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S.71 ENERGY SUPPLY CONTRACT

EXHIBIT

C21-4

# **Kemano Completion Project Review**

## **Summary Report**

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## 1.0 Background

Debate and controversy with respect to Alcan's Kemano projects have been ongoing for many years. The legal rights provided to Alcan stem from the Industrial Development Act of 1949 and an agreement between Alcan and the Province of B.C. (the "1950 Agreement") which, among other things, provided Alcan with water diversion rights to the Nechako River and the Nanika River, and favourable water rental rates. These water rights were granted to Alcan to develop a hydro-electric facility to power an aluminum smelter in northwestern British Columbia. Water rights granted to Alcan under the 1950 Agreement are to be exercised prior to December 31, 1999. At that time, Alcan will receive a water licence in perpetuity for the water required to operate facilities constructed for hydro-electric generation prior to the deadline. Construction of the first phase of development began in 1951 and was completed in 1954 with a total installed capacity of 896 MW.

The Kemano Completion Project ("KCP") involves the installation of four new generators at the Kemano power plant with a nameplate rating of 540 MW. This will bring the total installed capacity at the plant to 1436 MW. KCP also involves the construction of a new power tunnel and associated intake, the dredging of Taitsa Narrows and the addition of 1.1 metres to the gates at the Skins Lake Spillway. KCP also requires the construction of 82 km of 300 kV transmission line to transmit the KCP output to Kitimat, where it connects to the B.C. Hydro system.

B.C. Hydro has contracted to purchase an average annual 285 MW of KCP output for a period of at least 20 years. B.C. Hydro has also executed a Coordination Agreement with Alcan to capture efficiency gains realized from the coordinated operation of the Nechako Reservoir with the B.C. Hydro system.

To fulfill fish protection obligations the Project requires the building of a cold water release facility at the existing Kenney Dam and the construction of the Cheslatta fan channel. The Kenney Dam Release Facility ("KDRF") would draw cold water from deep in the reservoir to release into the Nechako River so that cool water conditions will prevail for the migration of adult salmon.

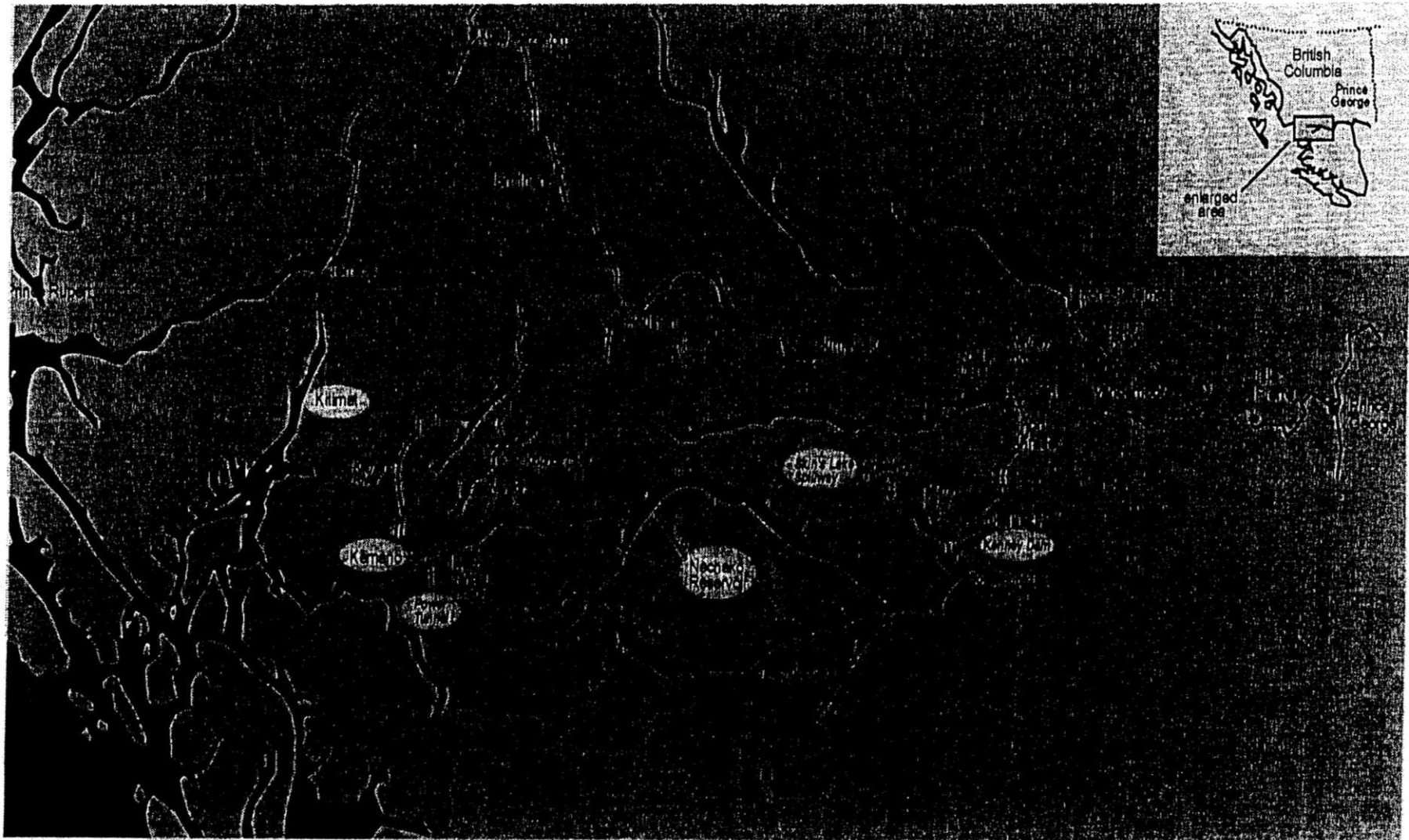
Figure 1-1 shows the location of the key features related to the KCP.

### The Settlement Agreement

Prior to 1980, Alcan and the federal Fisheries Department ("DFO") reached an impasse in discussions on the amount of water to be released into the Nechako River to satisfy the DFO's mandate to protect the salmon fisheries. In 1980 the DFO obtained an injunction from the B.C. Supreme Court requiring Alcan to release additional flows which the DFO considered necessary for the protection of the salmon fisheries.

In 1985, Alcan petitioned the courts for a permanent resolution of the flow requirements. Prior to the court case, the federal government, provincial government and Alcan agreed to enter private negotiations to find technically accept-

Figure 1-1. The Kemano Hydroelectric Development



Adapted from E. 135:10

able solutions to the conflict between Alcan's rights to the water in the Nechako and Nanika Rivers and the federal responsibility to protect the salmon fishery.

The 1987 Settlement Agreement between Alcan and the governments of British Columbia and Canada achieved an accord that all three parties deemed to be a satisfactory resolution, including a combination of flows and remedial measures for the Nechako River. This resulted in the development of the current KCP.

Under the Settlement Agreement Alcan gave up its rights under the 1950 Water Licence to divert the Nanika River and also agreed to construct a cold water release facility at Kenney Dam, as well as to construct and pay for other remedial measures required to maintain set numbers of chinook salmon. Alcan is to pay one half the costs of the monitoring and conservation measures and to share in the administration costs of a program to maintain the Nechako River fishery. The Nechako Fisheries Conservation Program (NFCP), was established with representation from the three parties and an independent expert.

The DFO agreed to forego any legal challenges to the 1950 Agreement, to pay for half the NFCP's costs of monitoring, and all the costs of applied research. The Province agreed to implement a fresh water fishery management strategy, and to amend Alcan's Water Licence and the 1950 Agreement to reflect the abandonment of Alcan's rights to the diversion of the Nanika River.

Alcan initiated construction of the KCP in 1988, but halted construction in 1991 following a successful challenge to the federal court trial division that KCP required a federal Energy Assessment Review Process Certificate prior to construction. That ruling was reversed by the Federal Court of Appeal and an appeal to the Supreme Court of Canada was dismissed in February, 1993. Approximately \$500 million had been spent by Alcan on the KCP to that point.

### **Commission Review**

On January 19, 1993, the Province of British Columbia issued the Terms of Reference for this Review under Order in Council No. 0033. The Terms of Reference specifically direct the Commission to "assess the nature and extent of the effects of the Project on the physical, biological, social and economic environments in the Kemano and Nechako River watersheds and the Nechako Reservoir." Issues to be addressed relate to river hydrology, fisheries, cost/benefit analysis, aboriginal concerns, and any other issues identified by the Commission. The Terms of Reference also direct the Commission to recommend options for addressing impacts of the project, inclusive of appropriate mitigation measures.

Initially, Alcan declined to participate in the Review process, but changed its position on July 9, 1993. The DFO had initially offered only limited participation, but that position also changed to full participation on January 27, 1994.

Representatives of the major First Nations' communities within the geographic region of the Review indicated that their participation in the Review would depend on certain concerns being addressed. Among the concerns, the First Nations' communities requested a full examination of the Fraser River, Kemano I,

and the justification for the project. The Commission's Terms of Reference did not satisfy First Nations' concerns regarding the scope of the Review, and First Nations groups declined to participate. The Technical Report provides additional background on the positions taken by First Nations. The recommendations from this Review will have a direct impact on First Nations.

The Terms of Reference direct the Commission to consult with interested parties on the form and content of the Review. The Pre-Hearing Activities commenced in April 1993 with a series of scoping meetings in Prince George, Fort Fraser and Kitimat. These meetings served to initiate consultation with interested parties about the Review and to scope the issues of concern to them, within the context of the Terms of Reference. As a precursor to the Public Hearings, the Commission staff held several workshops and pre-hearing meetings to provide a forum where interested parties could be informed about the Review and obtain clarification about the issues to be addressed.

Prior to the start of the public hearing, the Commission conducted two site visits of the study area. On September 10, 1993, the Commission was guided on a helicopter reconnaissance of the Nechako River, the Kenney Dam, the Nechako Reservoir, the Skins Lake Spillway, the Murray-Cheslatta system and the Cheslatta Fan. This was followed on October 20, 1993 with a tour of the Kemanan River, the Kemanan Community, the Kemanan I powerhouse and the KCP facilities under construction. These tours served to provide the Commission with familiarity as to the character of the region, as well as an appreciation of some of the concerns articulated at the scoping meetings. During July and August, 1994, boat and canoe tours of the Nechako River, a float plane tour of the Nechako Reservoir and bus tours of local communities provided additional insights.

To focus discussion at the Community and Technical Hearing, the Commission developed a preliminary list of issues from the sentiments expressed at the scoping meetings and from comments submitted to the Commission by interested parties. The Commission kept the public apprised of these issues, Panel determinations, and the evolution of the Review process by the issuance of regular newsletters.

