

Prepared by the  
Canadian Pipeline  
Environment  
Committee  
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# The Life Cycle of Pipeline Watercourse Crossings in Canada



## Questions & Answers

Canada

**CAPP**  
CANADIAN ASSOCIATION  
OF PETROLEUM PRODUCERS

**CEPA**  
Canadian Energy Pipeline Association  
Association canadienne de pipelines d'énergie

**ERCB**  
Energy Regulatory Commission

Government  
of Alberta

For more information on environmental issues in the pipeline industry and on watercourse crossings, contact the Canadian Pipeline Environment Committee (CPEC) care of the Canadian Energy Pipeline Association ([www.cepa.com](http://www.cepa.com)) or the Canadian Association of Petroleum Producers ([www.capp.ca](http://www.capp.ca)). CPEC is a multi-stakeholder group of industry, government and public representatives with an interest in sound environmental management of pipelines in Canada.

This document was prepared by the Canadian Pipeline Environment Committee (CPEC). It is not intended to be a legal or quasi-legal set of guidelines and does not satisfy all regulatory requirements. It is merely intended to offer the reader general options for consideration with regard to watercourse crossings in the context of a pipeline project in Canada. While the information contained within is believed to be reliable at the time of print, CPEC does not guarantee its accuracy. The use of the information within is at the user's sole risk, regardless of any fault or negligence by CPEC.

#### Abbreviations

CEAA	<i>Canadian Environmental Assessment Act</i>
CEPA	<i>Canadian Environmental Protection Act</i>
COGOA	<i>Canada Oil and Gas Operations Act</i>
CPEC	Canadian Pipeline Environment Committee
CSA	Canadian Standards Association
DFO	Fisheries and Oceans Canada
EC	Environment Canada
HADD	harmful alteration, disruption or destruction
MBCA	<i>Migratory Birds Convention Act</i>
NEBA	<i>National Energy Board Act</i>
NEB	National Energy Board
NWPA	<i>Navigable Waters Protection Act</i>
PoE	pathways of effects
SARA	<i>Species at Risk Act</i>
TC	Transport Canada

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## Introduction

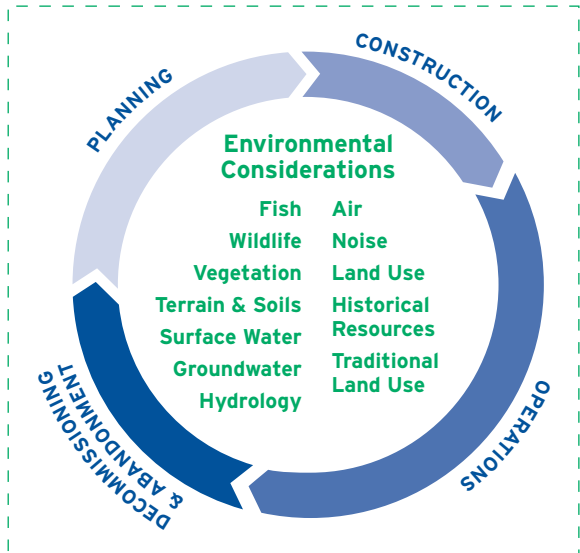
Watercourse crossings are common along Canadian pipeline routes. These particular locations merit focus because of the associated environmental sensitivities, multiple legislative considerations and complex design and installation activities.

Installation of a watercourse crossing typically requires specialized crews and equipment and involves a variety of activities at the watercourse and surrounding riparian area, including route planning, geotechnical and fisheries assessments, right-of-way surveying, clearing and site preparation, pipe installation, ditch backfilling and, as required, bed, bank, riparian and slope reclamation. Regulatory permits, inspection personnel, materials, crews and equipment for the watercourse crossing must be in place at the right time, with appropriate ground conditions, to avoid delays. Care and attention

is required throughout the complete life cycle of a pipeline crossing to ensure compliance with regulatory requirements and the integrity of the pipeline, and to protect the environment and safety of the public and pipeline workers.



## Environmental Considerations During Watercourse Crossing Life Cycle



This guide was published by the Canadian Pipeline Environment Committee (CPEC), a multi-stakeholder group of industry and government representatives with an interest in sound environmental management of pipelines in Canada. The intent of the document is to increase awareness and understanding among industry and government about the various considerations when planning, constructing and operating a pipeline at a watercourse crossing (excluding offshore pipelines). In particular, the guide highlights multiple sources of regulatory requirements and direction that must be adhered to and the current key issues and best practices that should be applied. The content is focused on federal legislation, but does recognize that other provincial, territorial and federal policies and legislative requirements must also be followed. A question and answer approach has been used to address the key considerations in the areas of regulatory requirements and general considerations throughout the life cycle of a pipeline watercourse crossing. The *'Pipeline Watercourse Crossing Guidance'* found at the end of this document provides a checklist that can be used as a planning tool for pipeline activities at watercourse crossings.

For the purpose of this guide, watercourse crossings are viewed as a 'landscape unit' which includes the ecosystem elements of the flowing stream channel with defined bed and banks and the riparian areas and the valley slopes. The level of planning effort may not be directly linked to the scale or size of the watercourse, instead it may be influenced by a number of factors, including, but not limited to:

- sensitivity of the resource
- complexity of the issues
- regulatory triggers
- traditional use
- public interest

While recognizing that other water bodies such as wetlands, bogs, fens and lakes have similar characteristics, this guide does not address the special issues unique to these landscape features.



## Additional Information

This guide is a supplement to the collection of pipeline crossing documents available from government and industry. The following are some of the commonly referenced sources:

- **Pipeline Associated Watercourse Crossings (CAPP 2005)** – This guide contains:
  - descriptions of selected pipeline installation methodologies
  - responsible planning and design considerations
  - details regarding the current regulatory framework
  - information about compensation and monitoring
 (Available at: <http://www.capp.ca/Pages/DocInfo.aspx?DocID=96717>)
- **Fisheries and Oceans Canada (DFO) Pathways of Effects Diagrams** – DFO's Pathways of Effects (PoE) diagrams describe, for a range of activities, the type of cause-effect relationships that are known to exist and the mechanisms by which stressors ultimately lead to effects on the aquatic environment. (Available at: [www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/pathways-sequences/index\\_e.asp](http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/pathways-sequences/index_e.asp))
- **DFO Operational Statements** – DFO's Operational Statements provide guidance to help companies avoid negative effects on fish and fish habitat and are used to streamline the review of low risk projects. (Available at: [www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index\\_e.asp](http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_e.asp))
- **NEB Filing Manual** – The Filing Manual provides guidance on filing requirements for applications to the National Energy Board (NEB). (Available at: <http://www.neb-one.gc.ca/clfnsi/rpblctn/ctsndrgltn/flngmnl/flngmnl-eng.pdf>)

# The Life Cycle of Pipeline Watercourse Crossing

Once the decision is made that it is feasible to progress a pipeline project to the planning stage, consideration must be given to watercourse crossings along the route. This attention continues through the life cycle of the pipeline — construction, operations and decommissioning and abandonment. At each life cycle phase, companies are required to comply with regulatory requirements and go beyond this obligation by applying industry best practices to accomplish enhanced environmental protection at pipeline watercourse crossings. In addition, specific government agencies conduct regulatory oversight during each life cycle phase through assessments, regulatory decisions, inspections and audits, all in the public interest.

