Risk Register For *Partial* Release - Project #16-31555 D2O Sto Input Page

Risk No.	Category	Title	Description & Causes	Risk Response Tactic	Risk Response Actions/Comments	Action Owner	Action Review Date	Action TCD	Action Status	Actions Urgency	Time to Perform Risk Response (days)	Cost to Perform Response ($)	Risk Time frame	Update / Review Date	Risk Closeout Date	Comments
Discrete Risks (specific)																
1	Cost	Ground Water/Soil	Potential for tritum present in ground water and soil at preferred site, potentially resulting in 1) forcing change of facility design from recommended in Conceptual Report, 2) higher cost due to tritiated groundwater and soil disposal, 3) possible schedule delays.	Mitigate	Project 16-38940 is conducting an environmental site assessment, including the proposed location of the new facility. This will assess the situation and proposed mitigation options, with contaminated soil disposal plan. The Mitigation and Disposal Plans will be incorporated into the Contract via the Change Management process as necessary.	P. Moore	Quarterly	Aug-12	On Track	3 months	20	$28,314	26-Apr-12 to 31-Aug-12	27-Jun-12		Risk level mainly due to dewatering. Soil risk is minimal. Cost to Perform Response: 2 ppl x 8 hrs to review Prelim report + 2 x 8 hrs to incorporate into ES MSA contract as necessary.
2	Scope	Legacy Design Issues	Legacy issues on Design, and interface issue with other related D2O projects	Mitigate	1. Contractor to conduct an SCR/OPEX/documentation review early in design process to identify any current conditions (such as the RV58 OPP issue) 2. Contractor to review current TSSA registration as part of their design. 3. Incorporate discovery issues into Contract via Change Management Process as necessary.	EPC Contractor	Monthly	Nov-12	On Track	3 months	10	$1,770	26-Apr-12 to 1-May-12	27-Jun-12		Cost to Perform Response: 2 ppl x 10 hrs to review deliverables and manage change process. Risk time frame ends after Mod Planning.
3	Scope	Geotechnical	Geotechnical Evaluation may be required to support Design Agency's evaluation of preferred site.	Transfer	1. Project 16-38940 will also be performing geotechnical analysis of the wells being installed on the proposed site location. 2. Contractor is required to identify and perform additional geotechnical studies at their cost.	P. Moore	Monthly	Aug-12	On Track	3 months	0	$0	26-Apr-12 to 1-Nov-12	26-Apr-12		No cost to OPG to perform response. Risk time frame ends after Mod Planning.
4	Schedule	Schedule Change	Due to time lines for Gate Review Board and Board of Directors review submission, baseline schedule for Phase 1 is developed prior to contract award. Changes within the AFS date, may occur upon contract award.	Mitigate	Schedule is based on recommended Proponents' proposal, so it is expected to be nearly final.	P. Moore	Weekly	Aug-12	On Track	3 months	3	$1,239	26-Apr-12 to 31-Aug-12	27-Jun-12	27-Jun-12	Contract has been awarded, no substantial changes to schedule.
5	Quality	Quality Oversight	There is a risk that the D2O Storage Project may experience incremental cost, and possibly schedule and other impacts due to the lack of previously established processes to efficiently manage the transition to the EPC management and oversight model currently planned for Nuclear projects.	Mitigate	Prepare an integrated project oversight plan that addresses EPC contract oversite.	P. Moore	Weekly	Aug-12	On Track	3 months	30	$2,653	03-Jul-2012 to 31-May-13	27-Jun-12		Preparation of the plan is in progress.
6	Quality	Design Quality	Design Deliverables not delivered to required quality.	Mitigate	1. Ensure involvement of design reviewers/stakeholders in the design process. 2. EPC strategy ensures constructability reviews will be incorporated. 3. Increased Engineering oversight - project to have dedicated multidisciplinary support and expertise for quality reviews.	P. Moore I. Yacoub	Weekly	Jan-13	On Track	3 months	88	$187,202	26-Apr-12 to 31-May-13	27-Jun-12		Reference Bruce D2O OPEX: Self-Assessment NO11-000423 (SCR N-2011-04605), Director of Risk Management's Secondment Presentation of 13-Jan-2011, and other OPEX.