The Community Hearings were designed for information gathering, where participants would inform the Commission about the impacts of the KCP on the communities within the geographic region of the Review.

Community Hearings were held over 8 days in November and December 1993 and took place in Prince George, Fort Fraser, Vanderhoof and Kitimat. The Community Hearings were relatively informal and there was no cross-examination other than questions from the Review Panel. At these hearings the Commission also received suggestions from participants on mitigation and compensation for the negative impacts of the KCP, and how the positive impacts of the project could be maximized. The Commission heard submissions from 170 individuals and groups. In total over 1,500 people attended.

The Technical Hearing on the other hand, focused on collecting, analyzing and critiquing the technical and scientific evidence related to the KCP. Unlike the Community Hearings, the Technical Hearing was considerably more structured and formal and was divided into phases by key issues. Witnesses presented their evidence under affirmation, and were subject to direct examination and cross-examination.

The Technical Hearing was held mainly in the regions affected by the Project - Prince George, Vanderhoof and Terrace. This was to ensure that the people within the geographic region defined by the Terms of Reference had local access to the Review proceedings. Several weeks of hearings were also held in Vancouver to accommodate the significant interest in the project expressed by residents in the Lower Mainland and coastal communities.

The Technical Hearing spanned 79 days - December 8, 1993 to August 10, 1994. In total, 810 Exhibits were filed and 16,489 pages of transcript were recorded. The full public record totalled more than 200,000 pages. The hearings provided an exhaustive review of the KCP under the Terms of Reference. The Commission heard from all interested parties and the Commission issued subpoenas to ensure full participation by DFO scientists, along with representations from the federal and provincial Ministers responsible for negotiation of the Settlement Agreement in 1987.

## 2.0 Reservoir Operations

Under the existing Kemano I operations, the volume of water in the Nechako Reservoir cycles annually in response to seasonal variation in inflows. An approximate annual water balance is maintained by releases through the existing Kemano powerhouse and at Skins Lake Spillway. Kemano I resulted in significant reductions in flooding along the Nechako River and downstream on the Fraser River. However, the reduced water releases also resulted in high river temperature conditions in warm, dry years which created unfavourable conditions for migrating adult salmon. Releases through the Skins Lake Spillway meant dewatering of the Nechako canyon and significant impacts to Cheslatta lands and the Murray-Cheslatta system.

Plans to coordinate operation of the reservoir, after the KCP, balance the need for power production for the aluminum smelter, the sale of power to B.C. Hydro and the agreement to coordinate reservoir operations of the Nechako Reservoir with the B.C. Hydro system. During sustained periods of small inflow and/or relatively low Nechako Reservoir levels, Kemano power generation would be reduced provided other reservoirs in the B.C. Hydro system were in a superior storage position. Conversely, during sustained periods of large inflow and/or relatively high Nechako Reservoir levels, power generation would be increased at Kemano to avoid spilling, provided other B.C. Hydro reservoirs had the capacity to store water. During periods of system-wide drought, all reservoirs would be drawn down together to ensure sufficient capacity would be available to meet Alcan and B.C. Hydro firm loads at the end of the dry period. The maximum fluctuation in reservoir levels would increase from approximately five meters at present to nine meters under the KCP and reservoir coordination.

The KCP as now designed has several notable features. The Nanika River is no longer a component of the project. The Kemano River would receive a 30 percent increase in flow. The Nechako River flow would be reduced to less than half the levels of recent years.

The most notable feature of the project is the Kenney Dam Release Facility which would provide a more effective and efficient source of cooling water for salmon migration, enable rehabilitation of the Murray-Cheslatta system, restore the Nechako Canyon as a recreational resource, reduce erosion and sedimentation and improve water quality in the upper Nechako River. The facility would also improve management of flood releases from the reservoir, accommodating whatever releases are necessary except those at least as infrequent as once in 200 years.

For these several reasons the Commission recommends that the Kenney Dam Release Facility should be used for water releases regardless of the future of the KCP. The Commission recognizes that if the KCP is not undertaken the facility and the Cheslatta fan channel would have to be redesigned to accommodate substantially larger flows in order to restore the Murray Cheslatta system to its natural state.

The various impacts from the KCP operations are summarized in the following sections and are discussed in detail throughout the Technical Report. The Technical Report provides detailed discussion and specific recommendations.

### **3.0 Nechako Reservoir**

The Commission recognizes that the Great Circle Chain of Lakes was once considered, and still has the potential, to be one of the most spectacular recreational assets of the Province. The Reservoir still provides the most ready access to Tweedsmuir Park. Safe public access to the site must remain a priority.

When the Nechako Reservoir was created in the 1950s, the Province granted Alcan the timber rights to the submerged trees. The Province did not require that Alcan remove the trees from the areas to be flooded, but did require Alcan to restore public road and water trail access, and to re-establish wharves and public approaches to pre-flooding conditions, up to a maximum total cost of \$250,000 (1950\$).

The resulting submerged timber created both significant navigational hazards and degraded the appearance of the Reservoir. A large number of partially submerged trees still protrude above the water. Debris and fallen logs have also accumulated along the shoreline.

Alcan has met its clearing requirements specified in the 1950 Agreement. Since 1979, Alcan has contributed approximately \$500,000 annually to a timber clearing program which serves to increase boater safety, to provide refuge from wind and storm, and to improve the Reservoir appearance. Despite continued efforts, Alcan has only cleared approximately 10 percent of the timber in the Reservoir.



The KCP would further exacerbate the danger and public nuisance of the submerged timber in the Reservoir. With the KCP and coordination by B.C. Hydro, it is possible that the reservoir elevations could vary by up to nine meters. The annual reservoir fluctuations with the KCP would expose more standing timber creating even more hazardous navigation conditions. From an aesthetic perspective, the additional drawdown would worsen an already unattractive scene. Additionally, the decreased reservoir levels would impede access routes, water trails, boat launches and the rail portage.

The enhancement of the recreational potential of the Reservoir requires an aggressive program of timber removal and Alcan's continued commitment to maintain safe public access routes. The Commission recognizes that Alcan's program of timber clearing has improved recreational opportunities. However, the Commission finds that an aggressive clearing program must continue in the post-KCP Reservoir to ensure the safety of boaters and public access to recreational sites.

The Commission recommends that the Province should be prepared to provide incentives for Alcan to develop and implement a mutually acceptable plan for completing the clearing of the Reservoir by the year 2005. Such a plan should give priority to routes of access to Tweedsmuir Park such as Whitesail Reach of Ootsa Lake, Whitesail Lake to Chikamin Bay, Intata Reach and the south shore of Ootsa Lake. Such a plan should also include local community input.

If Alcan does not meet the targets developed in the plan, the Commission recommends that the timber rights should revert to the Province. The province could re-issue the rights to other interested parties granting the new bearer similar incentives for expedient removal.

Alcan has agreed to extend the rail portage system between Whitesail Lake and Eutsuk Lake at Chikamin Bay to ensure that it will remain operational under the greater drawdown of the KCP. Alcan has also agreed to extend or re-design private wharves and boat launching facilities where necessary. Alcan should confirm its responsibility to restore public access to the parks in the region affected by the lower minimum Reservoir levels.

## **4.0 The Nechako River**

The most significant impacts of the Kemano Completion Project would occur on the Nechako River as the water releases from the reservoir would be substantially reduced. The effect would be most pronounced in the upper river above Fort Fraser, and most noticeable in the winter months from December to March, and in the summer months in years of low run off. These changes in river flows would have effects not only on fish, but on many other plants and animals of the river environment as well as on the communities near the banks of the river.

## 4.1 Fishery Impacts

### Sockeye Salmon

The sockeye salmon of the Stuart and Nautley rivers are by far the major fishery resource of the Nechako River basin. The average annual commercial value of the sockeye for 1981 to 1992 was \$26 million, which is 100 or more times the value of all other fish resources of the Nechako River. In 1993 the value of the sockeye catch was \$77 million.

The importance of the sockeye resource was recognized for many years prior to the Settlement Agreement. The critical need for the sockeye is cool water conditions in July and August as they migrate up the Nechako, enroute to their spawning grounds in the tributaries to the large lakes of the Stuart and Nautley watersheds where their young reside before going to sea.

At present, cooling water must be provided from July 20 to August 20 by releases of reservoir surface water from the Skins Lake Spillway. Large volumes of water are needed in hot summers and even this may not always be sufficient to keep river water temperatures below levels that are highly stressful for sockeye. With the KCP, cold water released from the Kenney Dam Release Facility would enable better maintenance of lower river temperatures than can be achieved at present.

The Commission recognizes that the provisions of the Settlement Agreement provide the opportunity for greater protection for sockeye with the KCP. However, the Commission has concluded that the negotiated provisions should be augmented to protect the potential future value of the sockeye resource. The Commission recommends that cooling water releases from the Kenney Dam Release Facility be increased to provide a target temperature of 18.4°C at the confluence of the Nechako and Stuart Rivers. The Commission estimates that accommodation of this recommendation would require additional water releases of 6.5 m<sup>3</sup>/s during the cooling period, or 1.1 m<sup>3</sup>/s on an annual basis. Sustaining this target temperature through the season of migration and providing for ramping of flows to avoid stranding of young chinook would require an estimated 0.1 m<sup>3</sup>/s on an annual basis. With these releases there will be the opportunity to undertake additional enhancements in the Stuart and Nautley systems which could very significantly increase the annual value of this fishery.

The possibility that reductions in the flow of the Nechako might cause difficulties for sockeye migration at Hell's Gate and at other points of passage on the Fraser was examined by the Commission. The recent installation of new, low level fishways at Hell's Gate together with other works designed to facilitate migration should ensure that any minor effect of the KCP on Fraser River flows would not affect salmon migration. With or without the KCP, the Fraser River should be monitored on a continuing basis for possible sites of obstruction.

## Chinook Salmon and Trout

Chinook salmon are a second fishery resource of importance in the Nechako River. The value of the annual catch of chinook is not readily assessed, but for the period 1981 to 1992 the commercial value of the Nechako mainstem stocks was placed at \$56,725 and that of the Stuart system at \$95,806. Both of these stocks would also benefit from the recommended changes in cooling flow releases during migration.

The Settlement Agreement provides for a target escapement to the mainstem Nechako of 3,100 adult chinook with a range of 1,700 to 4,000. The Commission recognizes that the achievement of the target escapement is confounded by many factors beyond what happens on the Nechako. Low escapements, such as have occurred in recent years may in part be the result of increased exploitation rates, decreased ocean survival related to warm ocean conditions or perhaps the effect of undetected pollution as the juveniles journey to sea. Adult escapement is a poor yardstick for measuring the effectiveness of mitigation measures.

