BC hydro

FOR GENERATIONS

Transcription Series:	**Columbia River Treaty Lectures (SFU 1974)**
Transcription File Name:	CRT Lecture 13
Speaker / Lecturer:	Gordon MacNabb
Speaker Title / Position:	Senior Assistant Deputy Minister, Energy Mines and Resources
Lecture Location; Date:	Simon Fraser University; 27 March 1974
Original File Source:	SFU Archives, Audio cassette, converted to digital .wav file.
Transcribed by:	Dania Robinson
Release Date:	January 2011 (50 years after Treaty signing)
Document Word Count:	14,784 words

Disclaimer: This material was transcribed by BC Hydro from 35 year old cassette tapes that contained highly variable audio quality. While significant effort was expended to render these transcripts as accurate as reasonably practical, many comments, questions and responses were unclear or inaudible. As a result, the enclosed transcripts are not a full disclosure of the Jan – April 1974 lectures, and may contain transcription errors. Readers that require the most complete understanding of these lectures are advised to review the originating tapes themselves, and/or the digital conversions which were requested and funded by BC Hydro. These audio files can be reviewed in the SFU Archives located at the Burnaby Mountain campus.

Introduction by Professor Cook

Well, we have ourselves today Mr. Gordon McNabb who is presently the Senior Assistant Deputy Minister in the Department of Energy Mines and Resources. A very daunting title, but it's nice to see that even though it's such a title, he's flesh and blood.

Mr. McNabb: I'm glad to get out of Ottawa too.

It's nice that this man's name has been mentioned to me just about by everybody else who has participated in the program. Get Gordon McNabb they all say, because Gordon McNabb has had, in one way or another (speaking to Larry Higgins, said) get Gordon McNabb because he's the one responsible for the mess, and so it goes. Then of course there were comments on the other side too. Gordon McNabb has been with the energy, been involved in energy matters since 1954, at least since 1954 in any case, when he was a member of the Water Resources Branch in 1964 and in various capacities. The Water Resources Branch was in fact staged in part of the Department of Northern Affairs and Natural Resources, and or the Department of Northern Affairs and National Resources.

Mr. McNabb: National, yes.

You see it written both ways. And while he was with the Water Resources Branch, he was the principle advisor to the federal government, both the Diefenbaker government, and the Pearson government in the negotiations for the Columbian River Treaty. And he also is the man who wrote, or at least was responsible for the production of the comments on General McNaughton`s article on the

proposed Columbian River Treaty. So those of you who are McNaughton`s fans I guess you'd have a chance to advocate questions about the comments about McNaughton, the McNaughton article. And he was also, along with Maxwell Cullen, responsible for the production of the presentation: The Columbian River Treaty and Protocol, A Presentation, amongst many other things. In 1966, the department, the Water Resources Branch went to the Department of Energy Mines and Resources so that constitutes his rise to the top ranks of the Department of Energy Mines and Resources.

He's also since 1964 the chairman of the Canadian section of the Columbian River Treaty Permanent Engineering Board. So I think it's probably fair to say that Gordon McNabb can speak with some authority on the Columbia River Treaty and the negotiations of it, and subsequent developments. So without any further comment on my part, I'll hand it over to Gordon McNabb.

CRT Lecture 13: Gordon MacNabb

Well thank you and I'm glad for the invitation to be here. I'm only sorry that because of the sensitivity of the subject, the fact that the Treaty has always been embroiled in politics, that it was not thought advisable that I should participate in an open session like your other speakers have. I personally would have welcomed the opportunity, but I certainly … you understood when you sent the invitation, I hope the rest of you do, that it is sometimes very awkward for a public servant to comment on subjects such as this. I was called by the Press about a week ago on matters relating to oil pricing and the statement by your Attorney General wrote here that the federal government was following up on it's initiatives of the January 1st ministers meeting. My comment to the Press was "yes, we are not doing it on the ministerial level, but certainly officials are meeting and we're getting ready for the next session". And the headline in the paper the next day was, "McNabb brushes aside Alex McDonald"! So you can see how things get drawn, taken out of proportion.

So I'm slightly rusty on this subject and I hope that your questioning will get rid of some of the cobwebs. I have been involved in, with the subject for something like 20 years but I really haven't had the time and, how I should I admit, the necessity of looking back too much recently. So while at one time I had all the facts and figures on the tip of my tongue, it may take a while today to pull them out of the red or the green and the blue books in front of me. And I am advised that both of these documents… this is the one the presentation that was prepared for the External Affairs committee, and the other one is just a compendium of related documents, both in your library. I would think that anybody that really wants to try and understand the Treaty and why it evolved the way it did, should look at those documents. And the other document I think you should all look at if you're really interested in it, are the very massive transcripts of the hearings that were held before the Standing Committee on External Affairs, which went on for a number of weeks during which not only the government's case was put forward, but all of the people who were arguing against the Treaty had their day in court. And it makes for very interesting reading for someone who is really interested in this subject.

I must admit that every now and then an article does appear that really gets my back up. I've seen a few recently emanating from here in your series of talks, but there seemed to be three general areas of

criticism and I'll try and touch on all of those quickly today and then turn it over as soon as I can to questioning. But those three areas would be first of all selection of the project themselves… and this takes us back to the old argument of the Treaty plan vs. the so-called McNaughton plan. The second one relates to the calculation of the benefits under the Treaty, calculation of the flood control benefits coming to Canada, the downstream power benefits coming to Canada. And the third one relates to the sale of the power benefits to the United States utilities, and the adequacy or the lack of it of those revenues in relation to the costs being incurred in British Columbia. So I'll go through those as quickly as possible because I don't want to bore you with a lot that's been said to you already in your previous sessions. And unfortunately I'm not aware of the detail that people have gone into at those sessions. All I know is what's in the Press, and I've learned not to trust that too much.

First of all, on the selection of projects, and I guess I can declare both my experience in this connection, and also the bias that might flow from that experience, that I have been involved in interpreting the initial surveys that were done by people like Bill Chin back in the 50's and plotting the topography of the dam sites, looking at possible designs for the power projects themselves. Which included projects on the Columbia itself, and on the Kootenay in Canada… so my knowledge of the pros and cons of the various sites goes back to that extent… some 20 years back. And the McNaughton Plan was one that really evolved from the report put together by engineers for the International Joint Commission. At that time, they studied three proposals; one that didn't have any diversion of the Kootenay River, and I hope you're all familiar enough with the topography that I don't have to point out the areas of diversion. One did not involve any flooding of the Kootenay in Canada, or any diversion of the Kootenay over to the Columbia. One involved diversion at a site called Copper Creek, which is just below that Canal Flats diversion arrow that you see at the right hand side of the map. And one involving diversions (I hope this wire is long enough)… diversions brought about by a dam at this site on the Kootenay coupled with a dam up here on the Columbia, forming a common reservoir right up to Kootenay river across the headwaters, across the Canal Flats to south of Windermere lake. Coupled with a further project on the East Kootenay which would trap the inflow of tributaries such as the Elk, and pump the water from this reservoir back up into these, and therefore work its way back down the Columbia system in Canada, rather than going down through the United States. And that is the system of projects that eventually became known as the McNaughton plan.

But I found over the years that really people have not understood what was entailed in the McNaughton plan, and why the decision was made, basically by the BC Government, not to go with it. First of all there was a matter of flooding. As you can see by that map, it would entail the flooding of the East Kootenay Valley, the Rocky Mountain Trench, from a point almost at the border of the United States right back up across Canal Flats. I believe the distance is something like 150 miles. It would have inundated 86,600 acres of land above the normal water service, and impeded transportation etcetera. On the other hand we were faced with a situation with which valley do you flood? Do you flood the Arrow Lakes valley or do you flood the East Kootenay valley, there wasn't much choice. We couldn't have said we don't do either or we wouldn't have a Treaty at all, and we were trying to develop a Treaty.

