INVESTCAN ENERGY CORP

FLAT BAY PETROLEUM EXPLORATION WELL & ACCESS ROAD

Environmental Preview Report

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August 2013

AMEC TF 1384601

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TABLE OF CONTENTS

1.0 INTRODUCTION AND NAME OF THE UNDERTAKING 1

2.0 THE PROPONENT 3

3.0 THE UNDERTAKING: NATURE, PURPOSE AND SCOPE 6
3.1 Nature of the Project 6
3.2 Project Purpose, Need and Rationale 6

4.0 DESCRIPTION OF THE UNDERTAKING 10
4.1 Geographic Location 10
4.2 Project Components 10
4.2.1 Access Road 10
4.2.2 Drill Pad 14
4.3 Construction 16
4.4 Operations and Maintenance 16
4.4.1 Drill Rig and Site Layout 16
4.4.2 Drill Set-up and Operation 18
4.5 Potential Environmental Emissions and Their Management 20
4.5.1 Air and Noise Emissions 20
4.5.2 Solid and Liquid Wastes 20
4.5.3 Fuels and Other Hydrocarbons 21
4.5.4 Drill Fluids, Cuttings and Other Chemicals 22
4.6 Other Potential Drilling Activities and Approaches 24
4.7 Matrix Acidizing 24
4.8 Labor Force and Occupations 26
4.9 Project Schedule 26

5.0 ALTERNATIVE PROJECT LOCATIONS AND APPROACHES 27

6.0 ENVIRONMENTAL SETTING, POTENTIAL INTERACTIONS AND MITIGATION 29
6.1 Natural Environment 29
6.2 Human Environment 31
6.3 Consultation 31
6.4 Potential Environmental Interactions and Mitigation 34
6.4.1 Atmospheric Environment 34
6.4.1.1 Construction 34
6.4.1.2 Operations and Maintenance 35
6.4.1.3 Environmental Effects Assessment Summary 35
6.4.2 Terrestrial Environment 36
6.4.2.1 Construction 36
6.4.2.2 Operations and Maintenance 37
6.4.2.3 Environmental Effects Assessment Summary 37
6.4.3 Freshwater Environment 38
6.4.3.1 Construction 38

6.4.3.2 Operations and Maintenance 39
6.4.3.3 Environmental Effects Assessment Summary 41
6.4.4 Socioeconomic Environment 41
6.4.4.1 Construction and Operation 41
6.4.4.2 Environmental Effects Assessment Summary 43
6.5 Environmental Protection and Response Planning 44
6.6 Effects of the Environment on the Project 45
6.7 Environmental Monitoring and Follow-up 45

7.0 PROJECT-RELATED DOCUMENTS 46

8.0 APPROVAL OF THE UNDERTAKING 46

9.0 DECOMMISSIONING AND REHABILITATION 46

10.0 EPR SUMMARY AND CONCLUSION 48

11.0 REFERENCES 49

LIST OF TABLES

Table 2.1 Some Past and On-Going Investcan Exploration Activities in Newfoundland and Labrador 3
Table 4.1 Drilling Additives and Estimated (Approximate) Quantities 22
Table 4.2 Anticipated Project Workforce – Construction and Operations 26
Table 6.1 Environmental Effects Assessment Summary: Atmospheric Environment 35
Table 6.2 Environmental Effects Assessment Summary: Terrestrial Environment 37
Table 6.3 Environmental Effects Assessment Summary: Freshwater Environment 41
Table 6.4 Environmental Effects Assessment Summary: Socioeconomic Environment 43

LIST OF FIGURES

Figure 1.1 Flat Bay Petroleum Exploration Well and Access Road: General Location 2
Figure 2.1 Location of Investcan Exploration Activities in Newfoundland and Labrador 4
Figure 2.2 Location of Exploration Activities in Bay St. George Area of Newfoundland 5
Figure 3.1 Regional and Local Geology 7
Figure 4.1 Flat Bay Petroleum Exploration Well and Access Road – Topographic Map View 11
Figure 4.2 Flat Bay Petroleum Exploration Well and Access Road – Air Photo View 12
Figure 4.3 General Site Layout 13
Figure 4.4 Photograph of an Existing Drill Pad (For general illustration) 14
Figure 4.5 Conceptual Illustration of Containment Berm 15
Figure 4.6 The Foragaz Drill Rig #3 17
Figure 4.7 Drill Site Plan and General Layout 18
Figure 6.1 Environmental Setting (Typical Site Vegetation) 30

LIST OF APPENDICES

Appendix A Environmental Preview Report Guidelines - Table of Concordance

Appendix B Foragaz Drill Rig #3: Specifications Sheet

Appendix C Material Safety Data Sheets (MSDSs)

Appendix D List of Potentially Applicable Permits and Authorizations

Appendix E Investcan Environmental Protection Plan (EPP)

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1.0 INTRODUCTION AND NAME OF THE UNDERTAKING

This Undertaking is referred to as the **"*Flat Bay Petroleum Exploration Well and Access Road*"** (also referred to herein as "the Project").

Investcan Energy Corp. (Investcan) is proposing to develop an access road and to drill an oil and gas exploration well (known as Thoulet #1) in an area of Western Newfoundland (Figure 1.1).

The Project was registered by the Proponent for environmental assessment (EA) review pursuant to the Newfoundland and Labrador *Environmental Protection Act* (Part X) (*NL EPA*) on March 25, 2013 (Registration #1702). This requirement to register and obtain EA approval for the Project has resulted from the access road component of the Project, pursuant to Section 35(1)b of the NL *Environmental Assessment Regulations,* 2003, and not from the proposed drilling components and activities themselves.

Following public and governmental review of that EA Registration, on May 16, 2013 the Minister of Environment and Conservation announced that an Environmental Preview Report (EPR) was required for the Project. An EA Committee was appointed to provide advice to the Minister on the EPR on May 24, 2013, and on June 20, 2013 Guidelines for the preparation of the EPR were issued to the Proponent (Appendix A).

As is often the case with proposed development activities at the EA stage of planning and design, the proposed Project has continued to evolve and become further defined since the initial EA Registration was prepared, submitted and reviewed. This has included a number of updates and modifications to the proposal based on technical, economic and other factors, including additional analysis and increased understanding of the local geology. Although the Project originally included the potential drilling of a second well (Thoulet #2) to the northeast of Thoulet #1, an exploration well at this location is no longer being proposed by Investcan, and it has therefore been removed from the scope of the Project for which EA approval is being sought. As also described later in this EPR, the specific nature of, and methods for, some of the proposed drilling activities that are associated with the Project have also become further defined as Investcan's planning and analysis have progressed. It should be reiterated that the petroleum exploration activities that are currently being proposed by Investcan as part of this Project, and for which EA approval is currently being sought through this EPR, are not considered and do not include hydraulic fracturing.

This EPR has been prepared and submitted by Investcan with the assistance of AMEC Environment & Infrastructure, in accordance with the *NL EPA* and its *Regulations* and the above referenced EPR Guidelines. The document is intended to provide further information on the Project and its existing environmental setting, potential environmental interactions, and proposed mitigation in order to address the various questions and environmental considerations raised during governmental and public review of the EA Registration. The EPR has been planned and prepared in accordance with the organization and structure of the EPR Guidelines themselves in order to optimize its utility and readability, and a Table of Concordance indicating where each of the specific requirements of the Guidelines are addressed is also included in Appendix A.

The EPR will be subject to governmental and public review, and eventually, a decision will be made by the Minister of Environment and Conservation as to whether the Project may proceed, subject to any associated terms and conditions resulting from the EA and/or subsequent permitting, or whether further environmental review may be required.

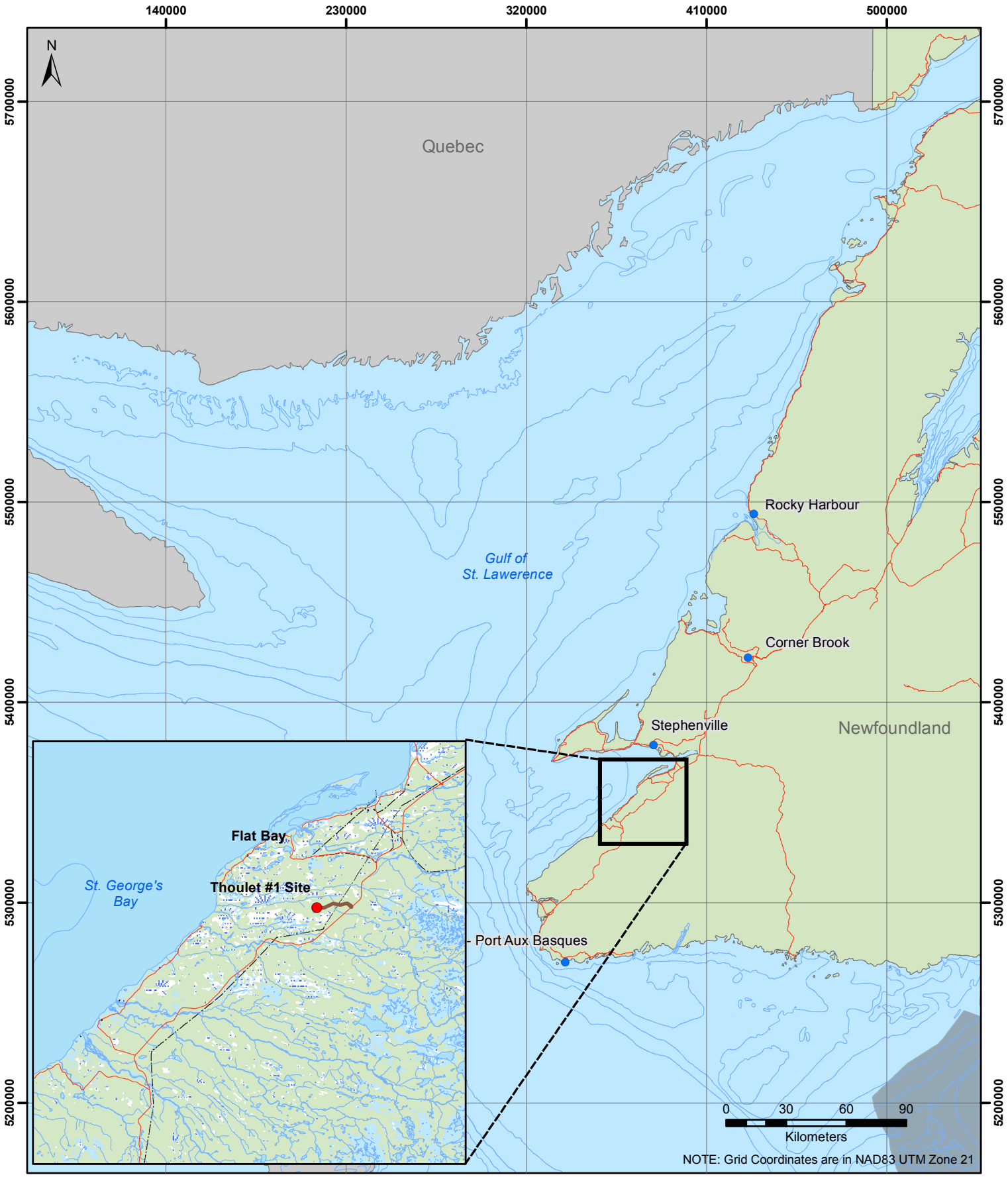

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Figure 1.1: Flat Bay Petroleum Exploration Well and Access Road: General Location

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2.0 THE PROPONENT

Investcan is a St. John's, NL based company and is a wholly owned subsidiary of SCDM Energie, a privately held company headquartered in Paris, France.

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Investcan is fully committed to the exploration and future development of oil and gas resources in Western Newfoundland and has been diligently and responsibly conducting petroleum exploration activities, including well drilling, seismic acquisition, related geological and geophysical interpretation and reservoir engineering, in the area for approximately five years (Table 2.1).

Investcan is currently involved in oil and gas exploration activities both onshore Western Newfoundland (under *Exploration Permits 96-105, 03-106 and 03-107*) and offshore in the Hopedale Basin on the Labrador Shelf (under *Exploration Licence 1107*) (Figures 2.1 and 2.2).

Table 2.1 Some Past and On-Going Investcan Exploration Activities in Newfoundland and Labrador

Exploration Activities	Date	Area	Role
Flat Bay 2-hole Coring Program	Feb-Mar 2009	EP 03-106	Partner
Drilling Robinsons #1	Jul-Oct 2009	EP 03-106	Partner
Drilling Red Brook #2	Oct-Dec 2009	EP 03-107	Partner
Drilling Seamus #1	Jan-May 2010	EP 03-103	Partner
Labrador Offshore Seismic Program	Sept-Oct 2010	EL 1107	Partner
Completions and Testing of Robinsons #1 and Red Brook #2	Aug-Nov 2010	EP 03-107	Partner
130 line km Onshore Seismic	Aug-Dec 2010	EP 03-106, EP 03-107	Partner
Drilling Finnegan #1	Sep – Dec 2010	EP 03-102	Partner
Flat Bay #1 Re-Entry	Oct 2010	EP 03-106	Partner
Flat Bay 6 hole Coring Program	Sep-Nov 2011	EP 03-106	Partner
Drilling Gobineau #1	Nov-Dec 2012	EP 03-106	Operator
Hurricane #2 Re-Entry	Jun -Jul 2013	EP 03-107	Operator
Drilling Thoulet #1 (Proposed)	Fall 2013	EP 03-106	Operator

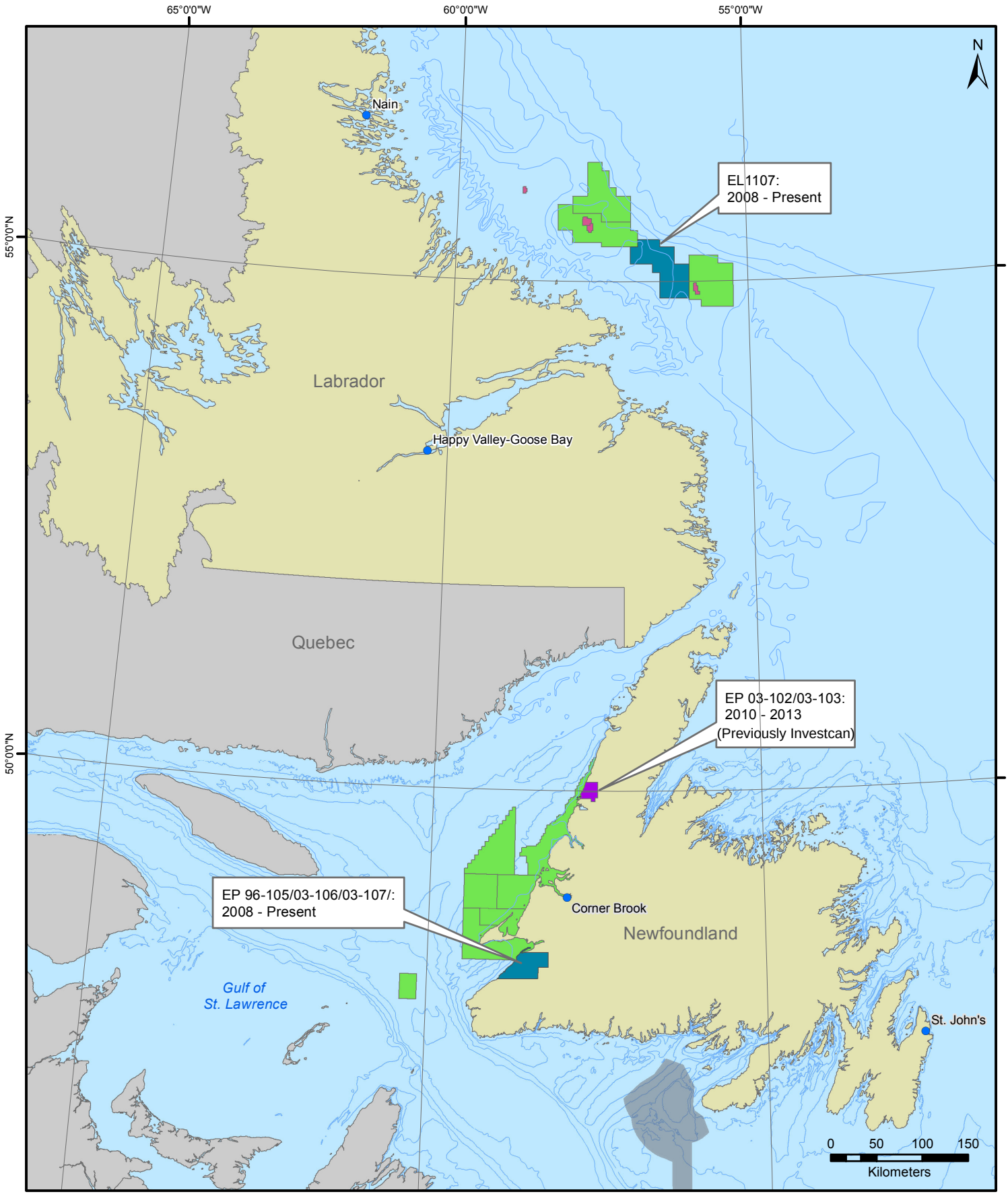

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Figure 2.1: Location of Investcan Exploration Activities in Newfoundland and Labrador

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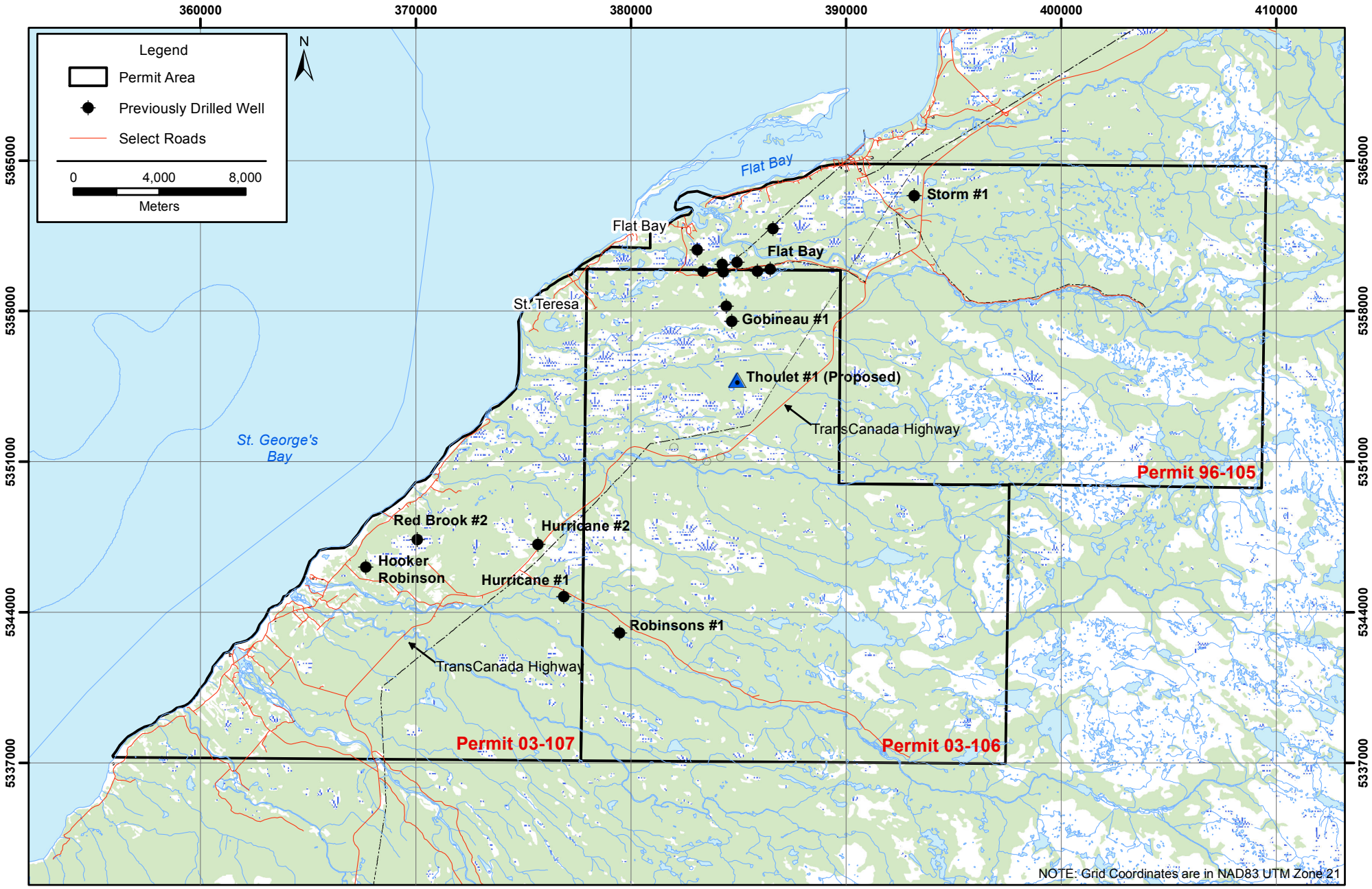

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Figure 2.2: Location of Exploration Activities in Bay St. George Area of Newfoundland

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3.0 THE UNDERTAKING: NATURE, PURPOSE AND SCOPE

The following sections provide a brief introduction to, and overview of, the proposed Project, including its overall nature and its underlying purpose, need and rationale, as background and context for the EPR.

3.1 Nature of the Project

The Project will involve the construction of an access road and drill pad and the drilling of an oil and gas exploration well, known as Thoulet #1, which will be located on Crown Land approximately seven kilometres south-southwest of the community of Flat Bay and approximately 1.5 - 2.5 kilometres west of the Trans Canada Highway (TCH) in Western Newfoundland (see Figure 1.1).

Following completion of the access road and the mobilization of the required equipment and personnel to the proposed well site, exploration drilling activities will commence. It is anticipated that approximately 50 days will be required to complete the targeted 2,000 metre deep exploration well.

Investcan has planned and conducted other oil and gas exploration activities in the Western Newfoundland region, as outlined earlier. This EPR and the associated EA review focuses on, and pertains only to, the construction of the access road, drill pad and the drilling of the Thoulet #1 exploration well as described herein.

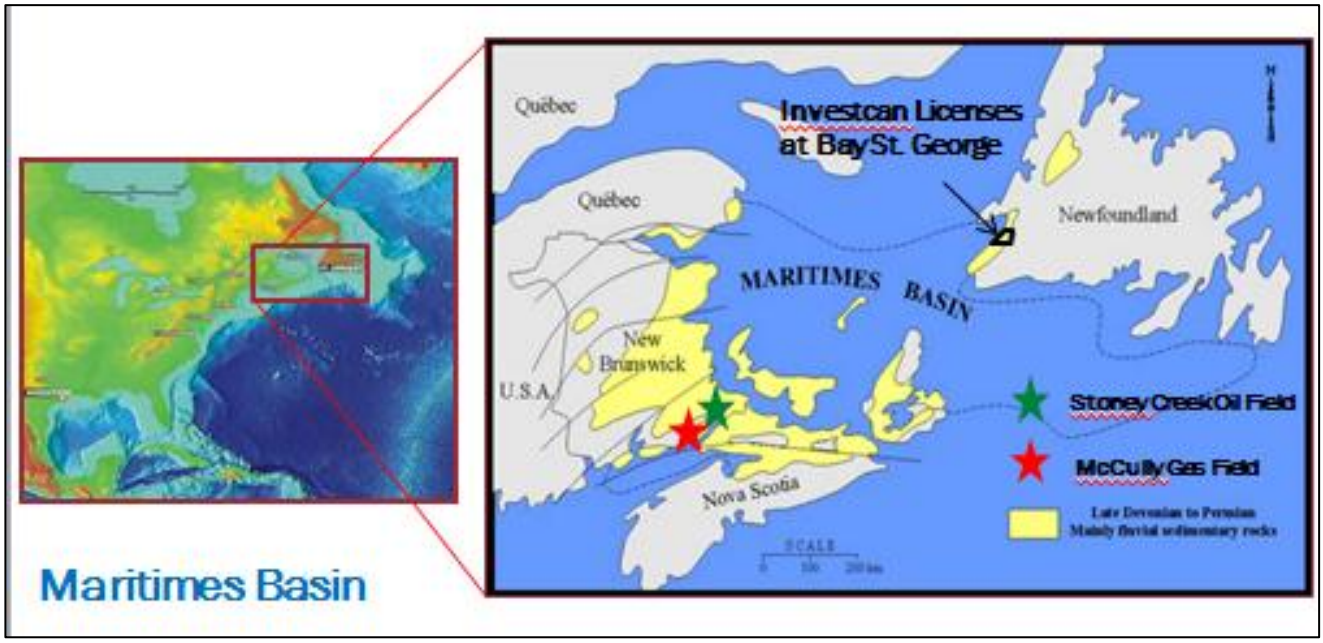
3.2 Project Purpose, Need and Rationale

The purpose of the proposed Thoulet #1 exploration well and the associated access road and other components and activities that are described in this EPR are to explore, evaluate and subsequently test Carboniferous aged Lower Anguille strata in the oil prone region of the Bay St. George Sub Basin (Figure 3.1). This is therefore the direct and immediate objective of, and rationale for, this proposed Project.

In terms of the regional geology, the Maritimes Basin is located in the southern half of the Gulf of St. Lawrence and covers an area of approximately 120,000 to 160,000 square kilometres, spanning onshore to parts of Quebec, New Brunswick, Prince Edward Island, Nova Scotia and Newfoundland and Labrador. The basin currently contains two producing hydrocarbon fields: 1) Stoney Creek; and 2) the McCully Gas Field, both of which produce from the upper member of the Albert Formation. Hydrocarbons in the Stoney Creek and McCully Fields are stratigraphically trapped in Horton Group sandstones and sourced from Horton Group shales. Investcan's primary targets in Bay St. George area are in the stratigraphically equivalent Anguille Group.

The northeast extension of the larger Maritimes fault basin contains approximately 10 km of sediments in age from late Devonian to late Carboniferous. These were formed as a pull-apart trough west of the Long Range fault, a major dextral strike slip fault that is part of the Hercynian fault system. Three basin fills filled the initial pull apart sequence from southwest to northeast. The first two basin fills of the Faemennian / Tournasion ages (Anguille Group) were deposited within a 30 km wide trough. By the time of the third basin fill in Visean time (Lower Codroy), the basin had broadened to 60 kms and was irregular in shape consisting of several subsiding depressions. Wrench movements ceased at this time and the sub-basin was subsequently influenced by block faulting until the Westphalian, when sediments of the Upper Codroy Group and the Barachois Group were deposited.