## Project Planning and Regulatory Requirements

In Canada, the legislative requirements for the construction, operations and decommissioning and abandonment of pipelines at watercourse crossings vary within each jurisdiction, potentially involving federal, provincial and territorial review. In addition to regulatory requirements, many regulatory authorities also have codes of practice, guidelines and policies that specifically address watercourse crossings and specify requirements for permits, approvals, authorizations and licences. Companies proposing to construct and operate pipelines are responsible for identifying and complying with the applicable legislation.



## Project Planning and Social Considerations

There are a variety of environmental and social considerations that prevail throughout the pipeline life cycle, but focus on these considerations typically begins early during the planning phase.

- **Pipeline integrity** – Pipeline operators are responsible for designing, constructing and maintaining pipeline facilities to ensure the integrity of the facilities and the safety of the public.

- **Riparian areas** – The characteristics of riparian areas can affect the allowable extent of bank disturbance, which in turn can affect available workspace, location of vehicle crossings, equipment operability, activity scheduling and potentially the feasibility of installation methods.
- **Fish and wildlife habitat** – The presence of fish and wildlife habitat heavily influences the design and construction of a pipeline, but is also a key consideration in planning activities during the operation of a watercourse crossing (e.g., timing restrictions, data collection methods, crossing location, site design and reclamation requirements).
- **Species at risk** – During the planning stage, as identified in federal, provincial and territorial legislation or guidance documents, it is important to identify whether species at risk or species of management concern and their habitat are present (e.g., vegetation, wildlife or fish) and to assess potential effects of the project on these species. There may also be additional provincial- and territorial-listed species to take into consideration with input from the appropriate authorities. Mitigation measures must be in place to avoid or lessen the effects of the project on listed species. If the negative environmental effects of the project cannot be avoided, a permit and/or a decision by the Minister responsible may be required.



The potential for species at risk at or near a watercourse crossing can extend pre-construction timelines because it is necessary to collect data (e.g., conduct seasonally sensitive surveys) and develop mitigation strategies. Depending on the species involved, the crossing location, construction schedule and installation method might also be influenced.

- **Terrain and soil conditions and special landforms** – Terrain and soil conditions (e.g., karst, shallow bedrock, sandy soils, permafrost) might affect the accessibility of the crossing site; influence pipeline design, routing or the feasibility of installation methods; or may be associated with specific direction from the regulatory agencies (e.g., soil handling specifications or post-construction reclamation methods).
- **Cultural and archaeological sensitivities** – Some watercourse crossing locations hold cultural value or archaeological artefacts that must be respected in the design, construction and operation of the pipeline.

## Project Planning and Construction

During the construction phase, companies must balance various interests including environmental considerations, regulatory requirements, equipment capabilities, and landowner and watercourse user interests and concerns. Watercourses that are considered sensitive to instream activity at the time of proposed construction require special attention and appropriate management strategies.

When selecting a crossing technique, companies must consider the following:

- the sensitivity of the watercourse, fish and wildlife and their habitat at the time of crossing construction (e.g., sensitivity to instream construction or associated sedimentation)<sup>1</sup>
- physical geomorphological limitations of the site
- **Access** – Landowner consent or approvals might be needed to access the crossing site during the design, construction and operations and maintenance phases. In addition to the ‘right’ to access, an operator needs physical access to the watercourse crossing site that will support the various pieces of equipment required to install the pipe and carry out any necessary maintenance during operations (e.g., valve maintenance, pipe replacements, cathodic protection test lead maintenance).
- **Navigability** – Construction and operations activities (e.g., instream construction activities, vehicle and equipment access across streams) could temporarily affect the navigability of the watercourse. The Navigable Waters Protection Division of Transport Canada (TC) administers the *Navigable Waters Protection Act (NWP)*, conducts a *Canadian Environmental Assessment Act (CEAA)* Screening, and will issue an approval.
- **Traditional use** – First Nations and Aboriginal communities may use the area of the watercourse crossing for traditional purposes. These communities must be consulted with regarding the potential effects of the project on their traditional use activities and the ways in which those effects will be avoided or reduced.
- **Recreational use** – A watercourse might support recreational activities (e.g., sport fishing, boating) that could be affected by construction timing or reclamation designs.



<sup>1</sup> For information on the effects of sediment exposure associated with pipeline watercourse crossings on fish and on the aquatic receiving environment, refer to Anderson et al. 1996.

- **Downstream and upstream users** – During the design and installation stage and during any maintenance activities, consideration must be given to the needs of downstream water users. Upstream interests may also be affected if they are vulnerable to water level changes. Activities and/or inwater structures such as anchor blocks, temporary cofferdams and backfill above bed level could potentially cause a backwater effect and flooding.
- **Economic considerations of installation methodology** – The installation method must balance the sensitivity of the watercourse and the needs of other users with cost-effectiveness and regulatory compliance.
- **Land use and regulatory processes applicable 'above the banks'**



– Additional workspace will be required on either side of the watercourse for various construction activities. In the case of trenchless installations, the workspace can be quite large depending on the size of pipe and the equipment.

- **Bank stability** – The stability of the banks on either side of the watercourse crossing must be considered during the planning, construction and operations and maintenance phases. For example:
  - the banks must be capable of supporting the required equipment during construction
  - following construction, bank stability must be reclaimed to the satisfaction of relevant agencies and for the purposes of pipeline integrity requirements
- bank stability must be maintained during operations to protect the integrity of the pipeline and ensure habitat objectives are met
- **Bed stability** – The stability of the bed of the watercourse is important and should be considered. Actions leading to bed instability, such as localized hardening of the bed or placement of armour stone may change flow velocities and bed/bank erosion characteristics with associated environmental degradation that could also affect pipeline integrity. For example, placement of backfill material or erosion protection materials having substantially different geotechnical characteristics and contours to the native bed and bank material may cause increased localized scouring and accretion and geomorphologic changes in the reach where the crossing occurs.

## Operations

The operations phase of a pipeline spans many decades. Pipeline companies have a commitment to the public and the regulators to operate and maintain a safe pipeline. As part of that responsibility, companies carry out regular operations activities (i.e., integrity digs) along the pipeline, including at watercourse crossings. In addition, they carry out scheduled or other necessary maintenance (e.g., regular monitoring or action required as a result of unplanned events such as weather conditions or possibly third-party activities). Before carrying out operations and maintenance activities, appropriate planning is required with consideration given to the various elements discussed previously under the project planning sections.

## Decommissioning and Abandonment

Once it has been determined that a pipeline is no longer needed, activities must be undertaken to properly decommission and abandon the facility. Discussion papers prepared by the Pipeline Abandonment Steering Committee in 1996 provide guidance for the development of a project-specific abandonment plan. The various elements discussed previously under the planning sections form a basis for developing plans for work at watercourse crossings.

Regulatory review of pipeline decommissioning and abandonment is in progress and further requirements are being developed.

For more information, see the NEB website (<http://www.neb-one.gc.ca/clf-nsi/rthnb/nvlvngthpbic/Indmttrs/Indmttrs-eng.html>).