The Commission acknowledges the value of the considerable body of information that has been assembled by the NFCP in developing monitoring methods, in pilot testing remedial measures, in applied research and in developing strategies for assessment of the status of the chinook stock. Nevertheless, the Commission does not have confidence that the proposed program will be successful in achieving the conservation goal of maintaining the chinook at a population level of 3,100, and has accordingly recommended increases in flow. The Commission has accepted the target level of 3,100 chinook as a requirement to be met. A cost effectiveness study in a regional or provincial context might determine the optimal level of chinook and trout preservation efforts. However, the context of this Review focused on the Settlement Agreement and the Commission reviewed mitigation measures in relation to the target of 3,100 chinook.

The Commission has concluded that flows during the winter months, from December through March, must be increased from 14.2 m<sup>3</sup>/s to 25.5 m<sup>3</sup>/s to provide greater assurance that survival rates of incubating eggs and over-wintering juveniles would be acceptable. Increased winter flows are also a basic requirement of the provincial plan for mitigation of effects of the KCP on trout. The NFCP has acknowledged that if more water was available an increase in winter flows would have first priority.

Proposed KCP releases of water for the spring and summer period have also been considered as inadequate for the provision of rearing habitat for chinook and resident trout. The Commission has considered the effect of increasing the base flow from April through August at three different levels above the proposed base of 31.1 m<sup>3</sup>/s in the Settlement Agreement.

### Flow Scenario I

Increasing the base summer flows to 35 m<sup>3</sup>/s would be a bare minimum provision and would still place the chinook and trout population at considerable risk. To ensure achievement of the conservation goal at this level of flow, a full scale hatchery operation should be undertaken immediately. It had been speculated at

one time by federal government employees that a hatchery on the Nechako could produce 50,000 adult chinook. While this may be optimistic, the Commission is confident that a hatchery operation could at least maintain the stocks to the level of the conservation goal, albeit artificially.

### **Flow Scenario II**

A second option, increasing the base summer flows to 40 m<sup>3</sup>/s, would give greater assurance that the wild stocks of chinook and trout would be maintained, but a pilot hatchery operation should be initiated at once to provide additional information on the biology of Nechako chinook and to prepare the way for a full scale hatchery if the need should emerge. The substantial decline in numbers of fry over the past four years and declines in the numbers of adults particularly in the past two years suggest that the need for a hatchery may emerge within five years.

### **Flow Scenario III**

The third regime of flow for April through August would provide 45 m<sup>3</sup>/s and give reasonable confidence that the natural stocks of chinook and trout could be maintained with only modest intervention and enhancement activities.

None of these levels of flow would be sufficient to guard against excessive sedimentation of the river bed. Accordingly the Commission recommends that high priority be given to erosion control and to encouraging riverbank vegetation in the Nechako mainstream and the tributaries between Cheslatta Falls and Fort Fraser. If these measures are not sufficient to forestall sedimentation problems, flushing flows to clean riverbed gravel may be necessary.

Of the various remedial measures described in the Settlement Agreement other than those concerned with erosion control and riverbank vegetation, the Commission would recommend that trials be continued with stream fertilization. The applied research and monitoring programs should be continued as a means of gaining greater understanding of the Nechako chinook stocks. The province should develop a parallel program for trout. However, as discussed in the Technical Report, the Commission recommends that the program of habitat complexes be discontinued.

The implications of these various flow provisions on seasonal and annual equivalent water releases are given in Table 1.1. It is to be noted that with increases of base flows the requirement for cooling flows would be reduced. The amount of the reduction could only be estimated with a computer simulation, and would vary both within the cooling flow period and from year to year. As is indicated in later sections, changes in the flows as outlined would have many beneficial effects for other uses of water of the river.

Determining the cost effectiveness between flow scenarios requires analysis of the cost of water not used for electricity generation, to be compared with the regional and provincial benefits of increasing flow. This analysis is beyond the Terms of Reference of the Review and requires simulations by B.C. Hydro of

Table 1. Possible Schedule of Flows for Fish Protection

Month	Short Term Observed 1980-1992	Settlement Agreement Below Cheslatta Falls		Rationale for Additional	Proposed Flows	
		Short Term	Long Term		35 m <sup>3</sup> /s April - August	40 m <sup>3</sup> /s April - August
January	31.1	31.1	14.2	Protection incubating salmon, overwintering juvenile salmon & trout	25.5	25.5
February	30.9	31.1	14.2	As for January	25.5	25.5
March	32.5	31.1	14.2	As for January	25.5	25.5
April	55.8	56.6	31.1	Rearing for salmon and trout	35	40
May	62.5	56.6	31.1	Base as for April. Flushing flows, 2 days @ 170 m <sup>3</sup> /s plus ramping, once every three years	35.0 + 4.1	40.0 + 4.1
June	55.5	56.6	31.1	As for April	35	40
July	138.7	56.6 + 82.1	31.1 + 10.9	Base as for April Cooling water* 6.5 for 18.4 °C target 0.6 for extending season 0.6 for ramping	35.0 + 18.6	40.0 + 18.6
August					35.0 + 18.6	40 + 18.6
September	39.5	31.1	28.3	-	28.3	28.3
October	35.3	31.1	28.3	-	28.3	28.3
November	33.3	31.1	25.5	-	25.5	25.5
December	32.9	31.1	14.2	As for January	25.5	25.5
<b>Mean Annual</b>	<b>59.8</b>	<b>41.9 + 16.20</b>	<b>24.53 + 1.85</b>		<b>29.90 + 3.51</b>	<b>32.01 + 3.51</b>

water available for electricity after accommodation of the releases into the Nechako River.

## **4.2 Agriculture and Ranching**

The reduced flows with the KCP will impact various consumptive uses of water along the Nechako River. Currently, irrigation is by far the most significant use of water from the river after power production and fisheries and, therefore, the most serious effects of water restrictions will be on this activity. The reduced flows may also have other impacts on agricultural activities such as a loss of sub-irrigation, the stranding of water intakes and problems with cattle containment due to the narrowing and shallowing of the river. Access to the river for watering cattle may be constrained by the need to ensure cattle do not wander and to protect water quality.

Alcan has agreed to mitigate or compensate for effects on agriculture caused by reduced sub-irrigation, stranding of water intakes, and cattle containment problems. The Commission is of the view that Alcan's commitments will resolve these concerns.

There is considerable debate about the amount of water which would be required for irrigation in the future and the amount of water which will be available under the 1987 Settlement Agreement long-term flows. As a result of this uncertainty, and at the request of the DFO, the Province has placed a freeze on new water licences upstream of the Stuart River.

The quantity of additional water required for future irrigation depends on how much land may be economically irrigated. The amount of land that would benefit from irrigation could vary from 5,040 hectares (present acreage under licence) to 54,000 hectares (maximum irrigable land) depending on economic conditions, particularly the price for agricultural products. The Commission is of the view that 18,000 hectares represents a reasonable approximation of the total acreage likely to be irrigated well into the foreseeable future. This represents about 13,000 additional hectares. The Province estimates that about 90 per cent of future agricultural development will occur downstream of the Nautley.

An additional 13,000 hectares of irrigated land would require approximately 1.2 m<sup>3</sup>/s of water on a mean annual basis. Of this amount, 0.1 m<sup>3</sup>/s would be required upstream of the Nautley, and 1.1 m<sup>3</sup>/s downstream of the Nautley.

As stated in the fisheries section, the Commission is of the view that the long-term flows in the Settlement Agreement are not sufficient to protect the fisheries resource and, therefore, they will not satisfy the needs of additional water withdrawals for irrigation. The Commission recommends that a survey of the availability of water from ground water, tributaries and the mainstem Nechako be conducted. The Commission further recommends that under the Settlement Agreement flows an additional 1.5 m<sup>3</sup>/s on a mean annual basis be set aside for future irrigation and other consumptive water needs. Water could be added to the long-term flows on an incremental basis when it is needed. If the studies of alternative water sources determine that there is additional water which could be

accessed for irrigation needs, then the 1.5 m<sup>3</sup>/s could be reduced. Allocations and distribution of this water throughout the year should be determined by the proposed Watershed Management Agency.

Commission Flow Scenario I would reduce the amount of water that should be set aside for future consumptive uses to less than 1.0 m<sup>3</sup>/s. Under Commission Flow Scenarios II and III, the Commission believes there would be adequate water available downstream of the Nautley to meet the needs of agriculture in the foreseeable future. In the event that one of Commission Flow Scenarios I, II or III is chosen, the current moratorium on water licences downstream of the Nautley could be removed. There still may be some concerns upstream of the Nautley, however, water withdrawals are very small in this part of the river in the context of the mean monthly flow for fisheries protection during May to August.

### **4.3 Community Impacts**

The reduced flows in the Nechako River after the commissioning of the KCP are anticipated to have impacts on community life along the river in several ways. Domestic water use, effluent discharge, future industrial development, and float plane operation would all be affected.

#### **Municipal and Domestic Water Supply**

The community of Fort Fraser has a water licence to extract its domestic water supply from the Nechako River. Currently, this is not a very good source of drinking water. However, the Province has made the commitment to absorb the total cost of any remedial measures deemed necessary to rectify the domestic water problem in this community after the installation of the KCP. This is anticipated to improve the overall water quality problem in Fort Fraser.

Vanderhoof also has a water licence to withdraw drinking water from the Nechako River, but has yet to exercise its rights under the licence. Rather, this community currently obtains its drinking water from wells.

Most individuals in the Nechako Valley obtain their domestic water from wells, with a small number withdrawing domestic water directly from the River. The water study recommended for agriculture and ranching will include ground water and should provide valuable information on how wells will be affected by the lower KCP flows. Alcan has committed to modify wells and any existing intakes in the river that are affected by the lower KCP flows. The Commission is satisfied that these measures are adequate.

#### **Sewage Treatment**

Currently, some communities utilize the Nechako River for discharging municipal effluents, particularly sewage after processing. Other pollutants may enter the river from surface run-off, leaching and tributary inflows. Sewage treatment at Vanderhoof and Fort Fraser is currently inadequate and the KCP will make

this problem worse. The Province is committed to upgrade the treatment facilities at Fort Fraser and Vanderhoof after the KCP, which will take care of the current problem and the problems caused by the KCP.

The Commission recommends that with the KCP, regular water quality monitoring should be conducted by the Province, especially in the Fort Fraser and Vanderhoof areas. The Fort Fraser area is particularly critical until the water and sewerage facilities in this community have been upgraded.

#### **Industrial Use of Water**

Industrial development upstream of the Nechako and Stuart confluence is sparse. The residents in the communities along the Nechako River have expressed fears that future industrial development in their communities would be hampered with the KCP as costs for effluent treatment and discharge would probably be very high. Additionally, the Ministry of Environment, Lands and Parks has stated that industrial proposals for the region would be closely scrutinized, especially with respect to effluent discharge, because of the reduced capacity of the river to absorb pollutants under the KCP.