Figure 3.1 Regional and Local Geology



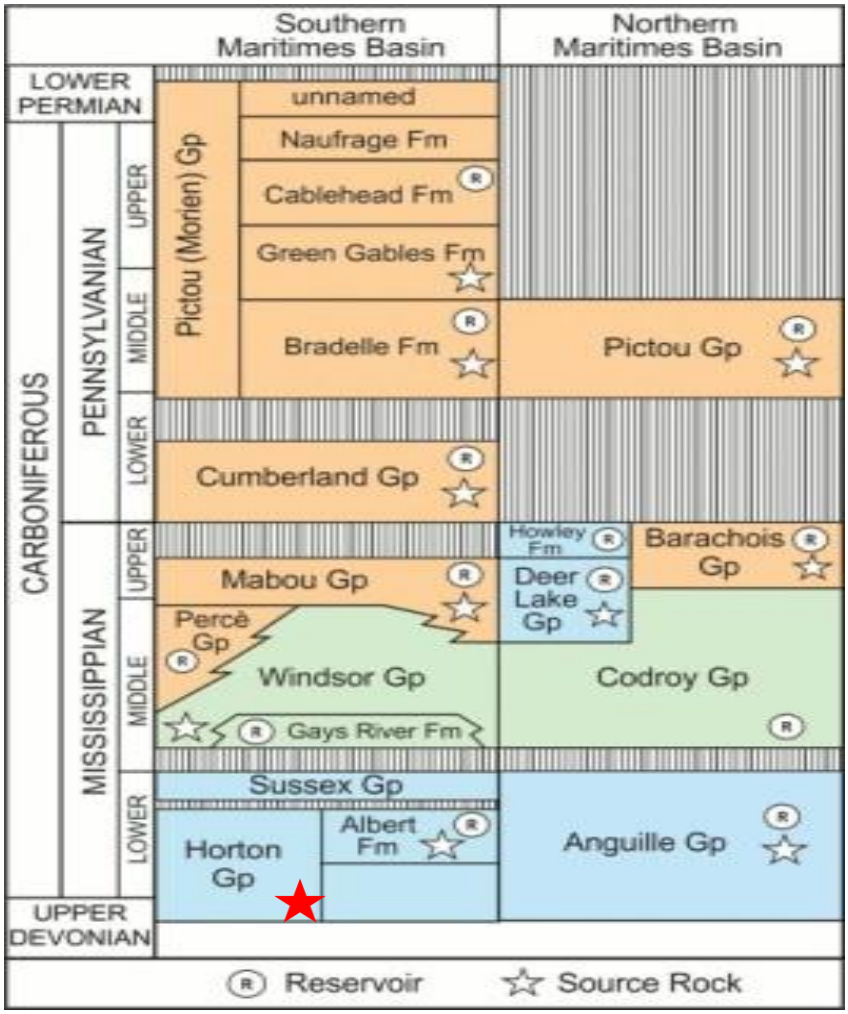
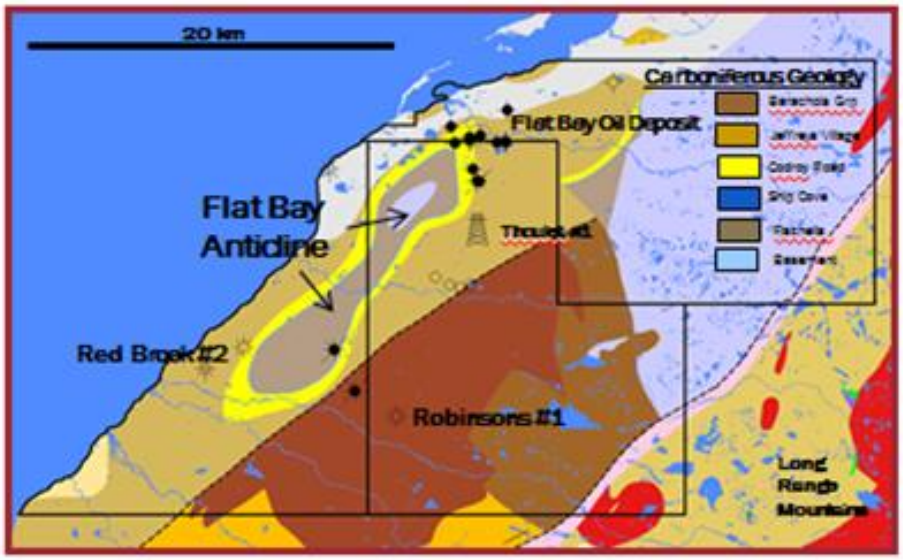
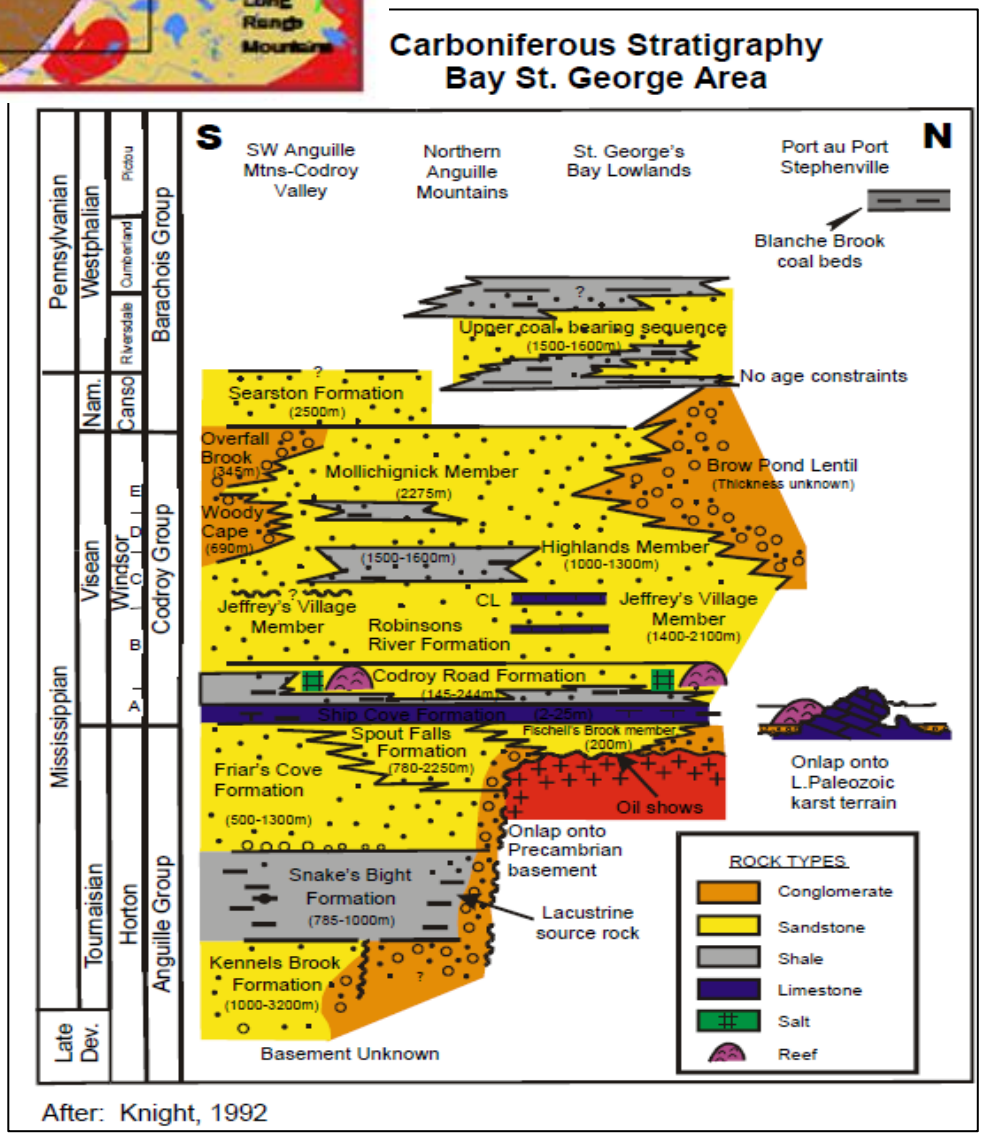


Figure 3.1 Regional and Local Geology (*continued*)





After: Knight, 1992

From: DME (2000)

The primary target for the proposed exploration drilling program is the Snakes Bight Formation of the Anguille Group. Key components of the associated geological model include:

Source: Anguille (proven) - Snakes Bight shale (lacustrine); Total organic carbon (TOC) up to 3 percent;

Reservoirs: Primary target is lacustrine shoreface sands of the Snakes Bight Formation. There are also reservoir quality fluvial deposits in the Anguille Group; and

Trap: Stratigraphic pinch out of lacustrine sands, subcrop of Snakes Bight sandstones, sealing fault traps with potential for structural traps.

Available information and previous analysis include approximately 350 km of 2D seismic survey data acquired on Investcan's exploration licences, including 130 km of seismic shot in 2010 that Investcan has re-processed using multi-focusing processing techniques, as well as gravity, magnetic, electromagnetic and surface geochemical (GORE) work.

Exploration drilling activities such as those proposed here are a necessary initial step in seeking to confirm the potential existence of commercially viable hydrocarbon reserves at any site. While seismic programs and other data can be used to plan and justify a drilling program, they cannot on their own confirm the presence of hydrocarbon resources at a site. The location of the proposed exploration well was chosen based on the available seismic data and associated geophysical interpretations which determined the best chance of success, and Investcan considers that drilling at this well location will provide the most useful information and understanding of the petroleum resource potential of this area. The 2,000 meter projected depth of the Thoulet location is in the oil window based on maturity data collected in the shallow (445 meter) Gobineau Well which was drilled previously in the region (Figure 2.2). The Gobineau Well encountered a tight conglomerate with 40 meters of continuous oil fluorescence indicating possible oil migration in the area.

As also described later in this EPR, the proposed exploration drilling program will result in the creation of various employment opportunities, as well as opportunities for businesses in the supply of required goods and services to the Project and other possible "spin off" economic benefits during this period.

In facilitating the above described exploration activity, the larger objective of the drilling activities and ancillary works associated with this Project is to seek to identify commercially viable hydrocarbon reserves in this area. A successful exploration program leading to the location of such resources could eventually lead to significant additional economic activity in this area related to further delineating, and possibly developing, any such oil and/or gas reserves. Some local residents, communities and other stakeholder groups in the area have expressed considerable interest around potential oil and gas development as a means of facilitating further economic development and growth in this area of Western Newfoundland (see, for example: Western Newfoundland Oil & Gas Steering Committee 2013). An exploration drilling program therefore could, if successful, eventually lead to the future development of a production facility and associated construction and operational activities. This could result in significant economic benefits, both in terms of revenue and returns to the developer and its shareholders, as well as contributing to the local, regional, provincial and national economies. Any such future development would provide employment and business opportunities, training and technology transfer, and generate tax and royalty revenues to government that would benefit the people of Newfoundland and Labrador in general.

4.0 DESCRIPTION OF THE UNDERTAKING

The following sections provide a description of the Project, including its location, main components, and the various activities that will be associated with its construction and operations phases. The information provided in this Chapter addresses each of the Project description information requirements specified in the EPR Guidelines (see Appendix A).

4.1 Geographic Location

The proposed Project is located on Crown Lands in Western Newfoundland, approximately 7 kilometres south-southwest of the community of Flat Bay, and 1.5 to 2.5 kilometres west of the TCH (Figures 4.1 and 4.2).

The proposed exploration drill site is located approximately at UTM (NAD27) coordinates Easting 384909 and Northing 5354587. The exploration area lies to the southeast of a former gypsum quarry which straddles Highway Route 403, approximately six km west of the intersection of that roadway and the TCH.

4.2 Project Components

The Project will involve the development and use of a new access road and drill pad to drill one oil and gas exploration well (Thoulet #1) in Western Newfoundland (Figure 4.3).

4.2.1 Access Road

The Thoulet #1 drill site is located at the end of a proposed new gravel surface access road that will be approximately 3.75 kilometres in length and which will extend from the TCH and then proceed in a general northwesterly then westerly direction to the well site (Figure 4.3). The new access road will be approximately 7 metres wide, and will be designed and built to accommodate heavy highway loads. Investcan has recently retained the services of a civil engineering firm that has carried out the initial physical reconnaissance of the area and has prepared the preliminary conceptual design of the access road.

The proposed access road route has been selected with a view to minimizing ground disturbance and optimizing the use of existing infrastructure to the degree possible. Most of the route can utilize dry ground, although it will be necessary to cross wetted areas in several places.

The proposed access road will also cross a tributary of Middle Brook, which will necessitate a watercourse crossing comprised of an 1,800 millimetre wide and 15 metre long culvert that will be installed as per applicable regulatory requirements. All other wetted areas can be traversed through the installation of small (1,000 millimetre diameter or less) drainage culverts. Drainage at the TCH intersection will be provided through the installation of an approximately 22 meter long and 600 millimetre wide culvert.

The proposed access road will also extend under an existing Newfoundland and Labrador Hydro (Nalcor Energy) electrical transmission line in the area (Figure 4.3).

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Figure 4.1: Flat Bay Petroleum Exploration Well and Access Road - Topographic Map View

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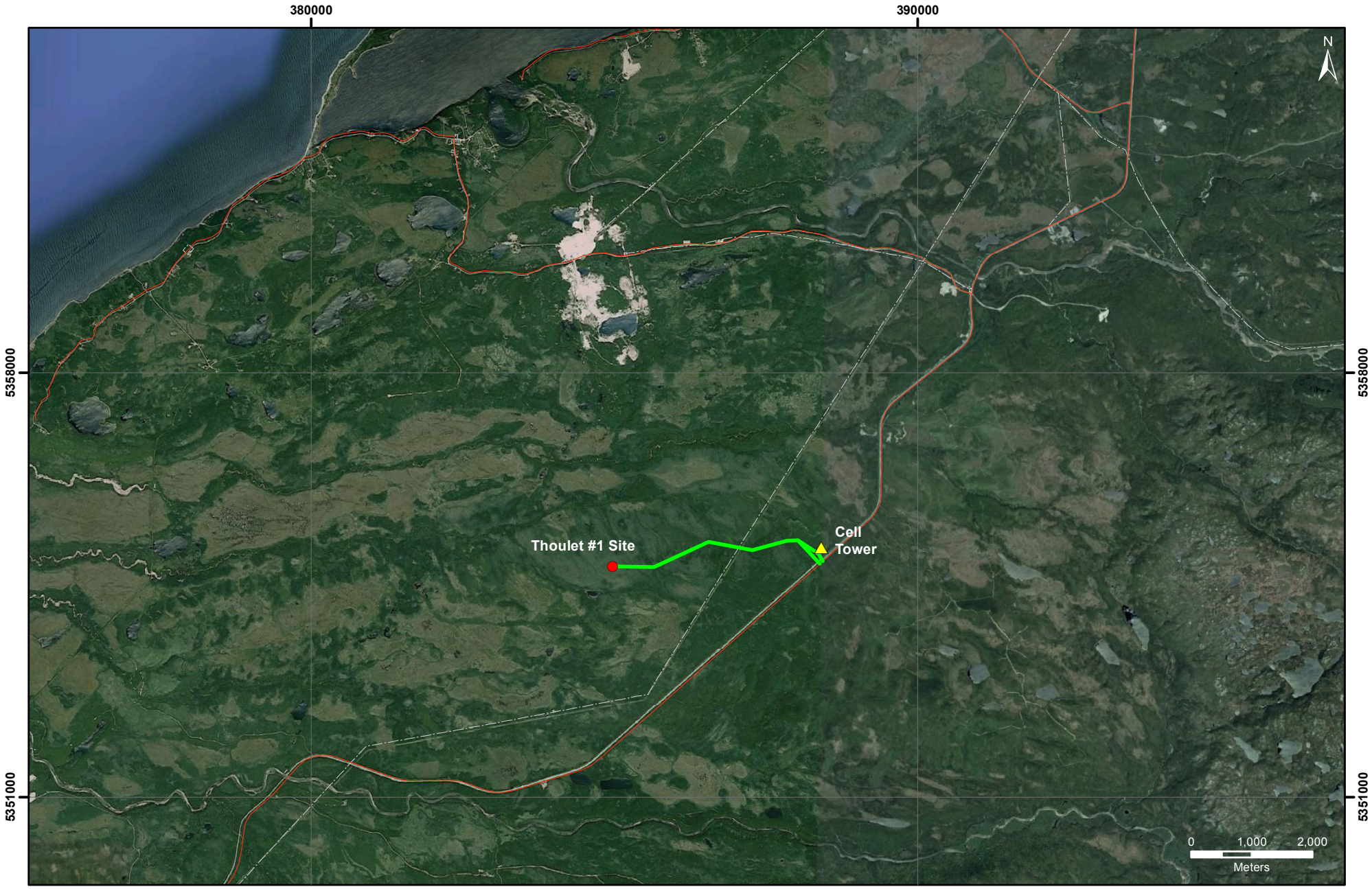

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Figure 4.2: Flat Bay Petroleum Exploration Well and Access Road - Air Photo View

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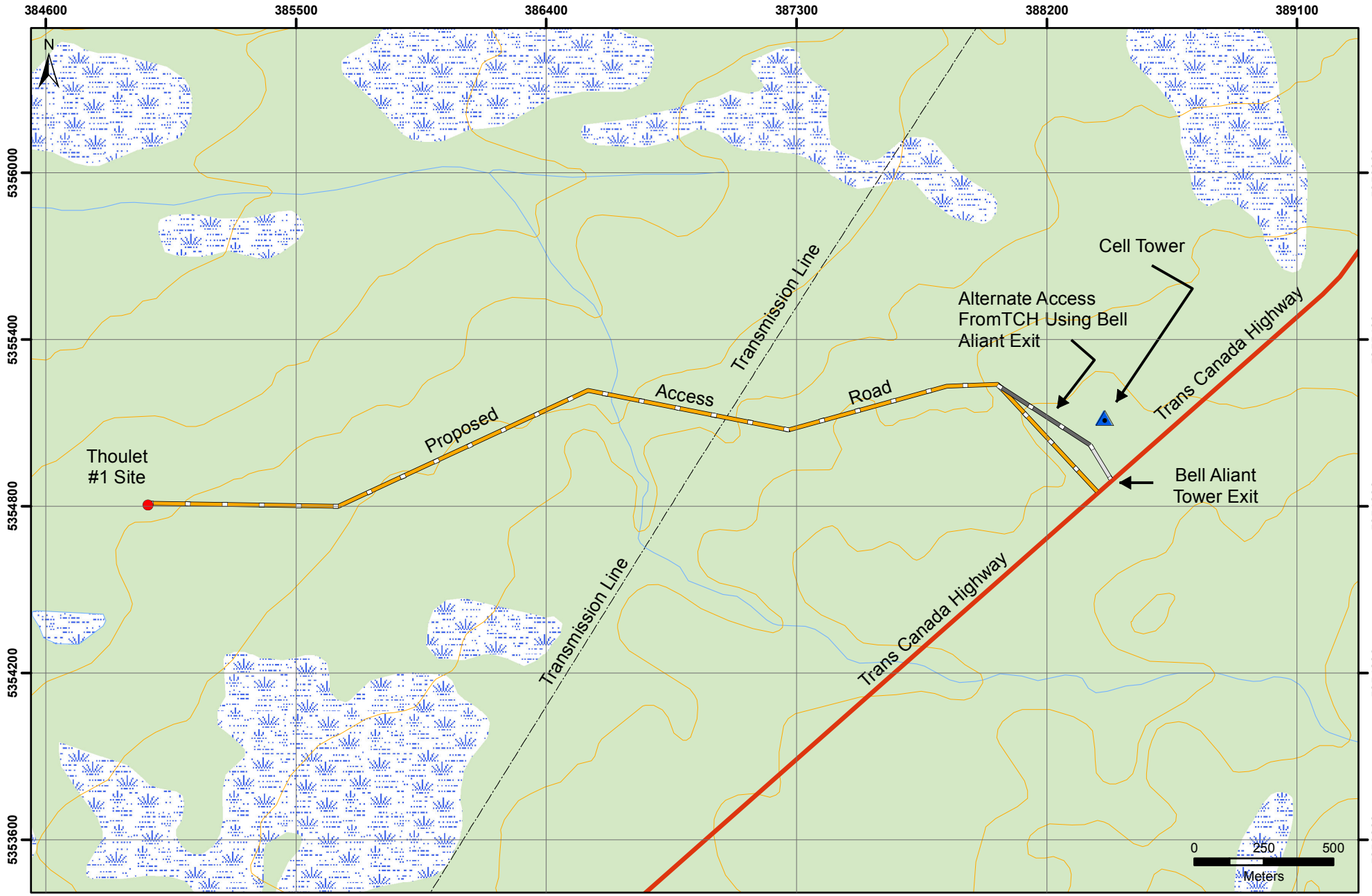

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Figure 4.3: General Site Layout

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4.2.2 Drill Pad

The proposed drill pad will be up to approximately 200 m by 200 m (4 ha) in size. During construction, the drilling site will be cleared, levelled and graded prior to the establishment of a gravel surface. A photograph of a recent oil and gas exploration drilling pad and access road in the Western Newfoundland area is provided in Figure 4.4, for general illustrative purposes.

Figure 4.4 Photograph of an Existing Drill Pad (For general illustration)

The drill site will be surrounded by a containment berm to ensure that no fluids can escape from the work areas (Figure 4.5). The berm will be approximately 1.5 m high and constructed of local material. The floor of the drill pad will be covered with a liner (geo membrane) to further ensure that no fluids can escape from the site, which will be covered with gravel worked to compaction and sloped to facilitate the collection of fluids within. The containment berm will be an engineered structure, designed and constructed as per the *Petroleum Drilling Regulations* under the Newfoundland and Labrador *Petroleum and Natural Gas Act* – Part V: Drilling Operations and Procedures, Section 76 (Bulk Handling of Fuel and Consumables). All drilling activity and associated fluid storage and use will occur within this impermeable dike, which will be of sufficient height and strength to contain all of the associated materials located within its perimeter.

All water collected within the berm area will be managed as if it has come into contact with a deleterious substance, and it will be removed from the area by vacuum truck on a regular basis by a certified contractor (such as Pardy's Waste Management and Industrial Services and/or Crosbie Industrial Services), who will transport these fluids to an approved facility in Newfoundland or elsewhere for proper disposal. There will therefore be no discharge of this water to the environment, including to any adjacent waterbodies.

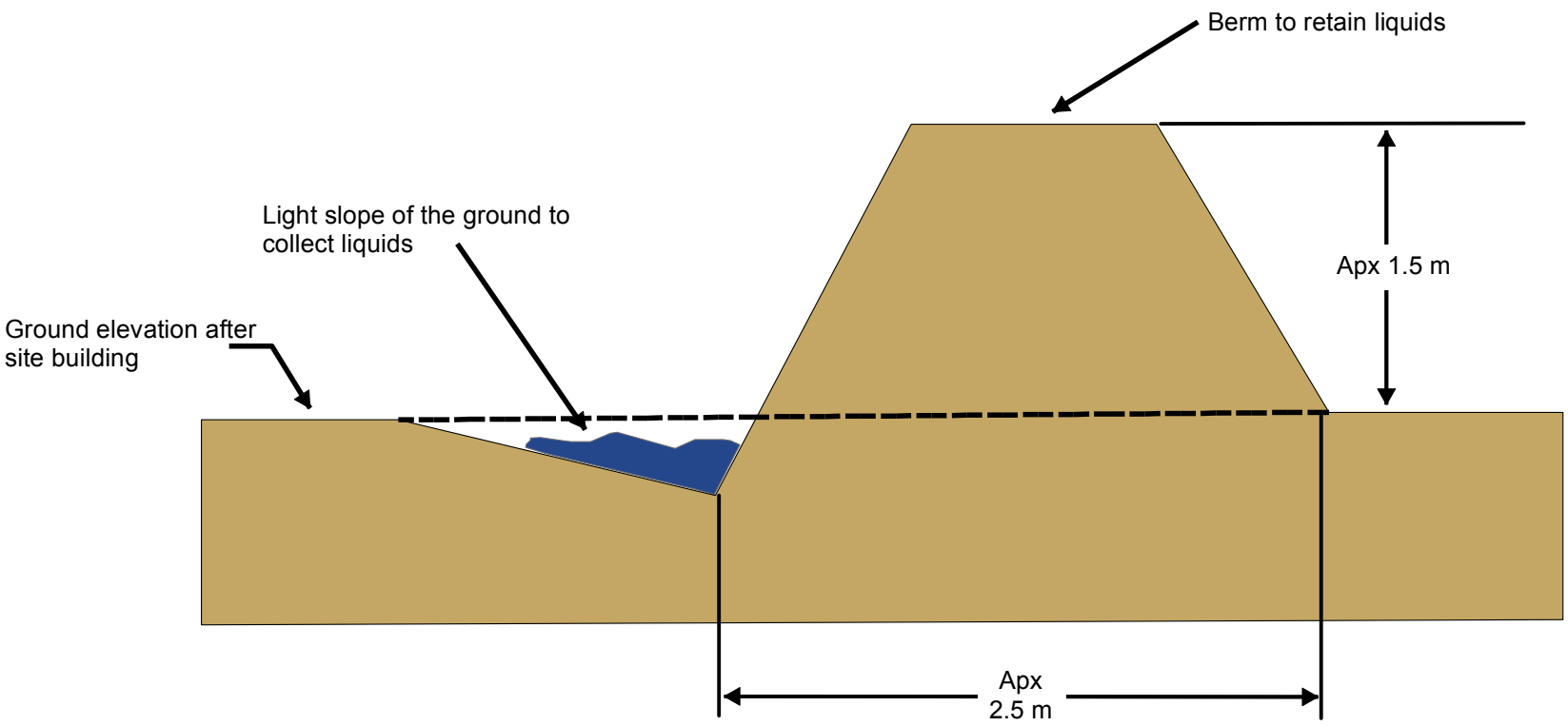


Figure 4.5: Conceptual Illustration of Containment Berm

4.3 Construction

Subsequent to release from the EA process, and the receipt of formal corporate approval and all other required regulatory approvals and permits, construction activity is anticipated to commence in late 2013. Construction of the access road and development of the drill pad will take approximately eight weeks to complete.

Standard and relatively routine construction methods will be used for access road construction and drill site preparation, which will be carried out in accordance with applicable environmental regulations, permits and standards. Project planning and design work to date has been completed with a view to minimizing the physical footprint of the Project and its various components and activities. Limits of clearing will be clearly marked and adhered to. During initial site preparations for the proposed access road and drill site, trees will be removed manually using brush saws and chain saws. On-site vegetation ranges in size from softwood scrub to potential saw logs and firewood, which will be salvaged in accordance with permit specifications. Once cleared of vegetation, the work areas will be grubbed and stripped, with any topsoil stockpiled appropriately for future use, including eventual site rehabilitation work (see Chapter 9).

Access road construction through dry areas will consist of clearing vegetation and then digging drainage ditches on both sides of the road with an excavator. Fill and surfacing materials for access road and drill pad construction will be obtained either from directly within the developed footprint of the Project site itself, or from any nearby existing quarries in the general region. Following clearing and site preparation of the roadbed and drill site, the locally-sourced gravel will be transported to the worksite and distributed, spread and compacted using standard construction equipment and methods.

Culvert installation at the required Middle Brook tributary watercourse crossing and elsewhere as required will be completed in accordance with regulatory requirements and standard and accepted construction practices, including Fisheries and Ocean Canada's *Guidelines for Protection of Freshwater Fish Habitat* (Gosse et al. 1998) and other relevant environmental protection measures. These methods include measures to minimize instream disturbance, to control erosion and sedimentation and to stabilize streambanks (see Section 6.4.3). Once installed, culverts will be inspected regularly by site personnel to ensure that they are functioning properly.

The primary equipment that will be required for access road and drill pad construction is anticipated to include two tracked excavators, two dozers, a road grader, 5-8 dump trucks and one front-end loader.

4.4 Operations and Maintenance

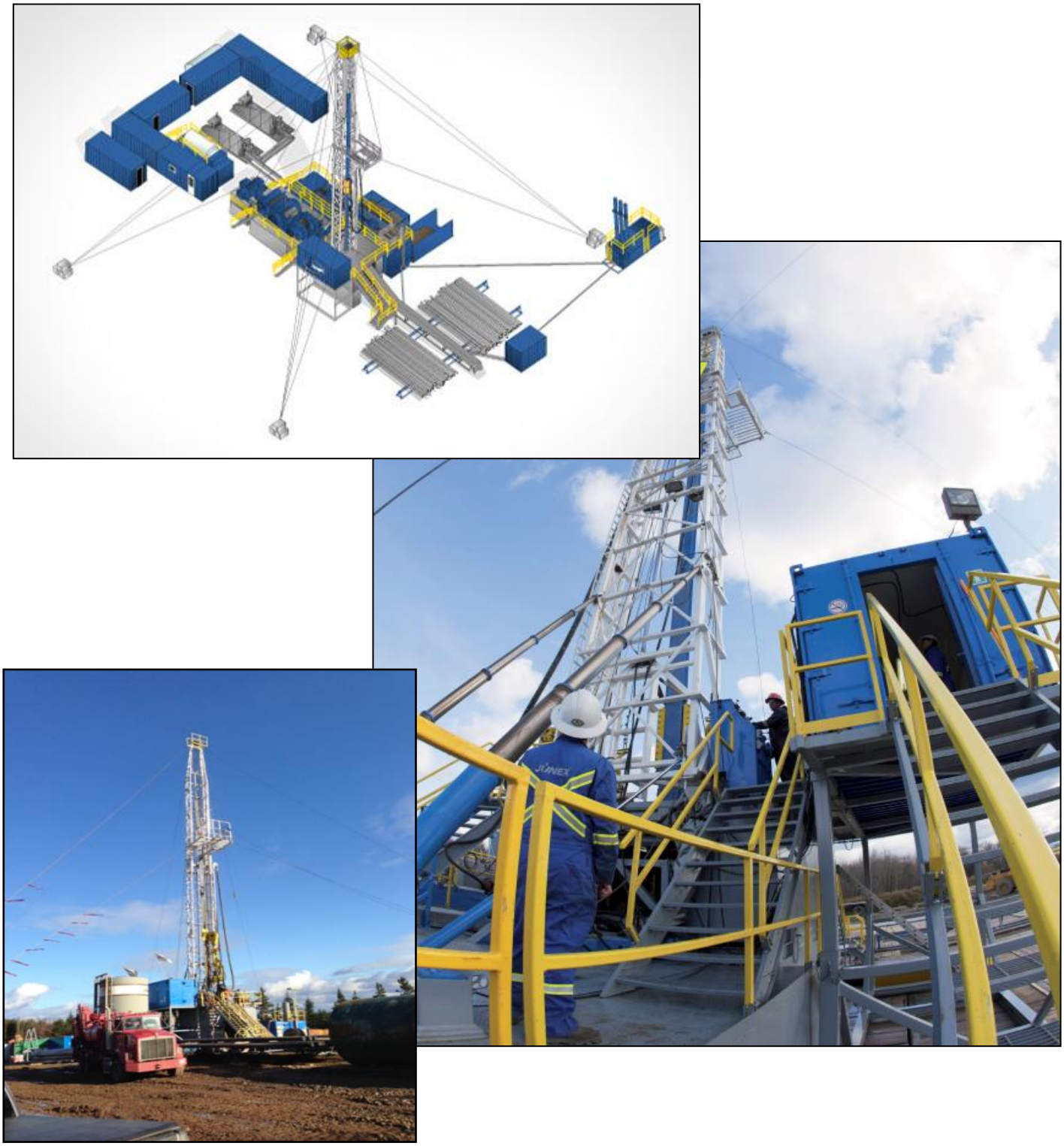
Drilling operations will commence upon completion of construction activity, and it is currently anticipated that well drilling will require approximately 50 days to complete.

4.4.1 Drill Rig and Site Layout

The drill rig used for this Project will be a modern conventional oil well drilling rig (Figure 4.6) established and arranged in a typical drill site layout (Figure 4.7). Investcan currently intends to utilize the Foragaz (a Division of

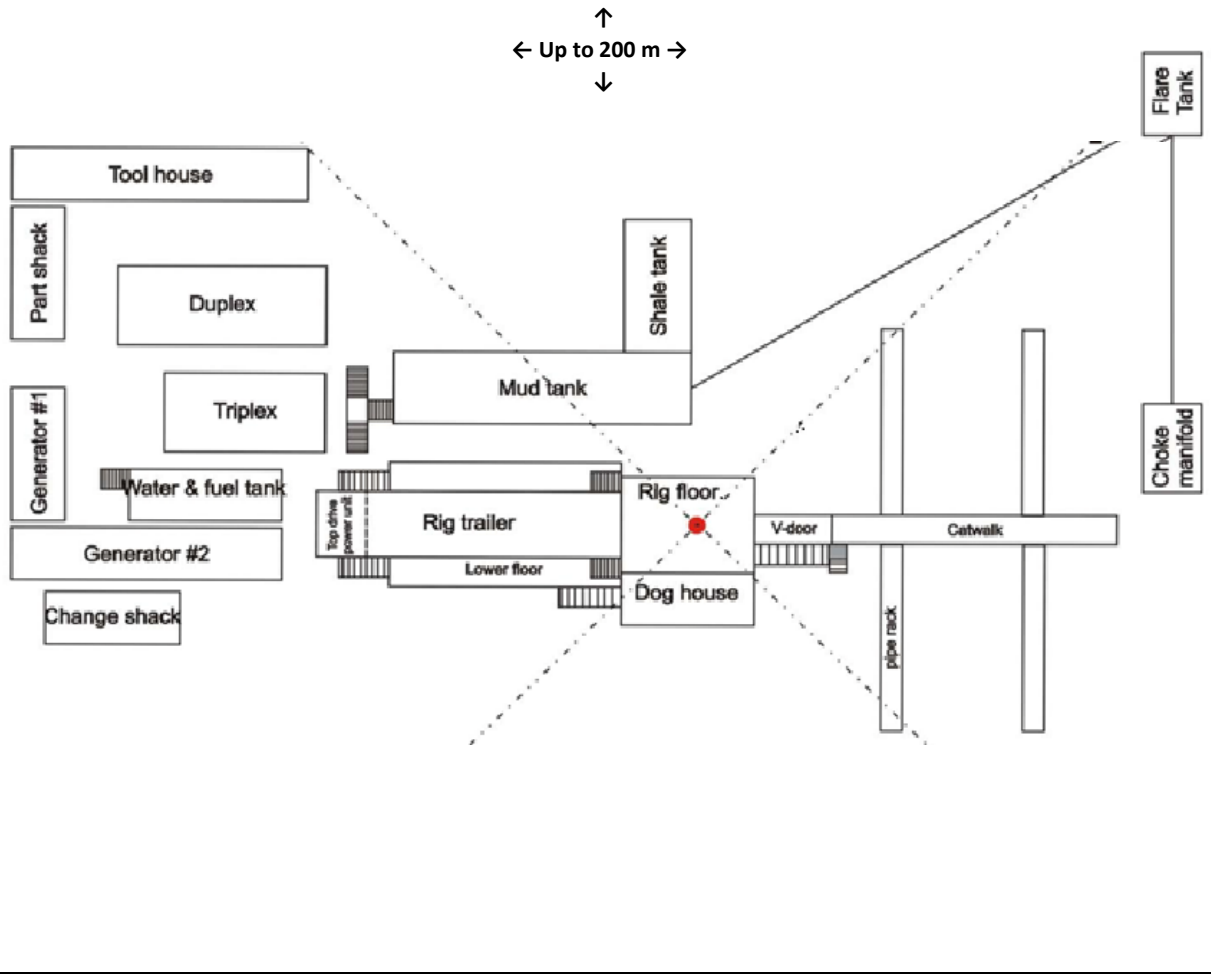
Junex Inc.) *Drill Rig #3* which is currently located in Western Newfoundland and under contract to the Company (Figure 4.6).