# Questions and Answers

## Legislative Requirements

As mentioned previously, the legislative requirements for the construction, operation and decommissioning and abandonment of pipeline watercourse crossings in Canada vary within each jurisdiction and might involve federal, provincial, territorial or municipal review. Pipeline companies are responsible for identifying and complying with the applicable legislation. The following are common questions and answers pertaining to federal regulatory requirements for pipeline watercourse crossings.

### 1 What watercourse crossing activities are subject to legislation?

Most activities that could affect fish and fish habitat, riparian wildlife habitat, species at risk, migratory birds during the nesting season or navigability of the watercourse may be subject to federal, provincial and territorial legislation. For example:

- vehicle or equipment movement across a watercourse
- maintenance activities such as excavating to verify pipeline integrity or increasing depth of cover over a pipeline already installed at a watercourse crossing
- bank stabilization and erosion control measures
- hydrostatic test water withdrawal and discharge
- handling of drilling fluids and other waste disposal
- decommissioning and abandonment activities

### 2 What federal legislative requirements should be considered when planning a watercourse crossing?

The following federal Acts are applicable to watercourse crossings:

- *Canadian Environmental Assessment Act (CEAA)*
- *Canada Oil and Gas Operations Act (COGOA)*
- *Fisheries Act*
- *Migratory Birds Convention Act (MBCA)*
- *National Energy Board Act (NEBA)*
- *Navigable Waters Protection Act (NWPA)*
- *Species At Risk Act (SARA)*

- **Canadian Environmental Assessment Act**

The CEAA requires that federal agencies consider environmental effects of proposed projects before federal authorities take actions that would allow these projects to proceed. The Canadian Environmental Assessment Agency administers the CEAA.

The Canadian Environmental Assessment Agency has a mechanism for identifying which agency or department of the federal government is responsible (i.e., Responsible Authority) for ensuring that the environmental assessment is conducted in accordance with the CEAA. For example, in the context of a watercourse crossing, an environmental assessment might be triggered by requirements under the *Fisheries Act*, the *NWPA*, the *NEBA* or *COGOA*.

In most cases, before a *Fisheries Act* authorization can be issued, DFO must carry out an environmental assessment in accordance with jurisdictional requirements and determine whether:

- local jurisdictions have requirements that must be included in the environmental assessment
- there are significant adverse environmental effects
- it is necessary to circulate the proponent's proposal to other relevant federal departments and also make it available to the public

- **Canada Oil and Gas Operations Act**

The COGOA promotes the following:

- safety, particularly by encouraging persons exploring for and exploiting oil and gas to maintain a prudent regime for achieving safety
- protection of the environment
- conservation of oil and gas resources
- joint production agreements
- economically efficient infrastructure

Watercourse crossings of pipelines (defined in the COGOA) are among the factors considered in addressing these responsibilities.

- **Fisheries Act**

The *Fisheries Act* was enacted to manage and protect Canada's fisheries resources. It applies to all fishing zones, territorial seas and inland waters of Canada and is binding to federal, provincial and territorial governments. An approval under provincial legislation does not necessarily mean approval under the *Fisheries Act*.

Fisheries and Oceans Canada is responsible for administering and enforcing the *Fisheries Act* in close cooperation with federal, provincial, territorial and local environmental protection agencies. The prime focus of DFO's 'Fish Habitat Management Program' is Section 35 of the *Fisheries Act*. Additional sections that also frequently apply to watercourse crossings are Sections 20, 22, 30, 32, 36(3) and 37.

Subsection 35(1) is a general prohibition of harmful alteration, disruption or destruction (HADD) of fish habitat. An authorization for a HADD can be issued under Subsection 35(2). It is important to note that a Subsection 35(2) Authorization authorizes the HADD only and not the project in its entirety. For further information about HADD, see Question 19.

In 1985, the DFO signed a protocol of understanding that assigns responsibility for administering Subsection 36(3) to Environment Canada (EC). Subsection 36(3) prohibits the deposit of a deleterious (harmful) substance. Unlike Subsection 35(2), there is no provision to authorize the deposit of a deleterious substance except by regulation or an Order in Council.

- ***Migratory Birds Convention Act***

The *MBCA* provides for the conservation of migratory birds and for the protection of their nests and eggs. Environment Canada is responsible for administering and enforcing the Act.

A specific concern for a watercourse crossing is the existence of migratory birds and their habitat in a riparian area. At this time, there is no permit available for incidental take under this legislation, which is a significant risk for a pipeline installation project because of the potential for unintentional harm while carrying out the primary activities related to the pipeline project.

- ***National Energy Board Act***

Interprovincial and international pipelines, and additions to existing pipeline systems under federal jurisdiction, require the approval of the NEB through the *NEBA*. The NEB's responsibilities include ensuring safety, security and environmental protection during planning, construction, operation and decommissioning and abandonment of a pipeline. Transport Canada is responsible for administering Section 108 of the Act, which addresses the construction of pipelines or other utilities across railroads.

- **Navigable Waters Protection Act**

The *NWPA*, which is administered and enforced by the Navigable Waters Protection Division of TC, ensures unobstructed passage of vessels in navigable waters and protects the public's right to navigation. A *CEAA* screening and approval may be required for a pipeline crossing on, over, through, under or across a navigable waterway.

The *NWPA* adheres to the following principle when establishing whether a waterway is navigable:

*the watercourse "...must be capable in its natural state of being traversed by large or small craft of some sort, as large as steam vessels and as small as canoes, skiffs and rafts drawing less than 1 foot of water."*

Using this principle, if a watercourse allows for the navigation of a small vessel at some point during the course of a year, it is considered navigable. The presence of natural barriers can affect the determination of the navigability of a watercourse. However, the determination whether a watercourse is navigable ultimately rests with TC. Transport Canada has issued the Minor Works and Waters (*NWPA*) Order that provides guidance around types of works and watercourses that do not require approval from TC. Proponents should review this order to determine its application as part of their project planning. Additional information about the order is available on the Transport Canada website (<http://www.tc.gc.ca/marinesafety/oep/nwpp/minorworks/menu.htm>).

- **Species at Risk Act**

The *Species at Risk Act* ensures the protection of endangered and threatened species in Canada and is administered and enforced by EC, DFO and Parks Canada. It builds on and complements existing legislation that protects wildlife in national parks (i.e., the *Canada National Parks Act*).

The overall goals of *SARA* are as follows:

- prevent aquatic and terrestrial species from becoming extinct or lost from the wild and protect listed species and their habitats
- help in the recovery of species that are at risk because of human activities
- promote stewardship of listed species

SARA prohibits the harm of wildlife species at 'risk' listed under Schedule 1 of the Act. The prohibitions outlined in SARA apply to all listed species on federal lands and listed fish and migratory bird species (protected by the *MBCA*, 1994) in the remainder of Canada. The provinces and territories also have legislation in place that identifies protected species (many of which are listed in SARA).

SARA does include provisions for a permit for incidental take as long as the following criteria are met:

- reasonable alternatives to the activity were considered and the best solution was adopted
- measures were taken to minimize the effect
- the activities do not jeopardize the survival or recovery of the species

The process and permit application requirements are available on the Species at Risk Public Registry website ([http://www.sararegistry.gc.ca/sar/permit/permits\\_e.cfm#permits](http://www.sararegistry.gc.ca/sar/permit/permits_e.cfm#permits)).

