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Aboriginal Affairs and Northern Development Canada
North Mackenzie District
PO Box 2100
Inuvik, NT
X0E 0T0

Dear Sir or Madam:

**RE: PROPOSED INTERIM CLOSURE AND RECLAMATION PLAN FOR
KURK M-15, WATER LICENCE N7L1-1759**

1. INTRODUCTION

At the request of Suncor Energy Exploration and Production Partnership (Suncor), on behalf of the beneficial owner Suncor Energy Inc., WorleyParsons Canada Services Ltd. (WorleyParsons) has prepared this letter for Aboriginal Affairs and Northern Development Canada (AANDC) as an Interim Closure and Reclamation Plan (ICRP) for Kurk M-15 (the Site).

The Site once operated under water licence N7L1-1759, which was issued by the Northwest Territories Water Board in November 2000; this licence has since expired (WorleyParsons 2013a). (A site investigation was completed by AANDC (2013a) on July 31, 2013. The findings of the investigation were reported to Suncor on November 11, 2013. The AANDC report identified that Suncor was deficient in supplying an interim abandonment and reclamation plan as per the condition outlined in the water licence.) The intention of this letter report is to address this deficiency.

A section outlining the limitations of this report is included at the end of the report.

2. BACKGROUND

2.1 Site Location

The Site is located in the northern Mackenzie Delta at approximately 69° 4' 51" N latitude and 135° 19' 25" W longitude. The Site is located on Langley Island and is approximately 30 kilometres (km) southeast of Camp Farewell, 65 km east of Swimming Point Base Camp and 150 km north-northwest of Inuvik, NT.



2.2 Site Description

The Site was originally drilled as a gas exploration well in 2001 and 2002 on previously undisturbed land in the Mackenzie Delta. An ice pad was constructed at the Site during drilling operations. The well was plugged and suspended in 2002.

The Site is low lying and is typically covered in shallow water and a thick cover of aquatic grasses and sedges. The Site may also be flooded by the Mackenzie River during periods of high water. Remaining infrastructure at the Site is limited to the Kurk M-15 well head marker sign, a drilling mud sump, a camp sump, and approximately 25 metal anchors once used to stabilize the drilling rig. Several isolated water ponds are present adjacent to the sumps. The recent well site inspection report completed by WorleyParsons (2013a) can be reviewed for further details.

2.3 Previous Assessments

A number of past assessments of the Site were reviewed prior to preparing this ICRP and are discussed in a Phase 1 environmental site assessment prepared in 2013 (WorleyParsons 2013b). Findings from the previous reports and the Phase 1 ESA were used to support the ICRP and provided information to identify the contents of the drilling sump waste material.

2.4 Existing Conditions

2.4.1 Surface Water Quality

The area surrounding the sumps is typically covered in either saturated soil or shallow water and aquatic species of plants in the summer months. At least two deeper ponds have historically been present on site. The edges of these ponds have fluctuated over time pre- and post-development of the Site. Based on aerial photographs, the drilling sump is now typically surrounded on three sides by ponded water. Based on historic evidence of driftwood on site, the Site is likely subject to periodic flooding events related to the Mackenzie River.

Historic water chemistry results from the ponds are limited but generally indicate that the surface water chemistry in the ponds around the drilling sump is similar to background conditions (WorleyParsons 2012).

2.4.2 Soil

Based on electromagnetic surveys of the Site and a limited number of shallow (<1.4 m below ground surface) soil samples collected from around the Site, there is evidence of elevated chloride concentrations above background values near the drilling sump cap (WorleyParsons 2012). There is some evidence of migration of salt impacts from the sump contents into the surrounding soil and water.

2.4.3 Vegetation

A review of historic site photographs shows that natural vegetation of the Site is occurring and that the majority of previously disturbed soil has been successfully re-vegetated. In 2007, aerial photos show very little vegetation had established on the sump caps (IEG Consultants Ltd. [IEG] 2008). During



assessment visits in 2012 and 2013, significant re-growth of local vegetation was observed on and around the sump caps.

The primary vegetation on the sump caps are grasses. Some small willows up to approximately 0.5 m tall have begun to establish on the sump caps.

The sides of the drilling sump cap continue to have less dense, vigorous and mature vegetation cover than the top of the drilling sump and the camp sump. Some of the soil immediately surrounding the drilling sump also has less dense vegetation cover than the surrounding environment. It is unclear if this is a result of increased salinity in the soils, fluctuating water levels, slope instability or some other factor.