Figure 4.6 The Foragaz Drill Rig #3



A specification sheet for this particular Drill Rig is provided in Appendix B of this report.

Figure 4.7 Drill Site Plan and General Layout



Note: Drill pad area (illustrated above) up to approximately 200 m by 200 m. Specific dimensions and equipment locations are subject to further refinement to optimize their on-site layout and locations for the proposed drilling operations. All drilling activities, equipment and materials will be located within the bermed drill pad area.

The drill rig and associated infrastructure will include all applicable components and equipment to help ensure the safe and environmentally responsible conduct of the proposed drilling program. This will include those elements and procedures which are required to ensure compliance with the relevant provisions of the NL *Petroleum Drilling Regulations,* including with regard to casing design and installation, well control equipment (including blow-out preventer systems) and testing, and others.

4.4.2 Drill Set-up and Operation

Safety and environmental protection are the number one priorities for Investcan, and the Company will ensure that the drilling rig and its set-up and operation are fit for purpose and that all appropriate regulations and standards are adhered to during the preparation for, and conduct of, the proposed drilling activities. The estimated depth for the proposed exploration well is approximately 2,000 metres.

The planned pre-drilling and drilling procedures are proven methods and technologies and have been used successfully at other exploration drilling sites throughout Canada and elsewhere, including previous wells drilled in Western Newfoundland (Figure 2.2). It is currently planned to transport the drilling rig to the work site in modules. Once on site, the rig will be assembled. Typical drilling rig modules will include the drilling platform, derrick (tower), drill mud handling equipment, power generators, cementing equipment and tanks for fuel, water and other materials (Figure 4.7). A water well rig or similar drilling unit will initially set a conductor pipe to the required depth at the well site, after which the conductor casing will be cemented into place.

During drilling operations, crews will work 12 hour shifts, 24 hours per day. An HSE Coordinator will be present at the rig site each day throughout the planned drilling operation. Most workers will travel to and from the site for each shift, with non-resident employees and contractors being housed in existing accommodations in the local area. Trailers will be placed at the drill site to accommodate several of the occupations which will require a continuous on-site presence. Self-contained sanitary facilities will also be available on site with all sewage wastes being contained and transported off site for disposal by a certified contractor, as described above. Potable water will also be transported to the site on a regular basis.

Drill rigs are generally equipped with two power generators, and a 225 kilowatt (kW) generator is planned to be used to power the rig along with an 80 kW generator for general service. The fuel for the drill rig and service generators will be supplied from a 4,000 litre rig fuel storage tank, which will be supplied and filled as needed by North Atlantic Petroleum, a certified fuelling contractor. The planned locations of the diesel generators are shown in Figure 4.7. The generators will operate 24 hours day during operational periods while the drill rig is onsite.

The drilling operations themselves will require fresh water, particularly to be used in the makeup of the drilling fluids. Total water usage at the site is predicted to be in the order of several thousand cubic meters over the life of the drilling operations. These water requirements will be supplied through one or several water supply and storage trucks to be maintained at the site during operations, through which a certified contractor will obtain and deliver water from existing sources.

Vehicle traffic on the access road will be limited to the transportation of employees, equipment and materials to and from the well site. During site development the access road will have a gate and “no access” signs posted at the beginning of the road (TCH turnoff), to restrict use to authorized personnel only. During rig mobilization and drilling operations, site security officers will be in place, and only personnel and vehicles involved in the Project will be allowed on the road and site during the 24 hour / day operations. Speed limits appropriate to this size and class of access road will also be posted and adhered to.

Rig mobilization and demobilization will each require approximately 30 truck loads. At these times, a crane may also need to be brought to the drill site for rig assembly and eventual disassembly. During drilling operations each crew will work 12 hour shifts so that each shift will travel the road twice a day. Additional truck traffic (up to several per day) will be required to deliver supplies to the rig during drilling. Waste disposal vehicles will also be brought in as required.

In the event of a hydrocarbon discovery, well testing would be conducted, which may involve short-term flaring (up to several hours). The particular well testing activities and their specific sequence and duration will be dependent on the actual reservoir and hydrocarbon characteristics found, but it is anticipated that testing

will see the well being open to the flare stack for approximately 2-3 hours at maximum, in order to generate sufficient drawdown onto the formation to be able to identify reservoir parameters. During that time, all hydrocarbon production will be sent to flare pit via a choke manifold and flare line.

A successful exploration program leading to a discovery of hydrocarbon resources that may be commercially significant may also result in the drilling of a second ("offset") well at the site, to further evaluate and delineate the nature and extent of the resources found. Any such well, if required, would be drilled within the same lease (drill pad) as Thoulet #1, using the same (or a very similar) drill rig and utilizing the same drilling methods and activities as those described above. A decision to drill such a well would be made upon the completion of the original well, and if required, would extend the duration of the Project by approximately 40-50 days. The potential environmental interactions and mitigation measures described in this EPR would be the same for any such second (delineation) well. There are currently no plans to drill any other types of vertical or horizontal wells at any other location as part of the proposed drilling program that is the subject of this EPR.

4.5 Potential Environmental Emissions and Their Management

4.5.1 Air and Noise Emissions

The primary sources of potential atmospheric emissions from the Project include:

- Combustion processes such as vehicle engines and generators;
- Airborne particulates (dust) from soil disturbance during site preparation and from vehicle traffic; and
- Particulates from other burning sources, such as well testing and associated flaring.

The principal emission gases include carbon dioxide, carbon monoxide, methane, volatile organic carbons (VOCs) and nitrogen oxides. The magnitude of these emissions depends on several factors including fuel type and engine efficiency and the nature and relative amounts of any hydrocarbons encountered. Equipment will be maintained and inspected to ensure emissions control components are properly functioning. Well testing is generally only conducted if there is a discovery, and if required, may involve very short-term flaring. Any emissions produced by the proposed exploration activities will not exceed applicable regulatory air quality standards.

On-site noise will be produced by engines, generators, and other operating machinery on the drill rig and elsewhere on the site. As noted above, the proposed drilling operations will utilize a modern, conventional drilling rig (see detailed specifications in Appendix B), which is approximately three years old and therefore, is in a very good state of repair and operates efficiently and relatively quietly.

4.5.2 Solid and Liquid Wastes

There are no planned solid or liquid discharges to the environment associated with the drilling program, which functions as a "closed system". The drilling operation will be subject to regular inspection and maintenance, which will help to prevent any leakage, spills or other unplanned discharges to the environment.

Commercial and domestic waste generated during the construction and operations phases of the Project will be collected and stored at the site, for regular (at least weekly) transport to existing and approved waste disposal facilities. Waste receptacles will be installed at all active areas for use by workers. Waste materials will be reused and recycled where possible and appropriate. Combustible waste (such as oily rags) will be stored appropriately and disposed of, as required, by a certified contractor. Hazardous wastes will also be suitably stored, and where necessary sealed, prior to disposal by a certified waste contractor. Typical hazardous wastes found in limited quantities during a drilling operation include solvents, motor oils, lubricants and other general cleaning products, as well as fuels and lubricants associated with the operation of electrical generators and motor vehicles. Upon completion of the Project, the site will be left clean and clear of all litter and debris.

As described previously, the drilling site will be bermed so as to contain any contaminated effluents on site. Any contaminated fluids collected within the berm will be recovered by a vacuum truck and transported to an approved facility for disposal. All other water which has or has likely been exposed to hydrocarbons or other pollutants will be collected and transported to an appropriate existing facility for disposal as required. The drives and brakes on the drill rig are water cooled, which is typically a closed system. The brake cooling water is sometimes treated with chlorine as a biocide on some rigs. If this is required, the treated cooling water will be disposed of at the end of the Project using a certified waste disposal contractor.

Self-contained sanitary facilities will be provided on site with all sewage wastes being contained and transported off site for appropriate disposal, and all grey / black water (i.e., that containing sewage material) will also be collected by certified disposal contractors (such as Pardy's Waste Management and Industrial Services or Crosbie Industrial Services) and disposed of in the appropriate manner.

4.5.3 Fuels and Other Hydrocarbons

Fuel and oils will be stored on site in approved storage containers. All relevant hydrocarbon storage at the site will be approved by Service NL prior to installation and use. Fuel transfer operations will follow procedures as designed by the fuel distributor and the drilling contractor and will comply with all regulatory requirements for such activities. Refuelling will be conducted from a self-bermed CSA approved tank by qualified personnel. The tank will have a capacity of approximately 14,000 litres and will be installed and registered as per the NL *Storage and Handling of Gasoline and Associated Products Regulations*. Personnel responsible for the transport, storage and handling of hydrocarbon products will be appropriately trained in the requirements associated with the use of these products and the response and reporting requirements of an incident prior to commencing work at the site. Refueling and maintenance activities will be undertaken on level terrain, at least 30 m from any surface water, on a prepared impermeable surface with a collection system to ensure oil, gasoline and hydraulic fluids do not enter waterbodies.

A supply of hydrocarbon spill response equipment and materials will be maintained at the site in an accessible location, including absorbents and open-ended barrels for collection of any contaminated ground or other debris. In the unlikely event that fuels or oils are spilled at site, they will be recovered, stored in metal containers, and transported to an approved site for disposal by a certified contractor (such as Pardy's Waste Management and Industrial Services and/or Crosbie Industrial Services). Personnel working on the Project will be appropriately trained and knowledgeable about these spill response procedures, and any such incidents will be reported to environmental authorities as applicable. Any contaminated soil, water (including snow or ice), absorbents or other materials will also be recovered and stored as outlined above, and will be removed from

the area by the contractor, who will transport these materials to an approved facility in Newfoundland or elsewhere for proper disposal.

4.5.4 Drill Fluids, Cuttings and Other Chemicals

Records will be maintained of all chemicals used during the Project, including a description of quantities, use patterns (timing and area of application), and disposal methods for each chemical product. Personnel will have the required training in the safe handling and effective application and disposal of chemicals, which will be stored and used in safe and secure areas away from any waterbodies.

Drilling muds are fluids that are circulated in oil and gas wells during drilling activities to lubricate and cool the drill bit and hole, circulate cuttings and carry them back to the surface, and maintain appropriate pressure in the well. Wells may be drilled using either water-based mud (WBM) or a combination of WBM and synthetic-based mud (SBM).

This proposed petroleum exploration drilling program will utilize a WBM comprised of freshwater with various biodegradable fluid additives, which will be similar in composition to the fluids approved and utilized in other on-shore exploration drilling activities in Western Newfoundland and elsewhere. The total volume of drilling fluid that is anticipated to be required to drill this well is approximately 60 cubic meters

The most common drilling additives in WBM at depth are barium sulphite, calcium carbonate, hermatite and potassium formate. Thickeners such as xanthan gum, carboxymethyl cellulose and starch may be used to increase viscosity. Deflocculants such as polyelectrolytes, acrylate, polyphosphate and lignosulfonates are used to reduce viscosity. These additives are environmentally benign and will be properly stored, handled and used within the bermed area. The depth of the well greatly influences the type and amount of such additives, and generally the surface hole (where the water table is penetrated) has the least amount of additives. The surface hole mud is generally made up of approximately 95 percent water, with the other 5 percent being composed primarily of bentonite, as well as lesser amounts of sodium bicarbonate and sodium hydroxide. With depth, the hole conditions dictate the density of mud required to ensure hole integrity and control. While the overall composition of the mud does not change, the percentage of additives is altered to ensure desired mud density.

The following Table provides an overview of the various drilling fluid additives that may be used for the project, based on recent well drilling experience in Western Newfoundland, and an estimate of the potential quantities of each.

Table 4.1 Drilling Additives and Estimated (Approximate) Quantities

Product	Estimated # of Sacks to be Used*	Sack Size	Concentration	CAS Number	Biodegradability
Barabuf	3	25 kg	0.94 kg/m^3	1309-48-4	N/A Mineral
Baracarb 5	6	22.7 kg	1.70 kg/m^3	471-34-1	N/A Mineral
Barathin – Plus	15	25 kg	4.69 kg/m^3	No CAS	Readily biodegradable
Barite 41	96	40 kg	48.00 kg/m^3	7727-43-7	N/A Mineral
Bicarb of Soda	24	25 kg	7.50 kg/m^3	144-55-8	N/A Salt
CW 8551	2	19 L	0.48 l/m^3	non-haz	Readily biodegradable

Product	Estimated # of Sacks to be Used*	Sack Size	Concentration	CAS Number	Biodegradability
Ez-Mud	3	19 L	0.71 l/m^3	64742-47-8	BOD(28 Day): 40% of COD
N-Dril LO	40	22.7 kg	11.35 kg/m^3	No CAS	Readily Biodegradable
N-Vis P Plus	6	22.7 kg	1.70 kg/m^3	Mixture	BOD(5 Day): 200mg/g COD: 1600 mg/g
Salt	299	20 kg	74.75 kg/m^3	7647-14-5	N/A Salt
Soda Ash	4	22.7 kg	1.14 kg/m^3	497-19-8	N/A Salt
XL Defoamer	19	20 L	4.75 l/m^3	104-76-7	Readily biodegradable, non-persistent
*Estimated and approximate Material Safety Data Sheets (MSDSs) are provided in Appendix C .					

Investcan has recycled and re-used drilling fluids in its past exploration drilling activities in Western Newfoundland, and plans to re-use drilling muds from previous wells in the region (Gobineau #1 and Hurricane #2) for this Project. These existing fluids (and the raw materials for any new WBM) will be transported to and stored at the site prior to their use, including fresh water transported to the site in one or more tank trucks with all fluids and additives being stored within the bermed area and mixed just prior to being used. The fluids will be mixed and contained either in the tanks on the drill rig itself, or in an additional 400 barrel steel tank brought to the Project site for that purpose and placed within the bermed area.

During drilling operations, the circulation equipment allows muds and cuttings to travel back to the rig for processing and reuse or disposal, with the drilling fluids are recycled through the metal tanks on the rig throughout the drilling operations. Investcan intends to recycle and re-use the drilling mud on a continued basis, from spud to Total Depth (TD) during the Thoulet #1 exploration well. Process water used in the drilling muds and overall operations will also be reclaimed, separated and re-used.

Drill cuttings are produced as the underlying rock is broken by the drill bit as it advances, and are carried to the surface by the drilling fluid circulating up from the drill casing. On the surface, these cuttings are separated from the drilling fluid by shaker screens for disposal, and will be stored in a large steel bin within the bermed area. It is estimated that approximately 60 cubic meters of drill cuttings will be produced as a result of the planned drilling of the Thoulet #1 exploration well.

Prior to their disposal, analysis will be performed on the recovered drill cuttings in accordance with the Guidance Document *Leachable Toxic Waste, Testing and Disposal* issued by the Newfoundland and Labrador Department of Environment, Pollution Prevention Division. This will include testing for the following parameters as specified therein:

a) Inorganic parameters: aluminium, antimony, arsenic, barium, beryllium, bismuth, boron, cadmium, chromium, calcium, chloride, cobalt, copper, cyanide, fluoride, iron, lead, magnesium, manganese, mercury, molybdenum, nickel, phosphorus, potassium, selenium, silver, sodium, strontium, sulfur, thallium, tin, titanium, uranium, vanadium, zinc

b) Polycyclic aromatic hydrocarbons (PAHs)

c) BTEX (benzene, toluene, ethylbenzene and xylenes) and TPH (total petroleum hydrocarbons), and

d) pH

The laboratory analysis (sample numbers, frequency, etc) will be designed in consultation with the Department of Environment and Conservation and/or Service NL, and the results will be submitted to the local Service NL office once available. Where possible and appropriate based on the results of the above described analyses, drill cuttings may be disposed of at an existing and approved landfill or other waste disposal facility, pending approval of the relevant municipality to accept this waste. Drill cuttings that are not appropriate and approved for such disposal will be disposed of in accordance with the direction provided by Service NL, which will likely involve transporting them to an approved facility that is equipped and approved for the disposal of drill fluids and contaminated cuttings (see below).

When Project operations have ceased, the used drilling mud will be collected and stored and may be used by Investcan or another operator on a future well, if there is one being drilled and/or proposed within a distance and timeframe that permits the fluids to remain within the required technical specifications. Used drill fluids will be tested and evaluated by the on-site mud engineer, and decisions are made on the re-use or disposal of used fluids based on their relevant properties (e.g., viscosity, sand and water content). When a decision is made to dispose of any of the drilling fluids either during or following the proposed drilling operation, they will be stored temporarily in an on-site 400 barrel steel tank before being transported to a certified treatment and disposal facility, such as the Newalta disposal facility in St. John's, NL or another approved disposal facility.

4.6 Other Potential Drilling Activities and Approaches

There are currently no plans for steam injection to be used as part of the proposed exploration well drilling activities that are associated with this Project.

Hydraulic fracturing (also at times referred to as "fracking") is a stimulation process that may be performed on oil and gas wells that involve low-permeability reservoirs. In these situations, the hydrocarbons present are trapped in the pores of the surrounding rock. The hydraulic fracturing process involves pumping high pressure fluid (typically comprised of water, chemicals and sand) down a well to create a network of fractures in the reservoir rock, which establish a series of pathways that allow the hydrocarbons to move more freely from the rock pores to the wellbore. The objective of this process is thus to help acquire oil and gas from identified hydrocarbon reservoirs that would not otherwise be obtainable.

The proposed petroleum exploration activities that are currently being proposed by Investcan as part of this Project, and for which EA approval is currently being sought through this EPR, are not considered and do not include hydraulic fracturing. Indeed, the drill rig that is planned to be used to drill the Thoulet #1 well (Section 4.4) is not capable of undertaking hydraulic fracturing activities.

4.7 Matrix Acidizing

Matrix acidizing is a process of pumping fluids into a drilled well (at considerably below fracturing pressure), in an effort to dissolve limestone, dolomite and calcite. This results in the dissolution of sediments and mud solids that inhibit the free flow of hydrocarbons to the well bore by enhancing the natural permeability of the

rock. This is essentially the same procedure as acidizing a water well to enlarge the existing seepage points, or to create new seepage chambers. Acidizing procedures have been conducted as part of previous petroleum exploration activities in Western Newfoundland in both offshore and onshore areas.

Based on current information and Investcan's drilling plans, there is a very low likelihood that matrix acidizing will be required or completed as part of this proposed exploration drilling program at Thoulet #1. In the unlikely event that it should eventually be considered necessary or appropriate to carry out matrix acidizing as part of the proposed drilling program, however, the following provides a overview of the materials and techniques that are typically used.

The specific fluids and their quantities to be used in acidizing procedures vary and are determined by the specific geological properties of the rock formation, which are only known once the well is being drilled and once compatibility tests are carried out (rock and fluid). Materials used in recent acidizing processes in Western Newfoundland and elsewhere are composed of formic acid, acetic acid and water. The total concentration of acid does not go higher than 15 percent. Solvent may also be added if the reservoir treated is paraffinic oil bearing, and a corrosion inhibitor is also added to the blend to prevent damaging casings or other equipment. An emulsifier may also be used to facilitate the mixing process.

A likely acid blend for the formation that is expected to be encountered for the Tholet #1 well (if acidizing should be eventually planned) would be comprised of the following:

- Formic Acid 90 %: 2.6 cubic metres
- Acetic Acid 60 %: 4.7 cubic metres
- Water: 17.7 cubic metres
- Additives (less than 0.1 cubic metres), including corrosion inhibitor and emulsifier
- Solvent (durakleen): 2 cubic metres

Applicable Material Safety Data Sheets (MSDSs) are provided in Appendix C.

Following the acidizing procedure, the associated fluids and any residual sediments are removed from the reservoir in a process commonly referred to as "backflush". Through this process, all of the acid and other compounds will be removed, as the liquid is contained and pumped into steel holding tanks on the surface. Usually the acids in the fluid have been neutralized before coming back to the surface due to the limestone in the ground, with additional soda ash also being added to the holding tanks to ensure neutralisation. Any such liquid wastes would then be fully tested before being shipped via tanker by an approved liquid hazardous waste handler. This testing is mandatory as the companies that take possession of the liquid need to identify exactly what is in it before accepting such materials.

In the unlikely event that acidizing is required and conducted for this Project, the process would be completed within one day, with flowback (backflush) taking an additional day and then approximately 5-6 days for testing activities. There is no potential for contact with any local ground water as the drilling equipment will involve two casing strings, both cemented to the surface, and most importantly, the process does not involve pressure that would exceed fracturing pressure during the acid treatment. Moreover, there is no potential for any inter-wellbore communication of these fluids as this Project will involve drilling different structures from previous wells drilled in the area, and given the associated distances between them (see Figure 2.2).

4.8 Labor Force and Occupations

The Project, through its construction and operations phases, will result in positive economic effects. The Project will create employment opportunities in a variety of occupations. In addition, the requirement for goods and services during Project construction and operation will provide opportunities for local businesses. These direct economic benefits will be supplemented by indirect and induced "spin-off" effects through, for example, spending by Project employees and contractors.

An estimate of the anticipated workforce requirements of the Project's construction and operations and maintenance phases is provided in Table 4.2.

Table 4.2 Anticipated Project Workforce – Construction and Operations

Project Phase	Number	Description	National Occupational Code (NOC)
Construction	1	Supervisor	NOC 7217
	4	Heavy Equipment Operator	NOC 7521
	6	Truck Driver	NOC 7511
	6	Labourer	NOC 7611
Operations and Maintenance	1	Drilling Superintendent	NOC 8222
	1	Rig Manager (Tool Push)	NOC 8222
	2	Driller	NOC 8232
	8	Roughneck	NOC 8412
	1	Geologist	NOC 2113
	1	Mud Logger	NOC 8232
	1	Directional Driller	NOC 8232
	1	HSE Officer	NOC 2263
	1	Electrician (intermittent, as required)	NOC 7242
	1	Welder (intermittent, as required)	NOC 7237
	1	Cementer (intermittent, as required)	NOC 7282
	1	Open Hole Logger (intermittent, as required)	NOC 8232
	1	Truck Driver (intermittent, as required)	NOC 7511
	2	Labourers (intermittent, as required)	NOC 7612
	1	Security Officer (intermittent, as required)	NOC 6541

4.9 Project Schedule

Subsequent to release from the EA process, and the receipt of formal corporate approval and all other required environmental permits and authorizations, construction activity would commence in late 2013 (tentatively planned for mid October 2013) and would take an estimated eight weeks to complete, followed immediately by drilling which would occur over a period of approximately 50 days.

5.0 ALTERNATIVE PROJECT LOCATIONS AND APPROACHES

As described previously, exploration drilling is a necessary step in confirming the hydrocarbon potential of any location. The selection of the drill site is based on the careful analysis of available geological data and, given the high costs associated with any drilling program, is carefully selected to optimize the potential success of the program. The location of the proposed exploration well for this Project was chosen based on the available seismic data and the geophysical interpretations which determined the best chance of success, and Investcan considers that drilling at the proposed well location will provide the most useful information and understanding of the petroleum resources potential of the area. No alternative drill site locations have therefore been identified or are being considered for this Project.

With respect to potential alternative means of accessing the site, options are limited to constructing an access road or slinging materials and transporting people to the well site by helicopter. The aerial option is not considered to be technically and economically viable due to the significant costs, logistical challenges and possible safety risks involved. The Project requires the transportation of personnel and large equipment (such as the drill rig) and other materials (such as fill for the drill pad) for which aerial transport would not be possible. Once operational, the drilling activity will (and must) be continuous, with constant access to the site for personnel, materials and equipment. The potential for weather and other interruptions in helicopter access to the site further contributes to this not being a feasible alternative. There are also potential safety risks associated with not only the aerial transport of this equipment and materials to the site, but also with only having aerial access in the event of an accident or malfunction. A winter road is also not considered to be a viable alternative as continuous access to the site is required to support the planned exploration program, which will require ground access during times of the year when there is no snow and ice cover. As access to the drill sites by air, water, or winter road is, for the reasons outlined above, not considered to be technically and/or economically feasible, these have not been subject to further analysis and evaluation.

As part of on-going planning and design for the proposed exploration program, various potential routes for the access road were also investigated. Although a more direct route and road alignment (and shorter overall distance) may have been possible by having the access road exit located further south on the TCH (Figures 4.1 to 4.3), the current location was required in order to have the exit on a single lane section of the highway as defined by applicable regulatory requirements. The currently proposed access road routing was also selected in order to seek to avoid or reduce interactions with watercourses and wetland areas to the degree possible, for both technical and economic reasons. A road route located further to the south would, for example, increase the requirement to cross through various large wetland areas as identified in the available topographic mapping (see Figures 4.1 to 4.3). Therefore, although other possible routes were considered in the general vicinity, the selected routing is considered to be the most cost effective while at the same time minimizing the potential for adverse environmental interactions.

Other alternative approaches and segments for the access road have also been considered. There is, for example, an existing access road to a Bell Aliant communications tower in the area (Figure 4.3), which is known to be an older woods road that existed prior to the installation of the tower structure. If the appropriate permissions can be obtained to do so, this road would be the preferred option for access off the TCH, and would shorten the length of new road required, which would then continue westward as shown in Figure 4.3. Otherwise, a new access road exit (access point) will be constructed off the TCH, just south of the tower access road and the new access road will follow the route shown in Figure 4.3.

In terms of the access road's specific design characteristics, it will comprise an approximately 3.75 km long and 7 m wide gravel-surface access road. It will be established and maintained to relevant standards using standard and proven construction methods, materials and equipment, as outlined above. The required width and other characteristics of the road are determined by the size, scale and type equipment and materials (including the drill rig, etc) and traffic levels that will be required to be transported over the road prior to and during the proposed exploration drilling program.

6.0 ENVIRONMENTAL SETTING, POTENTIAL INTERACTIONS AND MITIGATION

The following provides an overview of the existing environmental setting for the proposed Project, including a description of relevant components of the biophysical and socioeconomic environments. This is followed by an analysis of the Project's potential environmental interactions and the identification and description of mitigation measures which will be put in place to avoid or reduce any such effects.

6.1 Natural Environment

The Project site is located within the *Western Newfoundland Ecoregion* (Meades 1990; DNR 2013), which encompasses much of the western coastline of the Island of Newfoundland and adjacent inland areas south of Bonne Bay. This ecoregion is characterized by a humid climate with a relatively longer frost-free period. It contains some of the most favourable sites for forest growth although there is considerable variation due to altitude and proximity to the coast. The Dryopteris-Hylocomium-Balsam Fir forest type is the zonal forest for this region. The zonal soils are nutrient rich humic podzols with a very dark podzolic B horizon due to humus enrichment. The absence of prolonged dry periods appears to have excluded fires from all but the most coarse textured soils. Consequently, Balsam Fir rather than Black Spruce is the dominant forest cover. Yellow Birch is common in protected valleys below 200 m elevation. Within the larger *Western Newfoundland Ecoregion,* the *St. George's Bay Subregion* encompasses the proposed Project area, and extends from Robinsons River to the Cape Anguille Mountains. Climatically, this area has some of the most favourable conditions for growth in Newfoundland and a large portion of the area has been cleared for agriculture. The forested landscape is dominated by steep slopes (Meades 1990; DNR 2013).

The proposed Project site itself is primarily barren ground interspersed with shrubs and black spruce forest (Figure 6.1). Forest harvesting and silvicultural operations have occurred to the immediate south and east, and areas of replanted spruce can be found between the site and the TCH.

The Western Newfoundland region, with its productive and scrub forests, extensive wetlands and barren areas also provides habitats for a range of wildlife that are typical of boreal forest ecosystems. Wildlife species that are known or likely to occur in the general region include large mammals (moose and black bear), furbearers and small mammals (such as fox, hare, red squirrel, voles) as well as various resident and migratory species of birds, including raptors, waterfowl, passerines and upland game birds.

No plant or animal species that are listed under the Newfoundland and Labrador *Endangered Species Act* (*NL ESA*) or the Canadian *Species at Risk Act* (*SARA*) are known or likely to occur within the proposed Project area itself.

There are no waterbodies or watercourses within or immediately adjacent to the location of the proposed drilling site (see Figure 4.3). As described previously, the proposed access road will cross a tributary of Middle Brook as well as a number of other small wetted areas for which appropriate drainage will be required.

Figure 6.1 Environmental Setting (Typical Site Vegetation)

6.2 Human Environment

The proposed Project is located in the southwestern portion of the Island of Newfoundland, approximately 10 km inland from the coastline of St. George's Bay and just south of the Stephenville area and Port au Port Peninsula.

The Project area and surrounding communities are located within Canadian Census Consolidated Subdivision 4C, which had a total population of 1,935 residents, in 2011 (Statistics Canada 2012), including the nearby communities of Flat Bay (229 persons), St. Teresa (156 persons) and other residential areas, with the larger community of St. Georges (1,207) and various others located to the immediate northeast. The proposed Project area is located well outside of any municipal boundaries or planning areas, community infill limits or local service district bounds.

The TCH runs to the immediate south and east of the proposed Project area, and the entrance to Route 403 is approximately 5 km to the north of the proposed access road, which extends to the nearby coastal communities of Flat Bay and then on to St. Teresa and Journois. The proposed access road and its exit is within the Rural Conservation zoning district of the *Protected Road Zoning Plan Trans Canada Highway Channel-Port aux Basques to Corner Brook*, which will necessitate a development permit prior to Project construction (see Chapter 8 and Appendix D).

