification:	
Sheet Number: N/A	Revision Number: R001	Page: 23 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Principle	Comments
Risk Sharing vs. Risk Premium	The objectives and key risk areas associated with the Refurbishment Work were identified from analysis of the available options. These were considered to determine the best Contracting Strategy to achieve the DR and the Refurbishment Work objectives and post-refurbishment goals within acceptable risk thresholds taking into account inherent risks around transparency and value for money.
Working Approach/Philosophy between OPG and Vendors	Partnership approaches with appropriate monitoring and oversight by OPG was considered. 'Open book' contracts will be pursued to permit OPG to have a good understanding of the contractors' cost structure. OPG will leverage vendor capabilities and execution methodologies and work together to cooperatively resolve issues.
Use of OPG Knowledgebase	The Team gathered OPG OPEX for FH work from contracting and commercial perspectives through review of past projects and discussion with knowledgeable stakeholders across OPG.
Linkages to Other DR Strategies	OPG will avoid developing internal skills that will not be required post-refurbishment. Internal OPG resources will provide project oversight during planning and execution of the FH work to ensure effective integration with other DR strategies. Where required due to licensing and/or regulatory issues, internal OPG staff will be utilized.

Report

OPG Confidential
Commercially Sensitive

Document Number:

NK38-REP-09701-10130

Usage Classification:

Sheet Number:

N/A

Revision Number:

R001

Page:

24 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Appendix C: Vendor/Marketplace Capabilities, Restrictions

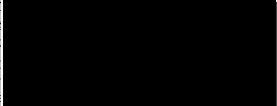
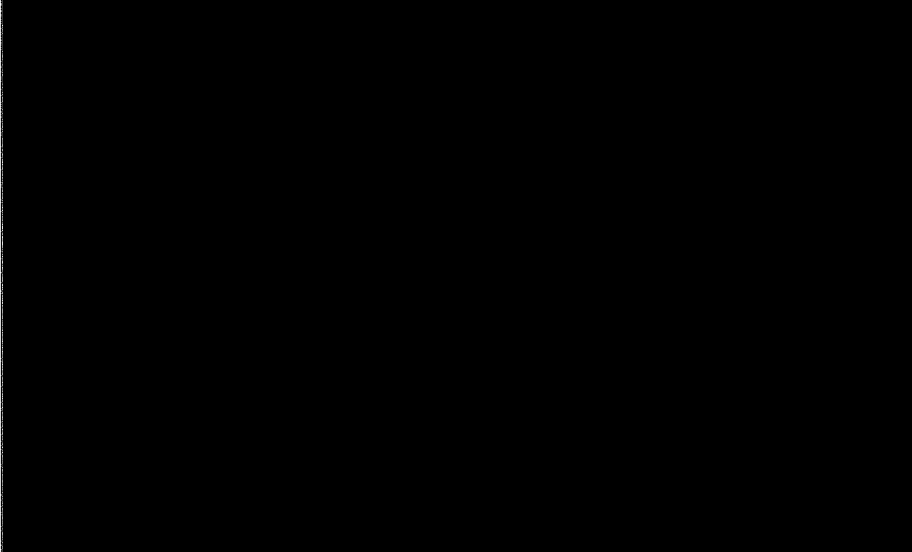
Vendor	Comments
EPC qualified contractors [REDACTED]	[REDACTED]
ESMSA Vendors [REDACTED]	

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130		Usage Classification:
Sheet Number: N/A	Revision Number: R001	Page: 25 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Vendor	Comments
	

Report

OPG Confidential Commercially Sensitive		
Document Number:	Usage Classification:	
NK38-REP-09701-10130		
Sheet Number:	Revision Number:	Page:
N/A	R001	26 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT**Appendix D: EOI Results - Summary Memorandum**