In the case of the Arrow Lakes, the land area that was flooded, and here it was complicated

because we have a natural lake there already which fluctuates quite widely during normal stream flow conditions. But with the High Arrow Dam we inundated 22,000 acres of land above what is the normal water surface of the lake, and about 27,000 acres above what is the normal surface elevation at the time of the growing season, so you have to select your basis of departure, your point of departure. Of course in the Treaty plan along with the Arrow Lakes flooding, there is flooding caused by Libby. The United States as part of the Treaty undertaking insisted on having flood control protection on the lower Kootenay River in the United States. There were 2 ways of providing it, one was with the proposed McNaughton dams in Canada, the other was with the Libby project in the United States, which would involve some flooding back into Canada. I've seen in many articles figures of 18,000 acres, 20,000 acres of flooding in Canada. The actual flooding is, the last recollection I had was 13,700 acres. And the forebay has stayed the same elevation, so I'm sure that's still the factor.

So you can see from those when you look at the two reservoirs strictly on the basis of land that would be inundated, the Treaty selection involved about half of the flooding that the McNaughton proposal would have involved. And at the time the decision was made, the ministers responsible in British Columbia looked at both the valleys they came back and said to the British Columbia Canada group that were negotiating that there was no way they could envisage the flooding of the East Kootenay Valley. As we looked at the pros and cons of these projects on a number of points, not just the amount of acreage flooded, we looked at the recreational potential, and again I don't know how many of you are familiar with that part of the country, but Windermere Lake is one of the few large warm water lakes within easy access of places such as Calgary. It's quite a favourite recreational area, yet I found in talking to people in Calgary who have cornered me and been strong proponents of the McNaughton plan, that they have cottages on Windermere lake, and the fact that that plan would have put their cottages under 90 feet of water, they had never heard of it.

So I think that in retrospect, if I had the selection to make again on the basis of recreation and accepting the fact that there is a recreation potential on Arrow Lakes, which has been effective to some extent, you cannot built a power reservoir without effecting the recreational potential of the lake, that still the damage of the flooding of the Windermere and the whole of the East Kootenay Valley would have been much greater than what has happened in the Arrow Lakes valley. And I might add here that the dams in the East Kootenay valley would have been the most extreme upstream storages in the whole Columbia River system. And to get the maximum economy from your power system you will operate it always to draw down your upstream reservoirs first. That allows you to keep your head at your lower generating stations as high as possible and therefore get the most kilowatt hours and peaking potential out of those projects. So the dams on the East Kootenay Valley and in the McNaughton proposal would have been drawn down first. They would have been drawn down starting almost as soon as the spring freshet was over. So they would have been drawn down during the recreational season and you would have had large areas of reservoir exposed at the time you normally would have wanted a stable surface water level for recreational purposes.

With regards to agriculture, you'll find our comments in the blue book on agricultural needs. Neither valley really presented the major agricultural potential. If I recall correctly the comments made

about the East Kootenay Valley were that if irrigation could be provided they were capable of supporting low cost, or low value crops, and we had the Department of Agriculture look at the Arrow Lakes valley and, with the exception of small isolated pockets, they looked upon it as a subsistence farming in that valley. The one area they did put a considerable value on for agriculture is in the Creston area, the Creston flats. And of course it is not affected by either the Treaty plan or the McNaughton plan, but it is protected now at least by the Libby reservoir in Canada and United States. And where I've heard a lot of talk about the flood damage in the United States prevented in 1972, it's interesting we haven't heard any comment about what flood damage was prevented in Canada by the Libby dam at Creston and I hope you all know your geography enough that I don't have to point these out to you, and also at Trail I might say.

Diversion, of course the essence of the McNaughton plan was that we would maintain control of the waters of the Kootenay River. And we were all great admirers of General McNaughton and it was I think very painful for all of us involved in supporting the government's plan that we found ourselves on the other side of the table from him. But one thing that did not enter into the General's way of thinking, certainly not at that time, was economics. We have always maintained in the cost figures at that time, and I'm sure into the cost figures today if we were to do it over again, would show that the increment of power that would have been produced by those reservoirs in the East Kootenay compared to the increment of cost involved, the power would not have been economic.

And yet under the Treaty, we have maintained the right to make diversions of the Kootenay River. We can divert 20% of the flow of the Kootenay River at the United States border at Canal Flats… first arrow at the right-hand side of the map after 20 years, in other words in 1984... 10 years away now, and that diversion would be 20% flow of the Kootenay. After the termination of the initial term of the Treaty (60 years) we can divert 75% of the water, and that would be diversion at the Bull River site, which would be involved at Luxor, in other words you're getting back to the McNaughton plan, and eventually in 80 years, if we deem it advisable we can go right back to the McNaughton plan. So while we did not think the maximum diversion was economic or wise at the time, either for environmental conditions, or on power economics, the Treaty did preserve the right to make those diversions in the future.

Personally I'd be very surprised if any of the diversions are made. And not because of any legal complications with the United States… just my own feeling, that even the most economic diversion (and it always appeared economic) and that is the diversion at the Canal Flats. And here again you have to understand the topography of the area, a very flat area of about 1 mile separating the headwaters of the Columbia river from the Kootenay river. In fact it gets its name from the fact that there was at one time a very shallow navigation canal built across the divide. So it's not much of an engineering problem to put a, almost a dike, across the Kootenay at that point, and divert the flows above down the Columbia. But in so doing you'd be diverting unregulated flows which peak at quite high volumes at that point, it's mountain run off, down the upper Columbia valley, and it's a very meandering river at that point. I know the environmentalists and certainly the water fowl people would be up in arms because it is quite a nesting area. It would sure straighten out some of the meanders of that river, and I think would play a bit of havoc with the recreational area on Windermere Lake. All I'm saying while the potential is there, and perhaps

strictly on power generational terms it would be very economic because it adds a lot of water to a power plant at Mica already constructed, I'd be surprised to see it take place in the future. So if it's not attractive to make that type of diversion now I just thank God we decided not to make the maximum diversion 10 years ago.

We looked at industrial implications of the two plans, and there really wasn't that much to chose between the two, except when you take water away from the Kootenay River and you'll notice once it enters the United States, it comes back into Canada, and goes through power plants in the lower Kootenay and near Trail. You are taking water away really from the industrial heartland of that country, and under the Treaty the water stays there, it's regulated through the Libby dam, and BC Hydro is currently in the position of building a Canal Plant to get more power out of the Kootenay river in Canada which is close to the industrial needs in that area.

Fish and wildlife considerations certainly played an important role in my way of thinking and I can only assume they played a significant role in the BC Government's thinking. And these are tabulated in this blue book and I don't think I should take all your time, but I give you one example: deer. We went down the list of species, deer, elk, moose, sheep, goat, water fowl, grouse, you name it. We compared the Treaty projects, to the Dorr / Bull River / Luxor area. And deer, this was done in 1963 in that area, estimated kill of deer in the section from the Canal Flats to the international boundary, all of which would have been flooded by the McNaughton plan. This is an annual kill 7,560 deer, minimum desirable kill 9,752, probably maximum kill 16,000 -18,000. Same thing all the way down. So their estimates made at that time that the potential of the Dorr Bull River Luxor area for big game alone which has been approximated by an official of the provincial department to represent an annual recreational expenditure of about 8 million dollars. Now depends on what you think about killing deer to begin with as to whether or not that's an attribute.