#### **Float Planes**

Float plane operators use the river, especially at Vanderhoof. The Vanderhoof operation can currently be problematic during periods of low flows. This situation could be exacerbated with the KCP flows. The Commission is of the view that safety must be the paramount criterion in determining appropriate mitigation measures. Alcan has committed to provide safe float plane landing and take-off conditions at Vanderhoof after the KCP, or, if this is not feasible, to construct new facilities at a nearby lake.

### **4.4 Social Impacts**

The Project will have various impacts on lifestyle and social considerations for the public using the Nechako River. The Project will affect the use and perceived value of the river to the local residents related to matters such as aesthetics, heritage sites, water based recreation, boating, angling, flooding and wildlife. It is difficult to determine the impact that each of the proposed Commission Flow Scenarios would have on these issues, except to recognize that each incremental increase in flow could reduce the magnitude of the negative social impacts.

#### **Aesthetics**

The rewatering of the Nechako Canyon under the KCP would have a positive impact. The most significant negative changes to the appearance of the Nechako River would occur between Cheslatta falls and Fort Fraser as a result of the substantially lower flows under the KCP, especially during the winter months. Although the stretch of the river from Fort Fraser to the Stuart confluence will not experience the same magnitude of flow reduction as the upper reaches, the



reduced KCP flows will cause some negative visual impacts. Downstream of the Stuart, the visual impacts will probably be noticeable but not significant.

The presence of artificial structures for fish habitat would reduce aesthetic values. The Commission has recommended that these structures not be used for fish habitat enhancement.

### **Heritage Sites**

There was little evidence presented regarding heritage sites and the implications of the KCP. Since many of the heritage sites had been constructed to avoid flooding under natural flow conditions, reduced flows should not affect the physical sites.

### **Water-Based Recreation**

At present, certain sections of the Nechako River are not particularly well-suited to water-based recreational activities because of poor water quality, high cooling flows, or the presence of substantial beds of aquatic weeds.

Improvements in the sewage treatment facilities would correct many of the current and future water quality problems, particularly near Vanderhoof. Additionally, the lower flows in July and August should improve safety conditions. However, increased weed growth at Fort Fraser and Vanderhoof after the KCP might decrease the desirability of the river for swimming. Furthermore, reduced flow might affect the safety of other water-based activities in parts of the river.

The Commission concludes that the impacts of the KCP on water-based recreation activities are uncertain. Although the proposed additional Commission flows should reduce weed growth relative to Settlement Agreement flows and improve conditions for small craft recreation, parts of the river might still remain unsuitable for swimming.

### **Recreational Boating**

Under the present conditions, navigation during the fall flows is difficult. The Commission is of the view that the KCP would have a detrimental effect on boating and canoeing. The effects would be most severe upstream of the Nautley. The Commission concludes that it is not possible to mitigate the effects on boating without additional flows.

The Commission notes that Alcan has placed on record its commitment to undertake the costs of any necessary facility modifications to private docks and boat launching facilities that have been adversely impacted by the KCP. Likewise, the Commission believes that the Province should undertake similar work required to rectify public docking and boat launching facilities.

### **Angling**

The rewatering of the Nechako Canyon offers an excellent opportunity to improve angling in the upper Nechako River. Lower and less variable flows should improve angling conditions upstream of the Nautley. The Commission has found that the flows under the Settlement Agreement would provide inadequate habitat for trout. The Commission Flow Scenarios would improve future angling by increasing habitat for resident fish.

The Commission is concerned about the lack of baseline data on angling in the Nechako River, particularly downstream of the Nautley. Without this information, it is difficult to see how the Province can properly fulfill its commitment under the Settlement Agreement to "maintain present recreational fisheries values."

### **Flooding**

The KCP will reduce the likelihood of flooding in the Nechako Valley. Under existing conditions this has been a problem at Vanderhoof and Prince George. Flood benefits will occur in lesser increments down the Fraser River.

### **Wildlife**

There was little evidence presented about the effects on wildlife to suggest that there would be any significant effects to which the wildlife would not adapt. A wildlife surveillance program could be used to identify any serious concerns. Specific effects that may merit monitoring include moose and deer calving and fawning sites on the in-channel islands, and the Vanderhoof Bird Sanctuary.

## **5.0 The Murray/Cheslatta System**

Water from the Nechako Reservoir currently reaches the Nechako River by way of the Skins Lake Spillway and the Murray-Cheslatta system. Since the 1950's, the variable and sometimes heavy flows in the Cheslatta River between Skins Lake and Cheslatta Lake have resulted in significant environmental alterations.

With the KCP, the KDRF has been designed so that the Skins Lake Spillway will not release flows more frequently than once every 200 years, apart from routine maintenance spills. Reducing the flows to natural levels will benefit the lake system, by eliminating the surcharges which have killed shoreline trees and the near shore fish food organisms. In addition, lake flushing rates will slow considerably, leading to greater productivity for freshwater fish.

Once natural flows are restored, most of the tributaries to the Murray-Cheslatta system may provide promising spawning and rearing habitat for trout, although some restorative measures may be necessary. Mitigation work on the lakes themselves will include clearing shoreline debris and replanting shoreline vegetation. Such measures are intended to slow erosion and siltation of lake trout spawning habitats, thereby allowing the fisheries and recreational potential of the Murray-Cheslatta system to be realized.

The Cheslatta Nation have developed a Cheslatta Redevelopment Project ("CRP") in parallel with the provincial Fisheries Management Plan. The CRP envisages the restoration of the lakes, the identification and establishment of historic sites, the creation of recreational opportunities and a significant element of training for band members.

In the view of the Commission, the potential for rehabilitation of the Murray-Cheslatta system is a major benefit arising from the KDRF component of the KCP. Allowing the system to revert to natural flows will allow it to stabilize. The Commission recommends that the rehabilitation of the Murray-Cheslatta system should be undertaken with a community approach. First Nations and other local interests should be represented in both the design and implementation phases.

The KCP design makes provision for flood releases down the Skins Lake Spillway no more frequently than once in 200 years. However, the data supporting this estimate do not allow for precise estimates so that the actual likelihood of flood releases could be substantially less than 200 years. The Commission recommends that flood releases through the Skins Lake Spillway should be avoided, if possible. This may be done through a combination of measures including pre-spills, greater release capacity at the KDRF, or the effect of the Commission flow scenarios on flood control.

## 6.0 Kemano Watershed

Powerhouse flows at Kemano would increase 30 percent with the KCP creating slow changes in the river channel with possible effects on salmon, trout and eulachon populations. The Commission flow scenarios would only modestly reduce the expected discharges after the KCP. The commercial value of salmon originating in the Kemano is approximately \$300,000 per year and there is the potential for increasing stocks. The hatchery proposal once considered by the DFO should be reassessed for its potential to enhance the salmon runs.

The Kemano River Working Group, made up of representatives of Alcan, the DFO and the provincial environment ministry guided the program of environmental protection during construction prior to the halt in the Project. The Coordination Agreement with B.C. Hydro implies a regime of powerhouse releases that could pose problems for fish protection. Operational guidelines should be established for the Kemano generating station under the KCP and should include the commissioning procedure, ramping rates, minimum discharge and flood control procedures and protocols for flow maintenance.

The Kemano River Working Group should be formally constituted to oversee environmental protection and mitigation measures for the remainder of the construction period and subsequently during operation. The membership should include local and regional community interests. This expanded Group should oversee the studies recommended by the Commission in the Technical Report.

Mitigation techniques that may be necessary for salmon have been demonstrated to a limited extent in the Kemano watershed or in other coastal areas. There is insufficient knowledge on which to base an assessment of impacts on eulachon and a study is recommended so that mitigation measures could be implemented if necessary.

## **7.0 Mitigation and Compensation**

### **7.1 Commitments by Alcan and the Province**

The terms of the Settlement Agreement provide for certain undertakings by Alcan and the Federal and Provincial governments to mitigate and/or compensate for anticipated negative impacts of the KCP. Additionally, Alcan and the Province have made commitments over and above those stipulated in the Settlement Agreement. Those latter commitments are described below.

#### **Alcan's Commitments**

Information presented at the hearing indicated that Alcan has committed to rectify or compensate for any KCP related impacts on the following existing facilities:

- private water intakes for domestic water or irrigation;
- cattle fencing;
- crop production losses caused by a reduction in sub-irrigation;
- private wells;
- trapping;
- private wharves and boat launching facilities; and
- float plane landing site at Vanderhoof.

The lowering of the minimum water level of the Nechako Reservoir will be mitigated by:

- clearing of standing timber and marking of hazards in specific areas of the reservoir to facilitate and improve boating;
- maintenance of Alcan's boat launch and campsite at Skins Lake; and
- extension of the Chikamin Bay rail portage.

Management of Alcan's commitments is being coordinated through a committee called the River and Reservoir Residents Committee ("RRRC"). This committee, established by Alcan in 1988, is comprised of Alcan personnel, consultants and a community liaison representative from the area appointed by Alcan. The terms of reference of the RRRC include reviewing and assessing requests for mitigation or compensation. The RRRC plans to establish objective standards to

ensure consistency between mitigation claimants. However, skepticism still persists among potential claimants about the effectiveness and impartiality of this body.

Notwithstanding the existence and intent of the RRRC, the Commission believes that a formal mitigation and compensation agreement or policy should be developed between Alcan and the stakeholders who may be affected by the KCP and to whom Alcan has expressed an intent to assist. The agreement or policy should state the precise nature of the commitments made by Alcan, including a time frame, and how effects will be evaluated. Such an arrangement would accomplish two goals. First, it would precisely describe the nature of Alcan's commitment to mitigate or compensate, thereby providing some certainty to parties that may be affected by the KCP. Second, it would ensure that the same standards are applied to all affected parties.

Integral to any arrangement is a fair and effective process for the resolution of disputes. Although Alcan indicated that there was a preference by residents to negotiate individually, there were parties at the Hearing who felt disadvantaged by the lack of formality to that approach. The details of any such process should be determined between Alcan, governments, and key stakeholders. However, it is critical that any process should include an independent decision-maker. The Watershed Management Agency proposed in Section 7.2 could undertake such a function.

### **Provincial Commitments**

The Province has undertaken to mitigate or compensate for impacts of the KCP on some of the public facilities in the region. Specifically, the Province has made commitments to:

- pay the full capital cost of any sewer or water supply upgrades required at Fort Fraser; and
- pay the full capital costs for upgrades to Vanderhoof's sewage treatment facilities.

Provincial commitments in respect of the rehabilitation of the Murray-Cheslatta system are described in Section 8 of the Technical Report.

## **7.2 Watershed Management Agency**

The concept of a Watershed Management Agency received widespread support in the Nechako region. Opinions differed over the type of structure and the degree of authority the Agency should have.