5 Energy Drive, Courtice, ON L1E 0E7

MEMORANDUM

**OPG Confidential
Commercially Sensitive**

July 24, 2013

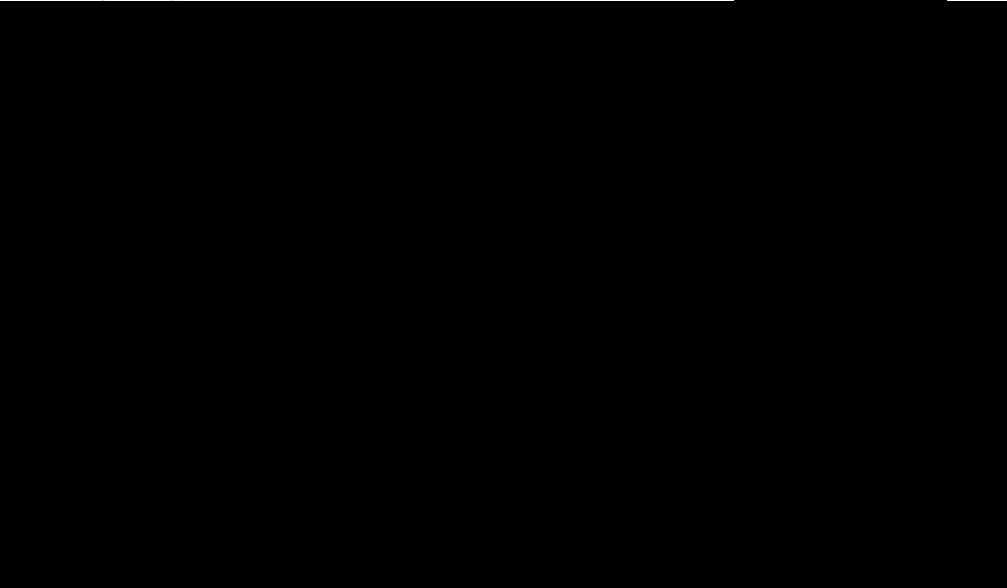
Document No.: 0469326

To file

Darlington Nuclear Generating Station ("DNGS") Refurbishment Program, Fuel Handling Refurbishment Project – trolleys, powertrack and auxiliaries replacement (the "Project")

The objective of this memo is to summarize the results of the request for expressions of interest ("EOI") and recommendation for the proponents list related to the request for proposals ("RFP") for the subject Project.

A request for EOI was issued and responses received from eight prospective proponents in accordance with the Contracting Strategy for Fuel Handling – Refurbishment, NK38-REP-09701-10130.



© Ontario Power Generation Inc., 2013. This document has been produced and distributed for Ontario Power Generation Inc. purposes only. No part of this document may be reproduced, published, converted, or stored in any data retrieval system, or transmitted in any form by any means (electronic, mechanical, photocopying, recording, or otherwise) without the prior written permission of Ontario Power Generation Inc.

Associated with OPG-STD-0031, Correspondence Standards

OPG-TMP-0007-R003 (Microsoft® 2007)
 E:\Darlington Refurbishment Program\FH\IC1 - Refurbishment\IC-RF\EOI Assessment Memorandum Final.docx

Report

OPG Confidential
Commercially Sensitive

Document Number:

NK38-REP-09701-10130

Usage Classification:

Sheet Number:

N/A

Revision Number:

R001

Page:

27 of 31

Title:

CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

OPG Confidential
Commercially Sensitive

Project Team/cc:

Sorin Marinescu, Jos Dening, Andrew Nelson, Evguenia Prokopieva, Nancy Woodward,
Kent Scherm, Robert Priller, Mike Vacariu

OPG Confidential Commercially Sensitive	
Document Number: NK38-REP-09701-10130	Usage Classification:
Sheet Number: N/A	Revision: R001

Title:
CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Appendix E: Bundling of Work

