



To: Mr. D.W. Roberts
Regional Water Manager
Ministry of Environment
1011 - 4th Avenue
Prince George, B.C.
V2L 3H9

Date: October 17, 1984

Our File: S2211-05

Re: Kemano Completion Project Review

In response to your telephone request we have investigated the following two items:

1. Nechako River at Cheslatta Falls
"Natural" Peak Flows

Based on a frequency analysis of annual maximum daily discharges for 08JA001 Nechako River at Fort Fraser, for the period 1916-17, 1930-51, and adjusting by the ratio of drainage areas (08JA001, 20,400 km²; immediately below confluence with Cheslatta River, 15,500 km²) the following estimates are obtained:

RETURN PERIOD (years)	DAILY PEAK FLOW		
	L/s/km ²	(m ³ /s)	(cfs)
Mean	27.2	421	14,900
5	31.0	481	17,000
10	33.5	519	18,300
25	36.3	563	19,900
50	38.3	594	21,000
100	40.1	622	22,000
200	41.9	649	22,900

1981-83 annual maximum daily discharges at 08JA017 Nechako River below Cheslatta Falls (about 10 km downstream from the confluence with the Cheslatta River) resulting from Skins Lake spillway releases are:

DATE	DAILY FLOW		
	L/s/km ²	(m ³ /s)	(cfs)
August 11, 1981	22.4	350	12,400
August 1, 1982	17.1	266	9,390
July 22, 1983	18.3	285	10,100

Mr. G.W. Roberts

October 17, 1984

2. Inflow to Cheslatta/Murray Lake

Data available for this estimate are from 08JA013 Skins Lake Spillway and 08JA017 Nechako River below Cheslatta Falls (August 1980-December 1983). It was assumed that the flow recorded at 08JA017 is equivalent to the flow at the mouth of the Cheslatta River. Nearby stations indicate that 1981-83 mean annual runoff is about 25% below the long-term mean (Nechako Reservoir Inflow, -21%; 08JB002 Stellako River, -28%; 08JB003 Nautley River, -31%).

The mean annual runoff for the drainage area above the mouth of the Cheslatta River (excluding Skins Lake Spill) is estimated to be $8.2 \text{ m}^3/\text{s}$ ($254,000 \text{ dam}^3$). The attached table lists the data used.

The estimate of $8.2 \text{ m}^3/\text{s}$ is somewhat larger than the $5.0 \text{ m}^3/\text{s}$ given in Vol. IIA, Energy Project Certificate Application, p. 136. It is not known how this estimate was determined.

The inflow of $254,000 \text{ dam}^3$ ($8.2 \text{ m}^3/\text{s}$) over the lake area (1:250,000 scale map) of 47.45 km^2 is equivalent to a storage depth of 5.35 m (17.5 feet). (This is a rough estimate).

D.E. Reksten

D.E. Reksten
Senior Hydrological Engineer
Surface Water Section
Water Management Branch
387-1111

DER/dma



MEMORANDUM

TO: Eric Bonham, P.Eng.
Assist. Director Engineering
Water Management Branch

DATE: January 12, 1989

FILE: NFCP

MINISTRY OF ENVIRONMENT & PARKS WATER MANAGEMENT BRANCH ASSISTANT DIRECTOR/ENGINEERING		
JAN 17 1989		
FILE NO:	E-3.15	
EDB		

RE: Nechako River Flood Flows - Cheslatta Fan

As discussed on the telephone a few weeks ago, I have attached two copies of a site plan for the Cheslatta Fan, a copy of a letter from myself to Mr. Loder with attachments, a copy of a letter from the Committee to Mr. Loder, and a copy of the first report prepared by consultants for the Kenny Dam Release Facility and Cheslatta Fan work (Unfortunately the parts of the report I highlighted for my use had blotted out the text.)

I have two problems or questions that I need help with, the 200 year flood flow estimate, and the proposed works to convey this flow at the Cheslatta Fan without scouring or erosion. First a brief history. The Kemano Project includes the Kenny Dam, a powerhouse at Kemano, a tunnel at the westerly end of the reservoir, and a spillway at Skins Lake which discharges into the Cheslatta River system. With the exception of local drainage, the Nechako River bed is dry from the Kenny Dam to the Cheslatta Falls. The project did not include any provision for the Cheslatta River to carry the spillway flows. In addition to scouring, a breakout occurred just upstream of the falls, causing a serious erosion problem and creation of the Cheslatta Fan. Construction of a coldwater release facility at the Kenny Dam, under the terms of the Settlement Agreement, will change the method of releasing water from the reservoir.

