ALBERTA
ENVIRONMENTAL APPEAL BOARD

Report and Recommendations

Date of Hearing - October 7, 8 and 28, 1997
Date of Report and Recommendations - December 9, 1997

IN THE MATTER OF Sections 84, 85, 86, 87, 91, 92 and 93 of the *Environmental Protection and Enhancement Act*, (S.A. 1992, ch. E-13.3 as amended);

-and-

IN THE MATTER OF an appeal filed by Nick Zon *et al.* with respect to Approval No. 10323-01-00 issued to TransAlta Utilities Corporation, by Mr. David Spink, Director of Air and Water Approvals Division, Alberta Environmental Protection.

Cite as: Zon *et al.* v. Director of Air and Water Approvals Division, Alberta Environmental Protection, *re: TransAlta Utilities Corporation*

HEARING BEFORE

Dr. William A. Tilleman, Chair
Dr. Ted W. Best
Dr. Steve E. Hrudey

APPEARANCES

Appellants	Mr. Nick Zon represented by Mr. A.O. Ackroyd, Q.C., Mr. Richard Secord; Dr. Balder Von Hohenbalken; Mr. Charles Spilsted; Mr. Stu Chase; Mr. Blair Carmichael; Mr. Dwayne Zon; Mr. Gary Gylytiuk; Ms. Gwen Bailey and the Summer Village of Point Alison, represented by Mr. K.F. Bailey; Ms. Donna Thomas and the Summer Village of Kapasiwin, represented by Mr. Dennis Thomas; Mr. James Paron, represented by Mr. Samuel Kravinchuk; and Mr. David Doull
Other Parties	Dr. E.A. Dale Allen
	Mr. David Spink, Director, Air and Water Approvals Division, Mr. Ernie Hui, Mr. Clement Ng, Mr. Randy Dobko, Alberta Environmental Protection, represented by Mr. Stan Rutwind
	Mr. Fred Lindsay, Mr. John Watt, Mr. Dwayne Dychkowski, Mr. Mike Leaist, TransAlta Utilities Corporation; and Dr. Stella Swanson and Mr. David Fernet of Golder Associates; represented by Mr. Steven Ferner

OVERVIEW

On March 27, 1997, the Director of Air and Water Approvals, Alberta Environmental Protection (Director) issued Approval 10323-01-00 (Approval) to TransAlta Utilities Corporation (TransAlta) for the Wabamun thermal electric power plant. The Environmental Appeal Board (Board) received twelve appeals to the Approval. The Board held a preliminary meeting on September 23, 1997, and decided that all of the Appellants who requested standing were, in some manner, directly affected by the Approval. The hearing occurred on October 7, 8 and 28, 1997 in Edmonton, Alberta.

Major Issues

The two issues of primary concern to most, if not all, of the Appellants related to TransAlta's impacts on the lake level and aquatic weed concentrations in Lake Wabamun. Concerns related to water quality (with respect to thermal input, chemistry and effects on fish), air quality, and winter ice were also expressed.

Conclusions on the Evidence and Recommendations to the Minister

From the evidence presented at the hearing, the Board concludes that the extent of TransAlta's impact on weed growth is more pervasive than earlier studies reveal. The Board finds that it is appropriate to recommend that TransAlta *extend* its weed harvesting activities to include (once again) Moonlight Bay, more of Kapasiwin Bay, and the Point Alison area, at least until TransAlta's water transfer scheme has caused lake levels to return to the level of 724.55 m or until new thermal impact studies convince the Director that a more expansive weed harvesting program should be discontinued. The Board agrees with the Director that TransAlta is in non-compliance with Alberta Environmental Protection's (Department) Alberta Ambient Surface Water Quality Interim Guideline, and strongly agrees that the thermal input amendment proposed by the Director should be added to the existing Approval regarding specific additional monitoring of the inlet and outlet cooling water, and referencing the 3^{o}C delta T as the new benchmark. With regard to lake level concerns, the Board notes that the Minister will be directing his staff to review the weir elevation in relation to effects once the lake water level of 724.55 m is reached. The Board agrees that this is an appropriate action to address the Appellants' concerns.

The Board agrees with the Appellants that water quality issues heard by the Board regarding Lake Wabamun are primarily related to TransAlta's operations at the lake. The Board finds that it is appropriate to recommend that increased monitoring of the inlet and outlet canals be done, and that chronic toxicity tests be conducted on the ash lagoon effluent.

The Board shares the concerns of all parties regarding the potential health issues arising in the emerging air emissions issues related to PM_{10} and $PM_{2.5}$. The Board is of the opinion that the Department and TransAlta should anticipate the proposed new Canadian air quality guideline for fine particulate matter and determine whether the Wabamun plant operations will be in complete compliance with these proposals. The Board is unable to draw any conclusions relating air emissions from TransAlta to the "black substance" found in the snow on one of the Appellant's lake property. The Board does, however, share the concerns regarding the amount of mercury and lead annually emitted from TransAlta's stacks, particularly since there are currently no Canadian standards for emissions of these substances. The Board's concerns are exacerbated by evidence that suggested the Wabamun plant operates in a manner markedly less efficient in terms of particulate emissions than its sister plant, the Keephills plant. With these concerns expressed, the Board is still of the opinion that the Director's decision encompassing impacts on air quality is warranted by the facts available to him and presented to the Board.

During the course of the appeal, the Board became aware of what it considers to be serious human safety issues (i.e. two drownings) associated with the open water and thin ice influenced by TransAlta's thermal input into Lake Wabamun. The Board recommends that a clause be added to the Approval to address this issue, and expects that everything should be done to prevent such tragedies.