### **3 What actions are taken if federal legislation is not adhered to?**

Contravening one or more of the Acts relevant to crossing watercourses may result in either a summary conviction or indictable offence. There is a range of penalties that could include both a financial and incarceration component in the sentencing. The limits of the penalties that may be applied under each Act can be found on the Department of Justice website (<http://laws.justice.gc.ca/en/index.html>).

- ***Fisheries Act***

It is important to note that a Subsection 35(2) Authorization under the *Fisheries Act* authorizes the HADD and not the project resulting in the HADD. A project does not need a 35(2) Authorization to proceed. However, if a HADD results and an authorization was not issued, the operator may be guilty of an offence.

Penalties for violating Subsection 35(1) include fines of up to \$1,000,000, up to six months imprisonment, or a combination of both. If found guilty, creative sentencing provisions might apply. For example, the operator might be required to cover the costs of restoring the habitat at the site or fulfilling other court-ordered remedies.

Issues of non-compliance are often identified through the following mechanisms:

- voluntary monitoring and reporting of accidents or malfunctions by the proponent
- site inspections carried out by government officials
- public complaints

If an investigation determines an infraction has occurred, a number of factors are considered when determining the appropriate course of action including the proponent's willingness to report the occurrence and their willingness to remediate the site. DFO responses to infractions could include but are not limited to the following:

- working cooperatively with the proponent to resolve the issue
- issuing an order(s) to have the proponent rectify certain problems
- prosecution under the *Fisheries Act*

Note: Failure to comply with an order carries its own penalties which are in addition to the penalties specified in the Act.

For further information about HADD, see Question 19.

- ***Migratory Birds Convention Act***

Typically, EC uses education and compliance programs to educate the public and industry about *MBCA* for first-time offences. Before deciding whether to prosecute, EC often considers the impact of the violation and the circumstances of the violation. Each case is considered individually and EC may prosecute if it is warranted.

- ***NEB Act and Canada Oil and Gas Operations Act***

The NEB enforces the conditions set out in NEB orders and certificates and the commitments made in a company's application and subsequent submissions. NEB inspectors and auditors are the primary players in enforcement. Enforcement tools include the following:

- verbal warnings for matters that can be immediately corrected
- written undertaking signed by a company representative that provides details on how compliance will be achieved and requires follow-up within an agreed time frame
- an Inspection Officer Order, which outlines specific measures or suspends work if a situation occurs that is hazardous to the environment or to the safety of the public or company employees

Penalties may be applied for contravening the *NEBA* or failure to comply with an order issued under the Act.

- ***Navigable Waters Protection Act***

Penalties for breach of the *NWPA* could include a stop work order for removal of the structure, a fine and possibly a jail sentence.

- ***Species at Risk Act***

The offences and punishments under *SARA* can be extensive and cannot be fully addressed in the scope of this document. To understand how offences and punishments are dealt with relative to *SARA*, refer to Sections 97 to 107 of the Act ([www.sararegistry.gc.ca](http://www.sararegistry.gc.ca)).

#### **4 Under what circumstances is a review by DFO not required?**

A DFO review should be sought whenever a proposed work or undertaking could affect fish and fish habitat.

To reduce the number of reviews done for routine, low risk activities, DFO has developed a series of Operational Statements for certain activities that describe mitigation measures and best management practices to avoid effects on fish and fish habitat (see [www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index\\_e.asp](http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/epmp-pmpe/index_e.asp)).

Projects that meet the conditions and measures of an Operational Statement are not expected to negatively affect fish and fish habitat and as such, should not require a DFO review.

Note: Use of Operational Statements does not relieve the need for obtaining any other permits or approvals that might be required under municipal, provincial, federal or territorial legislation that may otherwise apply to the work being carried out.

#### **5 What are the regulatory requirements for pipeline watercourse crossings north of 60°?**

In addition to the federal regulations outlined in this guide, there are specific regulatory requirements for projects that are planned in the North. Although a comprehensive regulatory regime is currently in place in the North, land claim negotiations are still ongoing in some regions that could alter the existing regulatory regime. It is imperative that pipeline companies stay apprised of any changes in regulatory requirements in the area(s) in which they have proposed or existing operations.

- Comprehensive guides outlining the regulatory processes for oil and gas exploration and production in the Northwest Territories are available online (see [www.oilandgasguides.com](http://www.oilandgasguides.com)).

- In the Yukon and Nunavut, information on requirements can be obtained by contacting the respective territorial governments, Yukon and Nunavut resource management boards, the NEB, DFO and the Nunavut regional office of Indian and Northern Affairs Canada, and through dialogue with First Nations, Aboriginal and Inuit landowners. In addition, companies should be aware of environmental assessment processes in the North.

Companies must ensure they are aware of all requirements and should contact appropriate agencies in advance to discuss their potential project and the authorization process (see Appendix A).

## **6 What are the legislative considerations for vehicle access across a watercourse?**

If a watercourse is being crossed using an existing, approved crossing structure (i.e., existing bridge or culvert), no permits are required. However, proposed vehicle crossing methods (temporary or permanent) must be considered under all pertinent legislation (federal, provincial, territorial and municipal) and could also require one or more authorizations or approvals, for example:

- authorization under the *Fisheries Act* might be required, depending on the crossing type and the watercourse that is being crossed
- the operator might be required to make an application under the *NWPA*, depending on the navigability of the watercourse and the type of structure being used
- *SARA* might also apply if there are identified species at risk within or near the work site and effects on these species or their habitat is of concern
- the *MBCA* may apply to any works that could affect the riparian zone of watercourses during the breeding season for migratory birds

## **7 What are the expectations of a pipeline operator during an emergency at a watercourse crossing?**

All legislation, regulations and requirements set out in NEB approvals apply to a pipeline during construction, operations and decommissioning and abandonment. This includes upsets, accidents, malfunctions and emergencies. It is the company's responsibility to obtain relief, if needed, from these requirements.

Companies must have an emergency procedures manual that addresses situations where the pipeline places people, property or the environment at harm. The emergency procedures must also address circumstances in proximity to the pipeline, such as flooding or slope failure, that place the pipeline itself at harm.

It is expected that the emergency manual will also address who to notify and under what circumstances. Notifications typically include the Transportation Safety Board, the NEB, EC, DFO, provincial and municipal agencies, and those potentially affected by the situation such as downstream water users.

The proponent (and/or its contractors) should have a Contingency Response Plan in place before constructing a pipeline. The overall plan should address issues related to watercourse crossings.

## Installing a Pipeline Watercourse Crossing

As mentioned earlier, pipeline watercourse crossings warrant attention during each phase of a pipeline's life cycle. The following questions and answers address some of the key considerations when installing a pipeline watercourse crossing.

### **8 What are a company's responsibilities for a pipeline watercourse crossing?**

The pipeline industry must ensure compliance with the applicable legislation and company procedures. A company is responsible for ensuring appropriate approvals are in place and all conditions are met. The majority of pipeline companies have established policy statements, programs and procedures demonstrating their commitment to complying with all applicable legislation.

### **9 What consideration should be given to industrial and recreational water users?**

Industrial and recreational water users need to be considered during the life cycle of a pipeline watercourse crossing. They may have their own specific interests and issues related to the watercourse, such as concern with and management of water quality and consultation obligations with the various regulatory agencies. In addition, these water users could also be governed by different regulatory requirements. Companies should ensure they understand who the water users are and the potential effects pipeline installation and operations might have on these user groups.