In the Nechako reservoir and watershed, the complexity of the KCP issues compound the difficulties of managing a scarce resource. Already there are conflicts between the consumptive uses of water, such as irrigation, and the protection of the resource for fisheries in the Nechako River. At present there is a freeze on the licensing of water for consumptive purposes in the reaches of the river above the Stuart confluence. Alternatives such as tributary storage and ground water

have been suggested, but require further study. In addition, there could be conflicts between the Nechako Fisheries Conservation Program of remedial measures and canoeing or boating activities on the river. There is little apparent communication between the agencies responsible for planning and managing the resources in the region and stakeholder groups. There was general consensus that a more comprehensive and integrated approach to management of the watershed involving community participation is required to address existing, as well as future, issues. A watershed management approach is broader in scope than site specific management and reflects the interdependencies in the watershed, for example between upstream uses and downstream effects. It provides sensitivity to regional resource issues and encourages cooperation in the resolution of conflicts.

A Watershed Management Agency would provide a framework for ensuring that studies of resources, such as the salmon and trout fishery are integrated. A coordinated approach to data collection monitoring and the development of evaluation criteria is required.

### **Structure**

The Commission recommends the immediate establishment of a Watershed Management Agency for the Nechako Reservoir and Watershed. The Commission notes that Hearing participants supported an approach that is flexible, involves stakeholder participation and is based on consensus-based decision making. The proposal of the Fraser River Management Board to facilitate the establishment of the Watershed Management Agency has merit in the absence of another alternative. However, this may not be necessary if the Province wants interested parties in the region to be directly involved with the setting up of the Watershed Management Agency. The Commission believes that the stakeholders in the region should determine the structure and mandate of the Agency and how they want the process of establishing the Agency to be conducted. It is expected that agencies such as the NFCP and the Water Comptroller will continue to undertake their existing responsibilities until such time as specific responsibilities are formally transferred to the Agency.

Existing agencies and planning programs will provide a core of stakeholders in the region for developing a new structure with a broader interest base.

The Commission recommends that the initial cost of establishing the Watershed Management Agency should be funded by the three levels of Government. The ongoing administrative costs of the Agency including the costs of participation by stakeholders, should be cost shared.

### **Responsibilities**

There is a need for a comprehensive water management plan to be undertaken in the Nechako watershed to examine the water source options available for meeting the existing and future demands for surface and groundwater. The Watershed Management Agency should be responsible for conducting and implementing a comprehensive water management plan. The freeze on licensing should

remain in effect under Settlement Agreement flows until it can be demonstrated that there is sufficient water available to protect the fishery and allow for further withdrawals.

### **Baseline Studies, Monitoring and Evaluation**

Studies which should be undertaken for the reservoir and watershed include a physical limnology study of the reservoir, a survey of groundwater wells and the collection of baseline data on resident fish in the Nechako.

Monitoring and evaluating the impacts of the KCP and implementing an adaptive management program will be an ongoing requirement post construction. Monitoring and surveillance studies identified include wildlife, particularly calving and fawning sites on in-channel islands and the Vanderhoof Bird Sanctuary, and water quality monitoring.

The Commission recommends that the program of baseline studies should be initiated as soon as possible. The Commission also recommends that the Watershed Management Agency should be responsible for overseeing the conduct of the baseline, monitoring and surveillance studies and for overseeing the implementation of recommendations or remedial measures.

## **7.3 Local Benefits Fund**

The Terms of Reference instructed the Commission to consider whether a local benefits fund would be an appropriate mechanism for addressing impacts of the KCP. A local benefits fund is designed to provide funds to groups, communities or regions that are adversely affected by a large project development. Typically, a local benefits fund is established in situations where most of the long term benefits from the development accrue over a much wider region than the one that experiences the direct impacts. A fund is intended to provide some compensation, to the extent possible, to the region that experiences the negative project impacts. It is designed to address negative impacts that are unmitigated or unavoidable.

In these circumstances, the purpose of a Local Benefits Fund would be to address the residual negative impacts of the KCP, and not the impacts where commitments for mitigation or compensation already exist. Commitments made under the Settlement Agreement and since the Settlement Agreement would be funded separately.

Experience with local benefits funds within B.C. and across Canada indicates that there are a number of different ways in which the funds are structured and implemented. Residents of the Nechako valley supported the establishment of a local benefits fund with a structure for managing the fund located in the region with local and provincial representation. Funding sources suggested were a water consumption tax, funding by Alcan, the water rental fees, or an equivalent contribution from B.C. Hydro.

The Commission recommends that a Local Benefits Fund be established to provide some compensation for the residual impacts of the KCP in the Nechako reservoir and watershed and the Kemano watershed. In the Nechako reservoir and watershed the Local Benefits Fund should support some of the administrative costs of the Watershed Management Agency and other responsibilities and activities directly related to the KCP.

In each watershed, funds should be provided in the initial years for baseline studies that are required to enable the impacts from the KCP to be evaluated post construction. Funding for monitoring and evaluation will be required on an ongoing basis for many years after the KCP is completed. In addition the Local Benefits Fund should have sufficient funds for remedial measures that may be required.

The fund should be allocated and managed separately in each watershed. The Local Benefits Fund could be managed either by government with local representation or by a local committee. The Commission believes that the fund should be structured in such a way to provide funds in perpetuity.

While it is difficult to determine an appropriate amount of money for the fund the Commission estimates that the capital of the fund under Settlement Agreement flows should be in the order of \$15 - \$20 million. This amount could be lowered to reflect reduced negative impacts under the Commission Flow Scenarios. The Commission has recognized that some of the initial funding is required to conduct baseline studies. However, a residual amount of money should remain in the fund and earn interest to provide an annual amount of money in perpetuity. It is suggested that the residual amount be not less than \$10 million. The funds could be provided by the project proponent, B.C. Hydro, government or some combination of these sources.

## **8.0 Financial Benefits and Regional Economic Impacts**

### **Financial Benefits**

From the analysis of the impacts on the provincial economy that Alcan claimed would accrue from its expenditures on the KCP, it is not possible for the Commission to determine whether the KCP would benefit the province any more or less than an alternative project that met the same domestic energy demand. Nonetheless, there would undoubtedly be positive employment and economic activity impacts in the region during the construction period.

The Commission finds that B.C. Hydro's projected benefits from the Coordination Agreement and Long-Term Electricity Purchase Agreement, exhibit variability depending on the value of other new energy supplies, the timing of the KCP and the quantity of available water in the Nechako Reservoir for electricity generation and coordination. The Commission cautions, however, that the ben-



efits from these agreements represent the benefits to B.C. Hydro and its customers, but do not necessarily represent the net benefits of the KCP to the Province, since there are unmitigated resource costs and benefits that have not been included in the evaluation.

The Commission Flow Scenarios presented in this report will affect the benefits to B.C. Hydro from the agreements with Alcan. There was insufficient evidence presented during the hearing for the Commission to determine the specific effect of alternative flow regimes on the benefits from Coordination. To determine this, it is necessary for B.C. Hydro to recalculate the quantities of energy and capacity available—under each recommended flow scenario—from coordination of the Nechako Reservoir with the rest of its system. The Commission Flow Scenarios would affect the benefit to B.C. Hydro from the Long-Term Purchase Agreement if the reduced generation capability would impair Alcan's ability to deliver the energy and capacity under the terms of the Purchase Agreement.

### **Regional Economic Impacts**

Previous sections of this Summary Report have detailed the positive and negative impacts of the KCP under the Settlement Agreement flows and the Commission Flow Scenarios.

The following matrix (Table 2) provides a recap of the various impacts of the KCP under the Settlement Agreement flows (inclusive of more recent commitments by Alcan and the Province) and the impacts under the Commission's recommendations for mitigation.

A major feature of the Commission's analysis is the recognition of the substantial benefits that would accrue from the installation of the Kenney Dam Release Facility. In addition to the restoration of the Murray-Cheslatta system, the Facility would ensure better protection of sockeye salmon than now exists, especially with the implementation of the lower target temperature. The Commission views these benefits as so significant that it recommends that the Facility should be built whether or not the KCP proceeds.

The Commission's recommendation of a plan for clearing the Reservoir of flooded timber by the year 2005 has important implications for recreational interests and possibly for the forest industry of the region.

For the chinook and trout of the Nechako River, the Commission was not satisfied that the provisions of the Settlement Agreement were adequate, but was unable to set a precise estimate on the single level of flow that would be best. Rather, as flow levels are increased the degree of risk is decreased. Hence, the Commission provides three scenarios of flow, each associated with different additional measures of mitigation. Each of these scenarios has implications for the mitigation of effects, other than those on fish, which are important for the maintenance of the quality of life and the environment of the Nechako Valley.

The Commission recognizes that its various recommendations have major implications for the viability of the Project as it is presently designed. Detailed analysis would be required to assess both engineering feasibility and financial consequences. With those assessments, it would then be possible to weigh the potential benefits and costs in a provincial context.

This Summary Report deals only with the major findings of the Commission. Many of the potential impacts of the KCP are interrelated and in some cases highly technical. The Technical Report provides full details on the positions taken by participants in the Review along with the rationale leading to each of the Commission's conclusions and recommendations.

Table 2. Comparison of the Settlement Agreement Mitigation with the Commission's Proposed Measures

	Effect of Settlement Agreement	Mitigation Commitments	Additional proposed mitigation compared to Settlement Agreement		
			Scenario I 35 m <sup>3</sup> /s plus chinook hatchery	Scenario II 40 m <sup>3</sup> /s	Scenario III 45 m <sup>3</sup> /s
<b>Nechako Reservoir</b>	Increase drawdown might impact safety, access and aesthetics of the reservoir	Alcan wharves, boat launch, etc.	Improved by tree clearing program		
<b>Nechako Watershed</b>					
<b>Sookeys</b>	Improved temperature conditions but still less than optimal	Kerney Dam Release Facility	Temperature control to 18.4°C provides significant improvement		
<b>Chinook and Trout</b>	Flows insufficient to achieve conservation targets for Chinook	Alcan remedial measures under Settlement Agr.	Minimum mitigation	Adequate mitigation	Natural mitigation
<b>Agriculture &amp; Ranching</b>	Insufficient water for present and future irrigation, etc.	Alcan-modified intakes & cattle fencing, etc.	Irrigation water required	Irrigation water available	
<b>Groundwater</b>	Potential drop in water table uncertain	Alcan-modified private wells	Potentially small improvement		
<b>Municipal &amp; Domestic Water Supply</b>	Problems currently exist at Fort Fraser & Vanderhoof; exacerbated by the KCP	Province	No change		
<b>Sewage Treatment</b>	Problems currently exist at Fort Fraser & Vanderhoof; exacerbated by the KCP	Province	No change		
<b>Industrial Use of Water</b>	Uncertain whether it would decrease future industrial investments	None	Potential improvement		
<b>Float Planes</b>	Currently problematic during low flows, exacerbated under Settlement Agreement flows	Alcan	No change	Remaining problems in September and October	
<b>Aesthetics</b>	Positive impacts on Nechako Canyon; mostly negative between Nautley & Cheslatta Falls	None	Improvement with increased flow		
<b>Water-Based Recreation Activities</b>	Some positive, some negative; weed problems	None	Modest improvement upstream of Nautley		Improvement
<b>Recreational Boating</b>	Detrimental effect on boating and canoeing, most severe upstream of the Nautley	None	Modest improvement upstream of Nautley		Improvement
<b>Angling</b>	Provincial commitment to "maintain present recreational fisheries values"	Province	Improvement	Further improvement	
<b>Flooding</b>	Reduced flooding in the Nechako Valley	None	Slight improvement		
<b>Wildlife</b>	Uncertain, but not likely significant	None	Some improvement		
<b>Murray/Cheslatta</b>	Improvement by decreased flooding; Return of Cheslatta Nation lands conditions for rehabilitation	Kerney Dam Release Facility	Avoid flood releases		
<b>Kemano Watershed</b>	Small negative impact on salmon, trout and eulachon	Alcan	Potentially small improvement		