A variety of land and resource use activities are undertaken throughout the larger surrounding region, including commercial, recreational and subsistence pursuits. Large and small game can be found throughout the area, and hunting has long been part of the lifestyle of area residents. Residents also harvest the area's forest resources for firewood and lumber. Fishing is also an important recreational and subsistence activity, with various species found in the numerous rivers and ponds in the region through angling. Cabins are located throughout the larger area, and are used in association with various recreational and subsistence pursuits. Snowmobiling is also a popular activity in the winter months. Local trail networks are also used by residents for hunting, fishing and gathering activities.

6.3 Consultation

Consultation is the cornerstone of the EA process, and a key aspect of Investcan's approach to its planning and development activities. A number of consultation activities have been or will be undertaken in relation to the proposed Project. These include the provision of information to, and discussions with, local communities, stakeholder groups, relevant government departments and agencies and others.

Investcan planned and conducted public meetings in several Western Newfoundland communities in late April 2013, subsequent to the initiation of the EA review for the proposed Project. These consultation meetings took the form of Public Open Houses, and were held during the evenings of April 29 and April 30 in the communities of Jefferys (at the Royal Canadian Legion) and Flat Bay (at St. Theresa's Community Centre), respectively.

These public consultation sessions were advertised through various means, including:

- Notifications and information packages were emailed to community leaders, town councils, and other residents identified through available contact lists, and advertisements were posted in public areas in each community;

- Radio announcements were provided through a number of local media, including the CBC West Coast Morning Show, and CFSX Radio Stephenville; and

- Advertisements were placed in local newspapers, including *The Georgian* and *The Western Star* newspapers.

Each public open house commenced at 7 pm, and began with a brief introduction and an explanation of the nature and purpose of the session. A short presentation was then provided by Investcan representatives, which gave an overview description of the proposed exploration drilling program. Meeting participants were provided with an information brochure and two large printed maps were displayed to illustrate the proposed exploration program location and its various components. Following the presentation, the floor was opened to a question and answer / discussion period, which lasted between 60-90 minutes. During that period, the proponent and its consultant provided additional information, answered questions, and recorded any and all questions, information and issues or concerns raised by participants throughout the session.

A sign in sheet was provided for all attendees as they entered the meeting venue, and all were invited to add their name, contact information and indicate their affiliation as appropriate. Although not all attendees chose to sign-in to the session, the overall attendance at each public meeting was determined to be over 50 people.

In addition to the above described public open houses, Investcan also met with a number of identified stakeholder groups in the region as part of its 2013 consultation activities. These meetings provided a further opportunity to meet with key groups while the Investcan team was in the local area, during the daytime "working hours" for these organizations, and were intended to further supplement the public consultations themselves. These stakeholder meetings took place as follows:

- Town of Stephenville, April 29 2013, 11:30 am

- Bay St. George Chamber of Commerce, April 29 2013, 1:00 pm

- City of Corner Brook, April 29 2013, 4:00 pm

- Qalipu Mi'Kmaq First Nation Band, April 30 2013, 12:30 pm

- Port au Port / Bay St. George Fracking Awareness Group, April 30 2013, 2:00 pm

- Flat Bay Mi'Kmaq First Nations Band, April 30 2013, 5:00 pm

Scheduled meetings were held in Corner Brook (Qalipu Mi'Kmaq First Nations Band and the City of Corner Brook), Flat Bay (Flat Bay Mi'Kmaq First Nations Band), and Stephenville (Town of Stephenville, Bay St. George Chamber of Commerce, Port au Port / Bay St. George Fracking Awareness Group). Attendance at each meeting ranged from three to 12 participants. The format again involved a short welcome and introduction, followed by a presentation by Investcan on the Project and a general round table discussion. Notes were again taken by the Proponent's team at each meeting, highlighting the various questions, issues and perspectives raised by participating stakeholders.

A number of key topics and recurring themes arose during the above described public and stakeholder consultation activities, including the following:

- The planned drilling methods and activities, including potential for, and concerns regarding, the conduct of hydraulic fracturing in Western Newfoundland (either as part of this Project or in general);

- The creation and optimization of local community benefits (particularly employment) as part of any future oil and gas exploration and/or development activity in the region;

- Measures to help ensure the health and safety of Project workers, local residents and the general public;

- The potential for Project activities to interact with the environment, particularly groundwater and the possible effects on local water wells, as well as waterways, fish and their habitats, and on local residents and their associated land and resource use activities (hunting, fishing, berry picking);

- The need for strict adherence to applicable drilling and environmental regulations and standards as well as Project-specific mitigation measures, and to ensure appropriate oversight, responsibility and accountability for adhering to regulations, mitigations and commitments;

- Questions around the nature and quantities of chemicals that will be utilized for the Project, including how they will be transported stored, used and eventually disposed of; and

- If there is a successful oil and gas exploration program, the likely next steps regarding additional exploration, delineation and possibly production activities.

These public and stakeholder consultation activities have provided Investcan with useful information on, and a good understanding of, the key questions and concerns that local residents and others may have regarding the Project and its potential environmental interactions. These issues have influenced and informed the focus and content of this EPR.

Investcan has also provided Project overview information to, and corresponded and met with, the provincial and federal governments on various occasions. Relevant government departments and agencies will participate in the review of this EPR and associated regulatory decisions.

The Project will also eventually require a range of additional environmental permits and other authorizations (see Chapter 8 and Appendix D). The post-EA permitting process will provide the opportunity for relevant government departments and agencies to receive and review additional Project design information, and to establish specific terms and conditions to avoid or reduce environmental effects. Investcan and/or its contractors will identify, apply for and adhere to all required permits and other authorizations that are required for Project construction and/or operations.

6.4 Potential Environmental Interactions and Mitigation

The following sections provide the results of an environmental effects analysis for the proposed Project, including each of its associated components and activities. The analysis focuses upon, and is organized according to, the following themes:

1) Atmospheric Environment

2) Terrestrial Environment

3) Freshwater Environment

4) Socioeconomic Environment

The analysis for each includes a discussion and description of the likely environmental issues (adverse and positive) that may be associated with the Project, with separate subsections for the Construction and Operations and Maintenance phases. Environmental planning and mitigation measures to avoid or reduce environmental effects are identified and considered integrally within the analyses. The assessment also includes possible accidental events and malfunctions that could potentially occur during each phase (construction, operations) of the Project. This is followed by a summary and evaluation of the likely residual (after mitigation) environmental effects of the Project. The environmental analysis concludes with an overview of any environmental monitoring and follow-up which may be required during one or multiple phases of Project implementation.

6.4.1 Atmospheric Environment

The environmental analysis for the Atmospheric Environment includes consideration of any likely implications of the Project on air quality and noise levels within and around the Project area.

6.4.1.1 Construction

The main potential interactions between Project construction and the Atmospheric Environment relate to the use of equipment, and the associated noise, dust and engine emissions that may be associated with these activities. Construction activity will include various activities associated with land clearing and site preparation, the movement and placement of equipment and materials, and other activities, which will result in some minor, temporary and localized air emissions due to Project-related dust and emissions from vehicles and equipment.

Project construction will be characterized by fairly standard and routine activities and practices, as described previously, and will occur within a localized area over a relatively short period. Project-related vehicles and equipment will be maintained in good repair and inspected regularly, and any associated air emissions from equipment and vehicles will conform to applicable regulations and guidelines. Fugitive dust from construction activities will be controlled as necessary using dust control agents, particularly water.

Any potential emissions or interactions with the Atmospheric Environment during Project construction are therefore likely to be negligible (and within existing regulations or standards), localized and short-term (intermittent over the construction period).

6.4.1.2 Operations and Maintenance

The operations phase of the Project will include drilling and the presence and use of other equipment and materials which will generate noise, air emissions (from engines and their exhausts), dust and other possible disturbances. As described earlier, equipment will be maintained and inspected to ensure emissions control components are properly functioning, and any air emissions produced by exploration activities will not exceed applicable regulatory air quality standards. Well testing may be conducted if there is a discovery, and if required, may involve short-term flaring (over several hours), as also described earlier.

On-site noise will be produced by engines, generators, and other operating machinery on the drill rig and elsewhere on the site. As noted previously, the proposed drilling operations will utilize a modern, conventional drilling rig (see detailed specifications in Appendix B), which is approximately three years old and therefore, is in a very good state of repair and operates efficiently and relatively quietly. As a result of these factors, and the location of the proposed Project site in relation to local communities and their residents, no adverse noise issues or effects will occur.

As a result of the above, as well as with consideration of the relatively localized and short-term (temporary) nature of the proposed exploration drilling program, the Project is not expected to have measurable or material adverse implications for existing air quality or noise levels in the area.

6.4.1.3 Environmental Effects Assessment Summary

A summary of potential environmental effects and identified mitigation measures for the Project on the Atmospheric Environment is provided in the Table below.

Table 6.1 Environmental Effects Assessment Summary: Atmospheric Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Air Quality	•	•	▪ Construction works ▪ Drilling activities ▪ Other equipment use (vehicles, fuel consumption) ▪ Possible accidental event (fire, others)	▪ Localized and short-term construction and operations activity. ▪ Standard construction and operational practices. ▪ Regular inspection and maintenance and equipment. ▪ Accidental event prevention and response.
Noise Levels	•	•		

6.4.2 Terrestrial Environment

The Terrestrial Environment is comprised of relevant components of the "on-land" biophysical environment which may interact with the Project, including vegetation, soils and wildlife.

6.4.2.1 Construction

Project construction will involve vegetation clearing, site preparation and excavation activities. The proposed Project site itself is characterized by primarily barren ground interspersed with shrubs and black spruce forest (see Figure 6.1), with roads, trails and other previously disturbed and developed areas being present throughout the larger region. No listed (protected) plant or wildlife species are known or likely to occur within or near the proposed Project area.

The proposed Project area is characterized by a relatively small footprint. Vegetation clearing and other ground disturbance activities will be confined to only those areas where it is absolutely necessary. Limits of clearing will be marked in advance, and only designated areas will be cleared. Clearing will be completed in compliance with relevant permits and regulations, and any merchantable timber will be salvaged in accordance with permit conditions. Naturally vegetated areas between the site and any surrounding properties and thoroughfares will be maintained.

Adverse interactions with wildlife are not likely to occur during the Project's construction phase. Any wildlife that may be present in the immediate area that may be disturbed by Project-related noise, human presence or other interactions may temporarily avoid the immediate vicinity of such works during the short-term period of construction. Any such avoidance and the associated ground (habitat) disturbance associated with the Project is not expected to affect the overall presence or health of any wildlife population in the area, and there is similar habitat available throughout the larger, surrounding area. Based on the current proposed Project schedule, construction activities will be undertaken outside of the nesting, breeding and brood rearing season for most species, including the particularly important May to July period.

The following additional mitigative measures will be implemented to further reduce the potential for interactions between Project activity and any wildlife that may occur in the area:

- Work areas will be kept clear of garbage;
- Project personnel will not hunt or harass wildlife;
- Pets will not be permitted on the Project site;
- Equipment and vehicles will yield the right-of-way to wildlife; and
- Any nuisance animals will be dealt with in consultation with the NL Inland Fish and Wildlife Division.

Waste materials generated through construction activities will be removed from the area and disposed of at an approved site. Non-hazardous refuse will be stored in covered metal receptacles, and will be transported to and disposed of on a regular basis at an approved landfill site. Waste materials will be reused / recycled where

possible. Any hazardous wastes will be stored in sealed, labelled containers and disposed of according to applicable regulations and Investcan practices. These include procedures for the characterization / identification, storage, inspection, labelling and transportation of hazardous wastes produced at the facility, as well as emergency preparedness / prevention and training. There will therefore be no adverse interaction between construction waste materials and the environment.

6.4.2.2 Operations and Maintenance

During the operations phase of the Project there will be little or no additional soil or vegetation disturbance, and therefore, little or no potential for further effects to these aspects of the terrestrial environment. Waste will be managed and disposed of properly throughout the life of the Project, as outlined earlier.

Operations activities will be characterized primarily by drilling activities, the associated presence, use and movement of other equipment, materials and personnel at the site. As for construction, the noise and other disturbances associated with drilling and associated activities may result in some localized and short-term disturbance to any wildlife (individuals) in or near the Project area, although any such avoidance (if it even occurs) would likely occur during construction and not be different or increased during the operations phase. In any event, the timing and relatively short-term and localized nature of the proposed drilling activity will help to further avoid or reduce the potential for (and degree of) any such interactions.

6.4.2.3 Environmental Effects Assessment Summary

A summary of potential environmental effects and identified mitigation measures for the Project on the Terrestrial Environment is provided in the Table below.

Table 6.2 Environmental Effects Assessment Summary: Terrestrial Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Vegetation	•	•	• Ground disturbance • Possible fuel or chemical spills	• Localized and small project "footprint", clearly delineated • Compliance with regulations and permits • Accidental event prevention and response
Soils	•	•		
Wildlife	•	•	• Noise, human presence, ground clearing and other disturbances • Possible avoidance of Project area	• No harvesting or harassment of wildlife by Project personnel • Waste management facilities and procedures • Accidental event prevention and response
Terrestrial Species at Risk				• None known or likely to occur in or near Project area

6.4.3 Freshwater Environment

The Freshwater Environment includes surface and groundwater (quantity and quality) and any fish and fish habitat which may interact with the Project.

6.4.3.1 Construction

The proposed access road route has been identified with a view to minimizing ground disturbance and avoiding interactions with watercourses, wetlands and other sensitive areas to the degree possible. Most of the access road will cross over dry ground, although it will be necessary to cross wetted areas in several places. Investcan's review of available satellite imagery and 1:50,000 topographic mapping indicates that the proposed access road will also cross a tributary of Middle Brook, which will necessitate a watercourse crossing comprised of a 2 metre wide culvert that will be installed as per applicable regulatory requirements. All other wetted areas can be traversed through the installation of small (1 metre diameter or less) drainage culverts.

All near and in-stream work will be undertaken in compliance with relevant government regulations, guidelines and permits. The culvert will be aligned to the existing water channel on firm ground, and will also be installed such that scouring of the stream bed does not occur with peak water velocities. The culvert placement will be of appropriate depth to maintain water velocity to allow for any fish passage. The use of open bottom culverts for stream crossings can potentially reduce or avoid environmental effects compared to cylindrical culverts. Decisions on which type of culvert to be used for any replacement will be made during detailed road design and permitting. The stream crossing methods chosen during the detailed design and construction phases will focus on those with the least in-water effect, so as to minimize potential effects on the aquatic environment.

The watercourse crossing structure will be installed in the dry by diverting or pumping water around the construction area. Precautions will be taken to ensure that fish are not left stranded in the work area, and any fish recovered from the work area will be returned unharmed to the watercourse as directed by DFO officials. Erosion control measures (e.g., sediment traps and filter fabric will be put in place during construction) as appropriate to minimize erosion and siltation of waterbodies used by fish. Following construction, regular inspections will be completed to verify correct culvert installation and operation.

There are no waterbodies or watercourses within or immediately adjacent to the location of the proposed drill pad. During construction, site drainage will be managed as required to prevent water containing sediment and/or other substances from entering any adjacent waterbodies and watercourses. Any silt-laden water will be discharged to a vegetated area prior to release. Control devices such as filter fabrics, sediment traps and/or others will be used as required to receive and manage drainage from areas disturbed by site preparation and any site clearing, grubbing and general construction activities. Regular maintenance and repair will be undertaken to ensure continued effectiveness of any such control devices.

Work will be performed in a manner ensuring that no deleterious substances such as sediment, fuel and oil enter waterbodies. Tools and equipment will not be washed in any body of water, and wash water will not be discharged into any waterbody. A designated cleaning area for tools will be established. A clearly marked buffer zone will be maintained between areas of ground disturbance and any adjacent watercourses.

Specifically, a vegetative buffer (30 metres or greater) will be maintained between the site and any surrounding watercourse or waterbody.

As described earlier, it is currently planned that water will be supplied to the Project during construction and operations from approved off-site sources, and brought to the work sites in one or more water trucks. Should it eventually be determined, however, that one or more water wells must be established to provide a water supply, these will be constructed and used in compliance with provincial *Water Resources Act* and associated permits and approvals from the Water Resources Management Division of the NL Department of Environment and Conservation.

6.4.3.2 Operations and Maintenance

During planned Project operational activities there will be no additional, direct interactions with surface water resources, including any adjacent waterbodies or watercourses. The watercourse crossing and any other drainage culverts during the construction period will continue to be used and inspected / repaired as required, and site drainage will be controlled as necessary. Each of these activities will occur in compliance with relevant regulations and permits.

There are no planned discharges to the aquatic environment associated with the proposed drilling operations, which functions as a "closed system". Once operational, the drilling equipment will be subject to regular inspection and maintenance, which will help to prevent any leakage, spills or other unplanned discharges to the environment. As described and illustrated in Section 4.2, the drill site will be surrounded by a containment berm and its floor will be covered with a liner (geo membrane) to ensure that no fluids can escape from the site. All drilling activity and associated fluid storage and use will occur within this impermeable dike, which will be designed and established in accordance with applicable regulatory requirements and will be of sufficient height and strength to contain within its perimeter all of the associated materials located within the bermed area. No additional interactions or adverse effects to surface water resources are therefore anticipated during this phase of the Project.

Given the proposed depth of the Thoulet #1 exploration well (approximately 2,000 m) and the drilling equipment and techniques that will be utilized - particularly, sealing off the drill well from any surrounding shallow ground water via cemented surface casings – interactions with and adverse effects upon groundwater (especially that which has potential to be utilized as a potable water source) are not expected to occur as a result of the Project. In recognition of the degree of public and stakeholder interest and concern that is often associated with the potential and perceived effects of on-land petroleum drilling on groundwater resources, however, and to help further ensure that the exploration activity remains isolated from groundwater in the area, Investcan will be undertaking a regional groundwater study and eventual groundwater monitoring program during is planned drilling activities.

As part of its on-going analysis and planning for the proposed drilling activities described in this EPR, Investcan has recently commenced the development of a conceptual model of groundwater occurrence and flow in and near the Project area, the scope of which includes the following components and activities:

- Identifying, compiling and reviewing existing and available documents, mapping and databases from government and university sources, supplemented by previous studies on the hydrogeology in the area (e.g., AMEC 2008);

- Interviewing key personnel with applicable government departments and agencies (such as the NL Departments of Natural Resources and Environment and Conservation), university researchers, drilling contractors and others with knowledge of, and experience working with, the hydrogeology of Western Newfoundland; and

- Preparation of a report summarizing the key information and findings from these sources, including a location plan, pertinent geological map(s), the location of the proposed well and a plan view and cross sectional view of the conceptual model of the groundwater resources in the area.

The information and insights obtained through the above described (and on-going) groundwater study will be used to inform on-going Project planning and eventual implementation, and will be provided to government as part of the eventual application for a drilling permit and other authorizations (see Chapter 8 and Appendix D).

During the proposed drilling activities themselves, Investcan will implement a groundwater monitoring program at the drill site. The groundwater monitoring program will take into account available information regarding groundwater depth and gradient and aquifer location (i.e., whether there are distinct aquifers located at depth and nearer to the surface). It is currently proposed that up to three groundwater monitoring stations will be established, which will be located such that one or two monitoring wells will be situated down gradient (for groundwater) from the proposed exploration well, with another monitoring well located to the north of the drill site. Samples would be collected from each monitoring well at three periods: 1) prior to commencement of drilling (as baseline), 2) during exploration activity, and 3) following the completion of drilling operations at the site.

All samples collected would be analysed using an appropriately qualified and accredited laboratory for constituents in the drilling fluid and other chemicals utilized in the exploration program, and the results will be provided to the appropriate regulatory agencies once available.

The final and detailed design of the proposed groundwater monitoring program (including the number and location of monitoring wells and planned sample numbers and analysis) will be completed in consultation with the NL Water Resources Management Division and other regulatory authorities as applicable, and will consider existing and appropriate regulations and guidelines, such as Section 36(3) of the *Fisheries Act*, the Canadian Council of Ministers of the Environment (CCME) *Environmental Quality Guidelines* and existing ambient water quality and site-specific factors.

The results of the monitoring program will be provided to and discussed with government once available. In the very unlikely event that groundwater or surface water contamination is detected through such monitoring (either during the drilling program or after drilling activities have ceased) Investcan will immediately contact the Water Resources Management Division, NL Department of Environment and Conservation and the NL Department of Natural Resources to discuss and implement appropriate mitigation and notification procedures.

6.4.3.3 Environmental Effects Assessment Summary

A summary of potential environmental effects and identified mitigation measures for the Project on the Freshwater Environment is provided in the Table below.

Table 6.3 Environmental Effects Assessment Summary: Freshwater Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Surface Water (Quantity and Quality)	•	•	• Installation / maintenance of watercourse crossings • Potential accidental spills	• Compliance with regulations and permits • Design mitigation, including culverts, berm / spill containment, casing design and installation, well control equipment / BOP systems and testing • Accidental event prevention and response
Groundwater (Quantity and Quality)	•	•	• Drilling activities, potential interaction with groundwater • Potential accidental spills / releases	• Compliance with regulations and permits • Design mitigation, including casing design and installation, well control equipment / BOP systems and testing • Accidental event prevention and response • Groundwater modeling study and eventual groundwater monitoring program
Fish and Fish Habitat	•	•	• Installation / maintenance of watercourse crossings • Potential accidental spills	• Compliance with regulations and permits • Design mitigation, including culverts, berm / spill containment, casing design and installation, well control equipment / BOP systems and testing • Accidental event prevention and response
Freshwater Species at Risk				• None known or likely to occur in or near Project area

6.4.4 Socioeconomic Environment

The Socioeconomic Environment includes relevant components of the human and cultural environments, including historic resources, land and resource use activities (commercial, municipal, recreational), human health and well-being, community services and infrastructure, and economy.

6.4.4.1 Construction and Operation

Historic resources include sites and objects of historic and archaeological, cultural, spiritual and paleontological importance, which may be protected under the Newfoundland and Labrador *Historic Resources Act* (1985) administered by the Provincial Archaeology Office (PAO) of the NL Department of Tourism, Culture and Recreation. Ownership of all archaeological objects is vested in the Crown. Construction activities and

associated ground disturbance have the potential to disturb or destroy archaeological sites and other historic resources.

There are no known historic resources within or near the Project area. The proposed Project "footprint" itself is relatively small, and it is unlikely that the Project will result in the disturbance or destruction of historic resources. During Project construction, however, standard precautionary and reporting procedures will be implemented. Should an accidental discovery of historic resources occur, all work will cease in the immediate area of the discovery until authorization is given for the resumption of the work. Any archaeological materials encountered will be reported to the PAO, including information on the nature of the material discovered and the location and date of the find.

During the operations phase of the Project there will be no additional ground disturbance, and therefore, little or no potential for effects to historic resources. The precautionary and reporting procedures implemented during construction will, however, continue to be in place throughout the life of the Project.

Project construction and eventual operations will be characterized by fairly standard and routine activities and practices, will occur within a small and localized area over a relatively short period. The proposed Project site is located several kilometres from local communities, and is not expected to interact with these communities or their residents either directly (it does not overlap with any municipal boundaries) or indirectly (Project activities will not likely be seen or heard from nearby communities).

No specific land and resources uses in the immediate Project area were identified through the existing and available information or during public and stakeholder consultation activities completed by Investcan (Section 6.3). The Project's potential overlap with existing commercial land uses in the area, such as the adjacent silvicultural area, its crossing of the existing transmission line easement, and the potential use of the existing roadway to Aliant's cell tower, will be either avoided in detailed design or addressed through Project related permitting. The Project will also not obstruct (and in fact, may help facilitate) any ongoing and future mineral exploration on existing mineral claims in the area.

The environmental protection measures outlined previously to prevent the introduction of Project related materials (such as fuel and other chemicals) into surface or ground water or nearby lands will also serve to mitigate any potential implications for human health. The Project is therefore not expected to have any negative implications for other existing commercial, municipal, traditional or recreational land use activities in the area, or on human health and well-being in local communities or elsewhere.

A development project can result in increased demands on local, regional and provincial services and infrastructure. This may include both direct Project requirements, such as in the use of local transportation and accommodations, as well as indirect demands from project workers and their families. Although some Project positions will require a continuous on-site presence (and these persons will be housed at the drill site), most of the non-resident construction and operations workforce will likely be housed in one or more nearby communities (such as existing accommodations at Stephenville) and will travel to and from the Project site each day. Given the relatively small size of the Project's workforce (Section 4.8) and the short-term duration of any such requirements, no adverse effects related to the availability or quality of community services and infrastructure are anticipated, and it is planned that Project activities will take place outside of the peak

(summer) tourism season. Investcan will continue to consult with the local communities and other stakeholders regarding Project related requirements, timing and opportunities.

The Project will create various employment opportunities during its construction and operations phases (Section 4.8), and will see capital expenditures in excess of $500,000 during construction (access road construction and site preparation) and approximately $5 million during the operations and maintenance (drilling) phase. The requirement for labour and for goods and services during Project construction and operation will provide opportunities for local workers and businesses. These direct economic benefits will be supplemented by indirect and induced "spin-off" effects through, for example, spending by Project employees and contractors.

As a result, the Project will make a meaningful contribution to local and provincial economies as a result of this employment and business activity, and (in the event of a successful drilling program) by helping facilitate future development and growth in Western Newfoundland's oil and gas sector and overall economy.

6.4.4.2 Environmental Effects Assessment Summary

A summary of potential environmental effects and identified mitigation measures for the Project on the Socioeconomic Environment is provided in the Table below.

Table 6.4 Environmental Effects Assessment Summary: Socioeconomic Environment

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Historic Resources	•		• Ground disturbance	• Localized construction and operations activity • No known (and low potential for) historic resources in the area • Standard precautionary and reporting procedures
Land and Resource Use	•	•	• Potential direct interaction with current uses and other disturbances (noise, dust, visibility, etc)	• Localized and short-term construction and operations activity • Distance from local communities, no likely overlap or interaction • No identified recreational or traditional activities in immediate Project area • Some nearby commercial land use. Any interactions can be addressed through planning and/or permitting
Human Health and Well-Being	•	•	• Potential implications of Project-related emissions and other disturbances for human health and well-being in local communities or elsewhere	• Distance from and low potential for interaction with communities and residents • Groundwater modeling study and eventual groundwater monitoring program • Accidental event prevention and response

Environmental Component	Project Phase / Potential Interaction			Key Considerations and Environmental Mitigation
	Construction	Operations	Issues / Interactions	
Community Services and Infrastructure	•	•	• Potential Project use of, and demands for, local services and infrastructure	• Localized and short-term construction and operations activity • Timing and scale of Project activities • Distance from and minimal interaction with communities
Economy	•	•	• Employment and business opportunities	• Positive effects (direct and indirect)

6.5 Environmental Protection and Response Planning

Environmental protection and response planning are an important and integral part of Investcan's oil and gas exploration programs, including their associated construction and operations and maintenance activities.

An Environmental Protection Plan (EPP) is an important tool for consolidating environmental information and procedures in a useable format for their timely and effective implementation in the field. An EPP provides clear and concise instructions to all project personnel regarding mitigation procedures and techniques to avoid, reduce or respond to environmental issues associated with construction and/or operations activities.

Investcan has a generic EPP for its exploration drilling activities, which was provided in the original EA Registration, and which is again included in this EPR for general reference (Appendix E). As is typical for proposed projects at the EA stage of their planning, review and potential implementation, the Project's EPP will continue to be further developed and refined as the EA and permitting processes move forward, so as to fully incorporate the mitigation measures identified through the EA review as well as the eventual terms and conditions of any eventual EA approval and subsequent environmental permits that are required and obtained for the Project.

In the construction, operation and maintenance of any project or activity, an accidental or other unplanned event is an unlikely, but unfortunately possible, outcome. As described earlier, some of the potential accidental events or malfunctions that may be associated with the Project and which are relevant for EA purposes include:

- An accidental spill of chemicals, fuels or other deleterious substances into the terrestrial and/or aquatic environments,
- A fire at the Project site, potentially extending into adjacent areas; and
- The potential contamination of groundwater resources through contact with drilling fluids, hydrocarbons or other substances.

The resulting environmental effects of such an incident would clearly depend upon the nature and magnitude of any such event.

Human health and safety and environmental protection have been paramount considerations by Investcan in the planning and design of the proposed drilling program, and these will continue to be the main priorities

during the construction and operation of the Project. The Draft EPP provided in Appendix E therefore also includes a number of measures and procedures for on-site Project personnel to respond in the unlikely event of a fire, spill or other environmental incident. Mitigation, monitoring and response measures at the corporate level that are related to other possible environmental incidents (such as the unlikely detection of groundwater contamination) are addressed in the relevant sections of this EPR itself (such as Section 6.4.3).

The Draft EPP therefore provides an initial identification and documentation of some relevant environmental protection and response measures for implementation in the field during the Project, based on (and reflecting) the current stage of Project planning. As is typically the case for any project, it is expected that the EPP will be a "living document" that will continue to evolve and be updated as Project planning, EA and permitting continue to be advanced.

6.6 Effects of the Environment on the Project

The proposed Project has been planned and designed, and will be implemented, with due consideration of the local environmental conditions in and around the Project site. Geological characteristics, topographic features, waterbodies and wetlands, existing infrastructure, and other environmental factors have, to varying degrees, influenced the placement and design of the Project and its associated components and activities. Weather conditions will also likely influence the timing of some activities. No additional or specific mitigation measures are required or proposed in relation to the possible effects of the environment on the Project.

6.7 Environmental Monitoring and Follow-up

Any potential environmental issues which may be associated with the Project can be addressed and mitigated through the use of good construction and operational practices and procedures, as described throughout this EPR. These will be further addressed through the specific environmental permitting requirements and compliance standards and guidelines which will apply to the proposed Project.

As described previously, Investcan will be undertaking a regional groundwater study and eventual groundwater monitoring program before, during and following its planned drilling activities. The information and insights obtained through the former will be used to inform on-going Project planning and eventual implementation, and will be provided to government as part of the eventual application for a drilling permit and other authorizations. The detailed design of the proposed groundwater monitoring program (including the number and location of monitoring wells and planned sampling and analysis) will be completed in consultation with the NL Water Resources Management Division and other regulatory authorities as applicable, and the results will be provided to and discussed with government once available.

The Project will be subject to regular inspections and maintenance as required. The Proponent is committed to obtaining all required authorizations for the proposed Project, and to complying will all applicable regulations (including any associated compliance monitoring and reporting requirements). No other environmental monitoring or follow-up is considered necessary in relation to the proposed Project.