The Settlement Agreement specified a release facility for coldwater flows for fish protection. Alcan now proposes to use the facility as a primary spillway for flows up to and including the 200 year flood. This flow is estimated to be 400 m³sec. I do not know how this flow was derived or who did the work, I believe it was probably Envirocon Pacific Ltd. (E.P.L.). Don Reksten has done a lot of work on hydrology for this project and has had meetings with Clyde Mitchell of E.P.L. I would like to have this flood flow estimate checked by our staff because we also need the data to refine the floodplain maps for Vanderhoof and Prince George. A separate request was sent to Peter Woods last fall to review these maps, in response to requests and appeals from the two municipalities and local residents.

My second request is a review of the Cheslatta Fan formation and suggestions on how the 200 year flood flow could be routed through or around it to prevent erosion. Klohn Leonoff Engineers believe that the majority of the material came from a large scour hole immediately upstream of the fan, plus material from the breakout. They also advised that there was a date error on a set of ~~their~~ photographs, the photos were marked 1978, but were actually taken in 1971. The Technical Committee has advised the consultants that Alternative 1. is the only option we are prepared to accept, because we want to preserve as much of the fan as possible for future spawning and rearing channels. The consultants are concerned about a curve in the channel and the need to have a large catchment area upstream of the dyke, at the head of the channel, for debris carried down from the now dry riverbed. Fish passage through the system is essential for Chinook salmon, trout and other resident sport fish. The consultants are currently conducting additional soil tests at the site.

I realize it will be difficult to comment on the proposal but I would be interested in any comments you may have. If possible it would be helpful if one of your staff could attend a meeting in February, when the consultants present their second draft. The meetings are usually held on Thursdays at E.P.L.'s office on Boundary Road. I would expect that a two hour discussion would be all that would be required at the meeting, thus it should be possible for the staff member to complete the round trip in one day.

If you wish to make contact with Klohn Leonoff Consultants or E.P.L. Consultants regarding the Cheslatta Fan, please call me or Pat Slaney in Vancouver at 660-1812. Pat is the primary Provincial member on the Technical Committee, I am the alternate. I believe that Don Reksten could contact Clyde Mitchell of E.P.L. directly regarding discussions on flood flows, as they have met before to discuss the hydrology of the Nechako system.

Any help you can provide will be appreciated.

D.W. Roberts

D.W. Roberts, P.Eng.
Regional Water Manager
Northern Region

DWR:dj



Province of
British Columbia

Ministry of
Environment
WATER MANAGEMENT
BRANCH

MEMORANDUM

To: Mr. Woods
Mr. Coulson

Date: January 25, 1989
File: E-3.1.5

Re: Request Region 5 - Nechako River Flood Flows
- Cheslatta Fan

Please find attached background information from Mr. Dennis Roberts, Prince George, regarding Nechako River Flood Flows and the Cheslatta Fan. Note the request for an overview from Victoria staff.

- 1) Mr. Coulson - Please have Mr. Reksten review the 200 year flood flows. It is understood that Mr. Reksten is familiar with the background hydrology.
- 2) Mr. Woods - Please have Mr. McMullen or yourself review the question of erosion and the formation of the Cheslatta Fan. I attach for information 2 drawings submitted by Mr. Roberts. I suggest you have a staff member attend the February meeting with the consultant. Note the timing. Feel free to contact Mr. Roberts or KL direct for further information.

E.W.D. Bonham
Assistant Director, Engineering
Water Management Branch

EWDB:bc

Attachment

cc: Mr. D. Roberts

6890126

February 9, 1989

82211-05

Study # 287

Memo to C.H. Coulson

Kemano Completion

Re: Nechako River/Kenney Dam Spillway Design Peak Flows

D. Roberts phoned after talking to Clyde Mitchell of Envirocon about obtaining the Hay & Co. report which derived ^{the} a 200 year return period peak flow of 400 m³/s for the design of the proposed Kenney Dam spillway. Apparently this flow was ~~derived~~ ^{based} ~~from~~ ^{on} earlier work done by Envirocon and presented in Vol. 2, Sec. D, 6.0 of the KC Environmental Studies, January 1984. ALCAN is reluctant to release the Hay & Co. analysis at this time because Klohn Leonoff is working on a further analysis based on a fall rain-on-snow event assuming a full reservoir. (D. Roberts and I question the validity of this type of event being critical in this area for such a large watershed.)

