

Oil & Gas Sector

YOLO Environmental Inc. - Representative Projects

Environmental Assessments for Seismic and Exploration Drilling and Risk Assessments for Tradewinds Mayaro-Guayaguayare Block, Trinidad and Tobago.

Environmental Advisor for Canadian Superior Energy Inc. on a lease of four exploration wells that will be situated between 3 and 7 km from the high water line. Two of the wells are gas and two wells are a heavy crude oil. Fisheries compensation negotiations.

Environmental impact assessment and risk assessment for Intrepid Block 5(c) Trinidad and Tobago.

S. Belford was the Sr. Environmental Advisor to Canadian Superior Energy Inc. who managed in-country consultants and prepared the environment impact assessment submitted to the Environmental Management Authority. The Health, Safety & Environmental Management Plan, Environmental Protection Plan, and Emergency Response Plan were prepared by for the drill rig, supply vessels and onshore logistic offices. Post-drilling monitoring was undertaken for the three wells.

Sable Offshore Environmental Effects Monitoring (EEM) Program, Exxon Mobil, 1998-2003.

S. Belford was responsible for the design, conduct and management of the offshore EEM program for the Sable Offshore Energy Project since 1998 on five production platforms. This program focused on the effects of drill waste disposal at sea. Component studies of the EEM program included: collection of benthic boundary layer water samples for analysis of drilling waste floc; underwater video and still photograph to document changes in surficial sediment and macrofauna; sediment collection analysis for chemical characterisation and toxicity; collection of scallops for taint and body burden; caged shellfish for produced water effects, sediment trap deployment, underwater noise monitoring for marine mammal detection; tern surveys on Sable Island; and training of fisheries observers stationed on rigs and vessels for observation of marine mammals and seabird distribution and behaviour.

Environmental Assessment for Seismic Exploration of Western Newfoundland Leases 1097, 1098, 1103 and 1104, NWest Energy Inc. 2007 – 2008

proposed to undertake a geophysical 3-D seismic survey program on NWest's landholdings on the West Coast of Newfoundland and Labrador commencing in the third quarter 2008. There is the potential for 2-D surveys on the licenses and geohazard surveys in areas of interest. The environmental assessment (EA) for this program addresses vertical seismic profiles which is an activity related to drilling exploration, but due to its seismic nature will be assessed in the EA for the environmental assessment. In total, seismic-related activities could potentially extend over an eight year period, as required. The Project requires approval through the Canada-Newfoundland Offshore Petroleum Board and is subject to the *Canadian Environmental Assessment Act (CEAA)*.

Canadian Superior Energy Inc. Seismic and Drilling Environmental Assessments.

Canadian Superior Energy Inc. (Canadian Superior) proposed to drill a maximum of six petroleum wells in each block located on Nova Scotia Exploration Licences EL2415 (Marauder Block) and EL2416 (Marconi Block). This environmental assessment (EA) report satisfies the requirements of the Drilling Program Authorization (DPA) application review process under the *Canada-Nova Scotia Offshore Petroleum Board Resources Accord Implementation (Nova Scotia) Act*. Canadian Superior Energy Inc. (Canadian Superior) planned to conduct multi-year, multi-survey seismic exploration on Nova

Scotia Exploration Licences EL 2409 (Mariner Block), EL 2415 (Marauder Block), EL 2416 (Marconi Block) and the lands between the Mariner and Marauder Blocks. The assessments addressed the factors to be considered under Sections 16 (1) of the *Canadian Environmental Assessment Act (CEAA)* as part of a screening level assessment, and addresses the specific requirements of the *Scoping Document for the Environmental Assessment*

Post-drilling Benthic Surveys of Exploration Wells for Chevron, Canadian Superior and Marathon. As per commitments made in environmental assessments, post-drilling reports were submitted to the C-NSOPB that describe pre and post seabed fish habitat conditions based on ROV surveys. A protocol was developed for the ROV operators to follow. Sediment samples were collected where and when possible. The reports also provide information from the OGOP observers on liaison with commercial fishers and observations of seabirds and marine mammals.