So I have not noticed that in the Press, coming out of your series of seminars much debate about the McNaughton plan as opposed to the Treaty plan. I don't know whether if this is an accurate assessment, maybe that's an old issue now, but all I can say is that perhaps very unwittingly, we were environmentalists ahead of our time. Because certainly if you were to do an environmental assessment of the Treaty and the diversion - McNaughton plan at this time, there is no doubt in my mind that you would end up with the Treaty plan. There is no way that people would allow the whole of the East Kootenay Valley in British Columbia to be flooded. I'm glad to come back to any questions on that later on.

On the benefit calculation, I have noticed in the Press clippings a lot of talk of flood control benefits for one. And here again you would have to go back to go thorough all the details of what went into that, into the documents relating to the Columbia Treaty. And the history on that really starts with the International Joint Commission, who went through… I guess it was about 2 years of negotiations, to develop what they called their principles for the division of benefits from an international development of the Columbia River. They called for such things, such very basic things as a splitting of the benefits, in other words, they calculate the flood control benefits produced in the United States by the regulation of water in Canada, calculate the dollar benefit on an average annual basis, and that Canada should be

credited with one half of these benefits. Now you can ask what's the rationale of dividing by one half? There is a certain rationale for dividing power benefits equally between the two parties. Canada provides the regulation; the United States provides the generators in which the power is produced, so we say ok we divide the benefits 50, 50. I guess in flood control, we provide the regulation, and they provide the land that would be flooded and therefore we should divide the benefits 50, 50. But this was something decided by the International Joint Commission, and clearly what lay behind it was that there had to be some benefit to the United States, otherwise they would not go into it. They had alternatives within their own country; projects that they felt at that time they could build, that would provide the same control the same flood control in the United Sates.

Now whether or not, as things turned out, they could have built them I don't' know, they have built some of them, others are still on the drawing boards. But as I say the IJC recommended this division, they recommended that the payment could be made as a lump sum payment in advance, or as annual payments into the future. But in any event, the benefits should be calculated in advance, so when you go into a Treaty, you know exactly what the flood control payments are to be. And they were to be based upon procedures such as the Corps of Engineers had evolved at that time, where they estimated at that time the build-up in the Columbia flood plain in 1985, and they estimated what damage would be caused by repetitions of floods such as the 1894 flood, which is the maximum flood of record. But they certainly were not going to pay us on the basis of that 1984 flood occurring every year. That's … I don't know what the probability of that one was, once in every 1000 years Bill (Chin)? So the payment was based on an average condition.

Another thing that should be remembered in looking on flood control, is that when we elected to take our payment in a lump sum payment, we negotiated it so that the annual benefits of the 60 years of the Treaty, or the 56 years because the flood control benefits are not paid to us until the projects are in operation, would be discounted to a present worth value at the U.S. rate of interest which I think was 3.5%. This is the rate of interest that the Corps of Engineers at the public utilities districts paid in the United States at that time, which was well below the interest rate that was applicable in Canada. By using the lower interested rate, we got a much higher payment in Canada than we otherwise would have. I think that if we used our own, let me get … I'll try and find a reference. If we used the Canadian interest rate, and taken it at an annual increment I think we found that at the time the 64 odd million dollar payment we got in advance, was more than equal to the value of the annual payments in perpetually if we used Canadian, the value of Canadian money at the time.

Another factor to be remembered is that similar to the situation with power, it's a story of the early bird gets the worm. There's only so much flood control storage required in the Columbia Basin to reduce the flood damage to their design levels. And like in power, the first project, the storage project you add, produces the greatest benefit, and the ones thereafter produce incrementally smaller benefits. Now, in the case of flood control the Canadian storage was assessed the same degree of benefit as existing projects that were in the United States in that time. So if you work out the value of an acre foot of storage, I think it was $1.38 per acre foot per year for flood control benefit, the Canadian storage was credited with that same $1.38 as was Grand Coulee, which was already there, and which was already providing benefits. So

we were not relegated to an incremental assessment for flood control, but got an equal value to the US projects. We also in calculating the flood control… as I say there was more storage actual going to be built than was required to reduce to the flood damage to the 800,000 cfs level at The Dalles which was the design target. And because of the location of the Canadian projects we were given a 22% bonus (I believe) over what would have been a normal payment to Canada. Because the Canadian storage at that location was controlling 18% of the flow, the total flow of the Columbia River at The Dalles, but over and above that, there was a 22% bonus given because of the effectiveness of the Canadian projects.

I've seen comments recently on flood control that I think I would like to comment on even though I understand that Professor Swainson has already done it. The references being made in the Press, that in 1972 the damage prevented in the way I read it in the Press, by the Canadian storage projects was something like 214 million dollars in that very high year of flood. The facts are that in that time in 1972, of course Mica was not finished yet. It was not storing water. So the projects in Canada that were operating in 1972 were Duncan and Arrow Lakes, and they provided somewhere between 20-25%of the total storage available to control floods that year. And I may say that to begin with that the 214 million dollars was the flood damage prevented in the whole Columbia Basin, by **all** storages in the Basin... not just the Canadian Storages. As I say the Canadian storages provided somewhere between 20-25% of the storage. So if you take 25% of 214 million you get 53 million dollars. If you take the Canadian half share of that you get 26 million dollars. So there is a slight difference between 26 and 214 million.

If you look at the 69 million dollars that we were paid for flood control benefits in advance, discounted at that low interest rate, and then start accumulating interest on that, since they were paid in '67 and '68, you'd find that we would have credit, something on the credit side of the ledger somewhere near 90 to 100 million dollars. You pick your interest rate. I don't know what interest rate you'd like to use. But don't forget the value of money… that money was paid in advance, and has been accumulating interest in one form or another since that time. So certainly they had a large flood, and certainly Canadian storages contributed to that flood protection. The probability of a reoccurrence of that kind of flood is maybe once or twice in the next six years of the Treaty [2011 Editorial note: Or is this 60 years?]. And you must remember that the flood benefit was calculated on an average annual payment. So the payment, we are getting payment for years where there is no flood protection provided at all, such as last year… there sure wasn't any flood threat last year. And yet under the negotiated Treaty, we received the benefit of the flood protection payment for 1973. So in a way it was an insurance premium that the United States was taking out. The premium on the insurance the United States was taking out and they paid us 69 million dollars for it. And only time will tell whether we were underpaid or overpaid.

But you must also keep in mind, that the, there is no extra operating procedures required really in Canada for flood control. The procedures that we follow for power generation at our projects almost automatically produce the flood control protection at the same time. There was an argument made that we are committed to provide flood control in perpetuity. Well that's an over-simplification of the facts also. Let me run down this list of what our commitments are for flood control. First of all we have a commitment to meet the assured plan of flood control in the United States that's to keep the water level down to 800 thousand cfs down near Portland. That commitment is for the period of the Treaty only: 60

years. And to do that we provide up to 8,450,000 acre feet of storage in Canada. Not the 15.5 million that we're building but only 8,450,000, of which only 80 thousand acre feet is at Mica. In fact what is being built at Mica is a dam capable of storing 20 million acre feet. So of that 20 million acre feet, only 80 thousand is tied up in any way in this assured flood control plan. For that, the factors governing that, we have committed ourselves to operate in accordance with operating plans, which would call for evacuation of the storage when required, and as I say normally that's exactly the same as power evacuation. We would operate to minimize US and Canadian flood damage, and we will refill the storage as requested by the US Entity after consultation with the Canadian Entity. The US obligation is to pay us 64.4 million dollars US which came to 69 odd million dollars Canadian, which was capitalized, I'm sorry the correct interest rate was 3 7/8%.

The next stage of our operation was to provide other benefits below the 800,000 cfs, down to 600,000, and again that commitment runs for 60 years. And under that we have committed ourselves to operate any addition storage in the Columbia basin within the limits of the existing facilities. And payment for that the United States if and when they call for it, and they have not done it yet, would make a payment to us of $1.875 million for each of the first four calls they make. They would pay us nothing in terms of dollars thereafter. But they would also reimburse us for any electrical power lost at the Canadian plants as a result of operating for flood control, so we would not be out of pocket any power generation.