Option 1	Bundle All Work Together	<p>The first option considered was bundling of the entire Project (Defuelling and Refurbishment). Bundling all the work together and contracting with one contractor, including GEH-C using an EPC model is the least complicated approach for procuring the Project and is an approach consistent with many of the business drivers and commercial principles (e.g., minimizing the number of parties being accountable for Project delivery, mitigating risks on long-lead items, reducing the number of interfaces, and taking advantage of vendor capabilities). Based on the vendor/marketplace capabilities, bundling of all the work together would require contracting of all the work to GEH-C. Given that some of the work can be done by others, this option does not appear to be the best option. Bundling of all of the work together could negatively impact on OPG’s ability to manage cost, integrate with the DR work schedule and OPG’s ability to demonstrate value for money.</p>
Option 2	Unbundle the Work by Type of Work	<p>The second option considered was a complete unbundling of the Project. This option would allow each of the Component Condition Assessment (“CCA”) work packages to be dealt with individually or broken down by type of work (i.e., engineering, procurement and construction or labour and materials). Labour and materials could be further broken down and bundled based on the type of labour (e.g., design, inspection, construction, etc.) or type of material (e.g., original equipment manufacturer).</p> <p>Unbundling of the work allows for each work package to be carefully assessed and opportunities identified to procure from competitive sources. While this approach may enable competition for some materials and may reduce the price of some items, managing multiple work packages, suppliers and contracts would be time consuming and require additional resources. This approach is not consistent with the DR Program philosophy, business drivers and guiding commercial principles.</p> <p>The risks associated with this approach have the potential to significantly outweigh any potential cost savings (e.g., compatibility issues between hardware and software). The impact on schedule could be significant. Configuration management risk and corresponding level of effort needed to mitigate this risk usually increases with the number of suppliers. It may also be difficult to achieve the schedule, integrate work provided by multiple suppliers, and seamlessly plan and execute the work.</p>
Option 3	Bundle by Scope of Work	<p>The third option considered was bundling the work by scope as follows:</p> <ul style="list-style-type: none">• Defuelling Work• Refurbishment Work <p>The Defuelling Work is by nature a completely separate type of work than the Refurbishment Work and therefore it doesn’t make sense to bundle the scopes together. In effect, until the reactor has been defuelled, the unit is still considered to be operational. Specifically:</p> <ul style="list-style-type: none">• The timing of the work and contract award is different for Defuelling Work and Refurbishment Work. Defuelling Work must be done long before the Refurbishment Work is done.• Defuelling Work is critical path and risks associated with Defuelling Work are very different from the risks in the Refurbishment (see Contracting Considerations for Refurbishment risks in section 4.0(a)). The commercial terms will need to mitigate these risks as much as commercially reasonable.• The potential suppliers for the Defuelling Work are different from the potential suppliers for the Refurbishment Work. The potential suppliers for the Defuelling Work are designers, engineering services and manufacturers of defuelling components including FH components. The potential suppliers for the Refurbishment Work will include contractors who will install FH components into the FH system. <p>Bundling by scope of work would allow OPG to source to the most appropriate contractor and better ensures alignment between vendor/marketplace capabilities and the work that needs to be done. It is a better option than bundling of all work together because it enables OPG to select the best sourcing option for each of the work scopes. Bundling by scope is less complicated than complete unbundling and the approach is consistent with many of the business drivers and commercial principles (e.g., minimizing the number of parties being accountable for Project delivery, mitigating risks related to schedule, reducing the number of interfaces, and taking advantage of vendor capabilities). Bundling by scope of work and alignment of scope with vendor capability will positively impact on OPG’s ability to manage the work. Given that and utilize competitive bidding which enables OPG to demonstrate value for money.</p>

E.1.0 REFURBISHMENT WORK

By further unbundling the Refurbishment Work into six (6) sub-bundles, OPG can ensure that the competitive process is utilized to the greatest extent possible while still mitigating the OEM/non-OEM integration risks. The 6 sub-bundles are: reactor area bridges and carriages refurbishment; Main FH Refurbishment (e.g., trolleys, power tracks, etc); IFB fuel inspection tooling, FM head overhaul; and FH control systems refurbishment.