Environmental Assessment of the Ras Laffan Port Expansion Project. Qatar Petroleum. 2005. Presently, with three operational LNG Berths, Ras Laffan Port is the world's largest LNG exporting facility, capable of accommodating a wide range of LNG vessels, including the new generation QFlex and QMax classes. The civil marine works for a fourth LNG is complete and this berth is expected to be operational towards the end of 2008, whilst construction of two further LNG berths is well under way. Prior to this undertaking, an environmental assessment was undertaken of dredging, land reclamation and construction of breakwaters on fish and fish habitat; artisanal fisheries; shoreline accretion/erosion; mangrove swamps; sensitive habitats such as marine turtle beaches, corals, and seagrass beds, water quality and sediment. The study described the details of the water, sediments and available biota quality using chemical and biological analysis and underwater observation. Marine habitat compensation plan was prepared and an effects monitoring program established.

PanCanadian Energy Corporation Baseline Benthic Study for the Deep Panuke Submarine Pipeline & Production Facility. 2002. S. Belford designed and conducted field surveys and prepared a report on existing marine conditions along the pipeline route, at existing wellheads and in the vicinity of the proposed production facility. The proposed offshore pipeline is to be about 175 km long. Data on sediment chemistry and benthic habitat and macroinvertebrate benthic communities was collected and described.

Deep Panuke Offshore Gas Development (2000-2003). S. Belford was involved in the environmental assessment of the Deep Panuke Offshore Gas Development project, including the collection of field data which included marine benthic habitat surveys for the offshore project locations and terrestrial habitat surveys for the onshore project study area. A draft comprehensive study report was filed in March, 2002. Following public and regulatory review of the documents, an Addendum containing responses to comments was prepared and the CSR was finalized. In December 2002, the Minister of Environment accepted the Deep Panuke CSR under the *CEAA*.

Deepwater Benthic Habitat Surveys (2001, 2002). S. Belford was the Project Manager and Offshore Party Chief for conducted a deep water benthic survey program of the Scotian Slope sponsored by various offshore operators, including: Chevron Canada Resources, Canadian Superior, Shell Canada Ltd., Imperial Oil Ltd., Marathon Canada Ltd., Kerr-McGee Offshore Canada Ltd., and EnCana Corporation. In 2001, data was

collected from eight licenses with approximately 85 sample sites. In 2002, the program was expanded to 8 new licenses with approximately 200 sample sites. Both survey programs included grab samples and seafloor photography to document the benthic biological communities. These data was combined with multibeam bathymetric data, bathymetry, surficial geology and sediment quality to map the benthic habitat within the prospective area of each license. Final reports were prepared for each operator and included color-coded georeferenced benthic habitat maps based on the surficial geology and biota.

Environmental Assessment of Exploration Drilling for Multiple Exploration Licenses for Various Operators (2000-2003). S.Belford prepared seven exploration drilling assessments, for different clients, covering many of the exploration licenses in offshore Nova Scotia. Specific clients included: Marathon Canada (Annapolis), PanCanadian/EnCana Corporation (Barrington, Highland, Plympton, Torbrook, Caledonia and Weymouth); Chevron Canada Resources (Mahone), Kerr-McGee Offshore Canada (Pinehurst, Pembroke). Shell Canada Limited (Onondaga, EL 2381, EL 2382), Canadian Superior (Marquis, Mariner), Imperial Oil Resources (2378/EL 2379). These environmental assessment reports were structured to meet the requirements of a comprehensive study level of assessment under the *CEAA* and were submitted to the CNSOPB according to the Drilling Program Approval process.

Comprehensive Study Report of Exploration Drilling on EL 2407 (2004, 2009). S. Belford prepared an environmental assessment on behalf of BEPCo Canada Company for exploratory drilling in EL 2407 on the Scotian Shelf. This environmental assessment was submitted to the CNSOPB according to the Drilling Program Approval Process but was structured to meet the requirements of a comprehensive study level of assessment under the *CEAA*.

Fate and Effects of an Accidental Discharge of Synthetic-based Drilling Mud at Annapolis Block EL2377, Crimson Well F-81. (2004) S. Belford prepared an investigative report on behalf of Marathon Canada Petroleum ULC to the Canada-Nova Scotia Offshore Petroleum Board of whole drilling mud loss from the failure of a riser flex joint. Underwater video evidence and sediment chemistry data were collected to describe the observed and fate modeling of the SBM loss.

Environmental Assessment of Seismic Exploration on the Scotian Shelf and Slope (2003). S. Belford prepared an environmental assessment report on behalf of GX Technology of a planned 2-D seismic survey on the Scotian Shelf and Slope. The report was structured to meet the requirements of a screening level assessment under the *CEAA* and approved by the CNSOPB in 2003.