D. Roberts pointed out to C. Mitchell that any peak flow analyses have to be reviewed by Water Management Branch in order for R. Round to approve the spillway design and for establishing flood elevations at Vanderhoof and Prince George for floodplain mapping.

C. Mitchell will raise the matter at the weekly Committee meeting tomorrow and may then be able to send a letter to D. Kasianchuk setting out ALCAN's conditions for our review of design peak flows.

D. Roberts suggested that we could start reviewing the peak estimating procedure in Vol. 2 as this analysis was used as a basis for at least some of the subsequent work. He also asked if we would find out how the 200 year return period peak was

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determined for Vanderhoof for the floodplain mapping published 3 or 4 years ago. He pointed out that R. Round probably has the drawings for the Kenney Dam cold-water release structure which were sent to D. Kasianchuk last week.

I told him I would discuss this with you before we started any investigations.

D.E. Reksten

Meeting on Kemano Completion Projects
Geotechnical Studies
Water Comptroller's Staff and
KCP Consultants
Vancouver, August 2, 1989

11th

Proposed Agenda

1. Introductory Remarks
 - Comptroller's responsibilities and requirements (R. Round)
 - Klohn Leonoff responsibilities
 - Simons-Crippen responsibilities
2. Update on schedule
 - dates of approvals required, priorities (KL)
3. Brief review of studies completed and reports in progress.
4. Design considerations
 - 4.1 Tunnel and Intake
 - Public safety aspects (portal area?)
 - Design assumptions (changes from norm?)
 - Areas of concern requiring special treatment
 - 4.2 Penstock
 - As for tunnel
 - 4.3 Powerhouse and Tailrace
 - As for tunnel
 - 4.4 Kenney Dam Release Facilities
 - As for tunnel
5. Flood Studies
 - Status of PMF Report
 - Data requested on 200 year flood.
 - annual max daily inflows 1956-74
 - seasonal volume data (April - July)
6. Future Meetings

89-06-16

R. Round

If you're writing to Bruno could you
ask for a list of 1956-74
annual max. daily inflow (referred to
in Envirocon report and Hay report) and
seasonal (April-July) volume data.

Don

February 22, 1989

File: 0179602-A

Mr. A. Clyde Mitchell, P. Eng.
Manager, Water Resources Engineering and
Environmental Assessment
Envirocon Pacific Ltd.
#205 - 2250 Boundary Road
Burnaby, B. C.
V5M 2Z3

Dear Mr. Mitchell:

Re: Kemano Completion Project
Approval of Plans

Thank you for your letter of February 2, 1989, with enclosed drawings of the hydraulic structures and conduits proposed for the Kemano Completion Project.

Please be advised that our review required under Clause (j) of your Amended Conditional Water Licence will require further information to supplement the drawings. In particular, we require:

- Hydrological studies and reports (by Crippen Consultants?) providing further information on the derivation of the project design flood. Your Operating and Maintenance Manual indicates this to be 90,000 c.f.s., however we must verify that this is the probable maximum flood required by current policy for all major high hazard dams.
- Details of reservoir routing studies which show the reservoir inflow design flood can be reduced to a spillway design flood of approximately 51,000 c.f.s; including assumptions regarding initial reservoir level, maximum flood level and operating rule curves for such events. (1977 Spillway Redesign by Crippen Consultants?)
- Hydrological reports and studies providing further information on the derivation on the 200 year reservoir inflow flood, and the routed value to be passed by the new spillway structure at Kenney Dam, together with all routing study assumptions.

It is recognized that the operating rule curves for both Skins Lake and Kenney Dam spillways are still in the process of being developed, but some basic data may be available at this time. (Report by Hay and Company?)

Mr. A. Clyde Mitchell, P. Eng. - 2 -

- Geotechnical studies and reports related to the main civil engineering components of the project, the Kenney Dam spillway and stilling basin, the Tahtsa Narrows channel improvements, the new intake, tunnel, surge chamber, penstock, powerhouse chamber and tailrace tunnel, including seismic parameter design values.
- Hydraulic studies related to the spillway and plunge pool (are hydraulic model studies contemplated?)
- Hydraulic studies providing estimated maximum surge levels, and flows through the surge chamber spill tunnel.
- Further design details of the penstock and tunnel liner at the downstream portal (when available).