After the period of the Treaty, and I think this is the important part, and as long as the Columbia River in Canada contributes to flood potential, and that's going to be a long time, Canada has a commitment to operate any storages existing within the basin at that time. There's no compulsion for us to keep Arrow Lakes there if we don't want to, but if it is there, we will operate it within the limits of the storage reservoir that's there. Canada shall operate as required to meet flood control needs after the Canadian Entity or the Permanent Engineering Board has considered the need. No calls for this storage can be made unless all of the United States storage existing at the end of 60 years, after ratification of the Treaty is used first. In other words, only after the US uses all of its own storage, and they can still prove that there is a need for the use of Canadian storage, does Canada then have a commitment to operate any existing storages. And if we do operate the storages, the United States must pay us all operating costs in providing the flood control, plus compensation for any economic loss in Canada, including power generation. So we're not benefiting from it, but neither are we going to lose from it.

So what we have, we have projects in Canada that have been completely paid for and we have said to our neighbours to the south, all right if the projects are there, and you can prove a need, we will operate those projects to prevent flooding in the downstream country provided we are reimbursed any costs. Now should, the question remain, should we have said that they have to pay us in perpetuity? I don't think so because if they had gone and built their own projects, their projects would have been financially written off by that time, and they would have had the flood control at no cost, other than operating cost.

I think I can leave flood control then and come to power benefits. This one I have more difficulty trying to explain to you … it's extremely complicated. I guess I had 6 or 7 years of working on computers

calculating downstream power benefits until I had nightmares. But, I must say that again you must recall that there was a system of storage in existence in the United States such as Grand Coulee, at the time we were negotiating the Treaty. And the first added project after that, that provided storage got most of the downstream benefits. Again it's the case as I say of a decreasing benefit as you add more and more storage, and there's a sketch in the blue book that indicates just how quickly that benefit drops off … if I can find it. Now we gave an example of increments of 5 million acre feet of storage. The first added increment would produce 400 megawatts of energy, the next 5 million acre feet would provide 260, the next 5 million 100, and the next 5 million only 60. So you see how critical it was for Canada to end the negotiations to get what we called at that time, first added credit. And in negotiating for that first added credit, and of course the US wanted to build Libby, it wanted to get first added credit for Libby.

But we kept referring back to the International Joint Commission principles. Which, while they were not formally adopted by either government, they were adopted as guidelines for Treaty negotiations. And those principles said that the project that should be built first is the one with the best benefit-cost ratio, no matter what country it was in. And I think they had some weasel words in there "with due consideration to other factors" or something like that. Well one other factor that the United States argued was the time in which the project could be built. They say you may have a project with a very good benefit cost ratio, but it can't be completed for 8 years in the future, in the meantime we have Libby that we can have done in 5 years, therefore Libby should get the benefit. The only project that we had that met both criteria, benefit cost ratio and also rapidity of construction was the Arrow Lakes project. So Arrow Lakes went in for a number of reasons, one of them was it produced the lion's share of downstream benefits in the United States which we got half, and the second one was it provided a very effective buffer between the Canadian generating system centered at Mica Creek and the two plants, Downey Creek and Revelstoke Canyon downstream at Mica, and the United States system.

I guess I'm diverting slightly here but people argue about that. They argue that the Arrow Lakes reservoir was not essential as a buffer between the Canadian system and the US system. They say you could have operated Mica completely integrated with the United States system; you wouldn't have needed Arrow Dam. But I argued at that time, and I argue now … I don't know whether if it's in our long term interest to enter into a cooperative undertaking where to get the maximum generation at site in Canada we have to operate totally connected, totally reliant on the United States power system. So there's an element of independence there that we paid for. And we're finding as time goes on that the buffer provided by the Arrow Lakes storage is proving critical, and that we can develop generating plans at Mica, designed to produce the maximum power in Canada, and still meet our downstream commitments, in terms of downstream power and flood control development.

But the power benefits during the course of the IJC negotiations, if I can take you back that far, they started off talking not about power benefits in terms of kilowatts and kilowatt hours, but benefits expressed in dollars and cents. In other words, how much additional energy and how much additional capacity does the regulation of the river in Canada produce in the United States, and what's the value of that commodity… let's share that equally. Sorry, let me go back on that. We calculate the value of the power benefit, and then we deduct from that gross benefit, costs incurred by both companies before the

benefit can be produced. In the case in Canada, it would be the cost of building the reservoirs, the dams in Canada. In the case of United States, and this is where we came up against the problem, it would be the cost of putting in the generators at the United States power plants to produce the extra power. The United States said, "Now hold on. Granted we built Grand Coulee in the depression years, but the fact is that that was an investment by the United States… an investment that's critical before you can produce power benefits at Grand Coulee. We're not going to write that off. If you're going to be starting to add up, adding up costs and benefits of both countries we have to work into that formula some part of the cost of the Grand Coulee Dam, brought up to present dollars, not 1936 or 39 dollars, whatever they were." So the thing fell apart on that, and the IJC ended up recommending that forget about the economic benefits in the two countries, measure the power benefits in physical terms not in dollars and cents.

Imagine them in terms of added capacity to generate at any time and average energy generated. Now this is probably where I get into trouble trying to explain the difference between the two. I guess the… and I see my friend Larry Higgins has gone back to that, but the best parallel I can draw is a person that owns the car (… is this the chalk here?), where he has an engine here of an undetermined horse power, he has a gas tank sitting right here, which is pretty large, and way off in the distance, and in the case of the Columbia some 400 miles off in the distance, he has another reservoir of energy, which in this case is the Mica Dam. Now these are the two inputs for energy, plus contributions along the way. Now energy is the total amount that he can take out of all these reservoirs in terms of kilowatt hours. It's the actual number of kilowatt hours generated, with and without this Canadian storage. First you operate this car if you like, see how many miles you can travel without the Canadian gas tank sitting on the back of it. And then you do it again with this gas tank sitting there regulating this flow, and the difference is the increase in actual generation, or actual miles if you like, that this car can travel: that's energy… the actual physical output of work. Capacity is the rate at which you can accelerate, and decelerate. Your system load fluctuates all over the place like this. The capacity is the ability to meet the optimum peak. Say it is January and everybody is trying to heat their houses, and everybody gets up in the morning. It could be 8am on January the 2nd, but you must always have the capacity in your power system to meet that peak plus some spare on top of it in case generators are out. [End of first tape.]

Now the person that owns this power plant, and assume this is the Grand Coulee power plant, or an engine in a car, he can have a 100 horse power engine there, or he can have a 400 horse power engine. What happened was that when we were negotiating the Treaty, they had a 100 horse power engine, and now they're building to put in the 400. But that storage sitting way up here, has no effect on how quickly and how rapidly that car can accelerate… he's got all the energy he needs for that short term acceleration sitting right on his door step at the Grand Coulee power plant. I'm talking about short-term peaks, hourly peaks in the system. Now there's no way that a reservoir of water sitting 400 miles distance in Canada can be operated in such a way that you release a slug of water that travels that 400 miles and just happens to hit the Grand Coulee forebay at 8 am in the morning. Now they don't need it. They've got all the water they need sitting right at the Grand Coulee power plant for that kind of operation. So there's no such thing, nor do we have a commitment to operate on a daily basis.