2.4.4 Physical Stability

Past assessments have compared size and shape of sump cap and ponds, observed cracking, slumping, erosion, vegetation cover, animal burrows and active layer thickness over time.

In general, the camp sump cap appears to have reached a point of relative stability with few discernable changes in recent observations. The drilling sump continues to have evidence of surface cracking and erosion from adjacent water movements. The drilling sump may not have reached a point where stability has been achieved.

2.4.5 Infrastructure

Other than the two sumps, the only other infrastructure present on-Site are the well head sign and approximately 25 rig anchors/pilings (WorleyParsons 2012). No other infrastructure was observed at the Site.

3. INTERIM CLOSURE AND RECLAMATION PLAN

Part H of the water licence issued for the Site required the plan to be in accordance with the *Guidelines for Mines in the Northwest Territories* (1980), or subsequent editions. This ICRP for the Site was developed using AANDC's *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (AANDC 2013b), the most recent edition of the guidelines and the Northwest Territories Water Board's *Protocol for the Monitoring of Drilling-Waste Disposal Sumps* (Northwest Territories Water Board [NWTWB] 2005).

3.1 ICRP Objective

The primary management objective of the ICRP is to ensure that the contents of the drilling and camp sump do not cause a significant negative affect on the surrounding environment. The long-term closure goal is to ensure that the Site and any surrounding affected areas remain a productive part of a viable and self-sustaining ecosystem compatible with a healthy environment and human activities. The closure goal is derived from the *Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories* (AANDC 2013b).



3.2 Monitoring Methods

The Site is currently not considered to be having a substantial negative effect on the surrounding ecosystem. The Site will continue to be monitored for evidence of change as described in the following sections and Table A.

3.2.1 Water and Soil

Limited near-surface soil sampling and pond sampling for hydrocarbons, salinity, routine parameters, and metals will continue during assessment years. These samples will be collected from as close to the historical sampling locations and depths as reasonable using the same methodology over time and will be compared to historic results to determine if there are trends in the data. Sampling should also be completed as close to the same time frame each year, where possible. This will potentially give more direct comparisons of the data across all assessments.

In the event that significant trends indicate that the drilling sump is failing, a site-specific risk assessment will likely be conducted to better understand the magnitude of ecological risk.

3.2.2 Vegetation

Seeding to re-vegetate the remaining bare areas around the drilling sump cap is not recommended at this time for the following reasons:

- the remaining un-vegetated soil is predominantly on or immediately below the slopes of the drilling sump and wave action or ice floes moving along those edges may continually abrade these areas;
- the soil itself may not be suitable for supporting any local vegetation due to the potential migration of salt impacts from the sump contents. Soil sampling is planned to verify the chemistry and growing conditions;
- planting willow to stabilize the sides may lead to the entire sump cap being colonized by willow which would likely degrade permafrost and may lead to collapse of the sump cap; and
- with the evidence of successful re-growth over all other areas of disturbed soil, it is likely that if growth has not occurred in the bare areas, it is likely seeding will not be effective at this time either.

Vegetation cover and vigor will continue to be monitored during subsequent site visits to assess the progression or recession of vegetation and the results will be further evaluated.

3.2.3 Physical Stability

The primary design strategy used for the containment of waste within sumps in the Inuvialuit Settlement Region has been through immobilization in permafrost. As identified in Section 2.4.1, the edges of ponds have fluctuated historically and are an important factor that may influence the stability of the sump caps through erosion and/or thermal degradation of underlying permafrost. The size and shape of the surrounding ponds will continue to be monitored as an indicator of geothermal stability in the surrounding soils.



The size and shape of sump cap and ponds, observed cracking, slumping, erosion, vegetation cover, animal burrows and active layer thickness will be assessed during subsequent visits to re-assess and compare changes over time.

If erosion is demonstrated to be ongoing, consideration for remedial options such as the placement of rip-rap will be considered.

3.2.4 Infrastructure

Suncor will consult with the Inuvik and Aklavik Hunters and Trapper Committees to determine if the remaining above grade anchors should be removed or cut off at ground surface and monitored for frost heaving during each site inspection and continue to cut them off as needed. If the area is identified as one where there is no safety risk to other land users such as hunters and trappers, then leaving them in place may be considered a reasonable option.