The Board recommends that the Approval be varied as set forth in the Recommendations to the Minister.

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I. BACKGROUND

[1] On March 27, 1997, the Director of Air and Water Approvals, Alberta Environmental Protection (Director) issued Approval 10323-01-00 (Approval) to TransAlta Utilities Corporation (TransAlta) for the Wabamun thermal electric power plant.

[2] On April 16, 1997, Mr. Richard Secord filed an appeal on behalf of Mr. Nick Zon for the Approval with the Environmental Appeal Board (Board). Further appeals were filed by Dr. Balder Von Hohenbalken, Mr. Charles Spilsted, Mr. Stu Chase, Mr. Blair Carmichael, Mr. Dwayne Zon, Mr. Gary Gylytiuk, Mr. Dennis Thomas (on behalf of Ms. Donna Thomas and the Summer Village of Kapasiwin), Mr. James Paron, Mr. K.F. Bailey (on behalf of Ms. Gwen Bailey and the Summer Village of Point Alison), Mr. David Doull and Mr. Bradley Scott Cowley.

[3] The Board advised the Director and TransAlta that the Approval had been appealed, and asked for copies of all related correspondence, documents and materials. On May 8, 1997 and May 15, 1997, the Board wrote to the Natural Resources Conservation Board (NRCB), and the Alberta Energy and Utilities Board (AEUB) asking whether the matter was the subject of a public hearing or review under their Boards.

[4] Response from the NRCB was negative, but the AEUB documented the history of the Wabamun plant in earlier Energy Resources Conservation Board (ERCB) proceedings.[1]

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[1] On May 23, 1997, the AEUB stated:

> "Further to your letters to us of 8 May 1997 and 15 May 1997, the ERCB first approved the construction and operation of Calgary Power Ltd.'s (Calgary Power) Wabamun Power Plant in the 1970's, pursuant to Approvals No. HE 7307, HE 7307A, HE 7606 and HE 8104, copies of which are attached. Also enclosed are ERCB report 76-D and decision report 81-6, at which hearings concerns were raised similar to those stated in the Notices of Appeal you provided us.
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> These documents confirm that discharge of heated water from the Wabamun Power Plant into Lake Wabamun has been a charged subject of debate between Calgary Power/TransAlta Utilities and the surrounding residents of Lake Wabamun for more than twenty years. Although dated, I hope that these materials will assist the Environmental Appeal Board (EAB) somewhat with its deliberations concerning the immediate appeal.

A review of our Wabamun Power Plant files reveals that none of the named individuals on the Notices of Appeal sent to the EAB were notified of or participated in the ERCB decision and report attached. Therefore, we are enclosing the attached information only for the purposes of providing the EAB with background and historical information regarding the issues raised in the Notices of Appeal." (Emphasis added.)

A. THE PRELIMINARY MEETING

[5] The Board held a preliminary meeting on September 23, 1997, in order to determine which Appellants were directly affected, who should be granted party status, and which matters contained in the notices of objection should become the basis for the hearing, the Board issued a Decision on September 26, 1997.

1. Decision on Standing and Party Status

[6] The Board decided that all of the Appellants that requested standing[2] were, in some manner, directly affected by the TransAlta Approval, and could therefore proceed to the appeal. The Department did not take a position on the standing issue. TransAlta did submit that not all of the Appellants were directly affected by all issues, leaving by implication the understanding that all of the Appellants were directly affected, but some may be affected to a lesser extent, on some of the issues.

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[2] Referred to as Group 1: Mr. Dwayne Zon, Dr. Balder Von Hohenbalken, Mr. Nick Zon, Mr. Charles Spilsted, Mr. Stu Chase, Mr. Gary Gylytiuk, Mr James Paron (represented by Mr. Samuel Kravinchuk), Mr. David Doull, Mr. Blair Carmichael, and Mr. Brad Cowley.

[7] With respect to Group 2[3] (those people who responded in writing to the Board's request for participation) the Board decided that they should be given the opportunity to participate through the mechanism of full **written** arguments, that were to be filed by the same date as all the other parties. The Board decided that no oral submissions would be made by this second group, but that cross-examination by the original Appellants might be permitted.

[8] With respect to the status of the Summer Village of Point Alison, Ms. Gwen Bailey, the Summer Village of Kapasiwin, and Ms. Donna Thomas, the Board decided that Mr. Ken Bailey should be allowed to appear at the hearing on behalf of the Summer Village of Point Alison and Ms. Gwen Bailey in order to speak to the undisclosed Agreement between these individuals or groups and TransAlta. The Board decided that such an Agreement, if it exists, may be tendered at the hearing and Mr. Bailey would have an opportunity to speak to the Agreement, and defend it if necessary.[4] The Board also decided that this group should have the opportunity to file written submissions, and should it elect to do so, that these must be filed by October 2, 1997. The Board decided that the same applied to Mr. Dennis Thomas' clients, Ms. Donna Thomas and the Summer Village of Kapasiwin.

2. Decision on Matters to be Included in the Hearing of the Appeal

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[3] Referred to as Group 2: Mr. John Briegel, Local Union 254, International Brotherhood of Electrical Workers; Mr. William Purdy, Village of Wabamun; Dr. E.A. Dale Allen; Mr. Terry Bean; Mr. B. Beil, Principal, Wabamun School; Mr. Al Hiebert, President, Lake Wabamun Enhancement and Protection Association.

[4] The Board added that if indeed an agreement was presented, that the Board would allow all parties to comment on the agreement before deciding what status the agreement has and how it affects the Board's Report and Recommendations to the Minister.