Would you also provide copies of drawings of the overall project general arrangement plan (mentioned in paragraph 2 of your February 2 letter but not attached) and drawings showing the underground powerhouse in general arrangement and section if available.

It would also be of assistance to both government agencies and Alcan, I believe, if you could supply us with a current project schedule, indicating times for preliminary design, detailed design, tender documents, award of contract and construction period, recognizing that such a schedule will require frequent modifications as the job progresses.

Related to the above, it would also be helpful to have a summary of your understanding of all the permits and approvals required for the Ministry of Environment, and approximate dates, in order to avoid possible oversights and minimize delays.

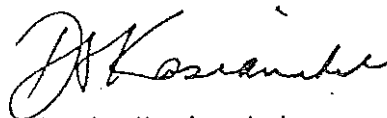
We confirm that once provisional approval has been given on preliminary design concepts, which include the drawings forwarded to date plus the additional information requested, the next review stage will be for the detailed design.

We also confirm that we will require a copy of the technical specifications for each component, including construction camps and facilities, civil engineering works, turbines, generators and transmission lines. We will not require specifications for mechanical

Mr. A. Clyde Mitchell, P. Eng. - 3 -

and electrical equipment other than the turbines and generators, should such equipment be provided under separate contract.

Yours sincerely,



D. A. Kasianchuk
Comptroller of Water Rights

cc: Mr. D. Roberts, Regional Manager
Northern Region - Prince George

Mr. D. Dryden
Planning & Assessment



NOV 02 1989

November 1, 1989

File: 0179602-A

Alcan Smelters and Chemicals Limited
Kemano Completion Project
1285 West Pender Street
Vancouver, B.C.
V6E 4B1

Attention: Mr. M. Bruneau
Permit Coordinator

Dear Sir:

Re: Kemano Completion Project
Approval of Plans

Further to my letter of February 22, 1989, to Mr. A. Clyde Mitchell of Envirocon Pacific Ltd. (copy attached), requesting additional information related to the above project, I note that we have not yet received definitive data related to design floods and operating procedures, as described on page 1 of my letter.

You will appreciate that such information is vital for our review of the Kenney Dam Release Facilities, Skins Lake Spillway modifications, Cheslatta Fan, Tahtsa Intake, and of Kenney Dam itself in terms of possible new operating levels, flood levels and freeland allowances. In particular, I have received requests from Water Management Branch Regional Managers for information on the 200 year flood derivation and proposed operating procedures. The significant changes in flow regimes in the Cheslatta system and Nechako River downstream of Kenney Dam will have a large bearing on water management policy and programs in the area.

freeboard

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Reksten

- 2 -

While recognizing that Water Management Branch approvals for these hydraulic structures may not be required until 1990 or 1991, I believe it would be in the best interests of expediting the approval process if the information requested could be forwarded to this Branch as soon as it is available.

Yours sincerely,



D. A. Kasianchuk
Comptroller of Water Rights

Attachment

Jcc: Mr. Hal Coulson
Hydrology Section



Province of
British Columbia

Ministry of
Environment
WATER MANAGEMENT
BRANCH

MEMORANDUM

To:

C.H. Coulson

Date:

November 14, 1989

Re: Klohn Leonoff's Report on the Kemano Completion Project.

As you requested I have quickly reviewed the report by Klohn Leonoff on "Nechako Reservoir Flood and Operating Studies - October 1989" to assess the use of the SSARR model.

As an aside, I am surprised that the 200-year flood is based on the annual peak daily flows of a regional analysis. In determining the effects of a reservoir of the size of the Nechako, the most important factor must be the volume of the "flood" to be routed through rather than the peak daily flow. It seems that the freshet volumes must be known and that a frequency analysis of these volumes would be more meaningful in determining the flood to be routed through the reservoir.

The SSARR model is widely recognised as a useful deterministic model that has been in use for many years. B.C. Hydro and Alberta Environment both make use of it. The key to successful deterministic modelling is the accuracy with which it is calibrated for the data available for the basin being modelled. This calibration can then be verified by simulating other years not used in the calibration and, if the recorded and simulated hydrographs show reasonable correspondence, one can have some confidence that other theoretical input sequences such as PMP and maximised snowpacks will be correctly modelled.