Our commitment is to release water over a monthly period… a certain amount of water to be

released from Canada over a period of a month. There's no way we're tied down to a daily operation, or even a weekly operation, although the Canadian entities are today operating on a weekly basis, but there's no commitment under the Treaty to do that. So coming back to the capacity benefit, there's no such thing as a daily capacity benefit to Canada, but there is a seasonal benefit. And that is, you take the worst stream flow conditions on record, and you study from the peak system, what peak load you can produce with and without Canadian storage… and we get credit for that capacity. But in time that reduces. I hope I haven't lost you here. In time that reduces and that's what Mr. Higgins and others are complaining about; they argue that it does not reduce in time.

But I have had the experience of negotiating another draft agreement which was never implemented because the authority to build the dam in the United States was never obtained. But in that case, the United States was the upstream part and Canada was the downstream. This happened to be on the St. John river, in New Brunswick. And the St. John River in New Brunswick… St John power system is a very mature power system. It's got hydro plants, it's got thermal plants, and we applied the same principles as we did on the Columbia, and we said and we had a draft treaty already, that there were no capacity benefits at all from upstream storage in the United States: just energy. So I, without getting into a lot of details on it, I can only say to Mr. Higgins, he and I have agreed to disagree for years on this. He is a load forecaster without being too cutting I might say we had his superior as a consultant with us at the time who was a major power system planner for Ontario Hydro, Mathew Ward, as a consultant with us when we were negotiating … calculating these benefits. So Mr. Ward who was a senior member of Ontario Hydro, he agreed that capacity benefits decrease in time. Now the only possibility that I would think of getting additional capacity benefits, relates to the Arrow Lakes project, because of its proximity, just north of the border, to the Grand Coulee reservoir. I suppose that theoretically you could operate Arrow on a daily basis so that it would help maintain the head at the Grand Coulee power plant on a daily basis, and there might be something possible there. But all I can say is that under the Treaty, our only commitment is to operate on a monthly basis.

Now the other thing I think you should remember, and this is very critical as time goes on, that under the Protocol to the Treaty, Protocol which was negotiated under the Liberals when they came in power in 1968... 1963 sorry I've lost track of time, thank you. What sticks in my mind in 1968 … there's a paragraph 7 in the Protocol as contemplated by article such and such of the Treaty, "Canada shall operate the Canadian storage in accordance with Annex A and hydro electric operating plans made there under." Also as contemplated by Annex A and B of the Treaty, "these operating plans before they are agreed to by the Entities will be conditioned as follows". In other words, our commitment to operate is conditioned by this, "as the downstream power benefits credited to Canadian storage decrease with time the storage required to be operated by Canada, pursuant to paragraph 6 and 9 of the Treaty will be that required to produce those benefits." So in other words in some point in time, the calculations show that our benefits are reduced by a factor of 10, they're down to one tenth of what they were, our only commitment to operate storage in Canada is to operate enough storage to produce those reduced benefits in the United States. So if they, the United States can not argue two ways. They cannot say the benefits are being reduced, but you have to continue to operate all of the Treaty storage. They can't have it both

ways under the Treaty. If the benefits stay up, ok we will operate our plants to meet those benefits.

Going to the last point on the sale, I think the important thing to remember there is that the objections that have been aired by the equality or inequality of the amount of money that was paid to Canada, to British Columbia for the sale of the downstream power benefits, that criticism is not a criticism of the Treaty. The Treaty called for the return of power to Canada, but left the option open to the BC Entity, BC Hydro, to sell the power if they wished. But if people are talking about a renegotiation of the price paid they're not talking about a renegotiation of the Treaty at all. They're talking about a renegotiation of a contract entered into by BC Hydro and a group called the Columbia Storage Power Exchange which purchased Canada's entitlement to downstream power benefits for the first 30 years of the Treaty. After that 30 years is up, the basic elements of the Treaty are reinstated, and British Columbia has the right to get the remaining downstream power benefits back to BC in terms of power, or to enter into a new sales contract. So I think that is important. It's easy to be critical with 20/20 hindsight about whether or not the payment was large enough, but we went though a massive exercise of calculating or trying to calculate in advance over 30 years what benefits would be produced, and those benefits change depending upon many, many assumptions: The rate of load growth in the United States; the amount of water that would be taken out of the river for irrigation; the amount of water required for the irrigation pumps at Grand Coulee, and; whether or not we're taking a 20 year period of record or a 30 year period of stream flow record.

So we went through that exercise and we struck a bargain on what we felt the power benefits would be over the next 30 years, and negotiated just hard nosed negotiations over a payment for those power benefits, which worked out at the time to something like 4.4 mills per kilowatt hour for the energy sold. And, here again, the sale was brought about as I think you are all aware by now, by the desire of the BC government to go ahead with the Peace River development, and at that time, there was no way that we could see a need in British Columbia for both the downstream power benefits from the Columbia, and the power from the Peace. So the options opened to us at that time were to forget about the Columbia entirely and go ahead with the Peace, or to go along with British Columbia's desire to sell the power in the United States.

So we negotiated the sale of the power, we negotiated a payment in advance, a payment that represented the kilowatt hours that we felt would be produced over the next 30 years, all discounted again at a low interest rate, in this case 4.5% (I believe), which again was a lower interest rate than applied in Canada, and we got the benefit of that. And it came out as you're, I think, well aware at about 274 million dollars, paid in 1964. At that time we, what we did, we took that 274 million dollars, we assumed it would accumulate interest in Canada at 5%, we added to it as the projects would be completed, the flood control payments the United States were committed to pay us, and accumulated those at 5% interest up to April 1 of 1973. And that came to 501 million dollars… 501.1 million dollars. On the other side of the ledger then we took the estimated cost of the Columbia projects in Canada: Duncan, Arrow and Mica, and we accumulated their costs on a debit side… again 5% interest during construction, and those costs came to 447.7 million. So that's what gave rise to the often-quoted comment that we would have a surplus at the end of something like 53 millions dollars. In other words the Treaty projects would be paid for and there

would be money left in the bank.

Well you know what has happened. The cost of everything has escalated, and unfortunately from looking at the ledger, I don't think the interest rate we got on our deposited 274 odd million seems to have escalated because for some unknown reason it has only accumulated now to 480 million, not 501 so somehow we got less than 5% interest in BC on that money. I don't' know how that could have happened, but in any event, rather than having a 53 million dollar surplus, in effect what we faced on the first of April 1973, BC was out of pocket according to my calculations, based on numbers given in the BC legislature about 78 million dollars. I noticed in last year's annual report of BC Hydro, it was something less than that 68 million dollars. Having reached this point then we can sit down and say "well what did we get for our sale of the benefits?"

We got the Arrow Lakes Dam paid for completely, and recall all we have sold now is the first 30 years, not the whole 60 years. We have the Duncan dam paid for, and again we have sold 30 years of power generation from it… downstream benefits. But out of Duncan we get benefits in the Kootenay and Canada which are not entered into this calculation at all, and we have the Mica Dam paid for. And under the Treaty, well with the 78 million dollar overrun we have. Under the Treaty the Mica Dam, all we require there is 7 million acre feet of storage, so if we had wanted to just meet our Treaty commitments, we would have built a low dam at Mica with 7 million acre feet of storage. And of course it wouldn't have cost nearly the 330 million dollars that had been paid out because what we have now is a dam with 20 million acre feet of storage which is the cornerstone for power generation on the Columbia River in Canada. So we have a deficit of 78 million dollars, but in effect what that means is we have Mica costing us 78 million dollars. If we did not have a Treaty, if we had not sold downstream power benefits, we decided to develop the Columbia system on our own, forget the United States, let's do it ourselves. Mica dam still would have cost 330 million dollars. Under the Treaty it's costing us a net outlay of 78 million. Just on that simple assessment there's a saving of roughly a quarter of a billion dollars.