[9] The Board decided that the following matters could be addressed by the parties at the hearing, but that the scope[5] of evidence and argument must be limited to the specifics pertaining to the grounds of appeal raised in their notices of appeal. The matters to be heard included:

- water quality (with respect to thermal input, chemistry and effects on fish),
- weeds,
- air quality,
- lake level, and
- winter ice.

[10] With respect to air emissions, the Board decided that the parties must limit the scope of their discussions to specifics pertaining to fallout of black substance from air emissions.

[11] The Board decided with respect to the lake level, that it was only interested in receiving submissions that establish the nexus between the operations of the power plant and other environmental changes occurring at the lake. The Board stated that it was not concerned with historical levels of the lake, nor about what the level of the lake "should be". The Board stated that it would be making a factual determination as to whether or not the terms of the Approval, if they relate to lake levels, impact the integrity of the Wabamun Lake ecosystem, and how they relate to the

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[5] This Board discussed the **scope of evidence** that a party may lead in *Walker and Haugen et al. v. Director of Standards and Approvals* (May 1994), No. 93-005 (Alberta Environmental Appeal Board):

> "...the test is not to rule out the environmental effects of all pre-Act facilities, as a matter of law, simply because there is a pre-Act facility involved. This is potentially unfair because there *may* be a link between the existing facility and the new facility sought by the amendment. In other words, the existing facility may indeed have environmental effects that are tied synergistically or antagonistically to the new facility. ...
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> Where transitional matters arise between old and new facilities, the resolution must come by way of a factual determination of *how* the existing plant's activities are directly linked to the new approval -- from an environmental effects perspective. If, for example, the appellants raise a *prima facie* case that pre-existing emissions from ongoing activities compound the emissions given by a new approval, the Board would hear all the evidence because it is relevant to the environmental acceptability of the *new* Approval." (At 7).

health of those parties directly affected by the Approval. The Board also stated that if the Appellants wished to raise the matter of lake levels and other environmental impacts which they allege TransAlta causes to the lake, the Appellants must identify with specificity those provisions or *bona fide* omissions of the Approval that affect the lake levels per se.

II. SUMMARY OF EVIDENCE

A. Summer Villages of Point Alison and Kapasiwin, Ms. Gwen Bailey and Ms. Donna Thomas

[12] Mr. Dennis Thomas and Mr. Ken Bailey indicated to the Board that the original appeals of the Summer Villages of Point Alison and Kapasiwin and Ms. Gwen Bailey and Ms. Donna Thomas were resolved by virtue of an Agreement[6] (the "Agreement") signed between themselves, TransAlta and the Department. Mr. Bailey emphasized that clause 4.2.19 of the Agreement,[7] modifies the original Approval to require TransAlta to develop and document a report on options available to reduce or eliminate the impact of thermal input into the lake. Clause 4.2.20 in the Agreement provides that this report be issued by April 1, 1998 in order to provide time for

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[6] Exhibit #2: Resolution of Appeal No. 97-012 - 97-013 Regarding Approval No. 10323-01-00/TransAlta Utilities Corporation dated August 7, 1997.

[7] 1. That the Approval be modified to:

4.2.19 The approval holder shall develop and document a report, which outlines all the options available to reduce or eliminate the impact of thermal input into Lake Wabamun. The report shall include, at a minimum:

a) a cost estimate for each option;
b) an estimate of the time required to implement each option;
c) a preliminary outline and discussion of the environmental implications and benefits of each option; and
d) an indication of which options will be pursued for possible implementation and the further analysis that will be conducted to select the preferred option(s).

review.[8] According to Mr. Thomas, the Agreement also modifies section 4.2.12 of the existing Approval,[9] which requires TransAlta to monitor the inlet and the outlet water temperature, to require that the temperature taken be the ambient temperature of the lake, and not the temperature of the intake canal. Mr. Thomas added that the Director and TransAlta were prepared to abide by the terms of the Agreement,[10] and that the Agreement should be included in the Board's recommendation to the Minister.[11]

B. The Appellants

[13] The Appellants that were considered to be directly affected[12] by the Director's decision formed a panel to address the five issues identified by the Board as matters that may be addressed by the parties at the hearing.[13] In order to expedite the hearing process and consolidate submissions, the panel appointed spokespersons to speak on behalf of the group for the main submissions, with individual comments or anecdotes to be added after the main panel submission. Blair Carmichael was spokesperson for weeds, water quality, and lake level; Nick Zon spoke to air

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8 4.2.20 The approval holder shall submit the report required in 4.2.19 to the Director no later than April 1, 1998.

9 4.2.12 Effective January 1, 1998, the release of cooling water to Lake Wabamun shall be controlled in such a manner that water temperature difference between the inlet and outlet canals is less than or equal to 11 degrees Celsius (or C) on a yearly average basis.

10 TransAlta written submission dated October 2, 1997 at page 29: "TransAlta wishes to honour the agreement entered into with the Summer Village of Kapasiwin and Donna Thomas, and the Summer Village of Point Alison and Gwen Bailey." Also, the written submission of the Director dated October 2, 1997 at page 2 states: "Mr. Spink submits that he considered alternatives and made a reasonable decision in relation to the relevant issues and that the Approval should be maintained except those matters expected to be put forward by the Summer Village of Kapasiwin and Donna Thomas and the Summer Village of Point Alison and Gwen Bailey."

11 It was also suggested by Mr. A.O. Ackroyd, Q.C., representing the Appellants at the preliminary meeting, that this document be presented at this hearing so as to allow it to form part of the evidentiary record. On this point, the Board agrees with Mr. Ackroyd.