The calibration runs (Dwgs 7 through 9) show an acceptable simulation of the inflow. I am surprised that the lake level data were not smoothed by using a 3-day moving average as this would make the graphs less confusing with only a small loss in magnitude of the peak flows. It is a pity that the verification runs (Dwgs 10 through 12) are not better and that only one of the three is for a spring freshet period. The simulation shown in Figure 10 definitely overestimates the volume of runoff prior to the peak although the overall volume may be close to correct. It would have been very useful to know how closely the cumulative volume was simulated in both the calibration and verification runs.

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Reksten

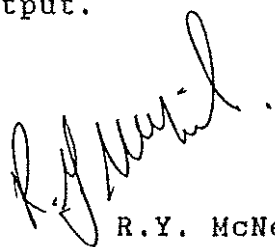
I suspect that there are two areas from which these errors are most likely to stem:

1. The connection between the snowpack definition used to initialise the model and the snow courses within the basin seems tenuous (Dwg 6). The over production of runoff in the 1958 simulation may be due to melting of non-existent snow.

2. The fact that a zero temperature gradient is assumed. Temperatures normally decrease with elevation - a figure of about 6 degrees per thousand metres is commonly used - so the assumption of a zero gradient will tend to produce more melting than would have occurred had a temperature gradient been assumed.

On the basis of the runs presented, it is difficult to have great confidence in the model's ability to produce an accurate runoff based on the PMP and maximized snowpack. However, without investing considerable time and effort, it is difficult to suggest what alternative approach could be undertaken to estimate these design flows. The evidence suggests that the model, as calibrated, tends to overestimate runoff and this would result in a small safety factor if this trend is also true for the major event simulation.

While no details are given of the use of the SSARR model to route the inflow hydrographs through the reservoir, the model is certainly capable of doing this and I can see no reason to dispute the output.



R.Y. McNeil, Head,
Hydrologic Modelling
Hydrology Section.



Province of
British Columbia

WATER MANAGEMENT
BRANCH

Ministry of
Environment

MEMORANDUM

To: R. Round
Power and Special Projects
Water Management Branch
Victoria, BC

Date: May 8, 1990

Our File: S2211-05

Re: Kemano Completion Project
Kenney Dam Release Facility,
Preliminary Flood Operation Study,
Klohn Leonoff, February 1990

We have reviewed the above report and aside from some minor points, we agree with the analysis and the conclusions drawn.

D.E. Reksten

D.E. Reksten
Senior Hydrological Engineer
Hydrology Section
Water Management Branch
387-9475

cc. D. Roberts

DER/lam
MAC W5031

APR 12, 1990

Nechako Reservoir daily peak inflow
Years 1956 to 1988

INPUT DATA

572.000	878.000	1008.00	1250.00	835.000	1006.00	1258.00	757.000
1122.00	814.000	752.000	916.000	1107.00	881.000	784.000	1248.00
1188.00	881.000	743.000	723.000	1245.00	740.000	874.000	786.000
585.000	912.000	856.000	689.000	558.000	874.000	876.000	762.000
776.000							

NO. OF INPUT DATA VALUES 33

MAXIMUM	1258.00
MINIMUM	558.000
RANGE	700.000
MEDIAN	874.000
MEAN	886.545
VARIANCE	39155.8
STANDARD DEVIATION	197.878
COEFFICIENT OF VARIATION	0.223201
COEFFICIENT OF SKEW	0.534596



Province of
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Ministry of
Environment

MEMORANDUM

JUN 07 1990

TO: Don Reksten, P.Eng.
Senior Hydrological Engineer
Water Management Branch

DATE: May 31, 1990

FILE: 0179602/Alcan

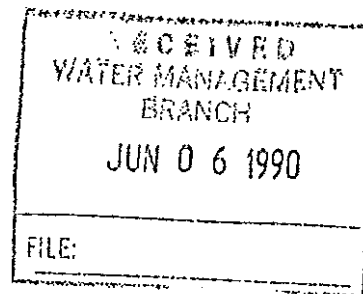
S2211-05

RE: Klohn Leonoff Report - February 1990
Preliminary Flood Operation Study
Kemano Completion Project

Thank you for the opportunity to review this report. I am returning it as requested. I have no comments to make but I do have some questions and a request.

Will the pencilled notations in the report be forwarded to Klohn Leonoff to be included in the final draft and could a copy of the final report be sent to Prince George, to be placed on our file? Can this information be used by Peter Woods Section to revise the floodplain mapping for Vanderhoof and Prince George?