Note: Shaded areas represent resources and activities most significantly impacted by proposed mitigation measures and flows

SECTION 4

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**The Settlement Agreement**

The evidence and argument of some parties and individuals considered that the process of how decisions were made was important to an understanding of the Settlement Agreement ("the Agreement"). While the Commission allowed considerable latitude in that regard, the focus in the Terms of Reference for the Review was not on the decision making process, but on the underlying technical and/or scientific rationale and the scientific debate surrounding the decisions that were reached. To provide the context for the discussion of that scientific evidence in a later section it is useful to document the main events leading up to the Settlement Agreement. This section also outlines the key provisions in the Settlement Agreement and includes a description of the structure and mandate of the Nechako Fisheries Conservation Program established under the Settlement Agreement. A copy of the Settlement Agreement is included in Appendix 2 of this Report.

## 4.1 Historical Context

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Under the provisions of the conditional water licence issued by the Province to Alcan in 1950, with a priority date of August 3, 1949, the rights to all the water in the Nanika Watershed and the Nechako Watershed above the site of the dam were given to Alcan. Although section 1 (3) of the Industrial Development Act provides for the protection of fish in agreements made under the Act, no flows for this purpose were contained in the conditional water licence.

The DFO indicated that from 1949 onwards, it had raised continuing concerns about the Kemano hydroelectric development and its impact on the fisheries resource (T. 40:6819). The DFO's concerns were flow levels, water temperature, and problems of total gas pressure at Cheslatta Falls (T. 40:6815). As early as 1949/1950, a cold water release structure at Kenney Dam was being proposed by the DFO (T. 44:7541). At that time, Alcan argued this would not be feasible citing safety and engineering reasons (E. 382A:2).

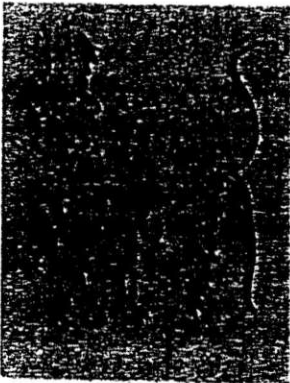
From 1958 onwards, the DFO made specific flow requirements to Alcan for the protection of the fisheries resource. Until 1980, reservoir inflow volumes and requirements for power generation allowed the flows requested to be met.

In 1979/80, low reservoir inflows and the increased demand for power resulted in the reduction of discharges by Alcan from the reservoir through the Murray Cheslatta System to the Nechako. For example in November 1979, the discharge from the reservoir at Skins Lake Spillway was 11.3 m<sup>3</sup>/s (E. 398:13).

In June 1980 the International Pacific Salmon Fisheries Commission (the Salmon Commission), on the basis of its temperature prediction models, raised concerns about the safety of the Stuart and Nadina sockeye runs.

On June 16, 1980 the Minister of Fisheries and Oceans, the Honourable Mr LeBlanc, ordered Alcan to release 28.3 m<sup>3</sup>/s before July 1, 1980 and thereafter provide additional releases as necessary for sockeye migration.

This was followed on June 27, 1980 by an order from the Provincial Comptroller of Water Rights for the release of 22.7 m<sup>3</sup>/s. Alcan agreed to the Comptroller's request, but did not formally comply with the Federal Minister's request. On July 25, 1980 the Minister, under section 22(3) (formerly section 20(10)) of the Fisheries Act, asked Alcan for the immediate release of 226.5 m<sup>3</sup>/s measured below Cheslatta Falls. This flow was to be maintained until August 20, 1980 for cooling purposes. Flows for other periods of the year were also established. From September 1, 1980 until March 31, 1981, the flows were to be 31.1 m<sup>3</sup>/s. From April 1 to June 30, 1981, the flows were to be 56.6 m<sup>3</sup>/s plus additional flows for cooling purposes in July and August.



On August 5, 1980 the Attorney General of Canada, on behalf of the DFO, obtained a temporary injunction from the B.C. Supreme Court requiring Alcan to release the flows requested by the Minister. In granting the injunction, the court directed the parties to seek agreement outside the court process to deal with flows for the protection of the salmon fishery. Studies were to be conducted jointly with Alcan for this purpose (T. 40:6837). From 1981 to 1985, the injunction flows were renewed annually by consent (T. 40:6819).

In 1980, Alcan revised its approach with respect to the environmental studies being undertaken by Envirocon. Envirocon had commenced baseline studies in 1979 for a project which maximized the use of Alcan's water rights in the Nechako and Nanika watersheds. Under the revised terms of reference, Envirocon was instructed to determine the flows required to protect the existing fish resources in those watersheds (E. 135:14).

In March 1981, a Joint Technical Committee (the Committee) which included representatives from the DFO, the Province, Alcan, Envirocon, and the Salmon Commission was established. The Committee studied flow regimes for the protection of fish in the Nechako River system. It also focused on the summer temperature management program and the development of protocols and computer models for temperature management. Technical sessions and workshops were also convened by the Committee on such topics as habitat modelling (E. 379A and 379B). The Committee was disbanded in January 1983. An agreement on flows had not been reached.

In 1982, the DFO assembled a team of specialists to evaluate the preliminary drafts of Alcan's environmental studies. A discussion paper was produced by the DFO team in January 1984 (E. 380).

In May 1984, Envirocon finalized its environmental studies. The studies contained a proposal for water flows and a single level cold water release at Kenney Dam. The DFO established a task force known as the Kemano Task Force to review these materials. Although Alcan put the project in abeyance in late 1984, the Task Force continued to examine unresolved issues from Kemano I and to review the Envirocon environmental studies (E. 383). The

Task Force completed a review document which was subsequently published in 1990 (E. 353).

In May 1985, Alcan advised that it was no longer willing to continue the injunction flows. Environmental studies were completed and flows for the protection of fish had been determined by Envirocon.

In July 1985, Alcan asked the B.C. Supreme Court for a permanent resolution to the jurisdictional and technical issues with respect to the flows. A trial was scheduled for the end of March 1987. The Province joined the suit as a co-defendant with Alcan on the question of jurisdiction over water flows.

In preparation for the trial, the Minister of Fisheries and Oceans had to establish a definitive position on the amount of water necessary to ensure the protection of fish (T. 40:6824). On November 14 and 15, 1985, a departmental staff workshop to provide a technical basis for the Minister's decision on flows was held in Vancouver (T. 40:6825; E. 386). After the workshop, departmental staff produced a document on flow requirements. This was provided to the Minister as a briefing document on February 24, 1986 (E. 355). By this time, the Honourable Tom Siddon had replaced the Honourable Romeo Leblanc as the Minister of Fisheries and Oceans. The briefing document reviewed the injunction flow regime and suggested two alternative regimes; a base flow regime, and the department's preferred flow regime (see Table 4-1). In this document, the requirements for summer cooling were based on releases through Skins Lake Spillway. The implications of the flow regimes with respect to the generation of power were also documented. It was noted that a cold water release at Kenney Dam might increase the water available for power generation (E. 355:84).

There was no unanimous agreement among the DFO scientists as to what was an appropriate level of flow and degree of risk (T. 40:6836). It was the evidence of some DFO scientists that their views had been ignored in the final analysis. To them, the flows recommended by the department posed an

Table 4-1. Comparison of flow regimes pre- and post-Settlement Agreement

Months of the Year	Injunction flows (m <sup>3</sup> /s)	DFO Base Flow (pleading flow) m <sup>3</sup> /s	DFO Preferred flow (m <sup>3</sup> /s)	Alcan flows for fish (pleading flow) m <sup>3</sup> /s	Settlement Agreement (short-term release) m <sup>3</sup> /s	Settlement Agreement (long-term release) m <sup>3</sup> /s
January	31.1	31.1	113.3	10.6	31.1	14.2
February	31.1	31.1	113.3	10.6	31.1	14.2
March	31.1	31.1	113.3	10.6	31.1	14.2
April	56.6	56.6	120.0	28.0	56.6	31.1
May	56.6	56.6	120.0	30.0 <sup>3</sup>	56.6	31.1
June	56.6	56.6	120.0	30.0	56.6	31.1
July	Cooling flows <sup>1</sup>	Cooling flows <sup>2</sup>	Cooling flows <sup>2</sup>	Cooling flows	56.6 <sup>4</sup>	31.1 <sup>4</sup>
August	Cooling flows	Cooling flows	Cooling flows	Cooling flows	56.6 <sup>4</sup>	31.1 <sup>4</sup>
September	31.1	56.6	120.0	24.0	31.1	28.3
October	31.1	31.1	113.3	10.6	31.1	28.3
November	31.1	31.1	113.3	10.6	31.1	25.5
December	31.1	31.1	113.3	10.6	31.1	14.2
Annual Avg.	41.7	39.1	116.6	19.6	41.7	24.5 *

<sup>1</sup> 226.5 m<sup>3</sup>/s constant until August 20

<sup>2</sup> 226.5 m<sup>3</sup>/s constant from July 20 to August 15

<sup>3</sup> Min. 30.0 m<sup>3</sup>/s from May 15

<sup>4</sup> Plus additional water as required for cooling flows

<sup>1</sup> measured at hydro-metric station below Cheslatta Falls

Sources (Col. 1 to 6): E. PF, 14:32; E. 357:2; E. 355; E. 135:19; E. 135, Appendix A, Schedule D; E. 135, Appendix A, Schedule D

\* Annual averages calculated assuming base flows throughout year.