7	Schedule	Design Reviews	Design Deliverables not reviewed by OPG in a timely manner which supports the schedule.	Mitigate	1. Clear and appropriately frequent communication of review expectations with all stakeholders. 2. Appropriate in-house Engineering resourcing - project to have dedicated multidisciplinary support and expertise for timely reviews.	P. Moore I. Yacoub	Weekly	Jan-13	On Track	3 months	71	$500,000	26-Apr-12 to 31-May-13	27-Jun-12		Reference Bruce D2O OPEX: Self-Assessment NO11-000423 (SCR N-2011-04605) and Pickering D2O Storage Project OPEX.
8	Quality	License Renewal	Darlington operating licence up for renewal in 2013. May require design re-work if codes/standards change.	Mitigate	For refurbishment only, application to CNSC for exemption for all design work for refurb to end of project to allow refurb code-effective dates to extend to end of refurbishment.	S. Harris	Monthly	May-12	On Track	1 month	7	$619	26-Apr-12 to 1-Nov-12	27-Apr-12		
			Insufficient in-house Procurement		Confirmation with Procurement Engineering											Currently this department has 2

Risk No.	Category	Title	Description & Causes	Risk Response Tactic	Risk Response Actions/Comments	Action Owner	Action Review Date	Action TCD	Action Status	Actions Urgency	Perform Risk Response (days)	Perform Response ($)	Risk Time frame	Update / Review Date	Risk Closeout Date	Comments
9	Schedule	Procurement Resources	Insufficient in house Procurement Engineering resources avaliable to ensure timely interfaces between Contractor and OPG.	Mitigate	about timing and resources required to support this project as per the Contract Owner Interface Requirement document. Utilize OSS vendor as required.	B. Keelan	Monthly	Aug-12	On Track	1 month	14	$1,239	26-Apr-12 to 31-Mar-13	27-Apr-12		Currently this department has 2 individuals, and hiring 2 more. There will be competition from other projects.
10	Schedule	Site preparation	Risk that the EA is late, delaying construction. D2O Storage Facility part of Refurb EA. CNSC target approval of EA December 2012.	Mitigate	Secure senior leadership engagement to keep EA on track, to extent within OPG control. Use of schedule contingency if necessary.	Deitmar Reiner	Monthly	Apr-13	On Track	1 month	7	$619	26-Apr-12 to 30-Apr-13	27-Jun-12		
11	Cost	EA Impacts	Risk that the EA is "on time" but conclusions will negatively the engineering work done up to EA approval date, and delay site preparation. D2O Storage Facility part of Refurb EA. CNSC will decide on EA by December 2012.	Accept												
12	Scope	Configuration Management	Configuration management issues with Flowsheets, flow diagrams, and passport.	Mitigate	1. Contractor to conduct a configuration management analysis. 2. OPG has provided known configuration management issues with Request for Proposals	Contractor T. Wong	Monthly	Nov-12	On Track	3 months	21	$1,858	26-Apr-12 to 1-Nov-12	27-Apr-12		
13	Schedule	Computer Upgrade	TRF DCC Upgrade Project interface timing does not line up, potentially causing re-work, or additional work to tie-in D2O systems into the software.	Mitigate	1. Maintain clear communication between the projects for need dates regarding design information. 2. Ensure design agency starts software program specification early in design phase.	V. Tzambazis M. Ferrarelli	Monthly	Nov-12	On Track	3 months	10	$1,858	26-Apr-12 to 1-Nov-12	27-Apr-12		
14	Scope	Buried Services	Additional buried services, concrete, etc are present than currently accounted for.	Mitigate	1. Ground scan conducted by field engineering 2. Ensure design agency starts detailed design with relocation of buried services EC's	J. Read M. Ferrarelli	Quarterly	Sep-12	On Track	6 months	30	$2,654	26-Apr-12 to 1-Nov-12	27-Apr-12		
15	Schedule	Regulatory Approvals	Delays to project schedule due to regulatory approvals taking longer than anticipated.	Mitigate	1. Advise regulatory agencies in advance of the pending changes. 2. Stage EC release to provided reasonable time for regulatory agencies to review each package	P. Moore	Quarterly	May-12	On Track	>6 months	2	$1,239	26-Apr-12 to 31-Mar-13	27-Apr-12		
16	Scope	Contract Owner Interface Requirement	Contract may change post-award, because the contract will likely be awarded prior to approval of the generic COIR. Once the COIR is formally signed any changes/amendments to the Contract will be addressed via the Change Management process.	Accept												
17	Scope	Field Engineering Oversight	Oversight to be provided by FE for EPC vendor's procurement processes is not yet defined. The governance is in process of being changed.	Mitigate	Communicate D2O Project needs to the owners of the process.	P. Moore	Monthly	31-Dec-12	On Track	1 month	30	$2,654	26-Apr-12 to 31-Dec-12	27-Jun-12		Current assumption is oversight will be in accordance with N-PROC-AS-0074-R001 "Contractor Quality Surveillance"
18	Scope	Safety Assessment	A nuclear safety assessment to support the construction may be required, similar to the hazard analysis already performed for other Campus Plan projects.	Mitigate	1. A meeting with Refurbishment Nuclear Safety to discuss need and scope will be arranged. 2. May be discussed during negotiation of contract for inclusion in price - additional cost risk would be eliminated.	P. Moore	Monthly	Jun-12	On Track	1 month	2	$1,239	26-Apr-12 to 30-Jun-12	27-Jun-12	27-Jun-12	Any safety assessments are included in the contract price.