12 Notices of Appeal, filed as Exhibit #3.

13 Preliminary Decision, Appeal No. 97-005 - 97-016, dated September 26, 1997 at page 9: "The following matters may be addressed by the parties at the hearing... water quality (with respect to thermal input, chemistry and effects on fish), weeds, air quality, lake level, and winter ice."

quality and Dwayne Zon gave evidence on winter ice.

1. Water Quality

[14] Mr. Carmichael stated that water quality and water depth are related, that the Approval permits the equivalent of 25,500 kilograms of oil per year to be emitted into the lake,[14] that this oil has an effect on water quality,[15] and that TransAlta should be charged a fee for dumping this oil. He stated that the Approval does not go far enough in monitoring the kinds and quantities of oil and grease, metals and phosphorus allowed to be emitted into the lake, that it does not make sense to be, in essence, fertilizing the lake and then cutting the weeds, and that allowing TransAlta to "dump what it wants to dump" will change the lake's water chemistry.

[15] Mr. Carmichael stated that previous Approvals given TransAlta have stipulated that the pH of the lake could not change, but that this Approval contains no such provision. Also, this Approval contains no requirement to monitor effects on fish; in particular, to check fatty tissue of

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[14] See Table 4.2-1 of the Approval at page 15 provides:

PARAMETER	SAMPLE TYPE	LIMITS	
		MASS IN KILOGRAMS PER DAY (Unless otherwise specified)	
		maximum daily average	maximum daily
TSS	Composite	576	1130
Oil and Grease	Composite	70	125
Iron	Composite	25	50
Total Phosphorus (as P)	Composite	3.2	6.4
pH	Composite	6.0-9.5 pH units	

[15] Exhibit #5: Article in Grove Examiner dated September 28, 1997 "Property owners and TransAlta prepare for hearing".

fish for PCB and heavy metals accumulation. Mr. Carmichael said that there should be a condition in the Approval to monitor lake sediment for heavy metals. He pointed out that 4.2.12 of the Approval refers to the release of cooling water and temperature variance, but that nowhere does the Approval permit actually permit the release of cooling water into the lake.

[16] Mr. Carmichael submitted that TransAlta should cease its release of thermal effluent into Lake Wabamun. In support of his submission, Mr. Carmichael referred to a study done by Paul Shewchuk[16] concluding that discharge of thermal waste into lakes less than 30 feet deep should not be permitted. Mr. Carmichael suggested that, contrary to TransAlta's submission that thermal effects are confined to 5% of the lake, the thermal discharge affects 100% of Kapasiwin Bay and Moonlight Bay. Both Kapasiwin Bay and Moonlight Bay, which receive thermal flow, have depths of 4 to 8 feet. The report states that nearly every physical property in a lake is affected by thermal discharge.

[17] Mr. Carmichael stated his concerns regarding: the fish kill of 1974; insufficient mixing of thermal plume and effects on fish and waterfowl; and, the presence of blue-green algae in areas of organic and thermal pollution. He pointed out that as a result of TransAlta's activities, the temperature of the cooling water is raised by an average of 8 degrees in the summer and 14 degrees in the winter. Mr. Carmichael expressed concern with TransAlta and the Department's reliance on the Beak Report, since these studies were conducted during a period of reduced operation of the Wabamun plant.

[18] Mr. Carmichael submitted a drawing[17] to illustrate his allegation that the lake level has been lowered in order to enable TransAlta to operate its plant at full capacity. He submitted that the Wabamun plant is now operating at four times the capacity that it was during the Beak studies, on a lake now containing a markedly reduced volume of water. He submitted that these two changes have resulted in more extensive impacts on the lake.

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[16] Written Submission of Mr. Blair Carmichael, Exhibit D.

[17] Exhibit #7: Graph prepared by Mr. Blair Carmichael "Net Generated by Wabamun Plant".

[19] Mr. Nick Zon added that water quality has deteriorated at the lake, that property owners have lost valuable swimming and wading opportunities because of increased weediness, and that as a result property values have diminished.

[20] Mr. Dwayne Zon added that he wants monitoring provisions added to the Approval to address the chemical makeup of the effluent, as there are a number of unknowns in the effluent arising from, for example, pumping water from the North Saskatchewan River into the lake.

[21] Mr. David Doull submitted that water quality had deteriorated, in part, because of reduced water levels. This has, in turn, resulted in less enjoyment of the lake by children and adults, and increased swimmer's itch.

[22] Mr. Stu Chase adopted the evidence of Mr. Carmichael, adding that the quality of water has decreased and that property owners no longer drink the water.

[23] Mr. Spilsted added that he no longer drinks the water, that the lake level is 60 million cubic meters of water lower, and that this low lake level affects water quality.

[24] Dr. Allen added his concern that the Approval allows for 11°C increase at the effluent outlet, where 3°C difference from ambient water temperature is the recommended standard under Alberta's legislation.

2. Weeds

[25] Mr. Carmichael showed photos and a diagram to the Board, to explain a clockwise flow of weeds in the lake. He submitted that weeds float down and get tangled up in Moonlight Bay, that thermal pollution allows greater light penetration in winter, causing earlier weed growth in the spring, and that the concentration of weeds causes the Appellants not to use the lake. He explained that weeds have always been a contentious issue, that initially TransAlta agreed to enter into a weed

harvesting program and that weeds could be cleaned up in Moonlight Bay if the water level was higher. He stated that TransAlta should be responsible for all environmental effects of the Wabamun plant.

[26] In response to a question from the Board, Mr. Carmichael agreed that it is really the rooted weeds that are a problem. TransAlta has assumed responsibility for weeds in some areas of the lake, but not in others. Mr. Carmichael explained that traditionally TransAlta cut weeds in Moonlight Bay, but no longer does so because the Bay is too shallow, and because weed cutting or chemical treatment is undesirable from a fish and wildlife habitat perspective. He referred to further photos to illustrate his claims that the Bay is impassable by sailboats and motorboats, and that waterfowl get tangled in the weeds.