As to what happened in escalation, I don't really think that the actual cost of building the dams themselves escalated that much, although in the case of Mica perhaps it did because they had to widen the base and the top of the dam to some extent. The case of Arrow Lakes … I think the escalation was largely due to improvements that were made in the reservoir. And the cost of those greatly exceeded the original estimates. But I'm sure Dr. Keenleyside will tell you tomorrow, that it was not a case of replacing like with like. If it was a gravel road there to begin with they did not put a gravel road back in… you'll find a paved road there with a new ferry system operating. Those of you that were familiar with Nakusp, community of Nakusp along the lakes before at the waterfront with its old CPR pilings and railway sidings. You wouldn't recognize it today with its beaches etcetera. So they put a lot of money into that. They did an excellent job of clearing. And I think, in the case of Arrow at least that's where a lot of escalation came about. Time will only tell as to what the benefits are. I think there are benefits of the Treaty obviously. As I say that simple calculation shows that a quarter of a billion dollars of benefits as compared to go it alone philosophy.

On top of that you have the flood control protection in Canada, you have the benefits in the

Kootenay River by Libby which we do not have to pay for or we do not have to share those downstream benefits, and you have the power potential produced at Downey, in Revelstoke. And I might add that the power installation at Mica alone is 2600 megawatts. If you were to put in 2600 megawatts of nuclear power today, the bill you would be facing is approximately 2 billion dollars. That will, don't forget, don't at any time think that it's only the costs of the Columbia that's being escalating in time, the cost of everything has been escalating. And although I cannot tell you today what the cost of Mica generation will be when it eventually starts to generate in 2 years time and is delivered to Vancouver. I'll lay you any amount of money it's well below anything else that you can produce at this time.

That runs me through my list… how are we for time? I don't' know whether I should go through the Press clippings. Want me to do that? It's the only way I can refer back to what other people are reported as having said, and as I say, I hate going by newspaper clippings, I get misquoted many times, and I'm sure other people get misquoted. What one article I have here is the one done in Ian McDougal's presentation in front of you. He says, "However BC wants to gain three things through renegotiation. First, more flexibility in using the water flow of the Columbia river." I don't know how he would achieve that. Flexibility of operation in Canada was almost or always foremost in our minds during these negotiations. As I mentioned to you, it's one reason that we included the High Arrow Dam because it provided a large reservoir to act as a buffer between our power generation in Mica down in Revelstoke and power generation in the United States.

We have flexibility to divert, much more flexibility to divert than we had before the Treaty. Our right to divert before the Treaty was limited by the Boundary Waters Treaty. I'm sure Mr. Professor Swainson would pick me up if I erred. The Boundary Waters Treaty first of all called for compensation if the upstream party diverted… it called for compensation to the downstream party. And the Boundary Waters Treaty could be terminated by either party on 1 years notice so that really didn't give the upstream party much protection. Under the Columbia Treaty, we have the right to make diversions from consumptive uses which includes irrigation, you name it other than power generation … at any time with no liability for damage downstream. We have the right to make specific diversions for power purposes, as I had mentioned to you those three arrows. Although I doubt very much they will ever be exercised.

And we have found that there is another clause we have in the Treaty, we find that in operating in downstream benefits that this, even with the Arrow Lakes reservoir as a buffer, we find that it is infringing upon our flexibility to produce power in Canada, that we can effectively withdraw from our commitment 500,000 acre feet of storage each year up to a maximum of 3,000,000 acre feet. We wouldn't physically withdraw the storage but the operation would be changed so that in effect it would have the same reduction in downstream benefits in the United States as if we had removed the storage from Canada. So we have the right to do that also. Now because we sold the downstream power benefits, if we do that we have to make some compensation, because the benefits are not as great as they, they were originally contemplated to be. So I think in every turn, we did try to put in flexibility in the system, so I really don't know what Professor McDougal has in mind.

He said second, "We want to make it clear we are not making a commitment for all time to allow

the present flow to continue at historical rate." Well of course we're not. There's no way we're making that commitment. I've mentioned to you that our commitment for flood control is to provide a regulation by what storages may exist in Canada off into the future, provided that the United States can show us that they need this protection, that all of their storages will not protect them from flood damage. We can divert the water, either from the Kootenay to the Columbia, we can divert it anywhere … into the Prairies as it was proposed at one time for irrigation. So again I don't know really what he means here commitment for all time to allow the present flow to continue. I often sometimes think that these people propose building a dam down at the border and bottling the water. But I don't know, you know the Columbia always did flow downstream.

Thirdly, "I think we might like sometime in the future to recover some of the land we lost or obtain compensation that more closely reflects the benefits being received as a result of that land being inundated from the flooding." I can recall the External Affairs hearings that Bert Herridge, a member for Kootenay West who was always one that was prodding me and digging me at the time… questioning me about our need to commit the Arrow Lakes reservoir for all time. He said, "Couldn't we take down at some time and see whether or not the land and the silting isn't more valuable as an agricultural area?" I replied yes we can after 60 years, but I thought it would be easier to open the gates rather than tear the dam down.

And we have that right. Our commitment to operate the Arrow Lakes reservoir runs strictly for 60 years. And for some unknown reason we feel that the silting from the Columbia has produced a wonderful agricultural area in there, we have in theory that right. But I don't expect to ever see it. For those of you that know the Arrow Lakes, you will know that in most cases the shoreline is very steep. The areas that were badly effected by the flooding were the alluvial flans that came out into the lake at the mouths of various rivers, and the area between the head of the lakes and Revelstoke where the Columbia river meanders down into the lakes. And in that case I might add, we could just lower the level controlled by the Arrow Lakes dam down to what the normal water level in the lake is and in effect end up after 60 years with what General McNaughton always called the Lower Arrow Dam capacity to store higher would always be there. But we could just lower the controlled level, and if you wanted you could reclaim all that land between Revelstoke and the head of the Arrow Lakes …we're not tied in any way under the Treaty after 60 years.

"BC gets none of the downstream benefits for water used for consumption which is valuable and sells in California for upwards of $200 per acre foot, and about $150 in the southwest," he said. Now this is one we had thrown at us too, and you will find reference made in the External Affairs hearings to it. It also, it assumes that the Columbia River in its natural state did not go down to the United States. There's more water in the Columbia River now, or was before being regulated, than they would ever need for irrigation … than they would ever want to divert into the arid southwest into California and Nevada. And I may say that the points of diversion that had been studied, one was from the Kootenay down through here, and the other one was from the Snake River. I know of no scheme that involves diversion of the main stem of the Columbia itself up over that range of mountains and down into California. But decided entirely from that, the Canadian's storage in no way provided additional water in the Columbia system:

all the Canadian storage does is re-regulate the flows that are already there.

So we're not selling them water, we're selling them a system of regulation of the river. And in fact, the regulation for power purposes and for flood control purposes takes water away from the U.S. during the spring and summer… at the time they would be wanting to divert it out of the Columbia for irrigation purposes. That's the time we're storing water in Canada, and we give it back to them in the winter, when they need it for power generation and when they don't need it for irrigation.

"BC lost for perpetuity whatever economic potential that existed in the flooded Arrow Lakes region." Well I just pointed out to you that we have not lost that. There were major losses question mark (I don't know what he means), in the construction of the Duncan and High Arrow Dams which were built solely for U.S. flood control, and generate no power. Of course they generate downstream benefit power in the United States, which under the Treaty we're entitled to have, a very large amount of power. And the Duncan dam generates power in Canada at the Kootenay Canal plants, the blue squares you see on that map. So that's the slight simplification.

"BC has lost the power to vary to any great degree the flow of the Columbia waters." Well I just assured you that the flexibility that we have put into the Treaty has proven to be useful. We're now 10 years into the Treaty, and we're working out assured plans of operation 5 years from now 1979, and we have found that the flexibility to operate as we need to operate for maximum generation in Canada is there. That the factors we built into the Treaty such as the Arrow Lakes Reservoir are adequate to do that.