Companies must also ensure industrial and recreational water users receive proper notification of pipeline construction and operations and maintenance activities.

## **10 What is a timing window<sup>2</sup>?**

Timing windows identify the times when fish, wildlife and their habitat are most sensitive and disturbance within the stream must be restricted to reduce potential effects. This window is one of the most influential factors in a pipeline construction schedule and provides an effective management approach to avoid harmful effects.

It is essential that regulatory approvals, qualified inspection personnel, required materials, experienced crews and equipment for the watercourse crossing be in place so construction can be conducted outside of sensitive periods, avoiding harmful effects on fish and fish habitat and avoiding project delays.

The effects of environmental conditions on the project are also an important consideration in defining activity timing around sensitive windows. For example, considering natural ecological cycles such as spring freshet or unexpected, infrequent events such as a flood during the planning stages could eliminate the need to demobilize construction crews and incur the resulting costs and delays. Depending on the duration of this temporary delay (days to months) and the available timing window to complete the instream activity, the company may have challenges completing the whole project and meeting commercial or construction contractual commitments (e.g., cost, schedule).

## **11 Are there other timing windows to be considered?**

In addition to the instream timing window, there are additional timing windows that must be considered when planning activities at a watercourse crossing. For example, appropriate ground conditions are necessary to support the heavy construction equipment. This is of particular concern in seasonally wet areas such as muskeg or swamp. Additionally, there are often wildlife timing windows along the pipeline route that need to be accommodated in the construction schedule (e.g., avoidance of sensitive breeding periods for migratory birds or larger animals like caribou and moose, and species at risk).

<sup>2</sup> It should be noted that some jurisdictions use 'restricted activity periods' and others use an 'open work window'. Care should be taken not to confuse what is allowed depending on the area of work.

## **12 What are the different types of watercourse crossing installation methods?**

There are two primary installation methods used for watercourse crossings, trenchless and trenched.

Trenchless techniques (e.g., methods that bore, 'ram/punch', micro-tunnel or drill under the waterbed or aerial crossings that span over a watercourse) require limited or no instream construction and, therefore, cause little to no disturbance to the bed and banks of a watercourse. Trenchless installation methods are designed to limit disturbance to the streambed and riparian area, but often require a lengthier time frame to complete. Aerial crossings involve attaching the pipeline to an existing bridge or constructing a bridge type structure to support the pipeline.

Trenched techniques disturb the watercourse bed and banks and are typically referred to as either 'open-cut' or 'isolation' techniques. During an open-cut installation, the pipe trench is excavated and backfilled using either a backhoe or dredging equipment in the stream channel. Open-cut crossings typically result in some degree of short term, increased sedimentation downstream during construction in a flowing stream. Isolation techniques, on the other hand, separate the construction activities from the stream flow. For example, high-volume pumps, dams, culverts or other methods are used to divert stream flow around the trench excavation and pipe installation so that water does not flow across the open trench.

## **13 What are the contingencies for a watercourse crossing installation?**

Even the best-planned watercourse crossings can fail or not proceed according to plan. That is why contingency measures are required at every watercourse crossing. Contingency measures should include a wide range of plans from minor adjustments (for such eventualities as higher than predicted flowrates) to major modifications such as plans for an alternate crossing installation method. These possible situations should be considered during the planning phase of the project to ensure that contingency measures can be implemented in a timely manner and that any additional approval requirements do not result in work delays.

Examples of events for which a contingency plan is required include:

- need for alternate crossing techniques
- drilling mud release
- historical resource discovery
- rare and endangered species or migratory bird nest discovery
- site-specific emergency response (e.g., fire, spill response and reporting, flooding due to extreme weather events)
- construction delay causing potential change of installation methods and mitigation

Before implementing a contingency plan, companies should confirm whether additional preparation is required, for example:

- additional permits, authorizations, approvals
- different equipment and qualified operators on site
- sediment control structures
- bank clearing and grading at entry and exit points
- pertinent timing restrictions for wildlife and fish
- pipe preparation

#### **14 What is a 'frac-out' or an 'inadvertent return'?**

A frac-out or an inadvertent return can occur when using horizontal directional drilling to install a pipeline under a watercourse. A frac-out refers to the inadvertent return of pressurized drilling mud through a fracture in the substrate to the surface — either to land or into the watercourse.

Frac-outs must be reported to EC and to the DFO immediately. They must also be reported to the NEB under the Onshore Pipeline Regulations, 1999 if there is a "significant adverse effect on the environment", and there will likely be provincial reporting requirements.

## 15 What are the concerns related to hydrostatic testing?

Hydrostatic testing is a method in which water is used to pressure test a pipeline. All water intakes, even if they are temporary in nature, must be screened according to the DFO Freshwater Intake End-of-Pipe Fish Screen Guideline (1995) to prevent entrainment of fish, ensure fish are not killed during the pumping process and ensure instream flow needs are met.

Water quality should also be a consideration. The disposal, discharge or trans-boundary use of hydrostatic test water must be reviewed with the *Fisheries Act*, Subsection 36(3). Provincial approvals might also be required to authorize this use and release of water.

Water quality considerations should also include water takings that may affect stream flow, including instream flow needs such as flows needed to sustain the aquatic environment and maintain consumptive uses downstream.

Measures should also be taken to prevent erosion and sedimentation that could occur if test water is released in inappropriate locations, without proper diffusive devices, and at excessive flowrates.

## Fish and Wildlife Habitat

### 16 What are the potential effects of a watercourse crossing on fish and fish habitat?

The following are examples of the potential effects of installing a pipeline across a watercourse:

- an increase in suspended sediments (i.e., because of construction or reclamation activities)
- HADD (e.g., decrease in availability of spawning beds)
- decrease in fish health (e.g., gill irritation)
- disruption to feeding (i.e., because of lack of food or alterations to nutrient dynamics)
- increase in fish mortality
- changes in water quality (i.e., because of increased sediment loading or altered thermal regimes, or spills of contaminants or deleterious materials)

The majority of aquatic effects associated with pipeline construction are considered to be the result of instream construction. Instream construction (i.e., installation phase) activities and erosion of soils exposed along the right-of-way increase sediment loads and subsequent downstream deposition in watercourses. Sediment load increases can directly and indirectly affect fish by modifying their habitat. In addition to sediment-related effects, habitat at the crossing site can be altered directly through the excavation and backfilling of the pipeline trench and associated changes to bank conditions and riparian vegetation.

If effects on fisheries cannot be mitigated to the satisfaction of the DFO, approval of a fisheries compensation plan might be required.

### **17 What is considered fish habitat?**

Fish habitat is defined in the *Fisheries Act* as “spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly in order to carry out their life processes”. It comprises physical, chemical and biological attributes (e.g., substrate type and structure, aquatic macrophytes, water depth, water velocity, water temperature, dissolved oxygen, riparian vegetation) that are required by fish to carry out their life processes. Examples of fish habitat include riparian areas, lakes, reservoirs, rivers, streams, marshes, wetlands, canals and drains.

Habitat requirements also change seasonally, and fish might be present in some habitats during only part of the year (e.g., intermittent streams and marshy areas that only flood in the spring can be used for spawning purposes or for overwintering).