3.3 Schedule

Subsequent monitoring visits are proposed to occur every three years (i.e. 2016, 2019, 2022 and 2025) and results to be compared to the previously-surveyed conditions. A performance assessment report will be prepared following each site visit. The site visit schedule will be re-evaluated based on the results of subsequent site visits and the accumulation of information. A geophysical survey is proposed for the 2025 site visit.

Table A Planned Activities

Year	Activities
2016, 2019 and 2022	<ul style="list-style-type: none"> shallow soil sampling around the drilling sump cap and analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbon fractions 1 to 4 (F1-F4), metals, and salinity levels; sampling of water quality at adjacent ponds and one background location and analysis of BTEX, F1-F2, routine parameters, and total metals levels; visual inspection of the physical stability of sump caps (e.g. cracking, slumping, erosion, animal burrows); visual inspection of vegetation cover and vigor; visual inspection of infrastructure (e.g. well head sign and pilings); GPS mapping of areas of concern for comparison during future visits; and report preparation.
2025	Same activities as above plus EM-31 and EM-38 geophysical survey of sump caps and surrounding areas.



4. CLOSURE

We trust that this report satisfies your current requirements and provides suitable documentation for your records. If you have any questions or require further details, please contact the undersigned at any time.

Sincerely,

Sam Bird, B.Sc.
Staff Environmental Scientist

Brett Knox, B.Sc., Geol.I.T.
Staff Environmental Geologist

Senior Review by



March 4, 2014

Ron Thiessen, M.Sc.(Eng), P.Eng., EP
Principal Engineer

NAPEG Permit to Practice P029

**Prairie Business Unit
Infrastructure & Environment
WorleyParsons Canada Services Ltd.**

cc: Rachel Banting, Suncor



5. REFERENCES

AANDC (Aboriginal Affairs and Northern Development Canada), 2013a. Industrial Water Use N7L1-1759 Inspection Report. November 2013.

AANDC (Aboriginal Affairs and Northern Development Canada), 2013b. Guidelines for the Closure and Reclamation of Advanced Mineral Exploration and Mine Sites in the Northwest Territories. November 2013.

IEG (IEG Consultants Ltd.), 2008. 2007 Site Visit and Surface Water Sampling at the Kurk M 15 Wellsite. January 18, 2008.

NWTWB (Northwest Territories Water Board), 1980. Guidelines for Mines in the Northwest Territories. September 1980.

NWTWB (Northwest Territories Water Board), 2005. Drilling-Waste Disposal Sumps. October 2005.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2012. 2012 Well Site Inspection Report, Kurk M-15. Report prepared for Suncor Energy Resources Partnership. File No. 307074-01587.1001 December 20, 2012.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2013a. 2013 Well Site Inspection, Kurk M-15. Report prepared for Suncor Energy Exploration and Production Partnership. File No. 307074-01941.100. November 28, 2013.

WorleyParsons (WorleyParsons Canada Services Ltd.), 2013b. 2013 Phase 1 Environmental Site Assessment, Kurk M-15. Report prepared for Suncor Energy Exploration and Production Partnership. File No. 307074-01941.101. December 12, 2013.



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This report has been prepared by WorleyParsons for the exclusive use of Suncor Energy Exploration and Production Partnership, on behalf of the beneficial owner Suncor Energy Inc., who has reviewed the scope of work for this project and understands its limitations. In providing this report, WorleyParsons accepts no liability or responsibility with respect to the property described in this report or for any business decisions relating to the property, including decisions regarding the purchase, sale, or investment in the property. Nothing in this report is intended to constitute or provide a legal opinion.

This report reflects the best judgment of WorleyParsons based on the property conditions observed at the time of the site visit and on information available at the time of preparation of this report. WorleyParsons has exercised reasonable skill, care, and diligence in assessing the information acquired during the preparation of this report, but makes no guarantees or warranties as to the accuracy or completeness of this information. The findings of this report are specific to this property and are based, in part, upon visual observation of the property at the time of the visit, interviews, and a review of available records, as described in this report. Any information that may have been provided by others is believed to be accurate, but has not been independently verified and cannot be guaranteed. The scope of this project specifically excluded the collection of samples for analytical testing. Unless specifically stated otherwise, the findings cannot be extended to previous or future property conditions, or portions of the property that were unavailable for direct observation. If property conditions or applicable standards change, or if any additional information becomes available at a future date, modifications to the findings, conclusions, and recommendations in this report may be necessary.

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