

**UGFI Environmental Protection Plan
(EPP)**

**Ikhil UGFI et al 02/J-35 Gas Well
DRILLING AND FACILITIES TIE-IN PROGRAM**

ENVIRONMENTAL PROTECTION PLAN - IKHIL UGFI 02 / J-35 GAS WELL DRILLING AND FACILITIES TIE-IN PROGRAM

The Management System that is utilized for the Environmental Protection Plan (EPP) is as documented in HSE Manual. The EPP forms an integral part of the Ikhil Tie-in Program execution procedures.

This EPP has been developed based on environmental protection procedures (or environmental commitments made by Utilities Group Facilities Inc. [UGFI]), which describe the necessary actions or requirements to protect sensitive environmental factors (i.e., the Valued Components [VCs]), identified in the Environmental Impact Assessment (EIA) Section 9. The environmental protection procedures were developed in conjunction with the mitigation measures recommended in the EIA Section 9. Recommended mitigation measures were developed to minimize negative impacts to the environment resulting from Project work and are summarized in Section 7 of this EPP.

This Project-specific EPP is a tool to communicate UGFI's environmental protection procedures and mitigation measures not only to regulators but also to Project crews. The purpose of an EPP is to outline all project-specific environmental commitments and associated mitigation measures in a concise way. Conformance by all personnel to the policies and procedures contained in the HSE Manual and the EPP pertaining to Program activities is mandatory.

Environmental protection procedures can be used for Project activities during all phases, such as equipment and personnel mobilization, camp construction, drilling activities, demobilization and transportation, as appropriate.

1. Organization Structure

The command structure for the well drilling and tie-in operations is separate from the production operations at Ikhil. For the drilling activities being conducted on the Ikhil 02/J-35 infill well, all Inuvik Gas Ltd. (IGL) employees, service company contractors, and visitors will report directly to the Canadian Petroleum Engineering Inc. (CPE) Drilling Manager who will be responsible for the implementation of the EPP. The Drilling Manager will report to the CPE Assistant Project Manager, who, in turn reports to the CPE Project Manager. The CPE Project Manager reports to the UGFI General Manager, who is ultimately accountable for the EPP.

- Drilling Manager – To be named
- CPE Assistant Project Manager – Lorne Hammer – office 403-781-6378/ cell 403-813-0718
- CPE Project Manager – Ed Fercho – office 403-781-6381/ cell 403-860-6318
- UGFI General Manager – Colin Nikiforuk – office 403-806-3317/ cell 403-816-5929

Note: UGFI is the applicant and operator of the Ikhil UGFI 02/ J-35 Gas Well 2011/2012 Drilling and Facilities Tie-in Program and owner of the well license. As such, UGFI (in its role as operator of the Ikhil Joint Venture) is ultimately accountable for ensuring adherence to all aspects of the EIA, including the EPP. In accepting ultimate accountability, UGFI approves and accepts the contents of the EPP as

prepared by CPE acting as agent for UGFI, and CPE is accountable to UGFI for ensuring adherence to all aspects of the EIA.

2. Chemical and Drilling Fluid Selection Procedure

The procedure for the selection of drilling / completion fluids and chemicals for the Ikhil 02/J-35 drilling program (as outlined in the Waste Management Plan) considers the following:

- operational suitability of the product for the conditions anticipated in the Ikhil 02/J-35 drilling and completion operations;
- safe handling procedures of the product for personnel, equipment, and environmental protection; and
- toxicity, handling, and disposal of waste and / or unused products.

All MSDS sheets for products used on the 02 / J-35 well site will be available and accessible to all personnel. The selection of the fluids used on the well site will be approved for use by the CPE Drilling Superintendant.

3. Waste Management

A detailed Waste Management Plan (WMP) is a vital part of the waste management process. The WMP details the wastes generated during the Project, and specifies the proper handling, storage and disposal practice for each waste stream. The WMP considers different streams of waste. It describes approaches for the disposal of waste materials and actively promotes waste minimization strategies.

All waste (domestic and hazardous), drilling fluids and wastewater from camp operations will be stored in appropriate containers and tanks and will be transported off-site in regular intervals for appropriate disposal in Inuvik, Fort Nelson (British Columbia) and / or Swan Hills Treatment Centre in Alberta. No waste will remain on-site, no sumps will be excavated and no wastewater will be released to the environment. To mitigate accidental spills, the following processes will be implemented:

- heated wastewater tanks will be stored in a bermed area, at a minimum distance of 100 m away from any water body;
- bulk fuel will be stored in one double walled tank located at a minimum distance of 100 m away from any water body, enclosed by a berm capable of containing 110% of the tank volume in the event of a leak and located above the high water mark of any water body.
- accidental fuel spills will be cleaned immediately and any contaminated materials stored in barrels and transported off-site for appropriate disposal;
- the camp will use biodegradable products; and

- grease traps will be installed in the kitchen to prevent grease from entering the environment through accidental spills or at the disposal site (in Inuvik).