January	44.4
February	42.2
March	49.1
April	96.7
May	222.0
June	342.9
July	271.5
August	164.9
September	108.2
October	94.6
November	119.7
December	139.2
Mean Annual flow (m <sup>3</sup> /s)	141.3

Table 4-2. Suggested flow regime (E. 487B:36).

unacceptable risk to the resource. The flows suggested by this group of scientists are outlined in Table 4-2. These flows are similar to the natural flows that predate Kemano I (T. 40: 6836).

On February 27, 1986, the Minister received a memorandum from his Deputy Minister which stated that the legal pleading document for the court case had been revised to adopt the base flow (the pleading flow) regime. The Deputy sought, and received, the Minister's concurrence with this position (E. 389).

In October 1986, the DFO published a habitat policy which had been prepared and implemented prior to 1986 (T. 40:6804). The policy is still in effect (E. 309). The overall objective of the habitat policy is to achieve a net gain of productive capacity. One of the guiding principles in the policy for accomplishing this objective is the concept of "no net loss of productive capacity of habitats". The DFO policy also recognizes that where productive capacity cannot be maintained, compensation as well as artificial production are options for addressing loss (T. 40:6803, E. 309). The policy was not intended to apply retroactively (T. 40:6814). Mr. Siddon indicated that he had applied the "no net loss" policy in reaching his decision to accept the base flow regime (T. 82:15455).

On February 28 1986, an amended statement of defence (E. 357) which adopted the base flow regime was filed with the B.C. Supreme Court.

During the rest of the time, prior to the trial date, DFO staff undertook a number of activities in preparation for the court case. These included undertaking further technical studies, preparing expert reports (E. 436A-B), and preparing witness statements. In addition, the DFO spent time examining remedial measures for the protection for fish populations (T. 40:6841). Meetings were also held with Provincial counterparts to review drafts of the Province's Nechako River Water Management Plan (E. PF. 14). Provincial staff were also preparing expert reports for the trial (E. 547, Tab E). Senior officials at both levels of government were discussing the possibilities for reaching an out of court settlement (T. 40:6837).

On February 24, 1987, DFO staff held another workshop to review the technical studies that had been completed to determine if there was new information to warrant a change to the Minister's opinion (T. 40:6837). No change was made (E. 396).

On March 12, 1987, the Provincial Ministers of Energy, Mines and Petroleum Resources, and Environment and Parks wrote to the Minister of Fisheries and Oceans to suggest that it would be more appropriate for the issues before the court, especially the technical issues, to be settled by negotiation amongst the parties (E. 359). The trial was adjourned from March 31 to May 25, 1987.

In April 1987, the Minister of Fisheries and Oceans and Alcan agreed to participate in tripartite negotiations to settle the outstanding issues. Formal settlement negotiations commenced in mid-May. Principles of Agreement



incorporating the idea of a percentage flow allocation and the construction of either a single or two-level cold water outlet at Kenney Dam were circulated back and forth between the DFO and Alcan (E. 360 and 361 attached). During the negotiations leading up to the Principles of Agreement, the DFO was insisting on the removal of the Nanika River flows from the development (T. 40:6842). Alcan was seeking the adoption of its pleading flows combined with the installation of a cold water release and a commitment to remedial measures (T. 40:6841).

However, the issue of the removal of the Nanika flows and the differences between the DFO and Alcan concerning the flows required for the protection of the fishery and a commitment to pay the costs of the remedial measures in the Nechako remained unresolved (T. 40:6844).

On May 22, 1987, the parties agreed to adjourn the trial from May 25, 1987 to August 31, 1987 to allow for further discussions (T. 40:6846).

Between May and August 1987, discussions in pursuit of settlement continued. The evidence indicates that the Province was anxious to reach a settlement to enable the development to proceed (E. 361 and E. 363). Litigation was regarded as a costly solution which would result in an all or nothing resolution of the issue. The Minister for the DFO continued to maintain the position that the flows proposed by Alcan were inadequate for the protection of the salmon fishery in the Nechako. As well, the Minister questioned the adequacy of the flows for the resident trout fishery (E. 282) and for non-fisheries water users (E. 367). In June 1987, there were discussions about the institution of remedial measures under low flows. At that time, DFO estimated that the cost of monitoring, testing and implementing the remedial measures was from \$8 to \$12 million (1987\$) plus \$200,000 per year, not including the cost of the hatchery (E. 291). A settlement proposal initiated by the Province in late July 1987 was rejected by the DFO and Alcan (T. 40:6851). Although the parties had agreed earlier not to institute a formal process of public consultation (T. 40:6846), in late June the DFO met with interested groups to outline their position (E. 361).

On August 17, 1987, the Attorney General of Canada, on behalf of the Minister of Fisheries and Oceans, and Alcan finalized an agreement with respect to the control of temperature in the Nechako River upstream from the Stuart confluence during the sockeye migration period. The Agreement on Temperature Monitoring and Control provides for a continuous flow of either 6000 cfs (170 m<sup>3</sup>/s) or 8000 cfs (226.53 m<sup>3</sup>/s) plus additional cooling water releases as required and determined by the "computer model" and the "protocol". The latter determines the flow adjustments required to maintain temperatures below 21.7°C in the Nechako River upstream from the Stuart from July 20 to August 15 in each year (Appendix 1).

Also on August 17, 1987, the Honourable Tom Siddon, in a letter to Alcan, suggested that a meeting of scientific staff should be convened to "... identify areas of scientific dispute and agreement with respect to flow requirements for fish in the Nechako River and explore whether technical resolution can be

achieved on some or all of the outstanding issues' (E. 365). A meeting between the DFO and Alcan was held on August 18, 1987.

At the meeting, the DFO put forward a new proposal for agreement (E. 366). In this proposal the DFO required the construction of a cold water release facility, maintenance of the DFO pleading flows, joint investigation between the DFO and Alcan over differences in flows, and a 10-year study to investigate the effectiveness of remedial measures to accomplish the no net loss policy objective (E. 366). The proposal was not accepted by Alcan on the basis of the required flows and the uncertainty after 10 years (T. 40:6854).

On August 20, 1987, a working group of technical experts from DFO, Alcan (including Envirocon), and the Province, the Nechako River Working Group (the NRWG) was established. An independent facilitator, Dr. Strangway was appointed to oversee the process. The Terms of Reference for the group were, "To develop a program of measures and plan of implementation which will provide an acceptable level of certainty for the conservation and protection of the chinook fisheries resource of the Nechako River." In developing the program of measures, the NRWG was to take the Alcan fish and other use flows as a given (Table 4-1). The NRWG was not asked to look at alternate flow regimes. In addition, the NRWG was directed to assume the construction of a cold water release facility at Kenney Dam and to ensure that the selection of remedial measures complied with the hierarchy of preferences in the Habitat policy document (E. 25-26).

The NRWG met from August 20-23, 1987. In its summary report the NRWG concluded that the average chinook escapement of 3100 spawners (based on 1980-1986 data) should be the conservation target for chinook salmon in the Nechako River. The report also concluded that by implementing a program of remedial measures the chinook resource could be conserved and protected with an acceptable level of certainty. The report proposed an implementation

Table 4-3: The NRWG program of remedial measures

First Stage	Second Stage	Third Stage
<p><b>Flow Design Changes</b></p> <ul style="list-style-type: none"> <li>• two-level release at Kenney Dam</li> <li>• flow changes should not be instantaneous</li> <li>• reduction to winter flows during late October</li> </ul> <p><b>Instream habitat modifications</b></p> <ul style="list-style-type: none"> <li>• design and construct a new channel through the Chesletta outwash fan</li> <li>• control specific sediment sources</li> <li>• modify tributary mouths to ensure year-long access</li> <li>• increase habitat complexity</li> <li>• fertilize upper river in spring and early summer</li> </ul> <p><b>Off-channel modifications</b></p> <ul style="list-style-type: none"> <li>• encourage riparian vegetation</li> <li>• fence areas to prevent erosion and disruption from cattle</li> <li>• open side and back channels</li> </ul>	<p><b>Additional habitat alterations</b></p> <ul style="list-style-type: none"> <li>• gravel cleaning</li> <li>• place additional clean gravel</li> <li>• construction of artificial dunes</li> <li>• habitat modifications in tributaries to increase productivity</li> <li>• ensure access to new habitat created by Kenney Dam water releases</li> </ul>	<ul style="list-style-type: none"> <li>• spawning channel</li> <li>• incubate Nechako chinook eggs at existing hatchery; return fry to the Nechako</li> <li>• hatchery on the Nechako</li> <li>• compensate for lost production by implementing appropriate measures in other systems</li> </ul>

plan consisting of three stages. First stage measures encompassed flow design changes such as the provision of a two-level release structure at Kenney Dam with hollow cone valves to control TGP problems, instream habitat modifications, and off-channel modifications. Second stage measures involved additional habitat modifications, and third stage measures included a hatchery. For a detailed list of measures, see Table 4-3.

To implement the remedial measures program, the NRWG determined that a technical committee should be formed comprised of senior technical staff from each of the three parties; namely, Alcan, the DFO, and the Province, plus an external technical expert. The NRWG suggested the establishment of a policy/steering committee to oversee the implementation and monitoring responsibilities of the technical committee. Membership of the senior level committee would consist of representatives from each of the three parties. Further details about the establishment and responsibilities of the committees and their operations is provided later in this section under the Nechako Fisheries Conservation Program (NFCP).

On August 28, 1987, the Provincial Minister of Environment and Parks, the Honourable Bruce Strachan, sent a letter to the Honourable Tom Siddon confirming the intention of the Province to "retain the present fisheries values of the Upper Nechako River Watershed" (Appendix 2). The letter further stated that the Province had concerns about the trout and char populations under the proposed winter flow regime. A strategy for maintaining the recreational fishery in the upper Nechako based on a no-net loss principle was provided. The strategy consists of two sequential steps both involving off site mitigation measures (Appendix 2).

On September 3, 1987 after an offer by the Province to try to provide Alcan with alternate sources of firm energy, Alcan agreed, subject to successfully concluding a negotiated settlement of the court case, to abandon its water rights to the Nanika (E. 283, Tab D, Prov).

The Settlement Agreement was signed on September 14, 1987.