19	Cost	Temporary Modifications	The intent is to schedule outages for piping and electrical service relocates in a manner that will not require temporary equipment/connections. If this is not possible for some services, extra scope/cost will be incurred to produce TMODs.	Accept												

Risk No.	Category	Title	Description & Causes	Risk Response Tactic	Risk Response Actions/Comments	Action Owner	Action Review Date	Action TCD	Action Status	Actions Urgency	Perform Risk Response (days)	Perform Response ($)	Risk Time frame	Update / Review Date	Risk Closeout Date	Comments
20	Schedule	Contractor Qualifications	The EPC contractors are only qualified to proceed with an EPC initial project in accordance with CSA N286-05, CSA N286.7-99, and CSA Z299.1-85 requirements. No other EPC projects can be placed until a successful implementation audit is conducted on the initial EPC project. One of the contractors is already engaged in the initial EPC project.	Accept										27-Jun-12	27-Jun-12	PO has been issued. ASL issue resolved on a memo regarding project manager accountability for overall quality surveillance plan.
General Risks, Uncertainty in the Project Estimate or Schedule																
21	Cost	Design Costs	Cost of EPC contract increases due to discovery work, existing systems do not have adequate capacity, or work not captured in Scope of Work, or assumptions Estimate for this phase is AACE Class 2 (-15/+20%)	Accept												
22	Schedule	Schedule Change	Additional delays associated with deferral or change of project schedule.	Accept												
3																
4																
5																
6																

Risk Register For Partial Release - Project #16-31555 D2O Storage

Analysis Page

Risk No.	Category	Title	Description & Causes	Risk Response Tactic	Mitigation Stage	Probability (P)	Impact (I): Financial	Impact (I): Schedule	Impact (I): Quality	Impact (I): Corporate Reputation	Impact (I): Regulatory / Legal	Impact (I): Health & Safety	Impact (I): Environment	Impact (I): Nuclear Safety	Risk Score (P x I)	Heat Map Priority	Impact Scoring Rationale	Sequence	Correlation	Probability	Schedule Impact: Min (days)	Schedule Impact: Most Likely (days)	Schedule Impact: Max (days)	Cost Impact: Min ($K)	Cost Impact: Most Likely ($K)	Cost Impact: Max ($K)
Discrete Risks (specific)																										
1	Cost	Ground Water/Soil	Potential for tritum present in ground water and soil at preferred site, potentially resulting in 1) forcing change of facility design from recommended in Conceptual Report, 2) higher cost due to tritiated groundwater and soil disposal, 3) possible schedule delays.	Mitigate	**Pre**	5	2	5							25	critical	P: Contract scoping documents say to assume no tritium issues. After prelim report, the schedule/cost to mitigate can be incorporated. I: Issue has potential for >90 day delay if not	1		75%	20	40	60	1,000	5,000	8,000
					Post	3	1	3							9	major				50%	15	25	35	500	3,050	6,875
2	Scope	Legacy Design Issues	Legacy issues on Design, and interface issue with other related D2O projects	Mitigate	**Pre**	5	1	4	3		2				20	critical	P: OPEX from other similar projects says there will be legacy	n/a	21(100%) 22(80%)	75%	35	45	55	150	200	250
					Post	3	1	3	2		1				9	major				10%	10	20	30	50	75	100
3	Scope	Geotechnical	Geotechnical Evaluation may be required to support Design Agency's evaluation of preferred site.	Transfer	**Pre**	3	1	4							12	critical	P: mitigating actions reduce probability from Possible to Improbable. I: Financial is "1" b/c	4		10%	35	45	55	100	130	160
					Post	1	1	3							3	minor				1%	0	3	10	0	15	30
4	Schedule	Schedule Change	Due to time lines for Gate Review Board and Board of Directors review submission, baseline schedule for Phase 1 is developed prior to contract award. Changes within the AFS date, may occur upon contract award.	Mitigate	**Pre**	4		3							12	critical		3	22(100%)	50%	20	30	40	0	0	0