Report

OPG Confidential Commercially Sensitive		
Document Number:	NK38-REP-09701-10130	
Usage Classification:		
Sheet Number:	Revision Number:	Page:
N/A	R001	29 of 31

Title:
CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Appendix F: Contracting Models

Contracting Model	Description	Subbundle	Pros	Cons
Self Perform	The Self Perform model would mean that OPG would perform all of engineering, procurement, and construction activities for the Project. This option was briefly examined with the Team identifying the following pros and cons.		<ul style="list-style-type: none">• Possibly cheaper (only if resources could be dedicated – see cons);• Provides OPG the greatest flexibility to adjust the scope and schedule of the work, if retained in-house; OPG will have maximum control;• Easier control of inage and pre-refurb outage scope, if required.	<ul style="list-style-type: none">• Limited resources / resources not available [eng/supply/trades];• No infrastructure to support this approach;• Lack of FH engineering expertise internally;• Limited trades staff;• Not in alignment with OPG’s strategic direction;• Time required to hire additional resources, train, etc., would cause delays;• OPG retains all risk.
Design, Bid, Build (DBB)	Historically the way OPG has done business, the DBB model has OPG contract with separate entities to provide the design and to install. Procurement can be handled by a contracted party or by OPG supply chain.	<ul style="list-style-type: none">• Reactor area bridges and carriages refurbishment	<ul style="list-style-type: none">• Less OPG resources than self perform (limited number of accountable parties for Project delivery);• OPG has more influence & can ensure OPG convention (i.e., historically this is the OPG way of doing things);• OPG can maintain input & control through reviews & design acceptance.• May maximize the fixed price component of the work, if construction work is being bid to fully completed design specification.• May leverage the competitive bid process with an increased supply base (multiple and/or different contractors for each of the contracts)	<ul style="list-style-type: none">• Separate contracts require increased OPG resources to oversee and manage;• Extends schedule by requiring engineering to be complete prior to procurement & construction (unless procurement done at risk);• Process tends to be serial with limited ability to compress timelines;• Responsibilities are split;• Increased risk on OPG to manage interfaces; e.g., finger pointing between design & build;• Increased difficulty in maintaining schedule & cost control;• Does not support minimizing interfaces and hand-offs (rather, maximizes numbers of interfaces and number of contracts) – potentially nullifies the benefits expected from bundling of the work for contracting purposes.
Engineer, Procure, Construct (EPC)	The EPC model would have OPG contracting with a single entity to provide the design, procure the material, and installation. It requires careful up-front development of specifications to ensure the EPC supplier has the required information.	<ul style="list-style-type: none">• FH trolley, power track and auxiliaries replacement• IFB fuel inspection tooling• FH control system refurbishment• IFB heat exchanger replacement	<ul style="list-style-type: none">• Fewest OPG resources required to oversee and manage (single interface, single contract);• Maximizes risk transfer to supplier (see cons for cost aspect);• Single accountability for contract, schedule, design, procurement, construction;• Potential cost savings due to better rates negotiated with supplier getting a larger overall piece of the overall program;• Seen as best opportunity at achieving schedule and cost targets when managed correctly;• In alignment with OPG’s strategic direction.	<ul style="list-style-type: none">• Difficult for OPG culture to ‘let go’ & lack of OPG experience managing EPC;• Transfer of risk to supplier can drive up cost to OPG;• Requires complete and accurate specifications to be produced by OPG up front;• OPG may have reduced ability to select subcontractors;• Larger overall impact if supplier underperforms.

Report

OPG Confidential Commercially Sensitive		
Document Number:	Usage Classification:	
NK38-REP-09701-10130		
Sheet Number:	Revision Number:	Page:
N/A	R001	30 of 31

Title:
CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT

Contracting Model	Description	Subbundle	Pros	Cons
Equipment Supply	Under the Equipment Supply model, the equipment or components would be supplied by an entity but OPG would perform all the on-site work of installation and commissioning.	<ul style="list-style-type: none">FM Head overhaul	<ul style="list-style-type: none">Possibly cheaper (only if resources could be dedicated – see cons);Provides OPG the greatest flexibility to adjust the scope and schedule of the work, if retained in-house; OPG will have maximum control;Status quo with current method of FH maintenance. Well developed methods for procurement and procedures for maintenance.	<ul style="list-style-type: none">Lack of FH engineering expertise internally if problems arise;Limited supply chain and trades staff;OPG retains all risk.

Report

OPG Confidential Commercially Sensitive		
Document Number: NK38-REP-09701-10130		Usage Classification:
Sheet Number: N/A	Revision Number: R001	Page: 31 of 31

Title: CONTRACTING STRATEGY FOR FUEL HANDLING - REFURBISHMENT
--