[27] Mr. Nick Zon added that the Golder Report[18] must be recognized as a synthesis of many previous reports, and is not the result of any new studies. He submitted that the report does not adequately address the problem of weeds, and that the main study relied upon in studying the effects of thermal pollution on plant growth (the Beak Report[19]) was done when the Wabamun plant was "throttled down."

[28] Mr. David Doull stated that his family has been unable to use their boat in the past five years, due to excessive weed growth.

[29] Mr. Stu Chase added that Coal Point, located some distance from the plant, was free

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18 This report was submitted by TransAlta to the Department as part of its application for Approval renewal: Golder and Associates Ltd., "Report on A Synthesis of Historical Information on the Effects of the TransAlta Utilities Wabamun Lake Power Plant Using a Risk Assessment Approach", dated March 1997. [hereinafter, the "Golder Report"]

19 The Golder Report relied on findings made by Beak Consultants regarding the effect of thermal discharge on aquatic plants, in estimating the areal extent of the effect of the thermal plume on aquatic plants in its own report. The Beak report referred to by Mr. Zon in this context is likely: Beak Consultants Ltd. 1980. The Effect of Thermal Discharges on the Aquatic Plants and Other Biota of Wabamun Lake, Alberta. Volume 1 380 pp.

of weeds until the mid-1980s, but now has considerable weeds.

[30] Mr. Pat Spilsted added that higher lake level would alleviate some of these weed problems.

[31] Dr. Allen added that there has been a decrease in the weed *Elodea*[20] population in the lake, but that native weeds are now being experienced in higher numbers. He explained that biomass of weeds can increase as water levels drop and light intensity increases, causing more favorable conditions for plant growth. According to Dr. Allen, Moonlight Bay is particularly sensitive to depth reduction because of its shallow depth (1.5 to 3 m), which causes an increase in weed biomass, and a reduction of oxygen concentration. He explained that prolonged low water levels are favorable for the establishment of emergent weed beds, which are woodier and decompose more slowly than those in deeper water. This can cause an accumulation of organic plant debris, which can entangle with other floating matter and eventually create a marshy area. Natural fluctuations reduce the establishment of these beds. Dr. Allen submitted that consideration should be given in the Approval to harvesting weeds in Moonlight Bay to ensure it remains in good condition, particularly for users of the provincial park and for lake property owners.

[32] Mr. Samuel Kravinchuk, on behalf of Mr. James Paron, presented concerns through written submissions.[21]

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20 Webster's New World Dictionary (Second College Edition) defines *Elodea* as: swampy, any of a genus of submerged water plants with whorls of short, strap-shaped leaves; often grown as aquarium plants.

21 Written submission dated October 10, 1997, wherein Mr. Kravinchuk stated:

"Lake temperature is the main factor affecting aquatic plants ("weeds"). The higher the temperature the greater the weed growth.

Lake levels directly affect lake temperature. The lower the level the higher the temperature, assuming all other factors are equal.

The operation of the Wabamun Plant (pumping hot water into the Lake) would increase lake temperature further during low lake level conditions.

3. Air Quality

Approval No. 10323-01-00 (the renewal to operate the Wabamun Plant) expires on April 1, 2000.

It is reasonably foreseeable that by April 1, 2000 the lake level will not reach 724.55 metres. Apart form Section 4.2.12, Approval No. 10323-01-00 does not address lake temperature and in particular the relationship to lake levels." ...

[33] According to Mr. Nick Zon, the Approval permits TransAlta to emit .72 tons per hour of particulate matter, or 6300 tons per year, which is the equivalent of 25,000 tandem truck loads per year. He stated his measurements show that the ooze in the water has increased to 7 inches, and he has noticed a black substance in the snow which he reported to TransAlta senior environmental engineer Mr. Phillip Vener. Mr. Zon asked whether stack emissions had been checked for mercury, and whether two independent checks done at the ash lagoon (1976 and 1977) resulted in published reports. He submitted an article from the Edmonton Journal entitled "Massive new emission cuts if lakes are to recover",[22] and read excerpts from the article.

[34] Dr. Allen reiterated that the potential for mercury loading had been partially addressed by examining fish tissues, and water samples, but that an analysis of metals in the lake sediments should also be done.

[35] Mr. Carmichael submitted that the devices for monitoring air quality in relation to stack emissions from the Wabamun plant are not properly located. Specifically, he stated that these devices, at locations east of the plant are mounted on the east side of "poles", which if true would shield the samples from emissions coming from the west where the plant is located.

4. Lake Level

[36] Mr. David Doull submitted that lake level was the major issue and that the Wabamun plant has caused reduced lake levels, making his beach a slimy and offensive mess. He said that this year was the first that his family had a pier out so that children could get out over the muck and slime, that low lake levels cause him higher maintenance, that many people have expressed a lack of desire to use the lake now, and that TransAlta should stop using the lake as a heat sink. He asked whether the Board could ensure that TransAlta would meet or surpass regulatory requirements. Mr. Doull stated that it is the weir that controls lake levels, and that if the weir had not been breached,

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[22] Exhibit # 10: Article in the Edmonton Journal dated October 7, 1997, "Massive new emission cuts a must if lakes are to recover".

none of the Appellants would be before the Board. He submitted that the lake level is linked to weed growth, and the ability of the lake to absorb thermal input. Mr. Doull read from TransAlta's "Sustainable Development Report", which states that TransAlta will meet or exceed regulatory requirements, and that they will work with communities and address stakeholder concerns.