					Post	3		2							6	moderate				10%	10	20	30	0	0	0
5	Quality	Quality Oversight	There is a risk that the D2O Storage Project may experience incremental cost, and possibly schedule and other impacts due to the lack of previously established processes to efficiently manage the transition to the EPC management and oversight model currently planned for Nuclear projects.	Mitigate	**Pre**	4	2	3	3	2					12	critical	P: Schedule delay due to lack of clear guidance on specifically how to perform the EPC oversight. Rework may occur due to not catching inadequate deliverables			90%	3	8	10	400	500	800
					Post	2	1	1	2	1					4	moderate				5%	0	2	3	0	100	300
6	Quality	Design Quality	Design Deliverables not delivered to required quality.	Mitigate	**Pre**	4	1	4	4					2	16	critical	P: Based on OPEX it is likely there will be design quality issues with no mitigation.	n/a	22(50%)	50%	70	90	110	250	300	350
					Post	2	1	2	2					2	4	moderate				5%	5	10	20	100	150	200
7	Schedule	Design Reviews	Design Deliverables not reviewed by OPG in a timely manner which supports the schedule.	Mitigate	**Pre**	4	2	5	3						20	critical	P: Pre-mitigation is "likely" based on specific OPEX. After mitigation is still "possible" due to	n/a	22(100%)	60%	80	100	120	3,000	3,500	4,000
					Post	3	1	3	1						9	major				10%	10	20	30	750	850	950
8	Quality	License Renewal	Darlington operating licence up for renewal in 2013. May require design re-work if codes/standards change.	Mitigate	**Pre**	2	2	4							8	major		7	21(100%) 22(100%)	5%	20	40	60	400	450	500
					Post	1	1	1							1	minor				1%	0	3	10	0	30	120
9	Schedule	Procurement Resources	Insufficient in-house Procurement Engineering resources avaliable to ensure timely interfaces between Contractor and OPG.	Mitigate	**Pre**	4	2	4	3						16	critical	P: Pre-mitigation is "likely" based on specific OPEX. After mitigation is still "possible" due to	n/a	22(100%)	60%	80	100	120	3,000	3,500	4,000
					Post	3	1	3	1						9	major				10%	10	20	30	750	850	950
10	Schedule	Site preparation	Risk that the EA is late, delaying construction. D2O Storage Facility part of Refurb EA. CNSC target approval of EA by December 2012.	Mitigate	**Pre**	3	2	5							15	critical	P: Possible, outside of project control. I: Financial impact is contractor delay time.	5	21(100%)	20%	30	60	120	5,000	6,000	7,000
					Post	3	2	5							15	critical				20%	30	60	120	5,000	6,000	7,000
			Risk that the EA is "on time" but conclusions will negatively the engineering work done up to EA approval		**Pre**	1	1	3							3	minor	I: no impact on environme			1%	10	20	30	300	500	800

Risk No.	Category	Title	Description & Causes	Risk Response Tactic	Mitigation Stage	Probability (P)	Financial	Schedule	Quality	Corporate Reputation	Regulatory / Legal	Health & Safety	Environment	Nuclear Safety	Risk Score (P x I)	Heat Map Priority	Impact Scoring Rationale	Sequence	Correlation	Probability	Min (days)	Most Likely (days)	Max (days)	Min ($K)	Most Likely ($K)	Max ($K)
11	Cost	EA Impacts	date, and delay site preparation. D2O Storage Facility part of Refurb EA. CNSC will decide on EA by December 2012.	Accept	Post	1	1	3							3	minor		6	21(100%) 22(100%)	1%	10	20	30	300	500	800
12	Scope	Configuration Management	Configuration management issues with Flowsheets, flow diagrams, and passport.	Mitigate	Pre	5	1	2							10	major		n/a	21(100%) 22(20%)	75%	5	10	20	200	250	300
					Post	3	1	1							3	minor				10%	0	3	10	50	100	150
13	Schedule	Computer Upgrade	TRF DCC Upgrade Project interface timing does not line up, potentially causing re-work, or additional work to tie-in D2O systems into the software.	Mitigate	Pre	4	1	3							12	critical	I: Financial is expected to be < $5M pre and post mitigation. Schedule reduced from > 10 days	5	21(100%) 22(50%)	50%	10	20	30	200	250	300
					Post	2	1	2							4	moderate				5%	10	20	30	50	100	150