### **18 What is considered a riparian area?**

A riparian area consists of the vegetated zone next to streams, rivers, lakes and wetlands that stabilizes banks and shorelines and provide important habitat for fish and wildlife. Riparian areas are generally identified based on the surrounding water-dependent vegetation and the soils. Although riparian areas make up only a small portion of the landscape, they are among the most productive and valuable of all landscape types and are considered important because of the services they provide. For example, they:

- act as a natural buffer and filter and help improve surface water quality before the water is introduced to streams, lakes and rivers from the surrounding watershed

- act as a natural sponge to hold water, recharge groundwater and retain soil moisture for vegetation
- provide abundant forage, shelter and habitat for livestock and wildlife

Riparian areas must be taken into consideration when planning a watercourse crossing to ensure these areas are effectively managed and reclaimed. For the benefit of both pipeline right-of-way stability and fish habitat, it is important to retain as much riparian vegetation as possible in the right-of-way corridor, especially the vegetation directly next to a watercourse. Care should also be taken when working around or within these areas to ensure that the introduction of invasive plant species, which have the ability to modify the natural species composition, does not occur.

### **19 What is 'HADD'?**

HADD is the harmful alteration, disruption or destruction of fish habitat and is defined as any change in fish habitat that reduces its capacity to support one or more life processes of fish. In assessing a project proposal for its potential to cause HADD to a fish habitat, habitat managers identify effects that are considered harmful. These effects would be of a type and magnitude sufficient to render the habitat less suitable or unsuitable for supporting a fish's life processes.

### **20 What are fish habitat assessments and what is their purpose?**

Fish habitat assessments are valuable tools for determining the sensitivity of fish and fish habitat at a pipeline watercourse crossing. This type of assessment is generally conducted for the pipeline company by a consultant with qualified personal that have expert knowledge of fish and fish habitat. The assessment is conducted on site and the results are documented in a report that informs the fish habitat assessment. Fish habitat assessments help to determine:

- the type of fish and fish habitat present
- the role of the habitat for supporting fish
- how the habitat may be affected by the proposed watercourse crossing, both within and downstream of the proposed right-of-way

This information is used to:

- assess environmental risk
- determine instream timing windows
- ensure protection measures are in place for the different fish species
- identify permit requirements
- aid in the development of habitat compensation plans, if required by DFO
- inform pipeline routing
- determine preferred and alternate crossing methods and locations

# Pipeline Watercourse Crossing Guidance

The following guidance is designed to assist with planning, constructing, operating and abandoning a pipeline at a watercourse crossing in an environmentally responsible manner. Additional considerations are described in the previous questions and answers. Though this guidance does not replace specific regulatory direction, it provides material for consideration in carrying out environmental planning and developing protection measures.

## Planning

Planning to install a pipeline at a watercourse crossing includes implementing project controls (e.g., budget, schedule), choosing a route, selecting the appropriate crossing technique, assessing environmental effects, identifying cultural interests and public concerns, identifying applicable regulatory requirements and the requirements of local governing bodies and industry best practices.

### *Regulatory Requirements and Supporting Documents*

- Identify applicable regulatory requirements.
- Consult with fisheries management agencies early in the planning process.
- Review supporting documentation for guidance (e.g., Pipeline Associated Watercourse Crossings, NEB Filing Manual, DFO Operational Statements).
- Identify related Aboriginal consultation requirements specific to fisheries resources, traditional use and navigation of the watercourse.

### *Data Gathering and Crossing Design Considerations*

- Collect biophysical information, including information on, but limited to, the following (depending on site conditions and project scope):
  - geotechnical characteristics
  - stream hydrogeology and geomorphologic characteristics
  - fish and wildlife habitat
  - plant species and riparian vegetation
  - instream timing windows
  - water quality and quantity

- seasonal stream flows and full bank width
- soil and substrate composition
- sensitive habitats
- other non-project activities at or near the crossing location
- Gather information about traditional land use and related cultural values. Consider this information relative to the biophysical information that is also collected.
- Gather information about other water user interests (e.g., recreational, commercial, domestic).

**Potential Effects**

- Assess whether the proposed watercourse crossing will result in effects on the environment, for example, HADD to fish habitat, refer to the DFO Pathway of Effects diagram (see [http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/pathways-sequences/index\\_e.asp](http://www.dfo-mpo.gc.ca/oceans-habitat/habitat/modernizing-moderniser/pathways-sequences/index_e.asp)).
- Meet with affected landowners and other watercourse users to understand their concerns.
- Assess the geotechnical and associated hydrological factors that will be considered in the selection of the crossing technique.
- Confirm the potential for navigability issues.
- If the proposed watercourse crossing poses potential harm to fish or fish habitat, consider rescheduling the activity, relocating or re-designing the crossing method, or re-routing the pipeline or facility.

**Mitigation Measures**

- Confirm whether the proposed activity meets the DFO policy objective of ‘No Net Loss’ of habitat.
- Develop appropriate mitigation measures to:
  - prevent or reduce the effects of construction on aquatic habitat, riparian areas, the watercourse and its approach slopes, and on other users/interests
  - minimize equipment activity within the perimeter of the watercourse crossing location
  - ensure noxious weeds and invasive plant species are not transferred from construction equipment into the stream or riparian areas

- Document mitigation in a project-specific environmental protection plan that embodies all the required protection measures as determined through the planning and regulatory review stages of the project such as:
  - during the environmental assessment process
  - commitments made through information requests and hearing questions
  - conditions on regulatory approvals

#### ***Project-Specific Construction, Monitoring and Contingency Plans***

- If the installation method is a horizontal directional drill, develop a mud management plan and a contingency plan in the case of a drilling failure. Refer to CSA Z662 Oil and Gas Pipeline Systems.
- If the installation method is trenchless, develop a contingency plan in the event the trenchless installation should fail and an alternative method must be used.
- Develop contingency plans for accidents and malfunctions such as fuel and hazardous materials spills.
- Develop a preliminary reclamation plan considering elements such as final bed and bank contours, aesthetics, erosion control, habitat re-establishment or enhancement, and other elements of the watercourse crossing landscape unit.
- Prepare monitoring plans for construction and post-construction (e.g., sediment monitoring, bank stability, reclamation status).

#### ***Project Coordination***

- Select the appropriate crossing technique based on watercourse sensitivity and a geotechnical assessment.
- Determine if blasting of bedrock is required and if so, consult with DFO.
- Choose a crossing schedule that corresponds to the lowest period of environmental and watercourse parameter sensitivity (i.e., identifying construction timing windows for fisheries and wildlife).
- Before starting construction, choose sources of clean gravel, cobble, rip-rap and native vegetation to use for site and habitat re-stabilization and reclamation.
- Ensure there is sufficient workspace on the approach slopes and the watercourse crossing so removal of the surface material and spoil material does not affect fisheries resources and habitat.
- Include plans, requirements and performance expectations in contract bid documents to lessen the risk of cost impacts or schedule delays during construction.