Well test flaring can produce carbon monoxide (CO), unburned hydrocarbons, particulate matter (soot and ash) and other organic compounds. These compounds are released to the atmosphere and, if produced in large quantities, they can be through various forms of transport and chemical reactions, deposited to surface water bodies or the terrestrial environment. Environmental impacts to ecosystems as a direct result of air emissions are generally managed at the source, i.e., through well test flaring dispersion modelling and controlled practices. The GNWT ENR has established a *Guideline for Ambient Air Quality Standards in the Northwest Territories* (2011; Table 1, shown below) under the GNWT *Environmental Protection Act*. These standards are harmonized with other Canadian jurisdictions and are intended to be used in the approval process of proposed and existing developments with regards to acceptable air emissions.

To manage levels of emissions to the environment as a result of flaring and ensure compliance with NWT Ambient Air Quality Standards, dispersion modeling and heat intensity calculations will be performed over a range of scenarios, e.g., flare volumes and durations, and relevant input parameters, e.g., flare stack height and meteorological conditions. The results of this analysis will be used to design a flaring program and practices that result in an acceptable level of emissions to the environment. If necessary, air quality monitoring stations may be used to monitor compliance with discharge limits.

Table 1 NWT Ambient Air Quality Standards (GNWT, ENR 2011)

Parameter	Standard (ug/m3)*	Standard (ppbv)**
Carbon Monoxide (CO)		
1 hr. average	15,000	13,000
8 hr. average	6,000	5,000
Fine Particulate Matter (PM2.5)		
24 hr. average	30	
Ground Level Ozone (O3)		
8 hr. average	130	65
Nitrogen Dioxide (NO2)		
1 hr. average	400	213
24 hr. average	200	106
Annual arithmetic mean	60	32
Sulphur Dioxide (SO2)		
1 hr. average	450	172
24 hr. average	150	57
Annual arithmetic mean	30	11
Total Suspended Particulate (TSP)		
24 hr. average	120	
Annual arithmetic mean	60	

* micrograms per cubic metre

** parts per billion by volume

All ambient air quality measurements will be referenced to standard conditions of 25°C and 101.3 kPa.

4. Compliance Monitoring

Pages 1 to 6 of the CPE HSE Manual address the roles and responsibilities of key personnel, employees, employers and contractors with regards to reporting and compliance on environmental protection. Record management and documentation guidelines are specified on page 40 of the HSE Manual.

The CPE Spill Response Plan (SRP) specifically addresses the spill prevention, response and reporting requirements and outlines the guidelines to be followed to record spills and damage to the environment.

Additionally, there is an added 3rd party compliance monitoring provided by the Inuvialuit Land Administration (ILA) Environmental Monitor that will be on-site throughout the duration of the Project.

A report will be compiled at the completion of the Project by the CPE Project Manager that will summarize the success and learnings of the environmental protection program utilized during the drilling operations.

5. Spill Reporting

Spill reporting will follow the procedures documented in the SRP.

6. Key Equipment, Facilities and Procedures

For the drilling, completion and tie-in of the Ikhil Offset Well Program, the key equipment, facilities and procedures to be utilized for environmental protection are:

- Drilling rig BOP stack and choke manifold
- Double walled and bermed bulk fuel tank
- Shale shaker catch tank for collection of drill cuttings and subsequent proper disposal of same.
- Flare system for management of gas kicks, should such occur, while drilling. System includes a catch tank on the flare line for collection of any liquid drop-out and subsequent proper disposal of same, as well as a flare stack.
- Camp environmental management systems, including domestic waste water and sewage storage tanks.
- Drip trays for use under all vehicles and heavy equipment when parked.
- Compliance with all aspects of the Fisheries and Oceans Canada – Northwest Territories Operational Statement - “Ice Bridges and Snow Fills” (Version 3.0) for any stream crossings as part of the project. In addition, proponent shall ensure that all winter stream crossings will be located so as to minimize approach grades and be constructed entirely of ice and snow materials and mechanized clearing will not be done immediately adjacent to any watercourse.

The equipment and facilities are inspected and leak tested as required to confirm integrity prior to installation at the well site and periodically thereafter in accordance with regulations.

7. Environmental Protection Procedures

The table below presents an overview of sensitive environmental factors (VCs identified in Section 9 of the EIA) that might be affected by Project work, environmental protection procedures and mitigation measures. The goal is to achieve protection of sensitive environmental parameters.