7.0 PROJECT-RELATED DOCUMENTS

Apart from this EPR and the original EA Registration (March 2013), no other EA-related documents have been produced by Investcan in relation to this Project.

8.0 APPROVAL OF THE UNDERTAKING

In addition to approval under the provincial EA process, the Project will require a number of environmental permits and other approvals from various provincial, federal and/or municipal authorities in relation to its proposed construction and/or operations and maintenance activities.

A listing of some of the main permits, licences, approvals and other authorizations that may be required for the Project is provided in Appendix D.

9.0 DECOMMISSIONING AND REHABILITATION

Eventual decisions pertaining to possible further exploration, delineation and/or development activities or to the demobilization and rehabilitation of the Project area will be made based on the results of the proposed exploration drilling program. The following section provides an overview discussion of several potential approaches and scenarios.

Scenario 1: From Completion of Planned Exploration Drilling to Review of Results and Associated Decisions

The information and results from the exploration well will be evaluated upon completion of drilling activities. During that period, some or all of the infrastructure and equipment associated with the Project will likely be kept in place at the site. The drill rig and other equipment will be appropriately secured, maintained and regularly inspected. The wellhead will be fenced and proper identification and standard industry-wide signage will be erected. Access to the site will continue to be restricted to authorized persons only, with the gate on the access road being kept in place.

Scenario 2: Unsuccessful Drilling Program - Decommissioning and Rehabilitation of the Site

If the results of the exploration drilling program indicate that the well does not contain commercial quantities of hydrocarbons, and if further exploration activities at this location are not planned, the site will be decommissioned. Decommissioning and rehabilitation means that any Project-related environmental disturbance to an area is corrected to the point where the area 1) is safe and stable; and 2) is restored as near as reasonable to its pre-disturbance condition. As part of its planning for and conduct of the proposed exploration drilling program, Investcan has and will make efforts to minimize any associated environmental disturbance, thereby reducing the amount of reclamation effort that is required to be undertaken upon completion of the Project.

In such a case, demobilization of the drill rig and rehabilitation of the site could be initiated as early as mid 2014. The rig and associated infrastructure would be disassembled and removed from the site and wastes will be treated and/or disposed of in accordance with the environmental protection measures outlined previously. Open rock formations will be sealed with cement plugs to prevent upward migration of wellbore fluids. The

top of the wellhead will be left in the cellar with at least two pressure barriers, capped with a steel plate and buried to a minimum of several feet below the surface. The drill site will be graded to even (pre-Project) grades, with a view to restoring the surface location to its pre-development conditions.

Should no further exploration or development be planned at the site, the access road can also be appropriately decommissioned and rehabilitated. In this case, the installed culvert would be removed, and the roadbed re-instated to even grades. The access road can also be cross-ditched at its start and at regular intervals along the route to prevent future unauthorized use, should that be deemed necessary and appropriate by government regulatory agencies. The drill site can also be revegetated using native plant species through hydroseeding, placement of lime, fertilizer and grass seed manually, planting of alder beds in sections along the road and drill site, or a combination of the above. If the road is required to be completely decommissioned and rehabilitated, as per the above, these revegetation activities can be extended to the roadbed as well. Any such site rehabilitation work will be undertaken during the summer period.

It is also possible that there may also be interest among other commercial interests and/or by local communities and stakeholder to keep the access road in place for other, future land and resource use activities. Potential plans and interests will be discussed with the Newfoundland and Labrador Department of Environment and Conservation and other relevant agencies as well as local communities and organizations prior to being undertaken at the site. Investcan will decommission / rehabilitate the Project site and access road as directed and prescribed by the applicable government authorities and in full compliance with the associated terms and conditions of the Project EA approval.

Any and all well termination and abandonment activities will be undertaken in strict compliance with the Newfoundland and Labrador *Petroleum and Natural Gas Act* and the associated *Petroleum Drilling Regulations,* including the relevant requirements of Part VIII (Well Termination) and the terms and conditions associated with all permits and authorizations from government.

Scenario 3: Successful Drilling Program - Further Exploration and/or Development Planned

If the exploratory well is successful, a wellhead valve assembly will be installed allowing the well to be temporarily suspended until future activities are defined and planned. During this period the well and associated site infrastructure will be regularly maintained, monitored and inspected, in accordance with applicable regulations. Access to the site will continue to be restricted to authorized persons only, with the gate on the access road being kept in place.

Any further and expanded exploration or delineation activity or possible oil and/or gas production that may eventually result from this exploration program are outside the scope of the present Project. The specific nature and characteristics of these potential future activities will obviously depend on the type and quantity of any hydrocarbons found, the location, area, depth and other characteristics of the reserves, etc. These and numerous other technical and economic factors will determine the requirement for, and specific characteristics of, any such future exploration or development and the associated infrastructure and activities.

In the event that the results of this planned exploration program are positive, any additional exploration and/or production activities (and their eventual decommissioning) will have to be planned and implemented in an environmentally acceptable manner, in accordance with relevant legislation, regulations and applicable

permits and approvals. Any such future exploration or development would therefore also comprise a future and separate project, which will be presented for EA review under the provincial and/or federal processes (as applicable) by the relevant proponent(s) of those developments once they are determined and defined.

10.0 EPR SUMMARY AND CONCLUSION

Investcan Energy Corp is proposing to develop an access road and to drill an oil and gas exploration well (known as Thoulet #1) in an area of Western Newfoundland. The proposed Project is subject to review and required approval under the Newfoundland and Labrador EA process.

This EPR has been prepared and submitted by the Proponent in relation to the proposed Project, the purpose of which has been to provide further information on the proposed exploration well and access road, the existing environmental setting and potential environmental interactions, and planned environmental protection (mitigation) measures to avoid or reduce any adverse environmental effects. This information will be subject to governmental and public review, and will help inform an eventual EA decision by the Minister.

Pending release from the EA process, and the receipt of formal corporate approval and all other required permits and authorizations, Project construction activity would commence in late 2013 and would take an estimated eight weeks to complete, followed by drilling operations which would occur over a period of approximately 50 days.

The relatively small size of the proposed Project area and its likely environmental zone of influence, along with the short-term nature of the planned construction and operations activities, means that the Project will not likely result in any significant adverse environmental effects. In order to further avoid or reduce any potential for environmental issues or interactions throughout the life of the Project, Investcan has also identified and committed to a number of environmental protection measures in this EPR. These include Project planning and design mitigation (e.g., the on-site berm and other containment, planned well casing design and control equipment, access road routing) and various construction and operational practices and procedures (such as those associated with the appropriate storage, use and disposal of drilling fluids, fuels and other substances). Although interactions with groundwater resources are not likely to occur during the drilling program, Investcan recognizes that there is a degree of public interest around this issue, and will therefore be undertaking a regional groundwater study and eventual groundwater monitoring program as part of its planned drilling activities.

Eventual decisions pertaining to the decommissioning of the Project will be made based on the results of the proposed exploration drilling activities. Should no further petroleum exploration or production activities be planned, the drilling equipment will be demobilized, and the well site and access road will be appropriately rehabilitated, in accordance with applicable regulations and standards and the terms and conditions of the EA approval and other relevant permits.

The exploration well drilling and associated components and activities that are the subject of this EPR will result in a number of direct and indirect economic benefits, including employment and business opportunities for local residents over the course of its planning, construction and operational phases in 2013 and 2014. Should the exploration program be successful in locating commercially viable oil and/or gas resources in this area, it could also eventually lead to significant additional economic activity in the region related to further

exploration, and possibly, petroleum development and production activities. The overall objective of the proposed Project is therefore to help facilitate future economic development and growth in the local area, region and province as a whole.

11.0 REFERENCES

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APPENDIX A

Environmental Preview Report Guidelines - Table of Concordance

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INVESTCAN ENERGY CORP - FLAT BAY PETROLEUM EXPLORATION WELL AND ACCESS ROAD **Table of Concordance with Environmental Preview Report (EPR) Guidelines**	
EPR Guideline Requirement	**Where / How Addressed in EPR**
NAME OF UNDERTAKING	
The undertaking has been assigned the Name "Flat Bay Petroleum Exploration Wells and Access Road."	Section 1.0
PROPONENT:	
Name the proponent and the corporate body, if any, and state the mailing address.	Section 2.0
Name the chief executive officer if a corporate body, and telephone number, fax number and E-mail address (if any). Discussion on company background and previous Projects.	Section 2.0
Name the principal contact person for purposes of environmental assessment and state the official title, telephone number, fax number and E-mail address (if any).	Section 2.0
THE UNDERTAKING:	
State the nature of the project.	Section 3.1
State the purpose/rationale/need for the project. If the proposal is in response to an established need, this should be clearly stated.	Section 3.2
DESCRIPTION OF THE UNDERTAKING:	
Provide complete information concerning the preferred choice of location, design, construction standards, maintenance standards, etc.	Section 4.0
Geographical Location:	
Describe the proposed site, planned layout and infrastructure, roads, wells, transmission lines, on site buildings, tanks, berms, etc., including boundaries. A detailed site plan showing the layout of the proposed project and infrastructure should be drawn to scale.	Sections 4.1, 4.2
Describe the petroleum geology (provide diagrams, maps) of the Bay St. George area.	Section 3.2
Provide information regarding ownership and/or zoning of the land upon which the project is to be located.	Sections 4.1, 6.2 and 6.4.4
Construction:	
State the total construction period (if staged, list each stage and its approximate duration) and proposed date of first physical construction-related activity.	Sections 4.3, 4.9
The details, materials, methods, schedule, and location of all planned construction activities must be presented including the following:	Sections 4.3, 4.9
• Additional detail should be provided on the containment berm. Ideally this should be an engineered structure designed and constructed in an appropriate manner to provide adequate containment for the type and quantity of fluid/material to be stored / contained. What are the testing criteria and will any discharges be directly released into waterbodies?	Section 4.2.2 No water from the bermed area will be released to the environment.
Operation and Maintenance:	
All aspects of the operation and maintenance of the proposed development should be presented in detail.	Section 4.4
In addition the following information must be presented:	
• Details on the use of work-over programs such as acidizing. Information on the volume of pumping fluid associated with this type of program should be provided. Information on associated waste streams and how they will be addressed should also be detailed.	Section 4.7
• Will steam injection be used? If so, why? For what periods of operation? Describe the process in detail.	Section 4.6 Steam injection is not planned.
• Will there be flare(s)? If so, why? For what periods of operation? Describe the process in detail.	Sections 4.4.2 and 6.4.1
• Details on why this proposed petroleum exploration activity is not considered "fracking". Will the acidizing program be used just for conditioning the bore hole or	Sections 4.6 and 4.7

INVESTCAN ENERGY CORP - FLAT BAY PETROLEUM EXPLORATION WELL AND ACCESS ROAD **Table of Concordance with Environmental Preview Report (EPR) Guidelines**	
EPR Guideline Requirement	**Where / How Addressed in EPR**
matrix acidizing or fracture acidizing? Will all acid and/or reaction compounds be removed?	
• Because the target formation is a carbonate (limestone, dolomite, etc), and the proposed acidizing is intended to dissolve carbonate rocks, the proponent must, in addition to the proposed conceptual model of groundwater occurrence and flow, also provide an assessment of the geological containment of the basin outside of the well bore. This includes, but is not limited to, providing an assessment (model) of the potential for inter-well bore communication between the acidized well(s) and any adjacent exploration or abandoned oil or gas well, as well as assessing the ability of the intervening zone (between the target formation and the shallow groundwater) to act as a confining layer and contain the stimulation treatment and prevent vertical migration of fluids, hydrocarbons, or other contaminants to the strata that contain non-saline groundwater.	Section 4.7
• Details are required on hydrogeological studies determining potential pathways of gas into water supplies.	Section 6.4.3.2
• The groundwater monitoring program should be presented to Water Resources Management Division for review prior to implementation. This monitoring will be subject to the Accredited Laboratory Policy. Monitoring should include establishing base-line groundwater quality conditions.	Section 6.4.3.2
• Will any long term groundwater monitoring be conducted?	Section 6.4.3.2
• Additional information should be provided on the storage and handling of drilling fluid additives (i.e. type of containers, spill containment, located within berm area, how it will be added to the drilling fluid, anticipated volume, etc.).	Sections 4.4.2, 4.5.4
• It is noted that drilling mud will be recycled and stored for reuse on the next well. Additional information on the storage of this material (container, volume, etc.) should be provided.	Sections 4.4.2, 4.5.4
• It is noted that drilling fluids will be analyzed and disposed of using approved methods by a qualified third-party provider when the decision is made to dispose of this waste. Additional information on the analyses to be performed and how the results will be used to determine appropriate disposal options should be provided. Details of temporary on-site storage should be noted. An estimate of the volume anticipated should also be provided.	Section 4.5.4
• Information on solids/cuttings waste stream associated with the drilling activity should be provided (i.e. disposal options, anticipated quantity, storage, analyses to be performed, etc.).	Section 4.5.4
• Additional information on the locations and expected operating hours of the diesel generator(s) associated with the drill rig should be provided.	Section 4.4.2
• Details are required on identity of hazardous chemicals used during this process. A CAS number is required to identify chemical elements, compounds, polymers, biological sequence mixtures and alloys.	Sections 4.5.2, 4.5.3, 4.5.4
• Details required on how hazardous material will be stored.	Sections 4.5.2, 4.5.3, 4.5.4
• Where and how will drilling muds, cuttings and fluids be disposed?	Section 4.5.4
• It is stated that offset, step-out, or kick-off wells may also be considered. How will this change the plans set out in this project registration? How could this potentially change environmental issues?	Section 4.4.2
• On Page 6 of the registration document, it is stated that final details and updated maps will be issued once further on site assessments are completed. How will this information and maps be issued? To whom?	Additional (and updated) Project description information is provided throughout this EPR. Subsequent to the EA process, Project information will also be provided to Government as part of Investcan's applications for the various permits and approvals that

INVESTCAN ENERGY CORP - FLAT BAY PETROLEUM EXPLORATION WELL AND ACCESS ROAD **Table of Concordance with Environmental Preview Report (EPR) Guidelines**	
EPR Guideline Requirement	**Where / How Addressed in EPR**
	will be required for the Project (See Section 8.0)
• Page 10 of the registration document mentions that mud/fluid additives will be biodegradable when possible. In the proponent's opinion, which additives are biodegradable and which are not? State specifics.	Sections 4.4.2 and 4.5.4
• Page 10 of the registration document states that fluids will be hauled to an approved disposal site. Provide a list of approved disposal sites that are being considered. What are the expected concentrations of each pollutant in the fluids?	Section 4.5
Note: The EPR describes the various fluids and chemicals that will be used, outlines their planned use, storage and disposal, and references several potential service providers and their disposal facilities. The specific "concentrations" of potential pollutants in any fluids cannot be known at this stage, as that will depend on the specific drill fluid (blending) required for the well. The main item here is that all such fluids will be managed and disposed of appropriately, as described in the EPR, and in accordance with regulatory requirements.	
• Page 10 (last sentence) of the registration document – states that solvents, etc., may be used. Provide the names of the exact fluids that may be used.	Sections 4.4.2, 4.5.3, 4.5.4
• If groundwater is contaminated, what would be the mitigative measures undertaken by the proponent?	Section 6.4.3
• Will wells be secured or sealed at the end of the exploration program? If so, the proponent should provide details regarding decommissioning and sealing the well(s).	Section 9.0
• In the registration document references are made to this project being similar to other activities in western Newfoundland. This does not address environmental concerns. Details must be provided so that environmental concerns can be evaluated.	This statement provides context, and is not meant to "address environmental concerns", other than to note that the Project will use equipment, materials and techniques that have been used in other (approved) drilling programs in the province. Other parts of the EA Registration and EPR provide details on environmental mitigation measures, etc.
• P. 11 of 14 (Section V) of the registration document – states that all grey/black water will be disposed of in the appropriate manner. Details are required. What is the appropriate manner? Where will this disposal take place? What will be the concentrations of potential contaminants in this water?	Section 4.5.2 Grey / black water is as defined in the EPR (i.e., water containing sewage or other human waste materials) and will be managed in accordance with regulatory requirements.
Note: The specific "concentrations" of various substances in this water is impossible to know at this stage. Again, the main item is that all such water will be managed and disposed of appropriately, as described in the EPR, and in compliance with regulatory requirements.	
• On page 3 of the Environmental Protection Plan (EPP), reference is made to an Emergency Response Plan and Contingency Plan. Where are these plans? Do they address potential groundwater contamination?	Measures to address potential accidental events (eg spills) are included throughout the EPR (Section 4.5, 6.0). Potential groundwater contamination is addressed specifically in Section 6.4.3.
• On page 3 of the EPP (section 1.2) – the list of potential impacts is not extensive. There is a potential for groundwater issues. There is a potential for a spill of contaminated water.	Each of these potential environmental issues is addressed in Sections 6.4.1, 6.4.2, 6.4.3, 6.4.4
• Page 5 of the EPP – states that contaminated soil or absorbents must be removed to a disposal facility. Name the facilities that are being considered for this potential disposal. How will the contaminated materials be stored on-site prior to removal	Sections 4.5.2, 4.5.3

INVESTCAN ENERGY CORP - FLAT BAY PETROLEUM EXPLORATION WELL AND ACCESS ROAD **Table of Concordance with Environmental Preview Report (EPR) Guidelines**	
EPR Guideline Requirement	**Where / How Addressed in EPR**
for disposal?	
• Page 7, of the EPP (Drilling on Land) – a number of access trails are mentioned. How many trails are planned? Locations?	No trails are being proposed. The current Project description is as described in Chapter 4.0 of the EPR.
• Page 7 of the EPP (Drilling on Land) – If drill waste does enter bodies of water or does run off from the drill sites, how will this be handled? Additionally, if contaminants are detected in groundwater sampled from sentry wells, what is the planned response?	Section 6.4.3
• Page 11 of the EPP (Spill Response) – If a spill or leak of fuel or hazardous material occurs on snow and/or ice, how will this snow and ice be contained? Where would this snow and/or ice be shipped to? Provide specifics.	Sections 4.5.2 and 4.5.3
• What analysis will be completed for water that may be pumped from work areas (drill sites, road/bridge construction) before discharge to a body of water.	No such discharge is planned. See Sections 4.2.2, 4.4.2 and 4.5.2
• List of the occupations required, the applicable NOCs, and the number required in each occupational area.	Section 4.8
ALTERNATIVES	
Describe the technically and economically feasible alternative locations that meet the project need and their biophysical and socio-economic selection criteria. State reasons for the rejection of alternative locations for the wells and access road.	Section 5.0
POTENTIAL ENVIRONMENTAL EFFECTS and MITIGATION:	
Provide detailed information regarding the potential effects of the undertaking on the environment and the proposed mitigation.	Section 6.0
PROJECT- RELATED DOCUMENTS:	
Provide a bibliography of all project-related documents already generated by or for the proponent (e.g., feasibility study, engineering reports, etc).	Section 7.0
APPROVAL OF THE UNDERTAKING:	
List the main permits, licences, approvals, and other forms of authorization required for the undertaking, together with the names of the authorities responsible for issuing them (e.g., federal government department, provincial government department, municipal council, etc).	Section 8.0 and Appendix D
DECOMMISSIONING and REHABILITATION	
Describe all aspects of the decommissioning and rehabilitation plans for the undertaking, including the access road.	Section 9.0
The Reclamation and Closure Plan does not address on-going measures to deal with potential contamination of groundwater and does not address decommissioning of the wells. Also, there is no mention of future monitoring of either groundwater or surface water, to ensure no incidental contamination were to migrate from the well(s) or if a spill or other issue has occurred during construction or operations.	Sections 4.5, 6.4.3 and 9.0

APPENDIX B

Foragaz Drill Rig #3: Specifications Sheet

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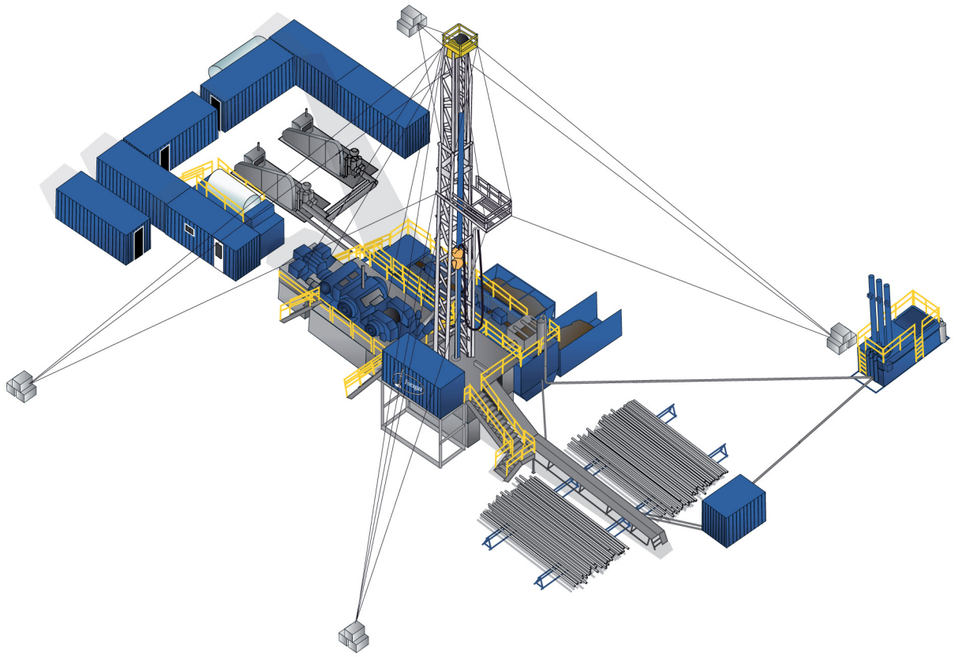
RIG NO.3

DOUBLE U-34 (with Top Drive)

	LOAD	WIDE x LENGHT x HEIGHT	WEIGHT
1-	Rig wood mats & Center unit	2.44 m x 12.2 m x 2.44m (8 ft x 40 ft x 8 ft)	25,850 Kg (57,000 lbs)
2-	Catwalk, V-Door, Pipe Rack, Poorboy, Drill pipe 4", Drill collar	2.44 m x 12.2 m x 2.44 m (8 ft x 40 ft x 8 ft)	25,850 Kg (57,000 lbs)
3-	Substrucutre: Bottom box (2), Top Box (2)	2.44 m x 12.2 m x 2.44 m (8 ft x 40 ft x 8 ft)	20,870 Kg (46,000 lbs)
4-	Lowerfloor box substrucutre (2), BOP, Top-drive power unit	2.44 m x 14.63 m x 2.44 m (8 ft x 48 ft x 8 ft)	22,680 Kg (50,000 lbs)
5-	Mast & Block/hook & Monkey board & Drilling line reel	3.66 m x 20.1 m x 1.8 m (12 ft x 66 ft x 6 ft)	18,140 Kg (40,000 lbs)
6-	Substructure ramp, Crown stand, Choke manifold	3.05 m x 13.7 m x 2.44m (10 ft x 45 ft x 8 ft)	13,150 Kg (29,000 lbs)
7-	Rig carrier	3.05 m x 13.7 m x 2.54m (10 ft x 45 ft x 8.33 ft)	25,945 Kg (57,200 lbs)
8-	Doghouse, Doghouse base, Top-drive	2.44 m x 13.41 m x 2.44 m (8 ft x 44 ft x 8 ft)	18,140 Kg (40,000 lbs)
9-	Auxiliary container #1 (Tool house, Compressor, Accumulator, Power room 80Kw):	2.44 m x 12.2 m x 2.44m (8 ft x 40 ft x 8 ft)	24,950 Kg (55,000 lbs)
10-	Water tank & Fuel tank	2.44 m x 6.71 m x 2.90m (8 ft x 22 ft x 9.5 ft)	9,070 Kg (20,000 lbs)
11-	Mud tank 60 m^3	4.12 m x 13.26 m x 2.70 m (13.5 ft x 43.5 ft x 8.83 ft)	29,710 Kg (65,500 lbs)
12-	Triplex Dragon Workforce 660 HP, Shale shaker	3.5 m x 9.14 m x 2.94 m (11.5 ft x 30 ft x 9.66 ft)	28,350 Kg (62,500 lbs)
13-	Duplex Wilson 600	3.5 m x 9.14 m x 3.05 m (11.5 ft x 30 ft x 10 ft)	26,308 Kg (58,000 lbs)
14-	Auxiliary container #4 (Power room 225Kw), Auxiliary container #3 (Equipment storage):	2.44 m x 12.2 m x 2.44m (8 ft x 40 ft x 8 ft)	13,605 Kg (30,000 lbs)
15-	Auxiliary container #2 (Equipment storage):	2.44 m x 13.41 m x 2.44 m (8 ft x 44 ft x 8 ft)	17,010 Kg (37,500 lbs)
16-	Auxiliary container #5 (Lunch room) & Drill pipe 4"	2.44 m x 15.85 m x 2.44 m (8 ft x 52 ft x 8 ft)	26,308 Kg (58,000 lbs)
17-	Drill pipe 4"	2.44 m x 9.14 m x 1.8 m (8 ft x 30 ft x 6 ft)	27,215 Kg (60,000 lbs)



RIG NO.3

DRILLING SPECIFICATIONS

RIG NO.3

DOUBLE U-34 (with Top Drive)

MAIN FEATURES

Substructure type:	Box-on-Box (8 pieces)
Rig floor level and Kelly Bushing:	3.96 m (13 ft)
Mast type and height:	29.26 m (96 ft), Guyed telescopic double
Maximum drill depth:	2,000 m (6,562 ft) with 4" drill pipe
Maximum hook load:	80,000 daN (180,000 lbf)
Drawworks (power, engine):	Simple drum, 450 HP, Detroit Diesel S60 12.7L
Top drive torque:	597 daN-m (4,400 lbf-ft) @ 100 RPM
Drilling line:	1" - 6 lines
Carrier:	Lee-C-Moore, 3 rear axles
Drill pipe:	101 mm (4"), 20.46 daN/m (14 lb/ft), S-135 connection 3 1/2 IF (NC38), 2,000m (6,562 ft)

MAST - GUYED TELESCOPIC DOUBLE

Maximum hook load:	80,000 daN (180,000 lbf)
Height:	29.26 m (96 ft)
Base width:	2.13 m (7 ft)
Racking platform capacity:	2,500 m (8,202 ft) with 4" drill pipe
Height of racking platform:	16.77 m (55 ft)
Crown:	6 sheaves (30")
Guyed and anchor:	6 wires attached to 4 (18,000 lbs) anchors

SUBSTRUCTURE - BOX-ON-BOX

Setback capacity:	93,400 daN (210,000 lbs)
Bushing capacity:	111,200 daN (250,000 lbs)
Rig floor level and Kelly Bushing:	3.96 m (13 ft)
Floor space:	4.27 m x 4.57 m (14 ft x 15 ft)
BOP trolley capacity:	10 tons (22,200 lbf)
BOP room spacing:	W 1.98 m x L 5 m x H 3.55m (6.5 ft x 16.5 ft x 11.66 ft)

DRAWWORKS - UNIT U-34

Engine:	450 HP, Detroit Diesel S60 12.7 L
Brake band:	2 x 0.52 m^2 (806 in^2) actuated with Air brake
Auxiliary brake:	Parmac 122 & 15DR Hydromatic brake
Automatic driller:	AOI Auto-Driller "Satellite"
Drilling line:	1"- 6x26 WC EIP
Weight indicator:	1-Cameron Mechanical 400,000lbs & 1- MD Totco "Deflection Type" 200,000lbs

TOP DRIVE

Model:	Ingersolll-Rand T5DH
Maximum torque:	597 daN-m (4,400 lbf-ft) @ 100 RPM
Speed:	100 rpm
Hydraulic power unit:	CAT 3056, 157 HP @ 2,200 RPM
Hydrostatic Transmission:	Eaton Heavy Duty model 76
Torque tube:	21.34 m (70 ft), 2 711 daN (20,000 lb-ft)

TRAVELING EQUIPMENT

Traveling Block & Hook:	100 Ton McKissick 3-30" sheaves / Web Wilson Hook 662
Swivel:	TSM 150, Max working pressure 24,500 kPa (3,500 Psi)
Bail :	Nominal size 2 3/4" x 84" (350 ton)

HANDLING TOOL

Powertong:	7 5/8" Eckel, Jaws 4"DP, 4 3/4" DC, 6 1/2" DC
Manual tong:	4,746 daN (35,000 lb-ft)
Break-out & Make-up hydraulic cylinder:	4,746 daN (35,000 lb-ft)
2-Auxiliary winch:	3,100 daN (7,000 lbs) capacity
Hand slips Woolley Type A:	4 3/4" (120mm) Drill Collar
Hand slips Woolley Type B:	4" (101mm) Drill pipe
100 tons elevator:	4" (101mm) Drill pipe

MUD SYSTEM

Triplex Dragon Workforce pump 660 (PZ-8 style):	Détroit diesel engine SGO 14L - 660 HP, with pumphouse
Duplex Wilson 600 pump:	6 1/2 x 14"- Cat 3406 engine - 400 HP, with pumphouse
Standpipe:	4" (101.6 mm), 24 500 Kpa (3,500 psi) Maximum pressure
Valve manifold:	35,000 kPa (5,000 psi)
Mud tank:	60 m^3 with 5 sections
Sand trap, Trip tank, Poorboy degasser 6" outlet lines	
Shale shaker:	United Oilfield Orbital 3000
5-Mud gun:	21,000 kPa (3,000 psi)
Mud hopper	
Mixing pump MCM:	5"x6" with 75 HP electric motor
4- Mud agitator:	5 HP
Katch Kan-Zero Spill System	

ELECTRIC POWER

Cat 3306 Power Generator:	225 Kw
Perkins Power Generator:	80 Kw

BOP'S

2-Stabbing Valve:	70,000 kPpa (10,000 psi)
STEELTECH Annular Preventer:	229 mm, 21,000 kPa (9", 3,000 psi)
STEELTECH Double Ram Preventer:	229 mm, 21,000 kPa (9", 3,000 psi)
HCR valve Cameron FLS:	79.4 mm, 35,000 kPa (3 1/8", 5,000 psi)
Flanged Bleed off line:	76 mm, 21,000 kPa (3", 3,000 psi), Flanged outlet
Emergency flare line:	76 mm (3")
2-Kill valve:	76 mm, 35,000 kPa (3 1/8", 5,000 psi)
Fire resistant flexible hose:	7m of the wellbore
Drilling spool:	229 mm, 21,000 kPa (9", 3,000 psi) c/w (3 1/8" 5,000 psi) Flanged outlet
R&T Accumulator unit with driller air remote panel:	44 Gallons
Choke manifold	21,000 kPa (3,000 psi): W 2.36 m x L 4.15 m x H 2.13 m (7.75 ft x 13.6 ft x 7 ft)

OTHER EQUIPEMENT

Compressor:	(45 cfm @100 psi)
27 m^3 Water tank:	W 2.38 m x L 6.86 m x H 2.13m (7.8 ft x 22.5 ft x 7 ft)
Fuel storage:	4,000 liters
Electric survey unit slickline:	2,500 m
High pressure wash pump:	
10 Rig wood mats:	W 2.44 m x L 7.32 m x H 0.09 m (8 ft x 24 ft x 0.3 ft)
2 Pipe Rack:	W 1 m x L 8.54 m x H 0.92 m (3.25 ft x 28 ft x 3 ft)
Catwalk:	W 1.22 m x L 12.2 m x H 0.92 m (4 ft x 40 ft x 3 ft)
Doghouse:	W 2.44 m x L 6.10 m x H 2.44 m (8 ft x 20 ft x 8 ft)
Auxiliary container #1 (Tool house, Compressor, Accumulator, Power room 80Kw):	W 2.44 m x L 12.2 m x H 2.44m (8 ft x 40 ft x 8 ft)
Auxiliary container #2 (Equipment storage):	W 2.44 m x L 13.41 m x H 2.44 m (8 ft x 44 ft x 8 ft)
Auxiliary container #3 (Equipment storage):	W 2.44 m x L 6.10 m x H 2.44 m (8 ft x 20 ft x 8 ft)
Auxiliary container #4 (Power room 225 Kw):	W 2.44 m x L 6.10 m x H 2.44 m (8 ft x 20 ft x 8 ft)
Auxiliary container #5 (Lunch room):	W 2.44 m x L 6.10 m x H 2.44 m (8 ft x 20 ft x 8 ft)

APPENDIX C

Material Safety Data Sheets (MSDSs)

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HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARABUF®**

Revision Date: 01-May-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARABUF®
Synonyms: None
Chemical Family: Mineral
Application: pH Control

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Magnesium oxide	1309-48-4	60 - 100%	10 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview May cause metal fume fever with flu-like symptoms. May cause allergic skin and respiratory reaction.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	Water fog, carbon dioxide, foam, dry chemical.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1, Flammability 0, Reactivity 0 , PPE: B

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions	Avoid creating or inhaling dust. Avoid contact with eyes, skin, or clothing. Wash hands after use.
Storage Information	Store in a cool, dry location. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	A well ventilated area to control dust levels.
Respiratory Protection	Not normally necessary. However, if significant exposures are likely then wear a Dust/mist respirator. (N95, P2/P3)
Hand Protection	Normal work gloves.
Skin Protection	Not normally necessary.
Eye Protection	Dust proof goggles.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	White
Odor:	Odorless

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	10.5
Specific Gravity @ 20 C (Water=1):	3.56
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	30- 40
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	> 3800
Freezing Point/Range (C):	> 2100
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	> 1
Percent Volatiles:	0.0
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	1
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers. Strong acids. Avoid halogens. Prolonged contact with aluminum.
Hazardous Decomposition Products	Metal oxides.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation. May cause allergic respiratory reaction. May cause Metal Fume Fever (if heated) which is characterized by chills, fever, aching muscles, dryness and metal taste in mouth and throat, headaches, sneezing, nausea, and irritation of the nose and trachea.
Skin Contact	May cause an allergic skin reaction. May cause mild skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	May cause abdominal pain, vomiting, nausea, and diarrhea.
Aggravated Medical Conditions	Allergic skin and/or respiratory reaction. Liver and kidney disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM96: 665,500 ppm (Mysidopsis bahia) SPP @ 0.3 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Dispose of container according to national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	Not applicable.
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARACARB® 5**

Revision Date: 01-May-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARACARB® 5
Synonyms: None
Chemical Family: Mineral
Application: Bridging Agent

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Calcium carbonate	471-34-1	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	0 - 1%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 0, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Physical Hazard 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust. This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Store away from acids. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container. Product has a shelf life of 60 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use in a well ventilated area. Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.
Respiratory Protection	Wear a NIOSH certified, European Standard EN 149 (FFP2/FFP3), or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid Powder
Color:	White
Odor:	Odorless
pH:	8-9
Specific Gravity @ 20 C (Water=1):	2.7
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	168
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong acids.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide. Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure Eye or skin contact, inhalation.