"We have ceded to the United States whatever legal claim we may have had on the on-going flood control benefits that the US gets from the Canadian portion of the river." As I say after 60 years we have. We have said as an upstream country, upstream neighbor, we have gotten benefits from you, we have paid off our dams, and we will if essential operate whatever storages we have if you ask us and if first of all, you use everything you have in your system to try to prevent that flood and you compensate us in any losses we may incur in doing you that favour.

And he comes back to that 214 million dollar saving for flood control in 1972 which I have explained. "BC got locked into very expensive power," he says. What's that saying… time will tell? But at the present time I know what nuclear power costs and I don't know what other power generation is costing and I say that you're going to have lower cost power from the Columbia than you can get from any other source of power at this time. You're getting a 330 million dollar dam for a net outlay of 78 million dollars. If you can't do something with that, and produce low cost power, then there is something the matter with the system.

"The United States got the best imaginable deal in terms of gaining long term control over the upper Columbia and Kootenay." As I've explained to you the differences of view between the McNaughton plan and the Treaty plan, and the fact that if in time we do want to make those diversions from the Kootenay, we do have the legal right to do it. But there seems to be, and I notice at the end of this article, there seems to be an association here between what was done on the Columbia, and what's being done on the Nelson Churchill in Manitoba, and what's being done on the James Bay project in

Quebec. And I can speak with a certain degree of knowledge on all of those projects, but inherent in the comments that Professor McDougal is making about the Columbia are his, his concerns about sell-outs to the United States.

And he lists these other projects in the same category. And the fact remains that the James Bay project no matter what you may think of it, is required for the power needs for the province of Quebec. And the delays they are experiencing now are critical delays. And they are going to have to, they have already ordered one nuclear unit, they may very well order another nuclear unit. This just goes to show you that they need that power. The only way they are going to have any surplus power to sell to the United States or to sell to Ontario or to sell New Brunswick which they, they are selling power to New Brunswick now though not from James Bay, is to accelerate the construction of James Bay, to compress it into a shorter timeframe. If they do that, and if it proves economic to do that, they may have power surplus for their own needs, but for only a very short term. So James Bay is being built for Quebec's power needs no matter what you may read in the Press. The Nelson Churchill project, and I have just come from a meeting on that yesterday, is being built for Manitoba's power needs. The Federal government owns the transmission line that brings Nelson River power down to Winnipeg. It may be again that if Manitoba decides to escalate the rate of construction of new power plants on the lower Nelson that for a short period of time they will have surplus power that they can sell to north-western Ontario, to Saskatchewan or to the Minneapolis - St. Paul area. But it will be relatively small amounts of power, and for relatively short periods of time, and at an economic advantage which in turn helps the power consumer in Canada. But as I say, there seems to be this association that any major project we do in Canada, is being done for the United States. That runs through Professor McDougal's comments.

So Larry Higgins, as I say, we agreed years ago to disagree on this… we do it smiling. "Payments to Canada in return for water storage were set at a reducing scale." I think that the only comment I can make to you there is that if they do reduce our commitment to operate, our storage reduces. The two are tied together. And as I mentioned before they cannot say that on the one hand that your benefits have reduced 90 percent, but you still have to operate all your storage the way we see fit. There's nothing of the kind. Our commitment to operate our storage and the commitment to operate any set quantity of storage, is tied directly to the benefits that we are credited with downstream.

And as I mentioned earlier, well he argues that the benefits of capacity were not known at the time of the Treaty calculations. As I say, I spent and Bill Chin over there all in white, spent years working on capacity benefits, and we had the benefit at that time of a consultant on leave from Ontario Hydro working with us. And we've had innumerable consulting firms… very competent engineers, power system planners look at it. And they're amazement is that we got any capacity benefits at all. They thought we got a very good deal on it.

And he quote again, "Nor does he believe that Canada can call for a scrutiny of the equity of the deal whereby we built a High Arrow dam that is useless to us for power generation, and has little value this side of the border for waters impounded… but must be maintained by us in perpetuity." I have already mentioned that in relation to Ian's comments. I don't know what more I can add on Larry's

comments. He talks again about the peaking situation. According to Higgins in the early 1960's, "the negotiators responsible for the Columbia Treaty had few examples to look at which would have shown the true economics of hydro peaking capacity in systems switching over from total reliance on water power, to mixed systems with thermal power stations." I think the best thing there is to refer Mr. Higgins to the Ontario Hydro system, the one he works for. Or in the area I live, there is a relatively small river call the Madawaska, with some upstream storage but without adding any more upstream storage, Ontario Hydro is going out and their putting in more and more generators, and old plants on that river. In other words they're getting peaking benefits by putting in more generators without any more storage being added up stream. But Larry seems to relate the ability to peak with the installation of upstream storage. The two are not necessarily related.

The other thing that I've brought with me and I hesitate to get into it, because this one really drove me up the wall, was the one that appeared in Weekend magazine, and I think that you mentioned before that someone already referred to this article by Ian Adams. It just seemed to me to be a compendium of all the nonsense that had been talked about on the Columbia River Treaty put into two pages. Well let me give you some examples. "Selling all of this water and power to the United States" he says… well there's no way we're selling water to the United States, we're selling a regulation of the river. The water always did go downstream; we're just putting it downstream in a different regime. And he says that, "Few people question the Premier's boast of free power from the Columbia or the sellout of our natural resources has not yet become a full blown political issue. Fewer still ask questions about possible ecological damage… the environment was not yet a reference point in the public's consciences. True there are some notable exceptions, General AG McNaughton as Canadian Chairman of the IJC fought long and hard with two Canadian governments against the terms of the Columbia Treaty." Yet no mention there that what General McNaughton was fighting for was projects that would flood out the whole east Kootenay valley, which would have been an environmental disaster. So that's the kind of reporting we're looking at here. I've got "x's" all over this article. Perhaps it's time to stop.

Professor Cook: Actually it might a good time to stop now, we can continue to tape, and we can have a cup of coffee and ask if we have any questions after that.

Mr. MacNabb: I think I've covered really most of the fiction in that article. You can't be involved in the project for 20 years with out developing biases, but I suppose that my bias' are at least based on 20 years of work.

Audience: [inaudible] What is the physical life of the project?

Mr. MacNabb: The life of the projects? 100 years plus. In some river systems you'd be concerned because of the silting of the reservoirs. But the silt load in the Columbia is not that great. You may get some silting in the upper regions of the Mica Reservoir but beyond that I don't see any problems.

Audience: What's the logic of the 20 year, 60 year, 80 year timeframes?

Mr. MacNabb: Well the logic of the 60 year logic is the fact that Libby would be amortized, the debt

would be written off, and therefore we could take significant amounts of water away from it without damaging it economically. 20 years was strictly a negotiation. It might be 20 years before we had the power plants on the Columbia in Canada all machined, and therefore diversion was an economical thing to do. This is another point about the McNaughton plan that under the Treaty, if we had agreed to build the storage reservoirs at Dorr / Bull / Luxor, we would have had to start out to do it immediately, because they wanted the flood control immediately, and also to get the downstream benefits we would have had to do it immediately. But what made those projects, what improved the economics of those projects although it didn't make them economic, was the added water it provided to Mica, Downy, and Revelstoke generators. But those generators wouldn't be in for 10, 15, 20 years but in the meantime would have to carry the economic burden of all of those storage reservoirs in the East Kootenay Valley.

Audience: Is there a rule of thumb that all the engineers use? Or is this drawn out of the air? Is it all neatly calculated according to anticipated returns or what?