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<i>Sensitive Environmental Factor (VCs)</i>	<i>Environmental Protection Procedure</i>	<i>Mitigation Measures</i>
Air and Noise (air quality and noise levels)	Flaring: the well test will be conducted in compliance with NEB Regulations, using standard proven testing procedures and equipment. Well testing equipment and wireline equipment will be used. Truck and heavy equipment use will be minimized and idling avoided to the greatest extent possible. No aircraft traffic is anticipated.	<ul style="list-style-type: none"> • Flaring will only be for short periods of time. • Number of vehicles, heavy equipment and diesel generators will be limited. • Noise will be restricted to the immediate vicinity of the work in progress. • The highest noise levels will likely occur from drilling and flaring of gas, which will occur during a short time frame only in a localized area.
Soils and Terrain (sensitive terrain; permafrost; soil quality)	<p>Aim at minimizing soil compaction / disturbance / contamination and impact to permafrost.</p> <p>Minimize overall machinery use; use existing winter access, construct snow / ice pads and use rig mats.</p> <p>Protect sensitive shore area of overland access.</p> <p>Implement Emergency Response Plan and Spill Contingency Plan; keep spill response equipment at hand.</p> <p>Use ice pad around the testing flare to protect the underlying vegetation and soils from radiant heat energy at ground level from the flare. Maintain ice layer during testing to prevent potential effects to vegetation, active layer or underlying permafrost.</p>	<ul style="list-style-type: none"> • Project will be completed under stable, frozen ground conditions. • Winter access on the river channel and use of previously established overland access (Alternate Route) will be used for access to the Project area. • Ramp of snow and ice will be built where ice road meets the land. • Flare stack and drill rig will be located on an ice pad with matting on top. • Temporary camp will be located on an ice pad. • A Spill Contingency Plan is in place to handle spills of fuel or hazardous materials. • An Emergency Response Plan is in place. • Storage areas will include secondary containment so that spills or ruptures remain contained on site. • Use of Environmental Monitors to closely observe Project activities.
Vegetation (sensitive species and rare plants)	<p>All components of winter access will follow existing route (Alternate Route). All vehicles and equipment will travel on minimum snow / ice cover.</p> <p>Minimum snow / ice cover will be maintained at all times to cover dormant vegetation.</p> <p>Footprint of camp and staging will be kept to a minimum.</p> <p>Ice pad will be constructed and lined with matting.</p>	<ul style="list-style-type: none"> • A minimum 20 cm snow / ice cover will be maintained on the overland access route and the ice pad. • Frozen ground and snow cover will allow travel over most vegetation without damage to the root systems. • Final site inspection and clean-up will be conducted with site-specific clean-up conducted on foot to avoid disturbance to vegetation. • Drilling will occur in winter, which will coincide with the dormant period for herbaceous plants. • Winter access follows previously established route along the western escarpment of the Caribou Hills. • Natural revegetation will be promoted by avoiding disturbance of the root zone.

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<i>Sensitive Environmental Factor (VCs)</i>	<i>Environmental Protection Procedure</i>	<i>Mitigation Measures</i>
Wildlife (barren ground caribou; semi-domestic reindeer; grizzly bear)	<p>Work will be designed to avoid any known den sites by at least 300 m.</p> <p>Wildlife Monitors will scout ahead to identify and avoid potential conflicts with bears.</p> <p>Bear safety training will be provided where appropriate.</p> <p>A clean camp will be maintained at all times. Wildlife proof containers will be used to store waste until off-site disposal.</p> <p>All crew will be advised not to feed or harass wildlife.</p> <p>Work will cease if caribou, reindeer or bears are spotted.</p> <p>Advise HTC's for any possible interference with traditional harvest.</p>	<ul style="list-style-type: none"> • Use of Wildlife Monitors to avoid disturbing any wildlife in the area and to identify bear dens. • If caribou, reindeer or bears are observed, work will cease until the animals leave the area. • Newly identified bear dens will be avoided by at least 300 m. • Camp will be kept clean, with use of bear-proof containers. • Personnel will have bear safety training. • Winter access follows previously established route. • Minimum snow cover requirements will help to mitigate possible effects to low-lying vegetation that may serve as habitat. • Ice pad will protect low-lying vegetation.
Aquatic Resources (fish and fish habitat)	<p>Build snow ramp where ice road meets overland access to protect sensitive shoreline.</p> <p>Overland access uses seasonal drainage valley.</p> <p>Use biodegradable camp products to minimize impact to environment in case of leaks or at disposal site (in Inuvik).</p> <p>No refuelling or storage of hazardous materials will occur within 100 m from any water body.</p> <p>Use of double walled fuel tanks and bermed refuelling areas.</p> <p>Vehicles and equipment will be well maintained and regularly checked for leakage.</p> <p>Drip pans will be used when vehicles or equipment are stationary.</p> <p>Spill Contingency Plan will be available and crew members trained in emergency response procedures.</p>	<ul style="list-style-type: none"> • All wastewater will be collected in lined, heated storage tanks and transported to the Town of Inuvik for appropriate disposal. • All drilling waste will be collected and transported for appropriate disposal in Alberta or British Columbia. • A Spill Contingency Plan is in place to address spills of fuel or hazardous materials. • Sites for storage of fuels, lubricating oils, chemicals, or other hazardous materials will be located a minimum of 100 m away from water bodies, and surface drainages. • Storage areas will include secondary containment so that spills or ruptures remain contained on-site. • Hazardous materials transportation operators will be licensed and adhere to approved emergency response and spill response plans.