14	Scope	Buried Services	Additional buried services, concrete, etc are present than currently accounted for.	Mitigate	Pre	5	1	5							25	critical	P: Probability is markedly reduced (5 to 1) due to scanning on entire construction area	4	21(100%) 22(50%)	75%	30	60	90	400	600	1,000
					Post	1	1	5							5	moderate				5%	30	60	90	400	600	1,000
15	Schedule	Regulatory Approvals	Delays to project schedule due to regulatory approvals taking longer than anticipated.	Mitigate	Pre	3	1	4							12	critical		8	22(100%)	10%	20	30	40	600	750	1,000
					Post	2	1	2							4	moderate				5%	3	5	10	3	10	20
16	Scope	Contract Owner Interface Requirement	Contract may change post award, because the contract will likely be awarded prior to approval of the generic COIR. Once the COIR is formally signed any changes/amendments to the Contract will be addressed	Accept	Pre	3	1	3							9	major	P: Large number of signatories to COIR mean changes are possible	n/a	21(100%) 22(50%)	10%	10	20	30	120	200	320
					Post	3	1	3							9	major				10%	10	20	30	120	200	320
17	Scope	Field Engineering Oversight	Oversight to be provided by FE for EPC vendor's procurement processes is not yet defined. The governance is in process of being changed.	Mitigate	Pre	5	1	3							15	critical	P: FE's role and governance is changing, so it is >75% probable. I: Estimated 10-30 day	4	21(100%) 22(50%)	100%	10	20	30	120	200	320
					Post	4	1	3							12	critical				80%	10	20	30	120	200	320
18	Scope	Safety Assessment	A nuclear safety assessment to support the construction may be required, similar to the hazard analysis already performed for other Campus Plan projects.	Mitigate	Pre	3	1	3						2	9	major		4	21(100%) 22(50%)	10%	5	10	15	20	30	55
					Post	2	1	2						2	4	moderate				2%	0	3	10	20	30	55
19	Cost	Temporary Modifications	The intent is to schedule outages for piping and electrical service relocates in a manner that will not require temporary equipment/connections. If this is not possible for some services, extra scope/cost will be incurred to	Accept	Pre	2	1	3							6	moderate		6	21(100%) 22(50%)	5%	5	10	15	75	100	125
					Post	2	1	3							6	moderate				5%	0	3	10	75	100	125
20	Schedule	Contractor Qualifications	The EPC contractors are only qualified to proceed with an EPC initial project in accordance with CSA N286-05, CSA N286.7-99, and CSA Z299.1-85 requirements. No other EPC projects can be placed until a successful	Accept	Pre	3	2	4							12	critical	P: Possible, because ASL notes remain, and project is close to being in a position to negotiate	2	21(100%) 22(100%)	5%	30	60	90	750	1,500	2,250
					Post	3	2	4							12	critical				5%	30	60	90	750	1,500	2,250
General Risks, uncertainty in the Project Estimate or Schedule																										
21	Cost	Design Costs	Cost of EPC contract increases due to discovery work, existing systems do not have adequate capacity, or work not captured in Scope of Work, or assumptions Estimate for this phase is AACE Class 2 (-15/+20%)	Accept	Pre	3	2								6	moderate	P: possible, 10% I: Phase 1 estimate is Class 3, which represents approx $12M in variability, or 11% of overall project - "2"	n/a		20%	0	0	0	0	1,500	3,000
					Post	3	2								6	moderate				15%	0	0	0	0	1,500	3,000
22	Schedule	Schedule Change	Additional delays associated with deferral or change of project schedule.	Accept	Pre	2	1	3							6	moderate		n/a		15%	10	20	30	450	500	550
					Post	2	1	3							6	moderate				10%	10	20	30	450	500	550
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Risk No.	Category	Title	Description & Causes	Risk Response Tactic	Mitigation Stage	**Probability (P)**	Financial	Schedule	Quality	Corporate Reputation	Regulatory / Legal	Health & Safety	Environment	Nuclear Safety	**Risk Score (P x I)**	**Heat Map Priority**	Impact Scoring Rationale	Sequence	Correlation	**Probability**	Min (days)	Most Likely (days)	Max (days)	Min ($K)	Most Likely ($K)	Max ($K)
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