Inhalation Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact May cause skin irritation.

Eye Contact May cause eye irritation.

Ingestion None known

Aggravated Medical Conditions Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: LD50: > 5000 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: TLM96: >1,000,000 ppm (Mysidopsis bahia) SPP @ 178.5 ppb
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D2A Very Toxic Materials Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

END OF MSDS

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARATHIN-PLUS**

Revision Date: 01-May-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARATHIN-PLUS
Synonyms: None
Chemical Family: Lignosulfonate
Application: Thinner

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Modified lignosulfonate		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye and respiratory irritation.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 0, Reactivity 0
HMIS Ratings: Health 1, Flammability 0, Physical Hazard 0 , PPE: X

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid creating or inhaling dust.

Storage Information Store in a cool, dry location. Keep container closed when not in use. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (95%)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	Golden brown
Odor:	Woody

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	Not Determined
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of sulfur. Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Shipping Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.
Disclaimer Statement	This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **BARITE 41**

Revision Date: 01-May-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: BARITE 41
Synonyms: None
Chemical Family: Mineral
Application: Weight Additive

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Barium sulfate	7727-43-7	60 - 100%	10 mg/m^3	15 mg/m^3
Crystalline silica, quartz	14808-60-7	1 - 5%	0.025 mg/m^3	10 mg/m^3 / %SiO2 + 2

More restrictive exposure limits may be enforced by some states, agencies, or other authorities.

3. HAZARDS IDENTIFICATION

Hazard Overview

CAUTION! - ACUTE HEALTH HAZARD
May cause eye, skin, and respiratory irritation. May be harmful if swallowed.

DANGER! - CHRONIC HEALTH HAZARD
Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposures below recommended exposure limits. Wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Review the Material Safety Data Sheet (MSDS) for this product, which has been provided to your employer.

4. FIRST AID MEASURES

Inhalation

If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin	Wash with soap and water. Get medical attention if irritation persists.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Ingestion	Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.
Notes to Physician	Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media	All standard firefighting media.
Special Exposure Hazards	Not applicable.
Special Protective Equipment for Fire-Fighters	Not applicable.
NFPA Ratings:	Health 1, Flammability 0, Reactivity 0
HMIS Ratings:	Health 1*, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures	Use appropriate protective equipment. Avoid creating and breathing dust.
Environmental Precautionary Measures	None known.
Procedure for Cleaning / Absorption	Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. HANDLING AND STORAGE

Handling Precautions	This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En 149, or equivalent respirator when using this product. Material is slippery when wet.
Storage Information	Do not reuse empty container. Store in a cool, dry location. Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits listed in Section 2.

Respiratory Protection	Wear a NIOSH certified, European Standard EN 149 (FFP2/FFP3), or equivalent respirator when using this product.
Hand Protection	Normal work gloves.
Skin Protection	Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Eye Protection	Wear safety glasses or goggles to protect against exposure.
Other Precautions	None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	Pink to tan to gray
Odor:	Odorless
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	4.23
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	135
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Insoluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	233.4

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	None known.
Hazardous Decomposition Products	Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Skin Contact

None known.

Eye Contact

May cause mild eye irritation.

Ingestion

May produce nervous system effects such as feeling of weakness, unsteady walk, and dilation of blood vessels. May affect the heart and cardiovascular system.

Aggravated Medical Conditions

Individuals with respiratory disease, including but not limited to asthma and bronchitis, or subject to eye irritation, should not be exposed to quartz dust.

Chronic Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

Other Information

For further information consult "Adverse Effects of Crystalline Silica Exposure" published by the American Thoracic Society Medical Section of the American Lung Association, American Journal of Respiratory and Critical Care Medicine, Volume 155, pages 761-768 (1997).

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity	Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997).
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not applicable

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: 7500 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory All components listed on inventory or are exempt.

EPA SARA Title III Extremely Hazardous Substances Not applicable

EPA SARA (311,312) Hazard Class Acute Health Hazard
Chronic Health Hazard

EPA SARA (313) Chemicals This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).

EPA CERCLA/Superfund Reportable Spill Quantity Not applicable.

EPA RCRA Hazardous Waste Classification If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.

California Proposition 65 The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law One or more components listed.

NJ Right-to-Know Law One or more components listed.

PA Right-to-Know Law One or more components listed.

Canadian Regulations

Canadian DSL Inventory All components listed on inventory or are exempt.

WHMIS Hazard Class D2A Very Toxic Materials
Crystalline silica

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

Section 1: Product & Company Information

Product Name: Bicarbonate of Soda

Chemical Family: Alkali

Product Use: Drilling Mud Additive

Workplace Hazardous Materials Information Systems Data (WHMIS):

Class ID	Class	Workplace Hazard
None	Not a Controlled Product	

Manufacturer Name: Bri-Chem Supply Ltd.

Address: 2125, 64th Avenue, Edmonton, AB T6P 1Z4 Canada

General Phone Number: (780) 455-8667

General Fax Number: (780) 451-4420

MSDS Revision Date: May 1, 2013

Supercedes: January 1, 2011

Prepared By: Bri-Chem Supply Ltd.

Preparer's Phone: (780) 455-8667

Section 2: Composition/Information on Ingredients

Chemical Name	Concentration	CAS#
Sodium Bicarbonate	100%	144-55-8

Section 3: Hazards Identification

Emergency Overview:

Routes of Entry:

Skin Contact:	Yes
Skin Absorption:	No
Eye Contact:	Yes
Inhalation:	Yes
Ingestion:	Yes

Potential Health Effects:

Skin:	Prolonged exposure may cause irritation.
Eye:	May cause slight irritation and/or redness.
Inhalation:	May cause cough and some respiratory irritation.
Ingestion:	Mildly toxic by ingestion. May cause nausea, vomiting, and abdominal pains. Doses over 5g/kg body weight can cause alkalosis and expansion in extracellular fluid volume with edema.

Section 4: First Aid Measures

Eye Contact:	Flush eyes with water for at least 15 minutes. If adverse symptoms develop, seek medical attention.
Skin Contact:	Wash with soap and water. If adverse symptoms develop, seek medical attention.
Inhalation:	Remove patient to fresh air. If breathing has stopped, administer artificial respiration, and seek medical attention.
Ingestion:	If conscious, give 2 to 4 glasses of water to drink. DO NOT induce vomiting. Seek medical attention. Do not give anything by mouth to an unconscious or convulsing person.

Other First Aid:

Section 5: Fire Fighting Measures

Conditions Of Flammability:	Non-flammable. Does not support combustion or flame.
Extinguishing Media:	Not combustible. This material is used as a dry powder extinguishing agent suitable for all classes of fires.
Flashpoint:	N/A
Upper Flammable Limit:	N/A
Lower Flammable Limit:	N/A
Autoignition Temperature:	N/A
Protective Equipment:	N/A
Sensitivity To Impact or Static Discharge:	If extremely large quantities are involved, significant levels of carbon dioxide may be generated, making necessary the use of self-contained breathing apparatus. (Carbon dioxide is an asphyxiant at levels >5%). Soda ash, another decomposition product existing at temperatures >115°C, is a respiratory and skin irritant.
Hazardous Combustion Products:	N/A
Fire Comment:	

Section 6: Accidental Release Measures

Personnel Precautions:	Use proper personal protective equipment as listed in section 8.
Spill Cleanup Measures:	Use appropriate safety equipment. Small spills, sweep up and put into approved DOT containers for disposal or re-use. Large spills, do not allow to enter waterways, sweep or shovel into approved DOT containers for re-use or disposal.

Section 7: Handling & Storage

Handling:	Avoid ingestion. Practice reasonable caution and personal cleanliness. Avoid skin and eye contact.
Storage:	Keep in a cool, dry place, in tightly closed containers away from acids. Long-term storage may result in caking.

Section 8: Exposure Controls, Personal Protection, Exposure Guidelines

Engineering Controls: Use general room dilution or local exhaust ventilation when excessive dust is expected in the work environment.

Personal Protective Equipment: Chemical-resistant clothing is recommended, including gloves, apron, and goggles.

Respiratory Protection: In absence of proper ventilation, recommended NIOSH-approved dust respirator.

Exposure Limits: As nuisance dust: 10 mg/m^3 total dust; for 5 mg/m^3 respirable dust. (ACGIH)

Chemical Name	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium Bicarbonate	10 mg/m^3 (total dust) ; 5 mg/m^3 (respirable dust)	Not Available

Section 9: Physical & Chemical Properties

Physical State: Solid

Odour And Appearance: White granular; odourless

Odour Threshold: N/A

Boiling Point: N/A

Evaporation Rate: N/A

Melting Point: Releases <chemical>CO_2</

Freezing Point: N/A

Specific Gravity: 2.16

Solubility in Water: 8.8 % by wt.@20C

Vapour Density: N/A

Vapour Pressure: N/A

pH: N/A

Flash Point: N/A

Volatility (% by volume): N/A

Coefficient of Water to Oil distribution: N/A

Section 10: Stability & Reactivity

Chemical Stability: Yes

Hazardous Polymerization: Will not occur.

Conditions Of Chemical Instability: N/A

Incompatible Substances: Reacts with acids to release CO_2 gas and heat.

Special Decomposition Products: The resulting dust may be irritating to the eyes and skin and respiratory tract.

Section 11: Toxicological Information

Chemical Name	LD_{50} (Oral Rat)	LD_{50} (Dermal Rabbit)	LC_{50} (Inhalation Rat)
Sodium Bicarbonate	4220 mg/kg	Not Determined	Not Determined

Effects Of Acute Exposure: None known.

Effects Of Chronic Exposure: Repeated exposure may lead to contact dermatitis. Prolonged contact with dusts or vapours may cause conjuctivitis.

General Irritancy Of Product: Mild

Sensitization: Not available

Carcinogenicity: Not available

Reproductive Toxicity: Not available

Teratogenicity: Not available

Embryotoxicity: Not Available

Mutagenicity: Not available

Synergistic Products: Not available

Section 12: Ecological Information

Ecotoxicity: Not Available

Environmental Fate: Not Available

Section 13: Disposal Considerations

Waste Disposal: All waste should be disposed of according to federal, provincial and local regulations. Containers should NOT be re-used. Containers should be disposed of in accordance with government regulations.

Section 14: Transport Information

TDG Classification: Not regulated

DOT UN Number: N/A

Shipping Notes: No special requirements

Section 15: Regulatory Information

Workplace Hazardous Materials Information Systems Data (WHMIS):

Class ID	Class	Workplace Hazard
None	Not a Controlled Product	

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

Section 16: Additional Information

MSDS Revision Date: May 1, 2013

MSDS Revision Notes:

MSDS Author: Bri-Chem Supply Ltd.

Disclaimer: This Health and Safety Information is correct to the best of our knowledge and belief at the date of its publication but we cannot accept liability for any loss, injury or damage which may result from its use. We shall ensure, so far as is reasonably practicable, that any revision of this Data Sheet is sent to all customers to whom we have directly supplied this substance, but must point out that it is the responsibility of any intermediate supplier to ensure that such revision is passed to the ultimate user. The information given in the Data Sheet is designed only as a guidance for safe handling, storage and the use of the substance. It is not a specification nor does it guarantee any specific properties. All chemicals should be handled only by competent personnel, within a controlled environment. Should further information be required, this can be obtained through the sales office whose address is at the top of this data sheet.

Product Name: CW 8551

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Supplier: Weatherford Engineered Chemistry Canada Ltd. (WECC)
1810 – 66th Avenue
Edmonton, Alberta, T6P 1M4

Emergency Contact #: CHEMTREC; within Canada or USA: 1-800-424-9300
Outside Canada or USA:
+1 703-527-3887 (call collect)

Product information: 780-440-6187

WHMIS classifications: Not Regulated

Product use: **Corrosion Water Soluble**

PIN: Not TDG Regulated

2. HAZARDS IDENTIFICATION

Route of Exposure: inhalation, skin contact, ingestion

Potential Health Effects

Inhalation: May cause irritation of the respiratory tract.

Skin contact: Prolonged and/or repeated skin contact with this product may cause irritation/dermatitis.

Eye contact: May cause slight irritation to the eyes

Ingestion: May cause irritation of the throat, stomach, and gastrointestinal tract.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient:	**This Product Contains No Hazardous Components**
CAS #:	
%Wt. or range:	
ACGIH (TLV-TWA):	
OSHA (PEL-TWA):	
LD_{50} (rat, oral):	
LD_{50} (rabbit, dermal):	
LC_{50} (inhalation rat):	

4 FIRST AID MEASURES

Inhalation: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. Obtain medical attention immediately.

Skin contact: Remove contaminated clothing and wash contact area with soap and water for 15 minutes. Obtain medical attention if irritation persists.

Eye contact: Flush eyes with a large amount of water for at least 15 minutes, lifting upper and lower lids occasionally. Care should be taken not to rinse contaminated water into the unaffected eye. Seek medical attention if irritation persists.

Ingestion: Do NOT induce vomiting unless directed to by medical personnel. If vomiting occurs spontaneously, keep head below hips to prevent aspiration into lungs. Never give anything by mouth if victim is rapidly losing consciousness, unconscious or convulsing. Obtain medical attention immediately.

Physician Notes: Contact regional/local Poison Centre.

5. FIRE FIGHTING MEASURES

Flash point:	>100°C/>212°F (Calculated)	**Auto-ignition temperature:**	NA
LEL (% by volume)**:**	NA	**UEL** (% by volume)**:**	NA
Conditions of flammability:	Non flammable		
Hazardous combustion products:	NA		
Unusual fire/explosion data:	NA		
Extinguishing media:	Use media appropriate for surrounding materials.		
Fire fighting procedures:	Use water spray to cool unopened containers. Cool containers with flooding quantities of water until well after fire is out.		

6. ACCIDENTAL RELEASE MEASURES

Eliminate all ignition sources. Isolate hazard area and restrict access. Try to work upwind of spill. Avoid direct contact with material. Wear NIOSH approved self-contained breathing apparatus (if applicable) and protective clothing.

Prevent spill material from entering sewers, watercourses or low-lying areas.

Stop leak only if safe to do so. Dike and contain land spills with inert material (earth, clay or sand); contain water spills by booming. For large spills, remove by mechanical means and place in containers. Absorb residue or small spills with inert absorbent material and remove to non-leaking containers for disposal. Flush area with water to remove trace residue. DO NOT flush to sewers. Collect waste for proper disposal.

Dispose of recovered materials as in Section 13.

State/provincial and federal regulations may require that environmental and / or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities.

7. HANDLING AND STORAGE

Maintain good personal hygiene. Wear appropriate personal protective equipment and avoid contact with skin, eyes or clothing. No smoking, eating or drinking allowed when using this product. Wash thoroughly after handling product. Avoid breathing vapors and prolonged or repeated contact with skin or eyes. Use adequate ventilation. Locate safety shower and eyewash station in use area.

Do not handle or store near an open flame, sources of heat, or sources of ignition. Empty containers may contain product residue. Follow labeled warnings even after container is emptied.

Air dry and then launder contaminated clothing prior to reuse. Store product-contaminated rags in container with tight-fitting lid.

Store in a cool, well-ventilated area, away from incompatibles. Keep container tightly closed when not in use.

Store in accordance with local/regional/national/international regulations.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Recommendations listed in this section indicate the type of equipment that will provide protection against overexposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices.

Ventilation system:	Mechanical ventilation is required for all indoor situations to control fugitive emissions. Concentrations in air should be maintained below the recommended threshold limit value if unprotected personnel are involved. For entry into confined spaces (i.e. bulk storage tanks) a proper confined space entry procedure must be followed, including ventilation and testing of tank atmosphere. Local ventilation recommended where mechanical ventilation is ineffective in controlling airborne concentrations below the recommended occupational exposure limit. Make up air should always be supplied to balance air exhausted (either generally or locally).
Respiratory protection:	If personal exposure exceeds the exposure limit, select appropriate protective equipment in accordance with NIOSH/OSHA recommendations.
Protective gloves:	Appropriate chemical protective gloves to prevent skin exposure.
Skin protection	Chemical resistant coveralls and boots where contact is likely. Long sleeved shirt where incidental contact is likely.
Eye/face protection:	Chemical safety goggles. A full-face shield may be necessary.
Other:	Handle in accordance with good industrial hygiene practices.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:	Liquid	**Boiling point:**	NA	**Evaporation rate:**	NA
Appearance:	Clear yellow	**Melting/Freezing point:**	-16.0ºC	**Vapour pressure:**	NA
Odor:	Mild Hydrocarbon	**Solubility in water:**	Miscible	**Viscosity:**	NA
pH:	6.0 - 8.0	**Vapour density:**	NA	**Specific Gravity:**	NA
Density (at 15℃)**:**	1.190 – 1.200 kg/L	**% Volatile:**	NA		

10. STABILITY AND REACTIVITY

Chemical stability:	Stable.
Conditions to avoid:	Sources of ignition, excessive heat.
Incompatible substances:	NA
Hazardous decomposition products:	From fire: May include oxides of carbon, potassium, and phosphorus
Corrosivity to metals:	NA
Corrosivity to non metals:	NA
Hazardous polymerization:	Does not occur.

11. TOXICOLOGICAL INFORMATION

Acute exposure:	See Section 2	**Chronic exposure:**	See Section 2
Reproductive toxicity:	NA		
Mutagenicity:	NA		
Carcinogenicity:	Not specifically listed or designated by ACGIH, IARC, NTP, or OSHA		
Fetotoxicity/teratogenicity:	NA		
Irritancy:	See Section 2		
Toxicologically synergistic products:	NA		

12. ECOLOGICAL INFORMATION

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. State/provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident.

May be harmful to aquatic life.

13. DISPOSAL CONSIDERATIONS

Waste management priorities (depending on volumes and concentration of waste) are 1. Recycle (reprocess) 2. Energy recovery (cement kilns, thermal power generation), 3. Incineration, 4. Disposal at a licensed waste disposal facility. Do not attempt to combust waste on-site; incinerate at a licensed waste disposal site with approval of environmental authority.

Dispose of in accordance with municipal, state/provincial and federal regulations. These regulations may apply to empty containers, liner and rinsate.

14. TRANSPORT INFORMATION (TDG)

Shipping Name: **NOT REGULATED FOR TRANSPORT BY CANADIAN TDG REGULATIONS**

Primary Class: N/A **Subsidiary Class:** N/A **PIN (UN / NA):** N/A **Packing Group:** N/A

15. REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

These products, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act.

16. OTHER INFORMATION

Prepared by: Regulatory Compliance Group **Telephone:** 780-440-6187

Date prepared: May 1, 2013

Revision: 3

The information contained herein is provided free of charge and is offered to the user in good faith as accurate. Certain aspects of the information have been obtained from sources outside of the supplier and while WECC believes such information to be correct, it cannot guarantee the accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either expressed or implied.

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **EZ-MUD®**

Revision Date: 01-May-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: EZ-MUD®
Synonyms: None
Chemical Family: Blend
Application: Shale Inhibitor

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Hydrotreated light petroleum distillate	64742-47-8	10 - 30%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin
Wash with soap and water. Get medical attention if irritation persists. Remove contaminated shoes and discard.

Eyes
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion
Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	> 200
Flash Point/Range (C):	Not Determined
Flash Point Method:	PMCC
Autoignition Temperature (F):	> 392
Autoignition Temperature (C):	> 200
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Use water spray to cool fire exposed surfaces.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 1, Reactivity 0
HMIS Ratings: Health 2, Flammability 1, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

Personal Protective Equipment If engineering controls and work practices cannot prevent excessive exposures, the selection and proper use of personal protective equipment should be determined by an industrial hygienist or other qualified professional based on the specific application of this product.

Respiratory Protection Organic vapor respirator with a dust/mist filter. In high concentrations, supplied air respirator or a self-contained breathing apparatus.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	White to gray
Odor:	Mild hydrocarbon
pH:	6-8
Specific Gravity @ 20 C (Water=1):	1.0
Density @ 20 C (lbs./gallon):	8.3
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	347
Boiling Point/Range (C):	175
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	0.002
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	70
Evaporation Rate (Butyl Acetate=1):	< 1
Solubility in Water (g/100ml):	Partially soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Ammonia. Oxides of nitrogen. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Aspiration into the lungs may cause chemical pneumonitis including coughing, difficulty breathing, wheezing, coughing up blood and pneumonia, which can be fatal. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.

Aggravated Medical Conditions Lung disorders.

Chronic Effects/Carcinogenicity No data available to indicate product or components present at greater than 1% are chronic health hazards.

Other Information None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability BOD(28 Day): 40% of COD

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity:	TLM96: >1000 mg/l (Pimephales promelas)
Acute Crustaceans Toxicity:	TLM48: 98 mg/l (Acartia tonsa)
Acute Algae Toxicity:	EC50: 16.70 mg/l (Skeletonema costatum)

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **N-DRIL® LO**

Revision Date: 01-May-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: N-DRIL® LO
Synonyms: None
Chemical Family: Polysaccharide
Application: Viscosifier

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Cellulose derivative		60 - 100%	10 mg/m^3	15 mg/m^3

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	430
Flash Point/Range (C):	221
Flash Point Method:	Not Determined
Autoignition Temperature (F):	752
Autoignition Temperature (C):	400
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid creating or inhaling dust. Avoid dust accumulations. Slippery when wet.

Storage Information Store away from oxidizers. Store in a dry location. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls A well ventilated area to control dust levels. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Powder
Color:	White to off white
Odor:	Odorless
pH:	6-7
Specific Gravity @ 20 C (Water=1):	1.4
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	32 - 38
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	5
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Forms gel
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None known.
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause mild respiratory irritation.
Skin Contact	May cause mild skin irritation.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Readily biodegradable

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

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*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **N-VIS® P PLUS**

Revision Date: 01-May-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: N-VIS® P PLUS
Synonyms: None
Chemical Family: Polysaccharide
Application: Viscosifier

Manufacturer/Supplier
Baroid Fluid Services
Product Service Line of Halliburton
P.O. Box 1675
Houston, TX 77251
Telephone: (281) 871-4000
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Contains no hazardous substances	Mixture	60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause mild eye, skin, and respiratory irritation. Airborne dust may be explosive.

4. FIRST AID MEASURES

Inhalation If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.

Skin Wash with soap and water. Get medical attention if irritation persists.

Eyes In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.

Ingestion Under normal conditions, first aid procedures are not required.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined
Flash Point/Range (C):	Not Determined
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Organic dust in the presence of an ignition source can be explosive in high concentrations. Good housekeeping practices are required to minimize this potential.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 0, Flammability 0, Reactivity 0
HMIS Ratings: Health 0, Flammability 0, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment. Avoid creating and breathing dust.

Environmental Precautionary Measures None known.

Procedure for Cleaning / Absorption Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Slippery when wet. Avoid creating or inhaling dust.

Storage Information Store away from oxidizers. Store in a cool, dry location.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Dust/mist respirator. (N95, P2/P3)

Hand Protection Normal work gloves.

Skin Protection Normal work coveralls.

Eye Protection Wear safety glasses or goggles to protect against exposure.

Other Precautions None known.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Solid
Color:	White to off white
Odor:	Slight

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	5-8
Specific Gravity @ 20 C (Water=1):	1.5
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	20-35
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	1,000,000

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May impede respiration.
Skin Contact	None known.
Eye Contact	May cause mild eye irritation.
Ingestion	None known
Aggravated Medical Conditions	None known.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: > 5000 mg/kg (Rat)
Dermal Toxicity:	Not determined

Inhalation Toxicity: LC50: > 21 mg/l (Rat)

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability BOD(5 Day): 200 mg/g COD: 1600 mg/g

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: TLM96: 320-560 ppm (Oncorhynchus mykiss)
Acute Crustaceans Toxicity: TLM96: > 75000 ppm (Mysidopsis bahia)
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Bury in a licensed landfill according to federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	None
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	Un-Controlled

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

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*****END OF MSDS*****

Section 1: Product & Company Information

Product Name: Salt

Chemical Family: Salt

Product Use: Drilling Fluid Additive

Workplace Hazardous Materials Information Systems Data (WHMIS):

Class ID	Class	Workplace Hazard
None	Not a Controlled Product	

Manufacturer Name: Bri-Chem Supply Ltd.

Address: 2125, 64th Avenue, Edmonton, AB T6P 1Z4 Canada

General Phone Number: (780) 455-8667

General Fax Number: (780) 451-4420

MSDS Revision Date: May 1, 2013

Supercedes: January 1, 2011

Prepared By: Bri-Chem Supply Ltd.

Preparer's Phone: (780) 455-8667

Section 2: Composition/Information on Ingredients

Chemical Name	Concentration	CAS#
Sodium Chloride		7647-14-15

Section 3: Hazards Identification

Emergency Overview: None required.

Routes of Entry:

Skin Contact: Yes

Skin Absorption: No

Eye Contact: Yes

Inhalation: Yes

Ingestion: Yes

Potential Health Effects:

Skin: May cause slight irritation.

Eye: May cause mild irritation.

Inhalation: May cause irritation of the upper respiratory tract.

Ingestion: May cause irritation in the mouth, esophagus, and stomach.

Section 4: First Aid Measures

Eye Contact: Flush with water for at least 15 minutes. If adverse symptoms develop or persist, seek medical attention.

Skin Contact: Wash with soap and water. If adverse symptoms develop, seek medical attention.

Inhalation: Remove from exposure. If symptoms persist, seek medical attention.

Ingestion: DO NOT induce vomiting. Seek immediate medical attention.

Other First Aid: None required.

Section 5: Fire Fighting Measures

Conditions Of Flammability:	Non-flammable
Extinguishing Media:	Dry chemical, CO_2, foam, water
Flashpoint:	N/A
Upper Flammable Limit:	N/A
Lower Flammable Limit:	N/A
Autoignition Temperature:	N/A
Protective Equipment:	Firefighters must wear appropriate breathing apparatus and clothing.
Sensitivity To Impact or Static Discharge:	N/A
Hazardous Combustion Products:	N/A
Fire Comment:	

Section 6: Accidental Release Measures

Personnel Precautions:	Use proper personal protective equipment as listed in section 8.
Spill Cleanup Measures:	Use appropriate safety equipment. Small spills, sweep up and put into approved DOT containers for disposal or re-use. Large spills, do not allow to enter waterways, sweep or shovel into approved DOT containers for re-use or disposal.

