15 Water Withdrawals

There are many practical administrative problems associated with water resource management. One of these is the withdrawal of water. Quite early in the hearings, it became apparent that water withdrawals during construction and operation of the pipeline could have substantial environmental and socio-economic consequences.

Construction of the pipeline will require hundreds of millions of gallons of water. And water requirements for the operation and maintenance of the pipeline, while substantially less, will still be significant. Although there are large volumes of water along most of the proposed corridor, there will be localized shortages and conflicts with other, competing uses. The shortages may affect fish and fisheries, and they will be accentuated by the scheduling of major parts of the construction work during winter, when stream flows and water levels are at their lowest. There will inevitably be competing demands for water between the project on the one hand and elements of the local environment on the other. There will be a host of other major and minor considerations, ranging from other human demands on a water resource, concerns over waterfowl and aquatic furbearers, to recreation and aesthetics. The effect of many other project-related activities on waterbodies must also be considered. I have discussed elsewhere wastewater, river crossings, and spills, all of which overlap considerations related to water withdrawal. All of these considerations should be taken together to form a comprehensive water resource management scheme.

The water resources of the Northern Yukon were of particular concern to many witnesses before the Inquiry. My recommendation against a pipeline across that region was partly based on this concern, particularly because of localized water shortages and the effects of low water flows on overwintering fish. The problems of water withdrawals elsewhere along the pipeline route warrant careful attention. Water will be required to test the pipeline hydrostatically, for camps, and for the construction of snow and ice roads, particularly along the northern part of the route where snowfall is low. But whatever may be the project's needs, the constraints imposed by the competing uses of the living environment must be considered. These constraints go beyond the obvious limitations of supply, with which engineers and contractors are familiar, to encompass the less obvious, but equally important, requirements for fish protection, habitat maintenance and aesthetics.

1. *The objective in regulating water withdrawal shall be to control the location and time of withdrawal, the volume removed, and associated activities so that they will not adversely affect: other industrial, or domestic or recreational uses of the water; transportation on, or access to, the waterbody; trapping or fishing in or near it by local people; populations of fish and and other aquatic biota in the waterbody; and waterfowl or wildlife that use the waterbody or its margins.*

The need to regulate water use is recognized in existing legislation such as the Inland Waters Act and the Fisheries Act. However, it may be that the proposed pipeline, because of its scale, may require measures not considered in the existing statutes. The project will involve hundreds of withdrawal sites and hundreds of millions of gallons of water, all within a very short period of time. Each water withdrawal activity will be linked to the next by very pressing schedules for project design, construction, operation and abandonment. The sites will be spread over an extensive area; the volumes used at some sites will be small but at others very large. Each withdrawal will have broad implications on project activities, on regional environment in general and on local water sources in particular; applications cannot, therefore, be considered in isolation.

The cumulative effect on the environment of all the water withdrawals could well be greater than the sum of the individual withdrawals. So, in planning and regulating the project, we must take a regional overview, as well as look at site-specific details.

2. *The Company's water withdrawal schemes shall be comprehensive by considering the immediate and cumulative environmental impact of all aspects of the preconstruction,*

construction, operation, maintenance and abandonment phases of the proposed pipeline.

Overall Plan

We have available some outstanding environmental studies that relate to water withdrawal but this work has not been brought together to give a comprehensive overview of the nature and scope of water withdrawals and their possible effects. It is essential that the concerns emphasized in the chapters on fish and the physical environment be considered together with such requirements of the project as pipe testing, snow roads, camps, and river crossings so that their relation to the problems of water withdrawal is clear to everyone involved with the design and approval of plans.

Overall plans have been recommended for various aspects of pipeline construction and operation. Because of the interrelationship between water withdrawals and the other uses of water resources, these plans must all be concisely keyed to each other. This could not be done during the Inquiry hearings, but it seems to me that it will have to be carried out before the government or other interested parties will be able to provide meaningful direction or comment. An overall plan is a means by which the views of experts and specialists in all fields can be incorporated into the planning and review process. I therefore endorse the approach taken by Commission Counsel in his final argument that, as in the case of all other aspects of the management of water resources, there should be an overall plan as well as site-specific applications.

3. *Before the final design phase, the Company shall prepare for approval by the Agency an overall plan for the water withdrawals for all construction activities and all permanent facilities over the life of the pipeline up to and including its abandonment. Subject to the direction of the Agency, the overall plan shall, as far as possible, be in cartographic form, shall be presented by drainage basin (or a part thereof) as designated by the Agency, and shall take into account, by means of overlays or other graphic techniques at the same scale or by notations, the other overall plans requested elsewhere in this report. The Agency may request the Company to resubmit parts of this overall plan if, for any reason, they do not meet with its approval. The Company shall undertake to keep the overall plan up to date so that it reflects the latest policies and actions of the Company, the Agency and government.*

4. *The overall plan shall specify such items as the general timing and the extent of pipeline-related activities; the source of all water to be used and the proposed method of its withdrawal, means of transportation, storage, treatment and use; the anticipated volume and the rates and periods of withdrawal; the general physical and biological characteristics and the domestic or commercial uses of the water source; and other details the Agency may require, such as alternative withdrawal sites and plans.*

5. *The overall plan shall be approved by the Agency before site-specific applications are submitted for water withdrawals.*

Site-specific Applications

6. *The Company shall file with the Agency a separate site-specific application for each water withdrawal, regardless of its rate or duration. Each of these applications shall be keyed to the overall plan. For administrative purposes, such individual applications may be group-filed by each spread year, except when they are not related to any specific spread location. In this event, they shall be filed on an individual basis.*