8. Summary of studies undertaken

The following is a summary of the studies undertaken to identify environmental hazards and to evaluate environmental risks relating to the proposed work program:

Assessment / Study	Period	Sources
Spring 2010 Aquatik Field program Results	2010	Kiggiak (2010a)
Submission to the EISC Inuvik to Tuktoyaktuk Highway / Spring – Summer 2010 Field Stream Crossing Assessment	2010	Kiggiak EBA (2010b) on behalf of GNWT, DOT
Submission to the EISC Construction of the Inuvik to Tuktoyaktuk Highway, NWT	2010	Kiggiak EBA (2010c) on Behalf of GNWT, DOT
Archaeological and Fisheries assessment of the Tuktoyaktuk to Source 177 Road	2009	IMG-Golder (2009)
Submission to the EISC MGM Energy Corp. Ogruknang 2D Seismic Program, 2007/2008, 2008/2009 and 2009/2010	2007	IMG-Golder Corp. (2007) on behalf of MGM
Review of the Ikhil gas development and pipeline regulatory and environmental process: Lessons learned (Environmental Studies research Fund)	2007	Kavik Axys (2007)
Inuvik Gas Pipeline Lessons Learned. Prepared by North of 60 engineering Ltd. (Imperial Oil resources Ltd.)	2004	McDougal (2004)
Annual Environmental Inspection Reports of the Ikhil Gas project	2003-Ongoing	AltaGas / IMG-Golder Corp.
Submission to the EISC: Chevron North Ellice and Olivier 3D Seismic Programs	2005	IMG-Golder prepared for Chevron Canada Resources
Submission to NEB: EIS for Mackenzie Gas Program	2004	Imperial Oil et al. (2004)
Submission to NEB: Comprehensive Study Report, Devon Beaufort Sea Exploration Drilling Program	2004	Devon Canada Corporation (2004)
Submission to the EISC: Chevron Arvoknar, Farewell and Ya Ya 3D Seismic Programs	2004	IMG-Golder. (2004), prepared for Chevron on behalf of the MDJV

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Submission to the EISC: Chevron Garry 3D Seismic Program	2004	Kavik-Axys Inc. (2004), prepared for Chevron on behalf of the MDJV.
Submission to the EISC: Chevron Taktuk 3D Seismic Program	2003	Kavik-Axys Inc. (2003), prepared for Chevron on behalf of the MDJV
Mackenzie Gas Project Reconnaissance and Impact Assessment	2003	Mackenzie Project Environmental Group (2003)
Napoiak Seismic Program and Napartok Gravity Survey	2001	Inuvialuit Environmental and Geotechnical (2001)
Mackenzie Delta Inuvik Block 1 & 2 Winter Seismic Program	2000/2001	Inuvialuit Environmental Inc. (2000) prepared for Chevron
Mackenzie River Delta Winter 2001 Regional Seismic Acquisition Program	2001	Inuvialuit Environmental Inc. (2000) prepared for Explor Data Ltd.
Mackenzie Delta Winter 2000/2001 Napartok Seismic Program	2000	Inuvialuit Environmental Inc. (2000) prepared for Petro-Canada
Submission to the EISC Ikhil Gas Development to Supply Natural Gas to the Town of Inuvik.	1997	Golder (1997a)
Technical Report: An ecological and archaeological survey of the Ikhil gas development study area	1997	Golder (1997b)
Environmental impact assessment for the Ikhil gas development to supply natural gas to the town of Inuvik (NEB)	1997	Golder (1997c)
Town of Inuvik gas supply environmental overview: A report submitted to the Inuvialuit Petroleum Corporation	1996	Webb and McDougall (1996)
Beaufort Region Environmental Assessment and Monitoring Program (BREAM)	1986 to 1994	BREAM analysis reports
Mackenzie Environmental Monitoring Program (MEMP)	1985 to 1994	Government and industry reports
Northern Oil and Gas Action Program (NOGAP)	1982 to 1992	NOGAP bibliographies and reports
Oil and gas exploration and development (CAGSL; Parsons Lake)	1970's to 1990's (onshore peak in 1970's)	Government and company reports; consultant studies