Section 7: Handling & Storage

Handling:	Avoid ingestion. Practice reasonable caution and personal cleanliness. Avoid skin and eye contact.
Storage:	Store in a cool, dry, well ventilated place. Keep container tightly closed and away from incompatible materials.

Section 8: Exposure Controls, Personal Protection, Exposure Guidelines

Engineering Controls: None required for normal use.

Personal Protective Equipment: Chemical-resistant clothing is recommended, including gloves, apron, and goggles.

Respiratory Protection: In absence of proper ventilation, recommended NIOSH-approved dust respirator.

Exposure Limits: ACGH nuisance dust TLV-TWA: 10 mg/m^3 total dust

Chemical Name	ACGIH TLV-TWA	OSHA PEL-TWA
Sodium Chloride	Not Available	Not Available

Section 9: Physical & Chemical Properties

Physical State: Solid

Odour And Appearance: White granules; odourless

Odour Threshold: N/A

Boiling Point: 1413°C

Evaporation Rate: Not determined

Melting Point: 804°C

Freezing Point: Not determined

Specific Gravity: 2.165

Solubility in Water: 1g\2.8 1

Vapour Density: Not determined

Vapour Pressure: 1.0 mm @ 865°C

pH: 6.7-7.3

Flash Point: N/A

Volatility (% by volume): Not determined

Coefficient of Water to Oil distribution: Not determined

Section 10: Stability & Reactivity

Chemical Stability: Yes

Hazardous Polymerization: Will not occur.

Conditions Of Chemical Instability:

Incompatible Substances: Lithium, bromide tri-flourides, strong acids, strong oxidizing agents

Special Decomposition Products: HCl, fumes of Na_2O

Section 11: Toxicological Information

Chemical Name	LD_{50} (Oral Rat)	LD_{50} (Dermal Rabbit)	LC_{50} (Inhalation Rat)
Sodium Chloride	Not Available	Not Available	Not Available

Effects Of Acute Exposure: Mild irritant to mucous membranes and upper respiratory tract.

Effects Of Chronic Exposure: Modulator of blood pressure.

General Irritancy Of Product: Not known

Sensitization: N/A

Carcinogenicity: N/A

Reproductive Toxicity: N/A

Teratogenicity: N/A

Embryotoxicity: Not Available

Mutagenicity: N/A

Synergistic Products: N/A

Section 12: Ecological Information

Ecotoxicity: Not Available

Environmental Fate: Not Available

Section 13: Disposal Considerations

Waste Disposal: All waste should be disposed of according to federal, provincial and local regulations. Containers should NOT be re-used. Containers should be disposed of in accordance with government regulations.

Section 14: Transport Information

TDG Classification: Not regulated

DOT UN Number: Not regulated

Shipping Notes: No special requirements

Section 15: Regulatory Information

Workplace Hazardous Materials Information Systems Data (WHMIS):

Class ID	Class	Workplace Hazard
None	Not a Controlled Product	

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

Section 16: Additional Information

MSDS Revision Date: May 1, 2013

MSDS Revision Notes:

MSDS Author: Bri-Chem Supply Ltd.

Disclaimer: This Health and Safety Information is correct to the best of our knowledge and belief at the date of its publication but we cannot accept liability for any loss, injury or damage which may result from its use. We shall ensure, so far as is reasonably practicable, that any revision of this Data Sheet is sent to all customers to whom we have directly supplied this substance, but must point out that it is the responsibility of any intermediate supplier to ensure that such revision is passed to the ultimate user. The information given in the Data Sheet is designed only as a guidance for safe handling, storage and the use of the substance. It is not a specification nor does it guarantee any specific properties. All chemicals should be handled only by competent personnel, within a controlled environment. Should further information be required, this can be obtained through the sales office whose address is at the top of this data sheet.

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY:	**Diversity Technologies Corp.** **8750 – 53rd Ave.** **Edmonton, AB T6E 5G2**	DATE: PHONE: FAX:	**May 1, 2013** **780-440-4923** **780-469-1899**

PRODUCT NAME: **SODA ASH**

PRODUCT USE: Oil well drilling fluid and cement additive.
CHEMICAL FAMILY: Inorganic sodium salt CAS #: 497-19-8

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION: D2B, E
WORKPLACE HAZARD: Eye irritant; corrosive to aluminum

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME: Not regulated under TDG
TDG CLASSIFICATION: Not applicable
UN NUMBER (PIN): Not applicable
PACKING GROUP: Not applicable

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENT	% (w/w)	CAS NUMBER	LD_{50}Oral-Rat	LC_{50}Inhal-Rat	ACGIH-TLV
Sodium carbonate	99.8	497-19-8	4090 mg/kg	2.3mg/L/2hr	Not established

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY: ☑ EYE CONTACT ☑ SKIN CONTACT ☑ INHALATION ☐ INGESTION
EYE CONTACT: Dust and concentrated solutions may cause moderate to severe eye irritation.
SKIN CONTACT: Non-irritating to intact skin. Minor irritation may occur on abraded skin. Prolonged contact may cause irritation (red, dry, cracked skin).
INGESTION: Although low in toxicity, ingestion can be harmful. May cause nausea, vomiting, stomachache and diarrhea.
INHALATION: Excessive levels of airborne dust may irritate the mucous membranes and upper respiratory tract.
CARCINOGENICITY: Not listed by NTP, IARC, OSHA or ACGIH.
TERATOGENICITY: No information available.
REPRODUCTIVE TOXICITY: No information available.
MUTAGENICITY: No information available.
SYNERGISTIC PRODUCTS: No information available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT:	Remove contaminated clothing and wash thoroughly with water and soap. If irritation occurs and persists, obtain medical attention.
EYE CONTACT:	Immediately flush eyes with gently flowing warm water for 15 minutes or until irritation ceases, lifting the upper and lower eyelids occasionally. When flushing period is complete, obtain medical attention.
INGESTION:	Do not induce vomiting. Rinse mouth with water. Give one to two glasses of water dilute. Obtain medical attention immediately. Never give anything by mouth if victim is unconscious, rapidly losing consciousness or convulsing.
INHALATION:	Move to fresh air. Apply oxygen or artificial respiration if required. If breathing difficulties or distress continues, obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	White granular solid; odourless
SPECIFIC GRAVITY:	2.509
BOILING POINT (°C):	Decomposes
MELTING POINT (°C):	851
SOLUBILITY IN WATER:	33.2% maximum pH: 11.4 (1% solution)
PERCENT VOLATILE BY VOLUME:	Not applicable
EVAPORATION RATE:	Not applicable
VAPOUR PRESSURE (mmHg):	Not applicable
VAPOUR DENSITY (air = 1):	Not applicable
BULK DENSITY:	0.86 – 1.12 g/mL

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	Not combustible
FLAMMABLE LIMITS:	Not applicable
EXTINGUISHING MEDIA:	Use media appropriate for packaging and surrounding materials.
SPECIAL FIRE FIGHTING PROCEDURES:	Self-contained breathing apparatus required for fire fighting personnel.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	None known.
HAZARDOUS COMBUSTION PRODUCTS:	Does not burn, but may decompose upon heating to produce corrosive and/or toxic fumes.

SECTION VII: REACTIVITY DATA

STABILITY:	☑ STABLE	☐ UNSTABLE
INCOMPATIBILITY (CONDITIONS TO AVOID):	Contact with acids will release carbon dioxide gas. Can react violently with red, hot aluminum metal; fluorine gas; lithium; and 2,4,6-trinitrotoluene. Sodium carbonate solutions (concentrations up to 35%) are corrosive to aluminum, lead, and zinc and zinc brasses at 21 deg C. Solid sodium carbonate is corrosive to aluminum at 100% relative humidity and normal temperatures.	
CONDITIONS OF REACTIVITY:	Not available.	
HAZARDOUS DECOMPOSITION PRODUCTS:	Heating to decomposition, it emits fumes of sodium oxide.	
HAZARDOUS POLYMERIZATION:	☑ WILL NOT OCCUR	☐ MAY OCCUR

SECTION VIII: PREVENTIVE MEASURES

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	NIOSH/MESA approved dust mask recommended for low levels of dust. Use approved respirator with dust cartridges if dust concentration in air exceeds TLV.
VENTILATION:	Local exhaust recommended if concentration of dust exceeds TLV (nuisance dust = 15 mg/m3).
PROTECTIVE GLOVES:	Suggest plastic or rubber.
EYE PROTECTION:	Safety glasses or goggles. Do not wear contact lenses when handling this material.
OTHER PROTECTIVE EQUIPMENT (SPECIFY):	Protective clothing as required to prevent contact. Ensure eye was station and emergency shower are available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid contact with eyes or prolonged skin contact. Avoid breathing dust. Use good personal hygiene and housekeeping. Launder contaminated clothing before reuse. Store in a cool, dry, well-ventilated place away from acids. Product is hygroscopic, prolonged storage may cause product to cake and become wet from atmospheric moisture. Obey hazard warnings and handle empty containers as if they were full.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Wear appropriate safety gear including eye and respiratory protection. Clean spill by sweeping up and shoveling into containers. Collect uncontaminated material for repackaging. Collect contaminated material in an approved container for disposal. Cautiously spray residue with plenty of water. Collect wash water in an approved container for disposal.

WASTE DISPOSAL METHOD

Dispose in accordance with federal, provincial and local regulations. If permitted by applicable disposal regulations, bury in a solid waste landfill or dissolve and neutralize as follows: Dissolve in water using caution as solution can get hot. Neutralize with acid and flush to sewer with plenty of water. Good ventilation is required during neutralization due to release of CO2 gas. Neutralized wastes may have to be disposed of by an approved contractor. It is the responsibility of the end-user to determine if material meets the criteria of hazardous waste at the time of disposal. Empty containers, which have not been cleaned and purged, contain residual hazardous material and must be disposed of, or recycled, in accordance with local regulations.

SECTION IX: PREPARATION

The information contains herein is given in good faith, but no warranty, expressed or implied, is made.

DATE ISSUED:	**May 1, 2013**
SUPERSEDES:	May 12, 2010
BY:	Regulatory Affairs
PHONE:	780-440-4923

SECTION I: IDENTIFICATION OF PRODUCT

COMPANY:	**Diversity Technologies Corp.** **8750 – 53rd Ave.** **Edmonton, AB T6E 5G2**	DATE: PHONE: FAX:	**May 1, 2013** **780-440-4923** **780-469-1899**

PRODUCT NAME: **XL - DEFOAMER**

PRODUCT USE:	Oil well drilling fluid additive		
CHEMICAL FAMILY:	Alkanol and surfactant blend in petroleum distillate.	CAS #:	Mixture

WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)

WHMIS CLASSIFICATION:	B3; D2B
WORKPLACE HAZARD:	Combustible liquid; skin and eye irritant

TRANSPORTATION OF DANGEROUS GOODS (TDG)

PROPER SHIPPING NAME:	Not regulated under TDG
TDG CLASSIFICATION:	Not applicable
UN NUMBER (PIN):	Not applicable
PACKING GROUP:	Not applicable

SECTION II: HAZARDOUS INGREDIENTS

INGREDIENT	% (w/w)	CAS NUMBER	LD_{50}Oral-Rat	LC_{50}Inhal-Rat	ACGIH-TLV
2-Ethyl hexanol	40 – 70	104-76-7	2049 mg/kg	Not available	Not established

SECTION III: HEALTH HAZARDS

ROUTE OF ENTRY:	☑ EYE CONTACT ☑ SKIN CONTACT ☑ INHALATION ☐ INGESTION
EYE CONTACT:	Severe irritant: May cause redness, inflammation and watering upon contact. High vapour concentrations may cause irritation.
SKIN CONTACT:	May cause mild to moderate skin irritation including redness and swelling. May cause more severe response under clothing, gloves, etc. Repeated or prolonged contact may cause dermatitis.
INGESTION:	May cause gastrointestinal irritation.
INHALATION:	May cause irritation of the respiratory tract. Prolonged excessive exposure may cause adverse effects including central nervous system depression. Aspiration in to lungs may occur during swallowing or vomiting, causing lung damage or even death due to chemical pneumonia.
CARCINOGENICITY:	No information available.

TERATOGENICITY:	2-Ethylhexanol has caused birth defects in laboratory animals only at doses toxic to the mother.
REPRODUCTIVE TOXICITY:	No information available.
MUTAGENICITY:	No information available.
SYNERGISTIC PRODUCTS:	No information available.

SECTION IV: FIRST AID MEASURES

SKIN CONTACT:	Remove contaminated clothing and footwear. Thoroughly wash affected area with soap and water. If irritation persists, or develops, obtain medical attention.
EYE CONTACT:	Immediately flush with gently flowing warm water for 15 minutes, or until irritation ceases. When flushing time is completed obtain medical attention.
INGESTION:	Do not induce vomiting. If vomiting occurs, keep head below hips to reduce risk of aspiration of vomitus into lungs. Get immediate medical attention.
INHALATION:	Move patient to fresh air. Apply oxygen or artificial respiration as required. If breathing difficulties or distress continues obtain medical attention.

SECTION V: PHYSICAL DATA

APPEARANCE AND ODOUR:	Clear water white liquid; sweet odour
SPECIFIC GRAVITY:	0.89
BOILING POINT (°C):	Not determined
MELTING POINT (°C):	<-25
SOLUBILITY IN WATER:	Dispersible pH: 7 - 8
PERCENT VOLATILE BY VOLUME:	Not determined
EVAPORATION RATE:	Not determined
VAPOUR PRESSURE (mmHg):	Not determined
VAPOUR DENSITY (air = 1):	Not available
BULK DENSITY:	Not applicable

SECTION VI: FIRE AND EXPLOSION HAZARD DATA

FLASH POINT:	73.3°C (TCC)
FLAMMABLE LIMITS:	Not determined
EXTINGUISHING MEDIA:	CO2; foam; dry chemical; water fog
SPECIAL FIRE FIGHTING PROCEDURES:	Self-contained breathing apparatus required for fire fighting personnel. Remove containers from fire area, or cool with water-spray, if possible.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	Explosive vapour/air mixtures may form at flash point. Vapours may travel to source of ignition and flash back.

HAZARDOUS COMBUSTION PRODUCTS:	Oxides of carbon.

SECTION VII: REACTIVITY DATA

STABILITY:	☑ STABLE	☐ UNSTABLE
INCOMPATIBILITY (CONDITIONS TO AVOID):	Strong oxidizing agents. Avoid sources of ignition.	
CONDITIONS OF REACTIVITY:	Not available.	
HAZARDOUS DECOMPOSITION PRODUCTS:	Not available.	
HAZARDOUS POLYMERIZATION:	☑ WILL NOT OCCUR	☐ MAY OCCUR

SECTION VIII: PREVENTIVE MEASURES

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:	In absence of proper ventilation, recommend approved respirator with organic vapour/mist cartridges.
VENTILATION:	Use in well ventilated area. Use local exhaust ventilation, process enclosure or other engineering controls to maintain airborne levels below TLV.
PROTECTIVE GLOVES:	Wear chemical resistant gloves: Viton or rubber recommended.
EYE PROTECTION:	Wear chemical splash goggles when handling.
OTHER PROTECTIVE EQUIPMENT (SPECIFY):	Suggest rubber apron. Ensure eye wash station and safety shower are available.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid ingestion. Practice reasonable caution and personal cleanliness. Avoid skin and eye contact. Wash thoroughly after handling. Clean contaminated clothing and footwear before reuse. Avoid breathing mists and vapours. Store in a cool area separate from incompatible materials. Store unused material in original container. Keep container tightly closed when not in use. Handle only in area free of ignition sources. Ground containers when transferring material. Empty containers, which have not been cleaned and purged, contain residual hazardous material and should be handled and stored as if full.

STEPS TO BE TAKEN IN CASE THE MATERIAL IS SPILLED OR RELEASED

Use appropriate protective equipment. Dike to contain spill and to prevent water pollution. Recover diked material by vacuum. Soak up small spills with absorbent material. Collect contaminated material and absorbents in approved containers for disposal. Flush area with water.

WASTE DISPOSAL METHOD

Dispose in accordance with all federal, provincial, and local regulations. It is the responsibility of the end-user to determine if material meets the criteria of hazardous waste at the time of disposal. Empty containers must be disposed or, or recycled, in accordance with local regulations.

SECTION IX: PREPARATION

The information contains herein is given in good faith, but no warranty, expressed or implied, is made.

DATE ISSUED:	**May 1, 2013**
SUPERSEDES:	May 18, 2011
BY:	Regulatory Affairs
PHONE:	780-440-4923

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **FE-1-60**

Revision Date: 02-Jan-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FE-1-60
Synonyms: None
Chemical Family: Organic acid
Application: Acid

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Acetic acid	64-19-7	60 - 100%	10 ppm	10 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye, skin, and respiratory burns. May be harmful if swallowed. Combustible.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion
Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	131
Flash Point/Range (C):	55
Flash Point Method:	Not Determined
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	5.4
Flammability Limits in Air - Upper (%):	16

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Use water spray to cool fire exposed surfaces. Decomposition in fire may produce toxic gases. Do not allow runoff to enter waterways.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 1, Reactivity 0
HMIS Ratings: Health 2, Flammability 1, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store in a cool well ventilated area. Keep container closed when not in use. Product has a shelf life of 24 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Organic vapor/acid gas respirator.

Hand Protection Impervious rubber gloves.

Skin Protection Full protective chemical resistant clothing.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear
Odor:	Acrid

9. PHYSICAL AND CHEMICAL PROPERTIES

pH:	1.38
Specific Gravity @ 20 C (Water=1):	1.05
Density @ 20 C (lbs./gallon):	8.75
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	244
Boiling Point/Range (C):	117
Freezing Point/Range (F):	62
Freezing Point/Range (C):	16
Vapor Pressure @ 20 C (mmHg):	11.7
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	100
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	60.6

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong alkalis.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Causes severe respiratory irritation.
Skin Contact	Causes severe burns.
Eye Contact	May cause eye burns.
Ingestion	Causes burns of the mouth, throat and stomach.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	Prolonged, excessive exposure may cause erosion of the teeth.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	LD50: 3310 mg/kg (Rat)
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Readily biodegradable

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN2790,Acetic Acid Solution, 8, II
NAERG 153

Canadian TDG
Acetic Acid Solution, 8, UN2790, II

ADR

UN2790,Acetic Acid Solution, 8, II

Air Transportation

ICAO/IATA

UN2790,Acetic Acid Solution, 8, II

Sea Transportation

IMDG

UN2790,Acetic Acid Solution, 8, II
EmS F-A, S-B

Other Transportation Information

Labels: Corrosive

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 952 Gallons based on Acetic acid (CAS: 64-19-7).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Corrosivity D002
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	B3 Combustible Liquids E Corrosive Material D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **FORMIC ACID 90%**

Revision Date: 02-Jan-2013

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: FORMIC ACID 90%
Synonyms: None
Chemical Family: Organic acid
Application: Solvent

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Formic acid	64-18-6	60 - 100%	5 ppm	5 ppm

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye and skin burns. May cause respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. Repeated overexposure may cause liver and kidney effects. Combustible.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion
Do not induce vomiting. Slowly dilute with 1-2 glasses of water or milk and seek medical attention. Never give anything by mouth to an unconscious person.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	121
Flash Point/Range (C):	49
Flash Point Method:	Not Determined
Autoignition Temperature (F):	1114
Autoignition Temperature (C):	601
Flammability Limits in Air - Lower (%):	18
Flammability Limits in Air - Upper (%):	57

Fire Extinguishing Media Water fog, carbon dioxide, foam, dry chemical.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Do not allow runoff to enter waterways.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 3, Flammability 2, Reactivity 0
HMIS Ratings: Health 3, Flammability 2, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Neutralize to pH of 6-8. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from alkalis. Store away from oxidizers. Keep container closed when not in use. Product has a shelf life of 12 months.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Acid gas respirator.
In high concentrations, supplied air respirator or a self-contained breathing apparatus.

Hand Protection Impervious rubber gloves.

Skin Protection Full protective chemical resistant clothing.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Clear colorless
Odor:	Sharp
pH:	1
Specific Gravity @ 20 C (Water=1):	1.2
Density @ 20 C (lbs./gallon):	10.0
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	215
Boiling Point/Range (C):	101
Freezing Point/Range (F):	50
Freezing Point/Range (C):	10
Vapor Pressure @ 20 C (mmHg):	23
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	100
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Miscible
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	46.03

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers. Strong alkalis.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	Causes severe respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness.
Skin Contact	Causes severe burns.
Eye Contact	May cause eye burns. May cause permanent eye damage.
Ingestion	Causes burns of the mouth, throat and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea. May cause kidney damage.
Aggravated Medical Conditions	Skin disorders.
Chronic Effects/Carcinogenicity	Repeated overexposure may cause liver and kidney effects.

Other Information None known.

Toxicity Tests

Oral Toxicity: LD50: 1100 mg/kg (Rat)

Dermal Toxicity: Not determined

Inhalation Toxicity: LC50: 15000 mg/m^3/15 min. (Rat)

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Readily biodegradable

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1779,Formic Acid, 8, (3), II
RQ (Formic Acid - 2273 kg.)
NAERG 153

Canadian TDG
Formic Acid, 8, (3), UN1779, II

ADR

UN1779,Formic Acid, 8, (3), II

Air Transportation

ICAO/IATA

UN1779,Formic Acid, 8, (3), II
RQ (Formic Acid - 2273 kg.)

Sea Transportation

IMDG

UN1779,Formic Acid, 8, (3), II
RQ (Formic Acid - 2273 kg.)
EmS F-A, S-B

Other Transportation Information

Labels: Corrosive

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 555 Gallons based on Formic acid (CAS: 64-18-6).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does meet the criteria of a hazardous waste as defined by the US EPA, because of: Ignitability D001 Corrosivity D002
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.

WHMIS Hazard Class

E Corrosive Material
B3 Combustible Liquids
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **MSA II INHIBITOR**

Revision Date: 03-Jan-2012

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: MSA II INHIBITOR
Synonyms: None
Chemical Family: Blend
Application: Corrosion Inhibitor

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Thiourea	62-56-6	10-30	Not applicable	Not applicable
Acetone	67-64-1	1-5	500 ppm	1000 ppm
Ethylene glycol	107-21-1	10-30	100 mg/m^3	50 ppm CEIL

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. May cause birth defects. Potential carcinogen. Combustible. May cause allergic skin reaction.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion
Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	120
Flash Point/Range (C):	48
Flash Point Method:	SFCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Use water spray to cool fire exposed surfaces. Vapors are heavier than air and may accumulate in low areas. Vapors may travel along the ground to be ignited at distant locations. Do not allow runoff to enter waterways.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 3, Flammability 2, Reactivity 0
HMIS Ratings: Health 3, Flammability 2, Physical Hazard 0 , PPE: X

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Remove ignition sources and work with non-sparking tools. Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors. Wash hands after use. Launder contaminated clothing before reuse. Ground and bond containers when transferring from one container to another.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep container closed when not in use. Keep from heat, sparks, and open flames.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Organic vapor respirator.
In high concentrations, supplied air respirator or a self-contained breathing apparatus.

Hand Protection Neoprene gloves. Nitrile gloves. Use Viton or 4H gloves.

Skin Protection Rubber apron. Rubber boots.

Eye Protection	Chemical goggles; also wear a face shield if splashing hazard exists.
Other Precautions	Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Dark brown
Odor:	Pungent
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	1.09
Density @ 20 C (lbs./gallon):	9.08
Bulk Density @ 20 C (lbs/ft3):	68
Boiling Point/Range (F):	212
Boiling Point/Range (C):	100
Freezing Point/Range (F):	-20
Freezing Point/Range (C):	-29
Vapor Pressure @ 20 C (mmHg):	16.4
Vapor Density (Air=1):	>1
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Disperses
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Oxides of nitrogen. Oxides of sulfur. Carbon monoxide and carbon dioxide. Hydrogen chloride.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness. May cause respiratory irritation.
Skin Contact	May cause moderate skin irritation. May cause an allergic skin reaction.
Eye Contact	May cause severe eye irritation. May cause permanent eye damage.
Ingestion	Harmful if swallowed. May cause stomach discomfort. May cause kidney damage. May affect the blood and blood system. May cause thyroid damage.

Aggravated Medical Conditions Skin disorders. Eye ailments. Liver disorders. Blood disorders. Central nervous system disorders. Respiratory disorders. Thyroid disorders.

Chronic Effects/Carcinogenicity Prolonged or repeated exposure may cause kidney damage. Prolonged or repeated exposure may cause reproductive system damage. Prolonged or repeated exposure may cause liver, heart, blood and brain damage. Contains thiourea, a suspected carcinogen of the liver and thyroid. Chronically high exposures cause bone marrow depression with anemia, leukopenia and thromboxytopenia. Prolonged or repeated exposure may cause embryo and fetus toxicity.

Other Information None known.

Toxicity Tests

Oral Toxicity: Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT

UN1993,Flammable Liquid, N.O.S.(Contains Acetone), 3, III, (48.9 C)
RQ (Thiourea - 4.5 kg.)
NAERG 128

Canadian TDG
Flammable Liquid, N.O.S.(Contains Acetone), 3, UN1993, III, (48.9 C)

ADR

UN1993,Flammable Liquid, N.O.S.(Contains Acetone), 3, III

Air Transportation

ICAO/IATA

UN1993,Flammable Liquid, N.O.S., 3, III
(Contains Acetone)
RQ (Thiourea - 4.5 kg.)

Sea Transportation

IMDG

UN1993,Flammable Liquid, N.O.S.(Contains Acetone), 3, III, (48.9 C)
RQ (Thiourea - 4.5 kg.)
EmS F-E, S-E

Other Transportation Information

Labels: Flammable Liquid

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: Ethylene Glycol//107-21-1 Thiourea//62-56-6
EPA CERCLA/Superfund Reportable Spill Quantity	EPA Reportable Spill Quantity is 11 Gallons based on Thiourea (CAS: 62-56-6).
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	Product contains one or more components not listed on the inventory.
WHMIS Hazard Class	D2B Toxic Materials B3 Combustible Liquids D1B Toxic Materials D2A Very Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **WS-36M**

Revision Date: 04-Jan-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: WS-36M
Synonyms: None
Chemical Family: Fatty-Acid
Application: Emulsifier

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Ethoxylated sorbitol esters		60 - 100%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview May cause eye, skin, and respiratory irritation. May be harmful if swallowed.

4. FIRST AID MEASURES

Inhalation If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin Wash with soap and water. Get medical attention if irritation persists. Remove contaminated clothing and launder before reuse.

Eyes In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion If swallowed, call a physician immediately. Only induce vomiting at the instruction of a physician. Never give anything by mouth to an unconscious person.

Notes to Physician Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	Not Determined**Min:** > 200
Flash Point/Range (C):	Not Determined**Min:** > 93
Flash Point Method:	TCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam.

Special Exposure Hazards Decomposition in fire may produce toxic gases.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 1, Flammability 1, Reactivity 0
HMIS Ratings: Health 0, Flammability 1, Reactivity 1

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Remove ignition sources and work with non-sparking tools. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid contact with eyes, skin, or clothing. Avoid breathing vapors.

Storage Information Store away from oxidizers. Store in a cool well ventilated area. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area. Local exhaust ventilation should be used in areas without good cross ventilation.

Respiratory Protection Not normally needed. But if significant exposures are possible then the following respirator is recommended:
Organic vapor respirator.

Hand Protection Nitrile gloves. Neoprene gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible. Rubber boots

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State: Liquid

9. PHYSICAL AND CHEMICAL PROPERTIES

Color:	Clear amber
Odor:	Mild sweet
pH:	5.1 (5%(75%IPA/25% H20))
Specific Gravity @ 20 C (Water=1):	1.011
Density @ 20 C (lbs./gallon):	8.42
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	.093
Vapor Density (Air=1):	> 1
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Disperses
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistrokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	None anticipated
Incompatibility (Materials to Avoid)	Strong oxidizers.
Hazardous Decomposition Products	Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation.
Skin Contact	May cause skin defatting with prolonged exposure. May cause skin irritation.
Eye Contact	May cause eye irritation.
Ingestion	Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea.
Aggravated Medical Conditions	Respiratory disorders. Eye ailments. Skin disorders.
Chronic Effects/Carcinogenicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined

Dermal Toxicity: Not determined

Inhalation Toxicity: Not determined

Primary Irritation Effect: Not determined

Carcinogenicity Not determined

Genotoxicity: Not determined

Reproductive / Developmental Toxicity: Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air) Not determined

Persistence/Degradability Not determined

Bio-accumulation Not determined

Ecotoxicological Information

Acute Fish Toxicity: Not determined
Acute Crustaceans Toxicity: Not determined
Acute Algae Toxicity: Not determined

Chemical Fate Information Not determined

Other Information Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method Disposal should be made in accordance with federal, state, and local regulations.

Contaminated Packaging Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	All components listed do not apply to the California Proposition 65 Regulation.
MA Right-to-Know Law	Does not apply.
NJ Right-to-Know Law	Does not apply.
PA Right-to-Know Law	Does not apply.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.
WHMIS Hazard Class	D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information	For additional information on the use of this product, contact your local Halliburton representative. For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

HALLIBURTON

MATERIAL SAFETY DATA SHEET

Product Trade Name: **DURAKLEEN**

Revision Date: 04-Jan-2011

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Trade Name: DURAKLEEN
Synonyms: None
Chemical Family: Blend
Application: Solvent

Manufacturer/Supplier
Halliburton Energy Services
P.O. Box 1431
Duncan, Oklahoma 73536-0431
Emergency Telephone: (281) 575-5000

Prepared By
Chemical Compliance
Telephone: 1-580-251-4335
e-mail: fdunexchem@halliburton.com

2. COMPOSITION/INFORMATION ON INGREDIENTS

Substances	CAS Number	PERCENT	ACGIH TLV-TWA	OSHA PEL-TWA
Heavy aromatic petroleum naphtha	64742-94-5	30 - 60%	Not applicable	Not applicable
Terpene hydrocarbon by-products	68956-56-9	5 - 10%	Not applicable	Not applicable
Cyclohexanone	108-94-1	1 - 5%	20 ppm	50 ppm
n-Methylpyrrolidone	872-50-4	1 - 5%	Not applicable	Not applicable

3. HAZARDS IDENTIFICATION

Hazard Overview
May cause eye, skin, and respiratory irritation. May cause headache, dizziness, and other central nervous system effects. May be harmful if swallowed. May be absorbed through the skin. Repeated overexposure may cause liver and kidney effects. Combustible.