[37] Mr. Carmichael added that the lake level directly affected many of the other issues to be addressed by the Board. He pointed out that "nothing has been volunteered" with respect to the lake level issue, and asked to question the government first about the lake level, in particular the 18 inch discrepancy. Mr. Carmichael submitted that it was the mandate of the task force to look at effects of the plant, and to develop a long range management plan. At the conclusion of the task force, TransAlta admitted to an 18 inch level drop in the lake level since it had last flowed over the earthen berm. Mr. Carmichael referred to a letter from the Department[23] that states the Department considers the lake level matter resolved.

[38] Mr. Zon added that the breach in the weir should be fixed, that TransAlta built its plant 18 inches too low, and that the historical benchmarks have been removed.

[39] Dr. Allan reiterated that water level is a key parameter to most of the concerns, and that the lake level goal is the long-term average level for the period that records have been kept. He stated that the lake level elevations do not make sense to him either. He said that if you tour around the lake, as he did recently, and observe the white substance (mixture of salts and corrosion) which reflects where lake levels were static, this high water mark is approximately 22 inches above the current water level.

5. Winter Ice

[40] Mr. Dwayne Zon stated that the ice does not freeze around the train trestle, that

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[23] Exhibit #11: Letter from Mr. Morley W. Barrett to Mr. Blair Carmichael dated September 24, 1997.

people enter onto the ice at the provincial park, see vehicles on the other side, and end up falling through the ice at the trestle area. He said this was a semi-regular occurrence, caused by thermal currents from the Wabamun plant. He stated the ice is 18 to 24 inches thick elsewhere.

[41] Mr. Chase added that last year, the Coal Point area experienced slush below the surface of the snow on the lake extending approximately a quarter of a mile out onto the lake. He stated that he will no longer cross the lake in winter due to safety concerns.

[42] Mr. Spilsted also expressed concern for the safety of his family.

6. Summary of Cross-Examination of Appellants

[43] When asked by the Department "what is your biggest problem with the Approval", Mr. Zon stated that these were weeds and lake level. In response to the Department's question "what does the Approval need to satisfy you regarding weeds", Mr. Zon responded that he wanted the weeds cut and extra water be returned to the lake. Mr. Carmichael noted that the focus should be on the weeds in Moonlight Bay and Kapasiwin Beach. When asked by the Department whether there was anything else the Approval needed, Mr. Carmichael added that oil and grease were an issue. The Department asked whether the Appellants were aware that there is background level of oil and grease. Mr. Carmichael said yes, that this was from motorboats, but that he did not know what that level was.

[44] The Appellants said that with respect to air emissions, they wanted tighter controls and accountability i.e., payment for particulate emissions. With respect to TransAlta adopting a closed cooling system, the Appellants said a closed cooling system would be good, but that 4.2.19 of the Approval was inadequate because 1999 is too late to still be planning. In response to the Department's question whether it would help the Appellants if the Board could make a general recommendation regarding the lake level, Mr. Carmichael said that the breach in the weir must be fixed in order to stabilize the lake level, and then a new higher level could be established. Mr.

Dwayne Zon added that the Board's decision should address TransAlta's manipulation of lake water levels, and that, if necessary, historical levels should be examined.

[45] In regard to heavy metals, the Appellants wished independent and spontaneous monitoring of water, sediments and fish (muscle and fatty tissues and maximum levels established).

[46] In response to the Board's request that the Appellants explain how they would solve the weed problem, Mr. Zon said that he wants the water level raised and for TransAlta to cut weeds closer to shore and in Moonlight Bay. He explained that the trestle is a problem in terms of altering the natural lake currents, resulting in a build up of weeds in Moonlight Bay.

[47] The Board asked about the practicality of weed cutting in Moonlight Bay, and the problem of floating rafts of vegetation in the Bay. Dr. Allen stated that weed cutting in the Bay is a good idea, and that construction of a new trestle might permit better circulation through the Bay.

[48] In response to the Board's question regarding whether the weir was controlling the lake level prior to the breach of 1982, Mr. Carmichael explained that it was and that prior to 1983, the plant was not operating at full capacity.

C. TransAlta Utilities Corporation

[49] TransAlta indicated in their opening comments that their direct evidence would address the pre-hearing decision and that their evidence would show that the thermal effects are localized, and that other aspects of the plant that potentially affect the larger area of the lake have been mitigated through the operation of the water treatment plant. TransAlta also proposed to lead evidence pertaining to the Agreement and the Golder risk assessment document.[24]

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[24] Golder Report, *supra* note 18.

1. Mr. John Watt

[50] Mr. John Watt, Manager, Business Generation, told the Board the TransAlta has operated in Alberta for 86 years. He said that TransAlta's policy applies the principles of risk assessment and sustainable development. He stated that TransAlta has not defaced benchmarks and that the level of the weir has no impact on TransAlta's operations. He added that TransAlta wants to be more involved in public consultation.

2. Mr. Dwayne Dychkowski

[51] Mr. Dychkowski, Plant Manager, Wabamun plant, has been the plant manager for one year. Prior to this, he was plant manager at Sundance (a sister plant also on the lake) and before that he held an engineering position. He has been employed by TransAlta for 17 years. Mr. Dychkowski stated in regard to allegations that the plant was built 18 inches too low: there has never been any record of flooding at the plant, that it is not possible for water to come up through the floor drains, that a head is not needed as the water is pumped out, and that the lake level does not affect operation of the plant. He added that the condenser tubes are stainless steel, and that he has no information regarding TransAlta torching and stamping benchmarks. Mr. Dychkowski stated that no chemicals are added to the cooling water, that the normal operating temperature of the thermal discharge (based on historical records) ranged from 11.9° to 15.6° Celsius, with peak temperatures of 21.5° to 29.4° Celsius. He said that the summer average discharge temperatures range from 24.7° to 26.7° Celsius, with peaks from 31.4° to 38.1° Celsius.