Mr. MacNabb: No, you normally write off hydro projects over something like 50 years, now the reason why 60 years was chosen, was the Mica dam would take about 7 years to build so you have already taken out 7 years out, and you're left with 50 years, 53 years of operation. Is 7 years wrong? 7 years to build Mica. So is 53 years of operation at Mica under the terms of the Treaty? You usually amortize a transmission line off in 30 or 40 years. You amortize a nuclear plant off in 25 or 30 years if they last that long? Nobody knows yet. Certainly the UK experience is that they haven't lasted that long. But sorry, just, in hydro it could go on forever and a day. We have power plants sitting in the Ottawa River in Ottawa. Low head plants that were built in 1896 or something like that and they're still producing power.

Audience: [inaudible]

Mr. MacNabb: Very reliable power, and perfectly suited for peaking. Rapid responses to demands on the system which other power sources cannot do except for gas turbines or something like that… that's quite expensive.

Audience: [inaudible]

Mr. MacNabb: And your fuel doesn't cost you much.

Audience: You mentioned this business of you putting our Kootenay first, because the American's were in a hurry or collecting total benefits. And I'd like to hear you say this because you're the first, first speaker who's pointed this out. I'm delighted and disappointed because I thought it was an original point. But it intrigues me that when I read the minutes of the liaison committee policy so the planning of the strategy going to the negotiation meetings I would like to hear that. It strikes me that we, our side, were taken aback when the Americans responded to our first bid. Well you can have your three dams or whatever it was in Canada, if you build them quickly and that seemed to think who should rule over our side because that immediately made the costs or the financing prohibited in BC. And we seemed to have lost our initiative from that point on. We were then knocked back on our heels and then we seemed to come forward with this power.

Mr. MacNabb: Well I have to comment on that from the vantage point that I had during that period. Now I think I can predicate by saying that at the technical level, as opposed to the political level, all studies had indicated that it was not economic to build those dams in Canada in the East Kootenay Valley. Now you might have done studies that would have shown that the total McNaughton Plan would have been economic. But when you break that plan down to increments, when you look at the last added increment of cost and the last added increment of benefit, you always found that the Dorr / Bull River / Luxor projects did not pay their way. But from a negotiating point of view it was decided to go into the negotiations asking for a lot as a negotiating ploy. And they went in asking, my memory serves me right, something like 20 million acre feet of storage in Canada. Next added benefits you know on this incremental benefit thing, we say forget Libby, and forget any other projects you may have in mind in the United States. We will build 20 million acre feet of storage in Mica, as long as we get the first added benefits of adding this storage. And I really, I can't recall, quite honestly, can't recall what the reactions was in the United States. But I do remember they said, well one condition associated with it of course, is you must build them now. Because one thing we want now is we want the power benefits as soon as possible, and we want the flood control benefits as soon as possible. And if you don't want to build the ones in the Kootenay valley in Canada now, we are prepared to build Libby now. And that brought it to the crunch. Yes, we went through the mechanism, yes.

Audience: But is it this a ploy of saying alright you can have your bid, but now they'll change the time path off?

Mr. MacNabb: In some sense, no I don't know if they changed the time path; that was always one of their conditions.

Audience: You didn't seem to have anticipated that they wanted to build now, maybe I'm wrong. You said you realized that we would have had to build them quickly.

Mr. MacNabb: Well we always knew that one thing they wanted to get out of the Treaty; they wanted the conditions … it went right through the IJC negotiations that preceded the Treaty negotiations, was flood protection on the Kootenay River in the United States. So whatever we did, whatever we did would have had to provide that flood control protection.

Audience: Can I correct again, get my mind straight. Did you say that when we went in we knew that was a big bid, a big opener, the 20 million feet of storage?

Mr. MacNabb: Everything was thrown in: High Arrow, Mica, Duncan, Dorr, Bull, Luxor?

Audience: What was our next best, what can we fall back to?

Mr. MacNabb: I think that… I don't think I can answer that. Because I think it depends upon the individuals. I think they all had different ideas that they might fall back to. And there was always this division of thought between the provincial people concerned and the federal government people concerned. And I think that it's fair to say that of the principles from the federal government they were

certainly moving along the lines of the McNaughton plan. On the provincial side and I might say on the technical side the McNaughton plan, from our point of view at least, was not an economic starter. Depended so much also upon the kind of deal you can get for Libby, and I think we ended up getting a good deal for Libby, so what do we do? It was always there in the background. We opened without it you're quite right.

Audience: Do you really expect it would be built? Even though everybody on both sides agreed that it…

Mr. MacNabb: Libby?

Audience: Yes

Mr. MacNabb: Depends who pays the piper.

Audience: But on the principles of the IJC and except, it should not be in it.

Mr. MacNabb: That's why I say those weasel words were in there, added in the benefit cost ratio, "with due regard to other factors", yes. But Krutilla, but you must remember that Krutilla's approach to the Treaty, even though he does say Canada got the best of the deal, was a very academic one. He approached it from what would have been the best development of the river system assuming it was all in one country. Now let's face it. We don't live in that utopia yet, and we went in the negotiations with, "What's the best deal we can get for Canada?" And the U.S. approached it the same way on the other side of the border. Whereas Krutilla, is this a valid criticism…?

Audience: He'd agree with you.

Mr. MacNabb: I'm sure he would.

Audience: Interesting that the IJC principles and the exercise in Canada …

Mr. MacNabb: No not at all. You know there was a special IJC principle on Libby… I can't recall off hand… yes general principle three if I can find it now. "With respect to trans-boundary projects in the Columbia basin, which are subject to provision of article 4 of the Boundary Water Treaty, the entitlement of each country to participate in the development to share in the downstream benefits resulting from storage and then power generated at site should be determined by crediting to each country such portion of the storage capacity and head potential of the project as may be mutually agreed." In other words, they left it wide open, or an agreement to agree on something at sometime in the future. And that just didn't happen there. The IJC themselves could not agree. The General wanted nothing to do with Libby… it was a dirty name. He didn't want it in the principles at all, but clearly it had to be there for the U.S. wanted that project. And Libby played a part in all of the studies from the word go. So the US desire for Libby was not something that struck us suddenly in the negotiations.

Professor Cook: This was a very political thing too wasn't it? I recall one of the Senators from I guess Idaho I think it was, that the US senate hearings saying there was no project more popular than Libby in

his area.

Mr. MacNabb: In his area, yes I'm sure. I don't know what the benefit cost ratio on Libby is.

Audience: Could you actually see those, when you attended the meeting of the policy Liaison Committee? Could you see these kinds of political things that work between? Did you recognize them at the time… the kind of political ploy that was being dropped in?

Mr. MacNabb: Between the federal and provincial? Very much, of course. And at some times we were on a bit of an awkward situation because of the technical level … We supported the position as being taken by the BC government at the time. You know here are the facts: The Dorr / Bull River / Luxor project is not economic. And yet there it was presented as the opening gambit in treaty negotiations.

Audience: And you're quite clear in your own mind there was no more than a ploy?

Mr. MacNabb: I say that depends upon the individual. Some people were strong supporters of General McNaughton's position, and forget the economics you technocrats… get out of the way. You know, control of the river is what's crucial, and the only way we can have ultimate control of the waters of the Kootenay River is to build dams in Canada, and divert that water over into the Columbia and then over into the Fraser if you like.

Audience: It was the whole package there, it was before wasn't it not just to three but four was put as packages … one package was a ploy?

Mr. MacNabb: Now this is why I say it depends on the individual. Ray Williston may have looked upon it as a ploy. And Bonner may have looked upon it as a ploy, etcetera. But there could have been people in the federal side that were, as I say, supporters of the McNaughton plan and were seriously putting that proposal ahead.

Audience: Howard Green?

Mr. MacNabb: Howard Green, definitely. Yes I think Alvin Hamilton would have, yes.

Audience: How close is the Treaty to the optimum Canadian potential?