Marathon Canada Limited Environmental Assessment of Exploration Drilling EL2410/EL2411. 2003. S. Belford prepared an environmental assessment for Marathon Canada in support of Marathon's proposed exploration drilling program on the Annapolis Block offshore Nova Scotia. This was the first assessment of a deep water exploration area off Nova Scotia. It was conducted to satisfy the requirements for the CNSOPB screening for the Drilling Program Approval application review process and addresses the factors required to be considered pursuant to Section 16 of the *CEAA*. JWEL also assisted Marathon in the preparation of a project description in support of the screening.

ExxonMobil Canada Properties Environmental Assessment of Exploration Drilling – Cree Block EL2361. 2003. S. Belford prepared an environmental assessment for ExxonMobil's proposed exploration drilling program on the Cree Block offshore Nova

Scotia. It was conducted to satisfy the requirements for the CNSOPB screening for the Drilling Program Approval application review process and addresses the factors required to be considered pursuant to Section 16 of the *CEAA*.

Encana Corporation Environmental Assessment of Seismic Exploration in the Stonehouse Area. 2003. An environmental assessment under *CEAA* was prepared to determine potential effects of Encana Corp. proposal to conduct seismic survey on EL 2414, EL 2403 and EL2404. The geophysical company WesternGeco was to undertake the data acquisition.

No Net Loss of Fish Habitat of the Sable Offshore Energy Project. 1998. This document constitutes part of the Sable Offshore Energy Project's (SOEP) Environmental Assessment, and was conducted in accordance with the Department of Fisheries and Ocean's Policy for the Management of Fish Habitat. The objective of this document is to quantify disturbance to benthic marine habitats potentially resulting from construction, operation and abandonment of the marine pipelines, terrestrial (freshwater habitat) pipeline and production platforms. The goal is to determine if there is a net loss of habitat. The report consists of two components. The first section provides a sensitivity analysis which evaluates the major project activities which may effect fish habitat. The second section provides a detailed quantitative assessment of the habitat loss and gains attributed by the marine pipeline.

Strategic Environmental Assessment (SEA) of Laurentian Subbasin. C-NSOPB and C-LNOPB. 2003. A SEA of potential oil and gas exploration within the Laurentian Subbasin was commissioned to provide an overview of existing environment of the region, discuss potential environmental impacts associated with oil and gas exploration in the study area, identify knowledge and data gaps, highlight key issues of concern and make recommendations for mitigation and planning. This information was to assist the Boards in determining whether exploration rights should be offered in whole or in part for an area and may also identify general restrictive or mitigative measures that may be considered for application to seismic and or drilling activities

Atlas of Ecologically & Commercially Important Areas in the Southern Gulf of St. Lawrence. Environmental Studies Research Fund. S. Belford and B. White prepared an initial strategic environmental assessment that identified gaps in baseline data, therefore a more thorough evaluation of environmental features in the southern Gulf of Lawrence was required. The study area included the north shore of mainland Nova Scotia, the western shore of Cape Breton and the southeastern shore of New Brunswick. The atlas provided the C-NSOPB, the National Energy Board and the C-LNOPB with useful information for the environmental assessment of subsequent proposals relative to sensitive areas and critical periods of fisheries resources in the southern Gulf of St. Lawrence.

Environmental Effects Monitoring Programme for LASMO Nova Scotia: S. Belford researched and designed an environmental effects monitoring programme for the Cohasset/Panuke sites near Sable Island, Nova Scotia for LASMO Nova Scotia. Year One of the EEM program consisted of the Phase I Hazard Assessment studies. These studies included complete characterization of the produced water, the condensate and all drill muds to be used during operation. Chemical characterization included a metal scan, hydrocarbon characterization and an organic fatty acid scan. Sediment quality, grain size, hydrocarbon and metal analyses were also included. Acute and sublethal

toxicity testing of the condensate, produced water and drilling muds were planned. The Phase II Hazard Assessment assessed the effect upon the benthos from drilling mud distribution and chemical characterization of surficial sediments. Tainting studies of fish and bivalves were recommended and the level of effort would be based upon results of the Hazard Assessment studies. A workshop was held in March 1992 with a select group of experts nationally and internationally known in oil research to review and revise the programme.



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