3. Mr. Fred Lindsay

[52] Mr. Lindsay addressed the lake level issue. He stated that he has been employed by TransAlta for 31 years, has been a resident in Wabamun for 48 years, has been involved in the weed harvesting program for 2 years, and that the weed harvesting program started in 1972. Mr. Lindsay also took part in the water level task force, as TransAlta's representative. He said that this task force met for 7 months. Mr. Lindsay stated that the report of the water level task force showed increased

evaporation to be an effect related to the Wabamun plant, and this impact was found to be 1.5 inches per year.[25] He explained that it is the policy of the mine to investigate complaints regarding groundwater problems, and to drill another well for complainants if necessary. He said that TransAlta had received no complaint from Mr. Zon regarding his well, and that TransAlta receives an average of only 6 complaints per year.

[53] Mr. Lindsay said that the lake level has historically fluctuated approximately 1 m, and that in the period of 1991-1995 the effect of the lake level reduction of 1 m was caused by TransAlta's operations (40%), and by drought (60%). He noted that Pigeon Lake also experienced similar fluctuations during this period.[26] Mr. Lindsay stated that the Wabamun Lake Task Group ("the Task Force") recommended surface runoff at the Highvale Mine be diverted toward the lake, and that a water treatment plant be constructed to pump water into the lake to mitigate TransAlta's

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[25] The Task Force Report, *infra* note 27 at p.11 contains the following table describing historic and average annual impacts of TransAlta's operations on lake level:

Historic Impact of TransAlta's Operations on Wabamun Lake (Jan. 1990-Dec. 1996)

Description of Impact	Volume *(million m^3)*	Equivalent Lake Level *(inches)*
1. Total impact, Jan 1990-Dec 1994	27.7	13.5
2. Overflow, Jan 1990-Jun 1992	(7.6)	(3.7)
3. Net impact, Jan 1990-Dec 1994	20.1	9.8
4. Estimated impact, Dec 1994-Dec 1996	18.7	9.1
5. Pit 02 North diversion	(1.2)	(0.6)
6. Sundance process water	(0.3)	(0.1)
7. **Total**	**(37.4)***	**18.2***

* Totals may not add due to rounding

Average Annual Impact of TransAlta Operations on Lake Level

Description of Impact	Volume *(million m^3)*	Equivalent Lake Level *(inches)*
1. Groundwater	0.80	0.4
2. Surface water	3.52	1.7
3. Reduction in direct precipitation to lake surface	0.37	0.2
4. Increased evaporation	3.16	1.5
5. Process and potable water	1.50	0.7
6. **Total**	**9.35**	**4.5**

[26] Exhibit #18: Graph - Historical Water Level 1972-1997, Wabamun Lake (ref: Water Survey of Canada 05DE002), Pigeon Lake (ref: Water Survey of Canada 05FA013).

effect on the lake level.[27] He stated that this mitigation scheme would take 2 to 7 years to replace the lost water, and that a separate Approval had been issued for the water treatment plant. Mr. Lindsay argued that the Appellants' claim that TransAlta had walked away from the Task Force is not supported by the minutes of the Task Force's January meeting.[28]

4. Mr. Mike Leaist

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27 Wabamun Lake Task Group: Recommendation Report, February 1996. Submitted to the Board in TransAlta Written Submission, dated October 2, 1997, Tab 2. [hereinafter the "Task Force Report"]

28 Exhibit #19: Minutes-Wabamun Lake Level Task Group Meeting, January 25, 1996.

[54] Mr. Leaist, Team Leader, Corporate Environmental Group, addressed air emissions issues. He stated he has been employed by TransAlta for 15 years, has been involved in regulatory reporting, and is involved in preparing TransAlta's "Coal to Kilowatts" flyer. Mr. Leaist said that he received complaints from other landowners regarding a substance in the snow. He stated that a metals profile of the particulates showed that the substance was not from coal dust, but was instead likely vehicle exhaust. Mr. Leaist argued that Mr. Zon's black substance could not have come from stack emissions because fly ash is grey, not black. Black dust would be more likely to be coal dust from the mining operation. However, if that were the cause, there would be a trail from the mine to Mr. Zon's property, and there was no evidence of a trail.[29]

[55] Regarding air emissions, Mr. Leaist said that opacity is measured by the visibility of the plume exiting the stack, and can be measured using a beam of light within the stack. He said that opacity requirements need to be relaxed during startup and shutdowns for fire reasons, that particulates are measured by stack survey contractors, and that particulates are essentially fly ash caused by the combustion of coal. Mr. Leaist stated that 70% of ash is emitted to the stacks (before removal) and 30% falls to the bottom. He said that particulates are grey, not black, and that there is a relationship between particulates and opacity. Basically, if there is a higher concentration of particulates, there is higher opacity, although flue gas temperature is also a factor. He stated that there were 36 startups and shutdowns in 1996 for the plant units, not the entire plant. He noted on average, stack emissions are half of the Approval limits.

[56] Mr. Leaist told the Board that TransAlta has spent 12.5 million dollars since 1988 on the replacement of equipment, in an attempt to improve its emissions. He explained that monitoring stations measure dust fall, dust fall is higher in the summer than in the winter, and that the amount of deposition would be .46 cm over 40 years meaning that the accumulation in one year would be slight. He stated the monitors are located on the pole side facing the plant.