## **4.2 The 1987 Settlement Agreement**

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The purpose of the Settlement Agreement was to ensure that the water resources of the Nechako River are managed to an acceptable level of certainty for the conservation and protection of chinook and sockeye salmon and, at the same time, to ensure that Alcan can continue to generate hydroelectric power for industrial purposes (Appendix 2). Under the Agreement, each of the signatories made certain undertakings. Among those agreed to by Alcan were the following:

- to release specified flows into the Nechako River for fish protection; the provisions in the Agreement specify a short-term and long-term minimum flow regime. The short-term flow regime is to operate from April

1988 until the Kenney Dam release facility is operating, at which time the long-term flow regime is to be implemented;

- to construct and pay for a release facility at Kenney Dam and pay for the operation and maintenance of the facility and the temperature management computer models and protocol;
- to pay for, construct, and maintain any remedial works necessary to achieve the conservation goal;
- to pay for one half of the costs of monitoring;
- to give up all of its rights under the 1950 Agreement to the Nanika River;
- to amend its rights under the 1950 Agreement to include water flow releases into the Nechako River for the protection of fish resources;
- to abandon its rights to store water in Cheslatta and Murray Lakes and to eliminate the proposed construction of a dam at the outlet to Murray Lake;
- to share the costs of a Steering Committee and Technical Committee to oversee the program of remedial measures; and
- to abandon any claims for compensation from the Federal or Provincial Crown in respect of any water foregone by reason of any action prior to or pursuant to the Agreement.

Under the Agreement, the obligations of the Federal Crown included the following:

- to pay for half of the costs of monitoring, all the costs of research referred to in the summary report of the NRWG, and half the costs of the external expert on the Technical Committee;
- to forego any challenges to the legality of the 1950 Agreement or any right in favour of Alcan issued under that agreement; and
- to restrict the ability of the Minister, or a person designated by the Minister, to restrict or close the Kenney Dam or Skins Lake Spillway in situations where; (i) Alcan fails to allow the annual water allocation for the Nechako River and Murray-Cheslatta System, or (ii) Alcan fails to construct physical works in accordance with the Agreement.

Under the Agreement, among the obligations of the Province were the following:

- to implement the fresh water fisheries management strategy outlined in the August 28, 1987 letter Schedule E to maintain the annual inflow into the Nechako River from the Murray/Cheslatta system at levels set out in the Agreement by establishing a water reserve for fisheries and instream purposes and to provide for a joint management plan to address issues that would arise if a water storage dam is built along the Murray/Cheslatta system;

- to amend Alcan's water licence and the 1950 Agreement to ensure that Alcan has abandoned its water rights on the Nanika River; and
- to assign annual amounts of water to the Federal Crown to meet the short- or long-term annual water allocation.

The Federal and Provincial Crown further agreed to limit Alcan's liability with respect to any obligation, liability, or expense not mandatory under any applicable statute in effect at the time of the Agreement with respect to any public hearing or regulatory process or any mitigation or compensation measure arising from the subject matter or implementation of the Agreement unless provided for in the Agreement or other authorizing document (Appendix 2, Sec. 2.5).

The Settlement Agreement adopted the conclusions of the NRWG regarding the establishment of a steering committee and a technical committee. The Agreement outlined procedures for the appointment of members and its operation.

In Schedule A of the Agreement, the Honourable Tom Siddon, in a letter to the President of Alcan, gave a revised opinion with respect to the flows necessary for the protection of fish. Having received additional information on alternative ways to achieve an acceptable level of certainty for the protection of fish in the Nechako River, the Minister concluded that the reduction in flows specified in the Settlement Agreement combined with the implementation of remedial measures contained in the NRWG summary report provided an acceptable level of certainty sufficient for the safety of fish.

On September 17, 1987, the Province placed a water reserve for fisheries and instream purposes on the unrecorded waters of the Cheslatta and its tributaries (E. 208).

On December 29, 1987, Alcan and the Province signed an agreement amending the terms of the 1950 Agreement. In particular, Alcan agreed to abandon its rights over the Nanika River and the Province gave the authority to amend Alcan's licence and permits. Amended Conditional Water Licences were attached to the Agreement.

### **4.3 The Nechako Fisheries Conservation Program**

Section 3 of the Settlement Agreement addresses the establishment and responsibilities of the two-tier committee structure to implement the provisions of the Agreement. The structure and program is commonly referred to as the Nechako Fisheries Conservation Program (NFCP). The suggestions of the NRWG were embodied in the membership and functions of the steering and the technical committees. Both committees have one member from each of the three signatories to the Agreement. The three parties must appoint alternates to the technical committee. In addition, the technical committee has a fourth appointee, an independent technical expert who is se-

lected by the members of the technical committee. Members of the technical committee must have scientific or engineering expertise in salmonid enhancement improvement methodologies with preference given to persons who participated in the NRWG.

Specific responsibilities of the steering committee are: to oversee the implementation of the Settlement Agreement, to determine matters referred to it by the technical committee; to approve and publish annual reports on program activities and their effectiveness; and to approve on an annual basis the proposed activities of the technical committee to achieve the conservation goal of 3100 chinook spawners.

The technical committee has responsibility for the implementation and administration of the remedial measures program identified in the summary report of the NRWG (Table 4-3) as well as monitoring, and applied research.

Decisions of both committees have to be unanimous. The technical committee can refer issues to the steering committee for resolution. Issues unresolved at the steering committee level can be referred to arbitration.

Prior to the construction of the KCP the work of the technical committee is to include: the collection of baseline data for use in the design and implementation of remedial measures; pilot field testing of remedial measures; management of flows and water temperatures; applied research initiatives; and the Review and approval of the design of the Kenney Dam Release Facility (KDRF) and the Cheslatta Fan Channel (E. 572:2).

Since the inception of the NFCP in 1988, the technical committee has undertaken and continues to undertake the pre-KCP tasks assigned to it under the Settlement Agreement (Appendix 2). In managing the flow allocation throughout the year, the technical committee has made some adjustments to monthly releases while ensuring that the annual obligation under the short-term flow regime is met. For example, the committee started spring releases in mid-April rather than the April 1 date contained in the Settlement Agreement flow regime. The water saved is reallocated for release in the fall and winter of the same year (T. 62:11086). Among other activities, the committee has collected baseline data, established an early warning monitoring program to detect changes in the chinook rearing environment (E. 572), and has pilot tested a number of remedial measures. Other committee tasks, such as the approval of the KDRF, have been completed.

The technical committee records the decisions that it makes through decision records. The decision records are published in the annual report. Typically, after publication of the annual report, the technical committee holds a public meeting in the Nechako region. Meetings have not been held while the project has been under litigation or public hearing.

The approval process for the KDRF provides an illustration of how the committee structure operates. In February 1988, Alcan approached Hay & Consultants to undertake a study of conceptual alternatives for a cold water release facility. The technical committee agreed that Hay & Consultants, the

technical committee independent member's firm, could undertake this work. This action was consistent with the subsequent guidelines for such contract work issued by the steering committee in 1990 (E. 573A, Tab 7). The contract work was completed in August 1988. About that time a project management and design team was convened by Alcan (T. 61:10927).

In October 1988, the technical committee advised the project manager about its mandate to approve the design of the KDRF under the Settlement Agreement. After that, the technical committee and the design team worked together to establish design criteria specifically related to the fisheries aspects of the KDRF. The role of the technical committee was not to undertake the design but to review and comment upon studies and designs. This iterative process continued for several years until 1991. In March of that year the KCP team issued a design report. At that time, the committee instituted a more formal review procedure. Six review modules were created to deal with design criteria, releases of cold water, water quality, operation of the structure, flood releases, and construction activities (E. 573A, Tab 8).

In March 1991, the steering committee, in response to a request from the technical committee, provided direction on the approval function of the technical committee (E. 573A, Tab 9). This policy established that responsibility for the design, construction, and operation of the KDRF rested with Alcan and its consultants. Members of the committee used expertise within their own organizations or hired consultants to review the design of the KDRF. In March 1993 the technical committee approved the plans and specifications for the KDRF (E. 573A, Tab 9). In the approval, the technical committee established a number of design criteria. With respect to temperature, the technical committee elaborated on the requirements of the Memorandum agreed to by the parties in August 1987. In that report, the specifications of the committee are as follows:

8. *Cooling water releases are to control temperatures in the Nechako River above the Stuart River confluence between July 20 and August 20 to limit the occurrence of mean daily water temperatures above 21.7°C to less than once in 200-years on average and to reduce the occurrence of mean daily water temperature above 20°C compared to observed data for the period 1958 to 1982.*

*The historical average of mean daily temperatures above 20°C for the period 1958 to 1982 is 3.88 days. The technical committee will use the 3.88 day value as a basis for comparison with post-Kemano completion flows.*

*The temperature control period is July 20 to August 20 and the "cooling water operating period" required to achieve this temperature control above the Stuart River may be longer than July 20 to August 20 in order to meet the temperature criterion during this stipulated control period. The date cold water releases are commenced is likely to be July 12 based on the need to gain control of river temperatures and meet temperature ramping criteria.*

*The July 12 date is an operational criterion. Experience with the operation of KDRF, and the numerical models used to forecast river water temperatures, may lead to a date other than July 12 being either necessary, or desirable.*

9. *All releases during the cooling water operating period will be at the controlled mean daily temperature of not less than 10°C over a 24 hour period and an instantaneous temperature of not less than 9.5°C.*

10. *The rate of change of temperatures during transitions between surface and deep sources, and immediately prior to and following the cooling water period should not adversely affect the Conservation Goal set out in the Settlement Agreement through temperature shears (E. 573 A, Tab 9 ,p. A2; see also 573A, Tab 11).*

The NFCP witnesses explained that the 19.4°C trigger temperature in the temperature memorandum and the reservoir source water temperature of 10°C originate from the cooling flow proposal contained in the 1984 Envirocon studies (T. 66:11917). The view of the NFCP panel was that they could only consider flow releases at that source temperature to meet the temperature objectives downstream.

The committee also set a target design objective of less than 103% total gas pressure within 1 km of Kenney Dam. Other criteria addressed maximum monthly releases from the reservoir and commissioning releases through the Nechako Canyon (E. 573A, Tab 9).

Work remaining to be done before construction of the KCP includes: reviewing and assessing the data collected; completion of the review of the Cheslatta Fan channel; addressing operational issues such as the rewatering of the Nechako Canyon and ramping rates arising from the commissioning of the KDRF; and determining a basis for implementation of the remedial measures program prior to flow releases from the KDRF (T. 61:10924).

After the construction of the KCP, the technical committee will continue to manage flows and temperature but the focus of other activities will change to a monitoring role. Stock escapement, habitat performance and the effectiveness of remedial measures will be monitored to assist the committee in evaluating the need for additional measures. The committee is also responsible for implementing additional measures if required (E. 572:2-3). In any evaluation of remedial measures, the Settlement Agreement directs the committee to consider: whether the measure is biologically sound; whether the measure is reasonable and based on practical and proven techniques; whether the measure is cost effective relative to other measures within the same stage; and, whether implementation of the measure is consistent with the Habitat Policy (E. 135: Appendix I:18). The Settlement Agreement also specifies criteria for deciding when to move from one stage to the next in the sequence. The committees and the remedial measures are to remain in existence "until such time as sustained achievement of the conservation goal can be demonstrated to the satisfaction of either the steering committee or the technical committee" (E. 135: Appendix I:19, Sec. 3.5).