7. *In all circumstances, the Company shall supply to the Agency all information that is required or requested regarding the potential effect of a water withdrawal on the environment, particularly as it relates to fish or to the use of a waterbody by other people for domestic or other purposes. In particular, each application shall outline the need for water and shall specify such items as the source of the water and the location of its use; the maximum rates of withdrawal; the total volume to be withdrawn or, in the case of a continuing withdrawal, the volume per unit of time; the design details of the means of taking, transporting and treating the water; the particular environmental and land use characteristics of the water supply source (including its use by fish, wildlife, trappers, fishermen or by any people for recreational, professional or other uses) on which the Company's assessment of the site and of the effects of the proposed withdrawal are based; the proposed methods for and the times of monitoring water withdrawals and their effects on the environment; and other details as requested by the Agency.*

The application shall predict the physical changes to the waterbody that may result from the withdrawal. In the case of watercourses, this will include the percentage decrease in flow rate, water depth and water level; and, for winter withdrawals when fish or eggs are present downstream, the changes in depth and area of pools during minimum flow and maximum ice cover. For lakes, it will include the percentage decrease in the water volume, the maximum water drawdown anticipated, and the length of time the waterbody will take to recover its natural level.

8. *Applications that are approved shall be valid for only the quantities, locations and periods of withdrawal specified. If the conditions are altered in any way that would increase or change the location of the impact, the Company shall submit an amended application for approval.*

Design Guidelines

Many principles of design and operation were placed before me in evidence that will assist the government and the Company in the preparation and execution of their plans. I have asked my staff to develop guidelines from this evidence,

and I commend them, together with the recommendations I have made elsewhere in this report, to everyone concerned, as a common starting point in the development of a comprehensive approach to water withdrawals.

9. *All water withdrawals shall be made only in accordance with site-specific plans prepared by the Company, signed and sealed by a professional engineer and approved by the Agency.*

10. To protect the physical and living environment, the design of all water withdrawal facilities shall be in accordance with the following parameters:

a) Water shall not be removed from a waterbody frequented by fish, waterfowl, or aquatic furbearers, unless the Company has demonstrated that this withdrawal will not be detrimental to the fish, waterfowl or aquatic furbearer populations and resources in and around the waterbody, either at the time of removal or at any subsequent time. If the Company submits that a waterbody is not frequented by fish, it must be able to demonstrate that claim to the satisfaction of the Agency.

b) No water intake shall be located within 1,000 feet of fish spawning or overwintering areas that have well-defined boundaries. Water removal from large waterbodies that have scattered fish overwintering and spawning areas shall be permitted, if proper screening and approved velocities are maintained.

c) Water removal shall not exceed 10 percent of the minimum quantity of water in the waterbody during the period of removal. In any case, water shall not be removed from any lake that contains fish, unless it is deeper than 12 feet, or from any flowing waterway that contains fish, if removal would reduce velocity below 75 percent of the normal flow or to a depth of less than 0.6 feet. In all waterways that contain overwintering fish, the flow rate shall be maintained at least at the natural median monthly minimum flow level between November and April. The monthly minimum flow calculation shall be based on the flow normally expected in streams during nine out of 10 years in each of the winter months.

d) Water removal shall not cause siltation or turbidity in excess of the standards set out in Fish.

e) Intake structures shall be located and designed so that the maximum inlet velocity is one foot per second or a velocity that is demonstrated to avoid interference with indigenous fish populations, assuming a worst-case situation with ice accumulation on the screen and in the water. Where it is necessary to avoid adverse effects to migrating juvenile fish, intakes shall be recessed into stream banks.

f) Stationary intakes shall conform to the specifications outlined in "Intake Screen Guidelines (1972)," prepared by the Fisheries and Marine Service (Vancouver), Department of the Environment.

g) Movable intakes shall be assessed and approved on an individual basis, but they should meet specifications that are comparable to those for stationary intakes.

11. The design of water withdrawal facilities shall include measures to be taken during use and upon abandonment to stabilize the approaches to the source so that soil creep and erosion will not occur.

12. Where permanently submerged water withdrawal structures are used, the Company shall arrange to have a government agency inspect the structure on site before it is installed.

13. The Company shall design all water-related systems for construction activities, camps or permanent facilities to incorporate practices and equipment that will minimize the use of water. This practice will be particularly important in areas that are ecologically sensitive or that are without an abundant water supply.

Operating Considerations

14. An individual qualified to supervise water withdrawal operations shall be at the withdrawal site at all times during withdrawals of water that will be used for industrial and related operations during pipeline construction and testing (for example, pipe testing, ditch flooding, and snow road construction).

15. An individual qualified to supervise water withdrawal shall be a person who has been so designated by the Company and approved by the Agency and who has a demonstrated knowledge of the critical biological features of the water supply source, including the habitat features that must be protected and the presence and movement of fish; the design and operation of the water withdrawal facility; and safety.

16. The individual qualified to supervise water withdrawal shall be given authority by the Company to stop all water withdrawals, should he be asked to do so on site by the Agency's representative or should he deem it necessary on the basis of his own judgment.

17. If an intake impairs fish habitat or interferes with fish movements, directly or indirectly, it shall be shut down and either redesigned or moved to a more suitable location that has been approved by the Agency.

18. If the minimum flow or depth in the watercourse or lake is approached during water withdrawal, the extraction of water shall be reduced until a safe water level has been restored.

19. Upon abandonment of a water withdrawal facility, or when such a facility will not be used for an extended period of time, as determined by the Agency, the Company shall remove the intake and all related equipment and structures from the water.