## Construction

The key steps in the pipeline construction phase at a watercourse crossing include:

- site preparation – includes right-of-way surveying, clearing, possible diversion of watercourse
- construction – includes trench excavation, laying pipe and ditch backfilling
- reclamation – includes bed, bank, riparian and slope reclamation, as required
- As part of environmental procedures, identify specific measures to help employees recognize, protect and conserve fish and fish habitat.
- Attempt to install each crossing as efficiently as possible to limit potential environmental effects during construction.
- During construction, ensure that the project-specific environmental protection plan is followed and any other mitigation that is included in the watercourse crossing plan and permit/approval conditions are incorporated into construction documents and implemented during construction.
- Assign appropriate inspection at the watercourse crossing to ensure the watercourse crossing plan, the environmental protection plan and associated protection measures are implemented.
- Remove any temporary vehicle crossings before freeze-up (summer construction) or spring breakup (winter construction), unless otherwise authorized.
- Where blasting is required, ensure the federal and any provincial blasting guidelines are adhered to. If these guidelines cannot be met, an authorization must be obtained from DFO.
- Educate staff and contractors on fish and fish habitat issues and correct protocols.
- If a contingency installation method is not feasible and an alternative crossing method is needed, check with regulating agencies to see whether additional fish and fish habitat surveys or monitoring is required. Before undertaking any work, consult with fisheries agencies, NEB and landowners to ensure that the action is appropriate and authorized.

- Where appropriate, conduct post-installation meetings with personnel (internal and contractor) and key stakeholders (e.g., regulators, public) involved with the crossing to assess the success of the crossing and to review what was learned and areas for improvement.
- Update and implement effective post-construction reclamation plans.

## Operations

Pipeline operation includes the activities required to operate and maintain the pipeline and ensure ongoing pipeline integrity, protection of the environment and the safety of the public.

- Determine the need for regulatory approvals for operations and maintenance activities.
- Consult with DFO and provincial fisheries agencies if watercourse crossings are required for operational purposes (e.g., pipe replacements, vehicle crossings, bank stabilization activities).
- Ensure operational activities (e.g., brush control) that involve crossing the watercourse are scheduled outside sensitive periods for fish and fish habitat.
- Monitor bank stability as part of the pipeline integrity monitoring program.
- Monitor re-vegetation success as part of the post-construction monitoring program.
- Monitor watercourse crossings during operations as part of pipeline integrity and right-of-way surveillance programs. In carrying out operational programs, take note of bank stability and stream characteristics.
- Share the results of mitigation efforts with industry and regulatory agencies and participate in research and monitoring programs that contribute to best practices for fish and fish habitat protection.

## Decommissioning and Abandonment

- Comply with all applicable regulatory requirements in place at the time of the proposed activities.
- Refer to Pipeline Abandonment: A Discussion Paper of Technical and Environmental Issues, authored by the Pipeline Abandonment Steering Committee, for detailed guidance on developing a project-specific decommissioning and abandonment plan.

- Before decommissioning or abandoning a facility, consider potential effects of these activities on fish and fish habitat.
- Discuss viability of removing the pipeline or abandoning it in place with appropriate regulators and ensure understanding of responsibilities relative to post-abandonment.
- If a decision is made to remove a pipeline at a watercourse crossing, explore all available methods of removal, keeping in mind the need to protect fish and fish habitat and at the same time maintain stable banks and approach slopes during and following the removal activities.
- Even if a pipeline is to be abandoned in place, there may be certain activities that could cause a disturbance or affect water quality at the watercourse crossing, such as capping the pipeline or filling it with a substance such as concrete.
- Schedule decommissioning and abandonment activities in watercourses to fall outside sensitive windows for fish and fish habitat.
- All disturbed areas must be reclaimed. Consider the need of fish and fish habitat and wildlife habitat that might exist in the riparian areas and approach slopes when planning reclamation (e.g., re-establish vegetation on riverbanks).

## **Appendix A: Information Sources for Pipeline Projects North of 60**

Yukon Water Board  
[www.yukonwaterboard.ca](http://www.yukonwaterboard.ca)

Nunavut Water Board  
[nwb.nunavut.ca](http://nwb.nunavut.ca)

Northwest Territories Water Board  
[www.nwtwb.com](http://www.nwtwb.com)

Sahtu Land and Water Board  
[www.slwb.com](http://www.slwb.com)

Gwich'in Land and Water Board  
[www.glwb.com](http://www.glwb.com)

Mackenzie Valley Land and Water Board  
[www.mvlwb.com](http://www.mvlwb.com)

Indian and Northern Affairs Canada (NWT Region)  
[www.nwt-tno.inac-ainc.gc.ca/index\\_e.htm](http://www.nwt-tno.inac-ainc.gc.ca/index_e.htm)

Indian and Northern Affairs Canada (Nunavut Region)  
[www.ainc-inac.gc.ca/nu/nuv/index\\_e.html](http://www.ainc-inac.gc.ca/nu/nuv/index_e.html)

Oil and Gas Guides.com  
[www.oilandgasguides.com](http://www.oilandgasguides.com)

Nunavut Impact Review Board  
[www.nirb.ca](http://www.nirb.ca)

Mackenzie Valley Environmental Impact Review Board  
[www.mveirb.nt.ca](http://www.mveirb.nt.ca)

Joint Secretariat, Inuvialuit Settlement Region,  
Environmental Impact Review Board  
[www.jointsecretariat.ca/eirb.html](http://www.jointsecretariat.ca/eirb.html)

## Resources

Alberta Energy and Utilities Board. 1996. *Directive 50: Drilling Waste Management*. October 1996. Calgary, AB.

Alberta Environment. 2001. *Code of Practice for Pipelines and Telecommunication Lines Crossing a Water Body*. "<http://www.qp.gov.ab.ca/documents/codes/Pipeline.cfm>"\t'\_blank. Edmonton, AB.

Alberta Environment. 2001. *Code of Practice for the Temporary Diversion of Water for Hydrostatic Testing*. "<http://www.qp.gov.ab.ca/documents/codes/diverse.cfm>"\t" blank. Edmonton, AB.

Alberta Environment. 2001. *Code of Practice for Watercourse Crossings*. "<http://www.qp.gov.ab.ca/documents/codes/Crossing.cfm>"\t'\_blank. Edmonton, AB.

Alberta Environment. 2005. *A Guide to Release Reporting. Alberta Environmental Protection and Enhancement Act*. Publication No. 1/792. Edmonton, AB.

Anderson, P.G., B.R. Taylor and G.C. Balch. 1996. *Quantifying the Effects of Sediment Release on Fish and their Habitats*. Prepared for the Eastern B.C. Habitat Unit and Alberta Area Habitat management Division, Department of Fisheries and Oceans. Canadian Manuscript Report of fisheries and Aquatic Sciences No. 2346. 110 p. + appendices.

Canadian Association of Petroleum Producers and the Canadian Energy Pipeline Association. 1996. *Hydrostatic Test Water Management Guidelines*. Prepared by Tera Environmental Consultants (Alta.) and CH2M Gore and Storrie Limited. September 1996. Calgary, AB.

Canadian Association of Petroleum Producers, Canadian Energy Pipeline Association and Canadian Gas Association. 2005. *Pipeline Associated Watercourse Crossings*. Prepared by TERA Environmental Consultants, Salmo Consulting Inc. and Applied Aquatic Research. September 2005. Calgary, AB.

Canadian Association of Petroleum Producers. 2004. *Planning Horizontal Directional Drilling for Pipeline Construction*. September 2004. Calgary, AB.