D. W. Roberts
D. W. Roberts, P.Eng.
Regional Water Manager
Northern Interior Region



DWR:dj

cc: R. Round, P.Eng., A/Manager, Power & Special Projects
Water Management Branch, Victoria
P. Woods, P.Eng., Head, Special Projects Section
Water Management Branch, Victoria



Province of
British Columbia

WATER MANAGEMENT
BRANCH

Ministry of
Environment

MEMORANDUM

To: D.W. Roberts
Water Manager
Prince George

Date: June 20, 1990

Our File: S2211-05
Your File: 0179602/Alcan

Re: Klohn Leonoff Report - February 1990
Preliminary Flood Operations Study
Kemano Completion Project

In response to your memo of May 31, 1990, we do not intend to request any changes to the report. The comments we made are of a minor nature and revision is not necessary.

We forwarded the report to P. Woods who will contact you regarding the floodplain mapping.

D.E. Reksten
Senior Hydrological Engineer
Hydrology Section
Water Management Branch
387-9480

DER/lam
MAC:W5080

cc: R. Round
P. Woods

January 18, 1994

43250-30/KCP
(S2211-05)

Study # 287

CH Coulson

Re: Study #287 Nechako Reservoir Peak Flow

As the assignment sheet for this study did not indicate a date for the finalized and approved report, I reviewed the correspondence files, work folders and consultants' report to determine the outcome of this assignment. Copies of the relevant memos and letters are attached. These should be kept in the Study work folder.

In January 1989 D. Roberts asked us to check the figure of 400 m³/s used by ALCAN as the "200 year flood flow" for the redesign of the Kenney Dam spillway so that its reliability could be assessed and also to refine the floodplain maps for Vanderhoof and Prince George.

To check the 400 m³/s we required the 1956-74 peak daily reservoir inflows derived by Envirocon, but not published in the January 1984 Environmental Studies. ALCAN (C. Mitchell) was reluctant to release the data because Klohn Leonoff was working on a further analysis. In the meantime I checked the daily inflow-outflow hydrographs in the Envirocon report (Vol. 20, 1984) which used data obtained from Crippen Consultants Ltd. for the period 1956-74. I calculated the peak daily inflows and outflows for the high flow periods for the years 1975-88. 1976 was the highest recorded snowmelt period inflow volume year for April-August, May-July and June-July total volumes. But the peak daily outflow was slightly less (1300 m³/s) than for 1972 (1364) which Envirocon used to establish the shape of the inflow hydrograph. Envirocon's frequency analysis of the 1956-74 peak daily inflows yielded a 200 year peak daily inflow of 1550 m³/s.

We carried out a frequency analysis of seasonal volumes for which we did have data to see how 1976 compared with 1972. Seasonal volumes (dam³/1000) for 1976 and 1972 had the following return periods:

	1976		1972	
April-August	7520	300 years	5810	25 years
(200 year)	7230			
May-July	5880	210 years	4960	45 years
(200 year)	5860			
June-July	4070	125 years	3510	40 years

(200 year 4300)

These estimates were never used in the process of reviewing consultants' reports.

In November 1989 we received a copy of the KL report "Nechako Reservoir Flood and Operating Studies", October 1989 as well as the Hay & Co. report "Flooding Studies Nechako Reservoir and Cheslatta/Murray Lakes", August 1988 which was the study which determined that "the 200-year flood could be passed without using Skins Lake spillway if the Kenney Dam release facilities have a capacity of 400 m³/s". Much of this report concerned the use of the SSARR model which R. McNeil provided comments on. You and I reviewed the report (margin notes) but no written comments were made.

On February 26, 1990 we received the KL report "Kenney Dam Release Facility Preliminary Flood Operation Study", February 1990 through B. Balachandran. This report included everything that was in the October 1989 report with the addition of rule curves and an analysis of Cheslatta River flows. You ran a frequency analysis of peak daily reservoir inflow for 1956-88 (I'm not sure where the 1956-74 data came from) on April 12, 1990. I did not review the report in detail (there are margin notes in your writing) but I indicated in a memo dated 8 May 1990 to R. Round that we agreed with the analysis and the results. Our final word on this assignment was the 20 June 1990 memo to D. Roberts. We agreed with the report in that we agreed with the estimated 200 year daily peak inflow (1540 m³/s), the shape of the inflow hydrograph, the routing of this inflow and the resultant outflow of 400 m³/s assuming no Skin Lake spill and a 1.9 m surcharge.

So there was no report produced for this assignment as it consisted of reviewing consultants' reports. The date "finalized and approved" can be taken as June 20, 1990.


D.E. Reksten