4. FIRST AID MEASURES

Inhalation
If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

Skin
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes. Get medical attention. Remove contaminated clothing and launder before reuse.

Eyes
In case of contact, or suspected contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention immediately after flushing.

Ingestion
Get medical attention! If vomiting occurs, keep head lower than hips to prevent aspiration.

Notes to Physician
Not Applicable

5. FIRE FIGHTING MEASURES

Flash Point/Range (F):	145
Flash Point/Range (C):	62.7
Flash Point Method:	PMCC
Autoignition Temperature (F):	Not Determined
Autoignition Temperature (C):	Not Determined
Flammability Limits in Air - Lower (%):	Not Determined
Flammability Limits in Air - Upper (%):	Not Determined

Fire Extinguishing Media Carbon Dioxide, Dry Chemicals, Foam.

Special Exposure Hazards Decomposition in fire may produce toxic gases. Closed containers may explode in fire. Use water spray to cool fire exposed surfaces. Do not allow runoff to enter waterways.

Special Protective Equipment for Fire-Fighters Full protective clothing and approved self-contained breathing apparatus required for fire fighting personnel.

NFPA Ratings: Health 2, Flammability 2, Reactivity 0
HMIS Ratings: Health 2, Flammability 2, Reactivity 0

6. ACCIDENTAL RELEASE MEASURES

Personal Precautionary Measures Use appropriate protective equipment.

Environmental Precautionary Measures Prevent from entering sewers, waterways, or low areas.

Procedure for Cleaning / Absorption Isolate spill and stop leak where safe. Contain spill with sand or other inert materials. Scoop up and remove.

7. HANDLING AND STORAGE

Handling Precautions Avoid breathing vapors. Avoid contact with eyes, skin, or clothing. Wash hands after use. Launder contaminated clothing before reuse.

Storage Information Store away from oxidizers. Keep from heat, sparks, and open flames. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls Use in a well ventilated area.

Respiratory Protection If engineering controls and work practices cannot keep exposure below occupational exposure limits or if exposure is unknown, wear a NIOSH certified, European Standard EN 149, or equivalent respirator when using this product. Selection of and instruction on using all personal protective equipment, including respirators, should be performed by an Industrial Hygienist or other qualified professional.

Hand Protection Impervious rubber gloves.

Skin Protection Rubber apron.

Eye Protection Chemical goggles; also wear a face shield if splashing hazard exists.

Other Precautions Eyewash fountains and safety showers must be easily accessible.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Color:	Amber
Odor:	Aromatic hydrocarbon
pH:	Not Determined
Specific Gravity @ 20 C (Water=1):	Not Determined
Density @ 20 C (lbs./gallon):	Not Determined
Bulk Density @ 20 C (lbs/ft3):	Not Determined
Boiling Point/Range (F):	Not Determined
Boiling Point/Range (C):	Not Determined
Freezing Point/Range (F):	Not Determined
Freezing Point/Range (C):	Not Determined
Vapor Pressure @ 20 C (mmHg):	Not Determined
Vapor Density (Air=1):	Not Determined
Percent Volatiles:	Not Determined
Evaporation Rate (Butyl Acetate=1):	Not Determined
Solubility in Water (g/100ml):	Slightly soluble
Solubility in Solvents (g/100ml):	Not Determined
VOCs (lbs./gallon):	Not Determined
Viscosity, Dynamic @ 20 C (centipoise):	Not Determined
Viscosity, Kinematic @ 20 C (centistokes):	Not Determined
Partition Coefficient/n-Octanol/Water:	Not Determined
Molecular Weight (g/mole):	Not Determined

10. STABILITY AND REACTIVITY

Stability Data:	Stable
Hazardous Polymerization:	Will Not Occur
Conditions to Avoid	Keep away from heat, sparks and flame.
Incompatibility (Materials to Avoid)	Strong oxidizers. Strong acids. Nitric acid. Sulfuric acid. Amines.
Hazardous Decomposition Products	Toxic fumes. Carbon monoxide and carbon dioxide.
Additional Guidelines	Not Applicable

11. TOXICOLOGICAL INFORMATION

Principle Route of Exposure	Eye or skin contact, inhalation.
Inhalation	May cause respiratory irritation. May cause central nervous system depression including headache, dizziness, drowsiness, incoordination, slowed reaction time, slurred speech, giddiness and unconsciousness. May cause liver damage. May cause kidney damage. May cause chemical pneumonia. May cause lungs to fill with fluids.
Skin Contact	May cause skin irritation. May cause skin defatting with prolonged exposure. May be absorbed through the skin and produce effects similar to those caused by inhalation and/or ingestion.
Eye Contact	May cause eye irritation. May cause corneal injury.

Ingestion	Aspiration can be a hazard if this material is swallowed. May cause liver and kidney damage. Irritation of the mouth, throat, and stomach. May cause abdominal pain, vomiting, nausea, and diarrhea. May cause central nervous system depression including headache, dizziness, drowsiness, muscular weakness, incoordination, slowed reaction time, fatigue blurred vision, slurred speech, giddiness, tremors and convulsions.
Aggravated Medical Conditions	Skin disorders. Liver and kidney disorders. Central nervous system disorders.
Chronic Effects/Carcinogenicity	Prolonged or repeated exposure may cause liver, kidney and lung effects. Prolonged or repeated exposure may cause central nervous system and brain effects.
Other Information	None known.

Toxicity Tests

Oral Toxicity:	Not determined
Dermal Toxicity:	Not determined
Inhalation Toxicity:	Not determined
Primary Irritation Effect:	Not determined
Carcinogenicity	Not determined
Genotoxicity:	Not determined
Reproductive / Developmental Toxicity:	Not determined

12. ECOLOGICAL INFORMATION

Mobility (Water/Soil/Air)	Not determined
Persistence/Degradability	Not determined
Bio-accumulation	Not determined

Ecotoxicological Information

Acute Fish Toxicity:	Not determined
Acute Crustaceans Toxicity:	Not determined
Acute Algae Toxicity:	Not determined
Chemical Fate Information	Not determined
Other Information	Not applicable

13. DISPOSAL CONSIDERATIONS

Disposal Method	Disposal should be made in accordance with federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. TRANSPORT INFORMATION

Land Transportation

DOT
Not restricted

DOT (Bulk)
UN1268, Petroleum Distillates, N.O.S., Combustible Liquid, III
Classified in accordance with 49 CFR 172.101(d)(4)

Canadian TDG
Not restricted

ADR
Not restricted

Air Transportation

ICAO/IATA
Not restricted

Sea Transportation

IMDG
Not restricted

Other Transportation Information

Labels: None

15. REGULATORY INFORMATION

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	Acute Health Hazard Chronic Health Hazard Fire Hazard
EPA SARA (313) Chemicals	This product contains toxic chemical(s) listed below which is(are) subject to the reporting requirements of Section 313 of Title III of SARA and 40 CFR Part 372: n-Methylpyrrolidone//872-50-4
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable.
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.
MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.

WHMIS Hazard Class

B3 Combustible Liquids
D1B Toxic Materials
D2B Toxic Materials

16. OTHER INFORMATION

The following sections have been revised since the last issue of this MSDS
Not applicable

Additional Information

For additional information on the use of this product, contact your local Halliburton representative.

For questions about the Material Safety Data Sheet for this or other Halliburton products, contact Chemical Compliance at 1-580-251-4335.

Disclaimer Statement

This information is furnished without warranty, expressed or implied, as to accuracy or completeness. The information is obtained from various sources including the manufacturer and other third party sources. The information may not be valid under all conditions nor if this material is used in combination with other materials or in any process. Final determination of suitability of any material is the sole responsibility of the user.

*****END OF MSDS*****

APPENDIX D

List of Potentially Applicable Permits and Authorizations

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List of Potentially Applicable Permits and Authorizations (Provincial, Federal, Municipal)

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
Government of Newfoundland and Labrador				
License to Occupy Crown Land	*Lands Act*	Any development on Crown Lands	Lands Division, Department of Environment and Conservation	Approval is required for Project activities and infrastructure on Crown Land.
Commercial Cutting Permit Operating Permit	*Forestry Act* and *Cutting of Timber Regulations*	Clearing land areas for the access road and drill site	Department of Natural Resources	A permit is required for the commercial cutting of timber on Crown Land.
Permit to Burn	*Forestry Act* and *Forest Fire Regulations*	Any burning required during Project clearing	Department of Natural Resources	A permit is required to light fires outdoors between April and December. Permits are not issued during forest fire season.
Certificate of Approval for any Alteration to a Body of Water	*Water Resources Act*	Any activities which may alter a water body	Water Resources Management Division, Department of Environment and Conservation	Approval is required before starting construction activities within 15 metres of any water body. Construction activities include all stream crossings, drainage works and any other work such as landscaping, clearing or cutting of any natural vegetation within 15 metres of a body of water.
Compliance Standard	*Water Resources Act, Environmental Control Water and Sewage Regulation*	Any waters discharged from the Project site	Department of Environment and Conservation	A person discharging materials into a body of water must comply with the standards, conditions and provisions prescribed in these regulations for the constituents, contents or description of the discharged materials. This Permit, if granted, will contain specific terms and conditions to prevent water quality degradation during construction and for the life of the project and may

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
				include requirements for water quality monitoring and reporting.
Policy Directives	*Water Resources Act*	Project activities	Water Resources Management Division, Department of Environment and Conservation	The Department has a number of potentially applicable policy directives in place for specific types of work and/or work in sensitive areas.
Water Use Authorization	*Water Resources Act*	Water withdrawal for use during construction and operation activities(if required)	Water Resources Management Division, Department of Environment and Conservation	Water use authorization is required for all beneficial uses of water.
Application for Water Well Drilling License Non-Domestic Drilled Well Permit	*Water Resources Act*	Drilling activity for a water well (if required)	Water Resources Management Division, Department of Environment and Conservation	A license is required for water well drilling in Newfoundland and Labrador.
Access to Highway Permit	*Urban and Rural Planning Act, Protected Road Zoning Regulations*	Construction of access road from TCH	Department of Transportation and Works and/or Service NL	The construction of an access to a highway that is classified as a Protected Road requires approval.
Preliminary Application to Develop Land	*Urban and Rural Planning Act, Protected Road Zoning Regulations*	Construction activity	Department of Transportation and Works and/or Service NL	Construction within the planning area boundaries of a highway that is classified as a Protected Road requires the prior approval of the Department of Transportation and Works and/or Service NL
Authority To Drill a Well Drilling Program Approval	*Petroleum and Natural Gas Act* and *Petroleum Drilling Regulations*	Drilling activity	Mineral Lands Division, Department of Natural Resources	Operator holding a subsisting licence, permit or lease issued pursuant to the *Petroleum Regulations* must apply for approval to conduct a drilling program, with information on the drilling rig and equipment and procedures to be used

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
Compliance Standard	*Environmental Protection Act, Air Pollution Control Regulations*	On-site generators	Pollution Prevention Division, Department of Environment and Conservation	The Regulations outline specific ambient air quality standards and emission standards, as well as relevant engineering design (e.g., stack height) requirements and other provisions
Quarry Permit	*Quarry Materials Act* and *Regulations*	Extracting borrow material (if required)	Mineral Lands Division, Department of Natural Resources	A permit is required to dig for, excavate, remove and dispose of any Crown quarry material.
Fuel Tank Registration - Storing and Handling Gasoline and Associated Products	*Environmental Protection Act,* and *Storage and Handling of Gasoline and Associated Products Regulations*	Storing and handling gasoline and associated products	Engineering Services Division, Service NL	Fuel Tank Registration required for storing and handling gasoline and associated products.
Mobile Fuel Storage Tank Relocation Request Form	*Environmental Protection Act* and *Environmental Guidelines for Fuel Cache Operations*	Temporary fuel storage	Engineering Services Division, Service NL	A permit is required for any temporary fuel storage in a remote location.
Permit for Storage, Handling, Use or Sale of Flammable and Combustible Liquids	*Fire Prevention Act,* and *Fire Prevention Flammable and Combustible Liquids Regulations*	Storing and handling flammable liquids	Engineering Services Division, Service NL	This permit is issued on behalf of the Office of the Fire Commissioner. Approval is based on information provided for the Certificate of Approval for Storing and Handling Gasoline and Associated Products.
Compliance Standard	*Dangerous Goods Transportation Act* and *Regulations*	Storing, handling and transporting fuel, oil and lubricants	Department of Transportation and Works	If the materials are transported, handled and stored fully in compliance with the regulations, a permit is not required. A Permit of Equivalent Level of Safety is required if a variance from the regulations is necessary.

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
				Transporting goods considered dangerous to public safety must comply with regulations.
Compliance Standard	*Health and Community Services Act, Sanitation Regulations*	Sewage and waste disposal	Department of Health and Community Services	Outlines standards for sewage and waste disposal.
Compliance Standard	*Occupational Health and Safety Act* and *Regulations*	Project-related occupations	Service NL	Outlines minimum requirements for workplace health and safety. Workers have the right to refuse dangerous work. Proponents must notify Minister of start of construction for any project greater than 30 days in duration.
Compliance Standard	*Occupational Health and Safety Act, Workplace Hazardous Materials Information System Regulations*	Handling and storage of hazardous materials	Operations Division, Service NL	Outlines procedures for handling hazardous materials and provides details on various hazardous materials.
Government of Canada				
Letter of Advice for Works or Undertakings Affecting Fish Habitat	*Fisheries Act*	Construction of watercourse crossing or any other activities in or near water that may support a fishery	Fisheries and Oceans Canada	If Project construction is able to adhere to planning guidance found in DFO Operational Statements there is no DFO review required. Instead, DFO requests that an Operational Statement Notification Form be submitted to them. If the Project construction can not adhere to guidance found in the relevant Operational Statements, a Request for Project Review application is required to be submitted to

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
				DFO. DFO will make a determination on the level of risk associated with the project activity. If it is determined to be a low risk then a Letter of Advice would be issued. If it is determined to be a higher level of risk an Authorization may be required.
Work Approval for Construction Within Navigable Waters	*Navigable Waters Protection Act* and *Regulations*	Construction of watercourse crossing and any other in-water work.	Transport Canada	A permit is required for certain works or construction activity located below the high water mark, either over, under, through or across any navigable waters. Any in-water works will be reviewed against the Minor Works and Waters Order pursuant to Section 13 of the *Navigable Waters Protection Act* to determine if they meet the criteria of a "minor" work or water, and if further review and approval is required.
Radiocommunication Permit	*Radiocommunication Act* and *Regulations*	Establishment and use of radio equipment and associated towers	Industry Canada	Approval may be required for sites on which radio apparatus, including antenna systems, may be located and the erection of masts, towers and other such structures.
Compliance Standard	*Fisheries Act*, Section 36(3), Deleterious Substances	Any run-off from the Project site being discharged to receiving waters	Environment Canada	Environment Canada is responsible for Section 36(3) of the *Fisheries Act*. Discharge must not be deleterious and must be acutely non-lethal.
Compliance Standard	*Migratory Birds Convention Act* and *Regulations*	Any activities which could result in the mortality of migratory birds and endangered species and	Canadian Wildlife Service, Environment Canada	Prohibits disturbing, destroying or taking a nest, egg, nest shelter, eider duck shelter or duck box of a

Approval Potentially Required	Legislation / Regulation	Project Component / Activity Requiring Approval or Compliance	Department or Agency	Requirements
		any species under federal authority		migratory bird, and possessing a live migratory bird, carcass, skin, nest or egg.
Compliance Standard	*Canadian Environmental Protection Act*	Any activities that may result in environmental emissions	Environment Canada	The Act enables protection of the environment, and human life and health, through the establishment of environmental quality objectives, guidelines and codes of practice, and the regulation of toxic substances, emissions and discharges from federal facilities, international air pollution, and disposal at sea.
Policy	Federal Policy on Wetland Conservation	Any disruption of wetland habitat	Environment Canada	The goals of this policy should be considered where a project could affect wetland habitat.
Compliance standards; permits may be required.	National Fire Code	On-site structures (temporary or permanent)	Service NL	Approval is required for fire prevention systems in all approved buildings.
Compliance standards; permits may be required.	National Building Code	On-site structures (temporary or permanent)	Service NL	Approval is required for all building plans.
Municipalities				
Approval for Waste Disposal	*Urban and Rural Planning Act, 2000,* and Relevant Municipal Plan and Development Regulations	Waste disposal	Community Council	The use of a community waste disposal site in Newfoundland and Labrador by proponents/contractors to dispose of waste requires municipal approval. Restrictions may be in place as to what items can be disposed of a municipal disposal site.

APPENDIX E

Investcan Environmental Protection Plan

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INVESTCAN ENERGY CORPORATION
ENVIRONMENTAL PROTECTION PLAN (2013)

1.0 INTRODUCTION

Environmental protection is an important and integral component of the overall planning and implementation of exploration activities to help ensure that environmental risks are identified, prevented and mitigated.

Environmental Protection Plans (EPPs) outline specific actions to be followed to help ensure that Project activities are planned and conducted in a manner that avoids or minimizes adverse environmental effects.

This EPP is structured to provide details on proposed Project activities, identify key potential environmental interactions which may be associated with these activities, and to provide a description of various mitigation measures to avoid or reduce or any such adverse effects.

In doing so, it provides a practical way for Investcan to demonstrate an understanding of environmental regulations, practices and procedures that are required to reduce or eliminate the potential environmental effects of its activities. The EPP sets out the procedures, responsibilities and control actions to be taken by Investcan personnel, contractors and subcontractors to ensure the safe and environmentally sound completion of the Project.

The purpose of this EPP is to provide all Project personnel with an identification and description of applicable environmental protection measures. This document is to be made available to all relevant staff, contractors and subcontractors in order to ensure that each is aware of their responsibilities and of the procedures to be used in the management and completion of this work. This will result in open lateral and vertical communications at all levels, as one means to achieve environmental protection and continuous improvement.

It is the responsibility of Investcan's Exploration Site Manager to ensure that this EPP is provided to all personnel - including employees, contractors and subcontractors - that are involved in the Project and its associated activities.

An orientation session will be held with each individual involved in the exploration program. All personnel are expected to read and understand the EPP (and acknowledge same in writing), and agree to comply with its provisions and to work in a manner that ensures that the protection of the environment is an integral part of their daily work activities and routines.

In addition, the Exploration Site Manager will perform daily inspections of the Project area and all related program activities as a means to monitor compliance with the EPP. Deficiencies will be corrected immediately; any major issues will be handled as per the relevant sections of the EPP and applicable regulations. A log of inspections, findings and follow up actions will be maintained.

2.0 ENVIRONMENTAL PROTECTION MEASURES

The following sections outline specific procedures and actions that are intended to help avoid or reduce the potential for adverse environmental effects during the proposed exploration activities.

These measures are organized by key Project component, activity and/or potential environmental issue.

2.1 Storage, Handling and Use of Fuel

2.1.1 Fuel Storage

- No fuel is to be stored at the exploration site beyond the completion of the exploration drilling program.

- Fuel must be stored at least 100 m from:

  - the high water mark of bodies of water and existing intermittent wet areas present at the time of storage;
  - power lines;
  - public roads; and
  - the recharge area of a water well currently used or likely to be used for potable purposes or other human consumption.

- The fuel storage site will:

  - be located in an area of low work activity and will have a buffer zone from existing or proposed activity;
  - not have a slope of more than 5 percent; and
  - will have no combustible material within a 15 m radius that could present a fire hazard, such as vegetation or garbage.

- Fuel storage drums must be:

  - stored upright;
  - kept in good condition;
  - free from leaks; and
  - stored on plastic tarps to prevent accidental minor spills from entering soil or water.

- Smoking is not permitted within 10 m of fuel storage areas.

- All fuel storage areas will have appropriate spill response equipment, as outlined below.

- Spill Kits for any locations with greater than 1,000 litres stored will include at least the following components:

  - one 45 gallon (205 L) 16 gauge drum;
  - two closing rings - one for ease of entry into the drum and the other to ensure absolute containment of products for transport and temporary storage;
  - one pair of neoprene oil and chemical resistant gloves;
  - one protective disposable suit;

- one pair of protective goggles;
- 12 m of 12 cm containment boom;
- 25 absorbent pads - approximately 46 x 46 cm x 8 mm thick;
- 23 m of absorbent blanket - approximately 70 cm x 8 mm thick;
- two polyethylene bags approximately 71 x 46 x I65 cm - 3 mm thick; and
- a shovel.

- Spill Kit for locations with less than 1,000 litres stored will include at least the following components:

  - one pair of neoprene oil and chemical resistant gloves;
  - one pair of protective goggles;
  - ten absorbent pads - approximately 46 x 46 cm x 8 mm thick;
  - one (1) polyethylene bag approximately 71 x 46 x 165 cm - 3 mm thick; and
  - a shovel.

- Any contaminated soil, water, absorbent pads or other materials resulting from a fuel spill must be removed to an approved off-site disposal facility.

2.1.2 Refuelling Operations

- Fuelling and lubrication of equipment shall be undertaken in a manner so as to prevent the possibility of any water or soil contamination.

- Fuelling or servicing of mobile equipment is not permitted within 100 m from a body of water.

- Leak-free containers and reinforced rip and puncture proof hoses and nozzles must be used for refuelling operations.

- The operator must be in close attendance and within visual range for the entire duration of the refuelling operation.

- All fuel storage containers must remain sealed except for the outlet in use for the refuelling operation.

2.1.3 Transporting Fuel and Petroleum Products

- When moving fuel or oil only CSA-approved containers in good condition must be used. The containers must have tight closures with screw or spring covers, and must be equipped with spouts or other means to allow pouring without spilling.

- Leaking tanks or containers must not be used to transport or store fuel or oil.

- Fuel tanks must be secured during transport to prevent their being jarred loose, slipping or rotating.

- Fuel tanks and cans must be placed on vehicles so as to minimize the chance that they will move and rupture (for example, gas cans should not be mounted on the rear of a vehicle).

- Tanks and cans with fuel must be placed in locations on the vehicle where there is minimum exposure to heat.

- Equipment must be inspected on a regular basis for fuel and oil leaks.

2.2 Wildlife Encounters

- There will be no harvesting of fish or wildlife at or near the Project site by any employees or contractors involved directly or indirectly in exploration or when traveling to or from the sites during the entire period of the Project. Employees and contractors must immediately leave the exploration sites on completion of an employment period / work rotation.

- Wildlife must not be chased, caught, diverted, followed or otherwise harassed by any Project personnel or with Project equipment.

- Personal pets must not be brought to the exploration site.

- Under no circumstances are wildlife to be fed directly and all measures must be taken to avoid inadvertent feeding.

- Equipment and vehicles must yield the right-of-way to wildlife.

- Exploration work crews must be made aware of the potential for encounters with black bears. All bear sightings must be recorded and reported to the Site Manager.

- If the presence of a black bear is posing a risk to workers on the sites, responsive actions such as bear deterrents (such as the use of "bear bangers"), rapping and displacement or destruction of the animal may be undertaken only under the approval (and supervision as required) of the Wildlife Division of the Government of Newfoundland and Labrador.

- All wildlife encounters are to be recorded by on-site personnel and a record of same will be maintained by Investcan.

2.3 Water Use and Water Quality Protection

- Removal of water from any body of water for the purposes of an exploration program (if required and approved) must be done in a way that protects the quality and integrity of the body of water.

- Pesticides must not be used in the exploration program except if approved for the purpose of protecting occupational health.

- Water pumped from work areas or other runoff must have sediment removed before discharging to a body of water.

- No water, soil or other materials that have (or have likely) been contaminated by fuel or any other deleterious substance may be released to the environment.

- Prevent silting and erosion by controlling water such as through the use of the following measures, as applicable:

  - appropriate grading of slopes;
  - ditches;
  - berms;
  - sumps; and

- sediment barriers such as rip-rap, brush barriers, straw or peat bales, sandbags and / or geo-textile filter cloth.

2.4 Vehicle Use

- Only established trails and roads may be used.

- All equipment must have appropriate mufflers installed.

2.5 Drilling

- All fuel and other hazardous materials present at a drill site must be handled with care so as to minimize the possibility of spills.

- The area cleared for storage should be the minimum size required and must be placed and contained to prevent release into bodies of water.

- All drill sites are to be identified with UTM NAD 27 coordinates.

- An inventory is to be maintained of the fuel and other chemicals brought to, used at, and removed from each drill site.

- At the termination of exploration, all fuels and hazardous materials are to be removed from the area, and all waste shall be collected, transported and disposed of at an approved site.

- Upon completion, all drill holes producing artesian water shall be plugged with a high-swelling clay such as bentonite.

- Unless otherwise approved, exposed drill casings must be removed or cut off at or below ground surface upon abandonment of the drill site.

- The drill sites and any water lines should be located, as much as possible, in areas where access to them and their operation will create the least amount of disturbance. The smallest area necessary for safe working practices must be cleared.

- Drill waste shall be prevented from entering bodies of water and shall not be left to run off from the drill sites.

- Drill cuttings and water must be controlled by a series of settling tanks, settling ponds or a sump located down slope from the drill, as applicable.

- Maintenance of drill equipment shall take place at least 100 m from the nearest body of water.

- All materials (slash, soil and overburden) removed for clearing of the drill sites must be stockpiled for use in reclamation of the sites. This stockpiling should be done so as to prevent erosion by wind, water or run-off and the rehabilitation/reclamation of the drill site should take place as soon as possible after termination of the drilling.

2.6 Solid Waste Disposal

- All waste products produced during exploration activities are to be removed from site and disposed of appropriately. Absolutely no waste products are to be left at site.

- During exploration activities all waste products are to be confined to a designated area and stored in a manner that prevents debris from being spread by weather conditions and/or wildlife interactions.

- Food waste is to be stored in a manner to deter attraction of nuisance wildlife.

2.7 Equipment Operations

- All required approvals, authorizations and permits for project activities will be obtained and followed.

- All equipment will have exhaust systems regularly inspected and mufflers will be operating properly.

- All equipment (e.g., diesel generators, etc.) will meet the requirements of the provincial *Air Pollution Control Regulations* under the NL *Environmental Protection Act*.

2.8 Pumps and Generators

- Drip pans will be placed underneath pumps and generators. Absorbent material will be kept at all sites where pumps and generators are in use.

- Hoses and connections on equipment located near water bodies will be inspected routinely for leaks and drips.

- All leaks will be reported immediately to the Site Manager.

2.9 Air Quality Protection

- Measures must be taken to prevent dust from becoming a problem at an exploration site.

- If dust control becomes a problem at the exploration site, the following must be implemented:

  - keep roads and exposed areas sprayed with water or an approved dust suppressant, such as calcium chloride, wherever practical; and
  - reduce vehicle speeds on dusty roads and trails.

2.10 Discovery of Historic Resources

- Exploration crews will be briefed on the recognition of Historic Resources prior to the commencement of the exploration program.

- In the event of the discovery of a Historic Resource or suspected Historic Resource, work must immediately stop, the area shall be cordoned off and photographed and the Provincial Archaeology Office, NL Department of Tourism, Culture and Recreation will be contacted for direction.

- The location of a potential discovery must remain cordoned off for the duration of the Exploration Program or until determined not to be of significance by the Provincial Archaeology Office, and under no circumstances:

  - is any work to be carried out at the location of the discovery or so as to disturb the discovery; and

  - is any individual, other than a Person authorized to carry out an Archaeological Activity under a written permit issued by the Provincial Archaeology Office to cause any disturbance or remove any material from the location of the discovery.

2.11 Clearing of Vegetation

- Trees shall be cut as close to the ground as possible, stumps must not exceed 15 cm in height.

- Portions of tree trunks larger than 9 cm in diameter (or as otherwise directed in the Project's Cutting Permit) shall be limbed and stacked neatly for salvage.

- Trees and tops with trunk diameter less than 9 cm shall be piled or lopped and scattered if conducive to reducing ground disturbance.

- Trees and slash which are cleared shall not be felled or discarded into a body of water.

- Where possible, operators must drive over flattened vegetation in order to preserve rootstock and prevent soil erosion.

- The organic mat must be preserved wherever possible to reduce the potential for erosion in the short and long term.

- Where possible trees must be felled inward toward the work area to avoid damaging any standing trees adjacent to the immediate work area.

- No clearing activity may occur within 800 m of a known bald eagle, osprey or other raptor nest during the nesting season (May 15 to July 31) and 200 m outside the nesting season. If a nest is encountered during clearing activities clearing must immediately stop.

2.12 Forest Fires

- Sites must be properly equipped to fight fires. Fire-fighting equipment at each site must meet Provincial regulations and all workers must be made aware of the location of extinguishers and other firefighting equipment.

- Other than in an emergency situation, there must be no use of open fires at exploration work sites.

- Fire should be reported immediately by calling 1-866-709-3473. The following information will be provided:
  - Name of the reporter and phone number;
  - Time of detection of the fire;
  - Size of the fire; and
  - Location of the fire

2.13 Spill Response

- In the event of a leak or spill of fuel or hazardous material, the individual who causes or discovers the leak or spill must take all steps necessary to immediately stop the leak or spill and contain the release of contaminant into the surrounding area, most particularly any body of water. The only exception to the requirement for immediate response is where the individual would be placed in an unsafe situation.

- All spills or leaks should be cleaned up regardless of size as part of regular maintenance.

- If a spill or leak of fuel or hazardous material occurs:
  - Stop source; and
  - Eliminate ignition sources.

- If a spill or leak of fuel or hazardous material occurs on land:
  - Do not flush or attempt to dilute;
  - Block it from entry into waterways and bodies of water and contain with earth or other barrier(s);
  - Remove small spills with absorbent pads or other absorbent material; and
  - Contain contaminated material until it can be appropriately treated or removed from the site to a licensed facility.

- If a spill or leak of fuel or hazardous material occurs on snow and/or ice:
  - Block entry into waterways and bodies of water and contain with snow or other barrier;
  - Remove minor spills with absorbent pads or snow;
  - Use ice augers and pump when feasible to recover diesel under ice;
  - Slots in ice can be cut over slow-moving water to contain oil; and
  - Contain contaminated snow and/or ice for later treatment or shipment off site to a licensed facility.

- If a spill or leak of fuel or hazardous material occurs within or near a body of water:
  - Contain spill as close to release point as possible;
  - Prevent entry into water, if possible, by building a berm (soil or snow) or trench;
  - Use absorbent pads or spill containment boom to pick up / contain the spilled material; and
  - Contain contaminated material until it can be appropriately treated or removed from the site to a licensed facility.

- **All spills in the marine or freshwater environments and spills of 70 litres or more on land must be reported immediately to the Canadian Coast Guard at (709) 772-2083 or 1-800-563-9089.**