Canadian Standards Association. 2003. CAN/CSA-Z731-03 *Emergency Preparedness and Response*.

- Cows and Fish Alberta Riparian Habitat Management Society. 2005. *Why are riparian areas valuable to producers?* Available at <http://www.cowsandfish.org>
- Environment Canada. 2003. *Implementation Guidelines for Part 8 of the Canadian Environmental Protection Act, 1999 – Environmental Emergency Plans*. Ottawa, ON.
- Environment Canada. 2006. *Species at Risk*. Available at: [www.sararegistry.gc.ca](http://www.sararegistry.gc.ca)
- Environment Canada. 2001. *Compliance and Enforcement Policy for the Habitat Protection and Pollution Prevention Provisions of the Fisheries Act*. Ottawa, ON. Available at: <http://www.ec.gc.ca>
- Fisheries & Oceans Canada. 1995. *Freshwater Intake End-of-Pipe Fish Screen Guideline*. Ottawa, ON.
- Fisheries & Oceans Canada. 2005. Operational Statements (various). Ottawa, ON. Available at: <http://www.dfo-mpo.gc.ca>
- National Energy Board. 2004. *Filing Manual*. Calgary, AB.
- OilandGasGuides.com. 2004. Regulatory Road Maps Project. Available at: [www.oilandgasguides.com](http://www.oilandgasguides.com)
- Pipeline Abandonment Steering Committee. 1996. *Pipeline Abandonment: A Discussion Paper of Technical and Environmental Issues*. November 1996. Calgary, AB.
- Reid, S. and P.G. Anderson. 2000. *Evaluation of Isolated Watercourse Crossings during Winter Construction along the Alliance Pipeline in Northern Alberta*. Proceedings of the 7th International Symposium, Environmental Concerns in Rights-of-Way Management. September 9-13. Calgary, AB.
- Transport Canada. 2004. *Navigable Waters Protection - Pipeline Crossing Guidelines*. Available at: <http://www.tc.gc.ca/pacific/marine/nwpc/pipelinecrossingguidelines.htm>
- Wright, D.G. and G.E. Hopky. 1998. Guidelines for the use of explosives in or near Canadian fisheries waters. *Can. Tech. Rep. Fish, Aquat. Sci.* 2107: iv + 34p.

## Glossary

### Abandonment (pipeline)

Abandonment means to permanently cease operation such that the cessation results in the discontinuance of service (Source: NEB).

### Aquatic fauna

Aquatic organisms include organisms such as finfishes, molluscs, crustaceans, marine plants and marine mammals, related organisms constituting their habitats (including freshwater plants), as well as eggs, sperm, spat, etc. (Source: DFO).

### Bed and banks

The streambed and the rising slope or face of ground bordering a watercourse, up to the level of rooted terrestrial vegetation.

### Compensation

The replacement of natural habitat, augmentation in the productivity of existing habitat or maintenance of fish production by artificial means.

### Crossing techniques

- Trenched
  - Open trenched/open cut: The excavation of a trench in flowing water.
  - Isolated: The crossing site is isolated from the main watercourse to prevent construction materials and sediment from entering the watercourse outside of the isolated area.
  - Dam/Pump: A dam is placed in the stream channel to prevent the main flow of water from flowing through the area that will be subjected to disturbance within the stream channel. A pump is used to pump water from the upstream side of the excavation to the downstream side to bypass the instream construction area.
  - Flume: A dam is placed in the stream channel to prevent the main flow of water from flowing through the area that will be subjected to disturbance within the stream channel. A large pipe (flume) is installed to permit the passage of water from the upstream side of the dam to the stream channel downstream of the work area.
- Trenchless: A crossing method in which there is no disturbance to the bed and banks of a water body. Trenchless crossing methods include horizontal bores, horizontal punches and directional drills.
- Aerial: Pipeline is either fixed to an existing bridge structure, or a new structure is built to support the pipeline.

### **Decommissioning (pipeline)**

Decommission means to permanently cease operation such that the cessation does not result in the discontinuance of service (Source: NEB).

### **Deleterious substance**

(a) Any substance that, if added to any water, would degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water, or

(b) Any water that contains a substance in such quantity or concentration, or that has been so treated, processed or changed, by heat or other means, from a natural state that it would, if added to any other water, degrade or alter or form part of a process of degradation or alteration of the quality of that water so that it is rendered or is likely to be rendered deleterious to fish or fish habitat or to the use by man of fish that frequent that water.

### **Deposit**

Means any discharging, spraying, releasing, spilling, leaking, seeping, pouring, emitting, emptying, throwing, dumping or placing.

### **Fish**

Includes: parts of fish; shellfish, crustaceans, marine animals and any parts of shellfish, crustaceans or marine animals; and, the eggs, sperm, spawn, larvae, spat and juvenile stages of fish, shellfish, crustaceans and marine animals.

### **Fish habitat**

Spawning grounds and nursery, rearing, food supply and migration areas on which fish depend directly or indirectly in order to carry out their life processes.

### **Frac-out**

The inadvertent seepage of drilling mud onto the ground or into surface waters through fractures in the subsurface. Frac-outs can occur when using pressurized crossing construction methods such as horizontal directional drilling.

### **HADD**

Harmful alteration, disruption or destruction (HADD) of fish habitat is defined by Fisheries and Oceans Canada (DFO) as "any change in fish habitat that reduces its capacity to support one or more life processes of fish".

It should be noted that this definition of HADD applies when determining if, or whether, any of the three conditions (i.e., harmful

alteration, disruption, or destruction) identified in Subsection 35(1) of the *Fisheries Act*, are likely to result from a project.

These conditions do differ, and are differentiated essentially by the severity of impacts and their duration, as follows:

- harmful alteration – any change to fish habitat that indefinitely reduces its capacity to support one or more life processes of fish, but does not completely eliminate the habitat
- disruption – any change to fish habitat occurring for a limited period which reduces its capacity to support one or more life processes of fish
- destruction – any permanent change of fish habitat which completely eliminates its capacity to support one or more life processes of fish

### **Instream activity**

Usually interpreted as any activity conducted in a water body (i.e., stream, river, lake, pond, isolated pool).

### **Mitigation**

Actions taken during the planning, design, construction and operation of works and undertakings to alleviate potential adverse effects on the productive capacity of fish habitats.

### **Navigable waterway**

A navigable water is defined by the *Navigable Waters Protection Act* as being “any body of water capable, in its natural state, of being navigated by floating vessels of any description for the purpose of transportation, recreation or commerce, and may also be a man-made feature such as a canal or reservoir’.

### **No net loss**

A national guiding principle by which DFO strives to balance unavoidable habitat losses with habitat replacement on a project-by-project basis so that further reductions to Canada’s fisheries resources due to habitat loss or damage may be prevented.

### **Riparian**

Pertaining to anything connected with, or immediately adjacent to, the banks of a watercourse or water body.

### **Rip-rap**

A foundation or revetment made of irregularly placed stones or pieces of boulder on earth surfaces (e.g., stream banks) to reduce erosion of underlying soil or material by water.



**The Life Cycle of  
Pipeline Watercourse  
Crossings in Canada**

Prepared by the  
Canadian Pipeline  
Environment Committee  
October 2009