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[29] The Board notes that there was no evidence about the presence or absence of such a trail presented at the hearing.

[57] With regard to heavy metals, Mr. Leaist stated that these are emitted from the plant (including chromium, cadmium, selenium, and copper). He said that 10 kg of mercury and 20 kg of lead per year are emitted from the stacks, and that there are currently no Canadian air quality standards for emissions of these substances.

5. Mr. David Fernet

[58] Mr. Fernet was responsible for the Golder Report fisheries review. He stated that the studies done on the lake show that the Whitefish population is good and of export quality, and that the lake supports an excellent winter fishery. He said that perch populations have declined, but that perch would actually prefer warmer water along with pike, who also require weedy bays. He noted that cooling water may have a small impact on pike spawning, particularly within 100 m of the outlet, and also on whitefish. Mr. Fernet stated that the anecdotal fish kills of 1996 and 1997 may be associated with gas supersaturation and/or thermal shock. A temperature related gas supersaturation problem was found in the canal**,** whereby heating of saturated cold water caused supersaturation. He said that a one-month 1997 monitoring program showed evidence of gas bubble disease. He told the Board that TransAlta had developed a plan for constructing a fence at the beginning of the canal to prevent fish access to the canal, and for installing aerators in the canal. Mr. Leaist stated that the 1973 fish kill at the lake was related to thermal shock caused when the plant was shutdown and the water temperature dropped rapidly from 24 degrees to 5 degrees. He stated that the studies he reviewed suggested that no fish species would be lost from the lake due to its increased temperature or decreased dissolved oxygen.

6. Dr. Stella Swanson

[59] Dr. Stella Swanson, Golder Associates Ltd., addressed the thermal input issue for TransAlta. Dr. Swanson stated she has been an aquatic biologist since 1981, she is in charge of the risk assessment approach taken in the Golder Report, and that this approach provides a good framework for organizing thoughts. She described how the information used in the Golder Report

for lake temperature and plume modeling, was obtained from the 1974-1978 Beak Report and the 1980-1993 information from AGRA. For lake levels, she used the Reid Crowther report; for water quality and sediments, she used a variety of literature sources. For weeds, she used TransAlta's weed harvest data since 1973, and 1961-1995 references. For fish, she used commercial fishing records and recreational fishing information.

[60] In regard to weeds, Dr. Swanson stated that light penetration, substrate characteristics, and exposure to waves control where weeds grow. She said that the TransAlta plant is the source of three other stressors, namely, temperature, nutrients, and lake level. She explained that thermal discharge enters the lake, and in the first 90 m the heated water spreads out into the lake**,** where it loses approximately one-third of its heat to the atmosphere, and approximately two-thirds of its heat to the lake through mixing with the ambient water. But she stated that the entire lake is not heated because the thermal influence extends only 1000 m into the lake. Dr. Swanson noted that the last lake wide survey of weeds was conducted in the 1970's, and that there is no recent data for the whole lake.

[61] Dr. Swanson stated that there is a need to continue to investigate a solution to maintaining the health of the lake ecosystem. She said that those Appellants most affected by weed growth are those in Kapasiwin Bay and Point Alison.

[62] Mr. Lindsay added with respect to the weed issue, that TransAlta received approval from the ERCB in 1971 to harvest weeds. The current Approval now requires an enhanced weed harvest program. He submitted to the Board, the June 1997 weed harvesting program,[30] and explained that TransAlta can cut weeds down to a depth of 5 feet, that TransAlta has harvested weeds every year since 1972, and *did* harvest weeds in Moonlight Bay in 1973.

[63] Dr. Swanson addressed the impact of the lake level on weed growth, and explained

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30 Exhibit # 23: Wabamun Lake Aquatic Weed Harvesting Proposal dated June, 1997.

that increased weed growth is related to the temperature plume, and not really the lake level. She said that Moonlight Bay is excellent habitat for weed growth because of its muddy substrate and the shallow nature of the Bay. Dr. Swanson said that even if there was no power plant on the lake, there would still be weeds, as Wabamun Lake is a typical prairie lake. She stated that phosphorus is the limiting nutrient in the lake, and that the main source of phosphorus is the sediment. She said that phosphorus is a concern, but emissions from the ash lagoon are only 5% of the total phosphorus sources and the weeds already have more than enough available to them in the sediments. Dr. Swanson added that the natural levels of phosphorus in the lake have not changed in the last 1000 years, nor in the last 20 years.

[64] With respect to heavy metals and loading, Dr. Swanson stated that the ash lagoon is the main TransAlta source. She stated that water in the ash lagoon has a lower concentration of heavy metals than that already in the lake, with the exception of zinc and manganese. She stated that the effluent from the ash lagoon has not changed the quality of water in the lake. Bioassay testing for acute toxicity done for the period 1991-1996 apparently showed 100% survival when exposed to full strength effluent from ash lagoon.

[65] Regarding the potential for PCBs in Lake Wabamun fish, Dr. Swanson stated that the Alberta Environmental Centre (Vegreville) tested in 1982, and found that PCB concentrations were below consumption guidelines and below those from fish in the Great Lakes.

[66] Dr. Swanson stated that a sediment analysis conducted on September 25, 1997 showed that metal concentrations in the lake seem related to particle size and organic content in lake sediment. She stated that there was no pattern of metals downwind of the plant to implicate the plant as a source.

[67] With respect to allegations of increased swimmer's itch, Dr. Swanson stated that she found no unusually high incidence of itch reported from the lake. She noted that while there were more snails that carry parasites in the area of discharge, these parasites only affect waterfowl.

[68] In regard to ice cover, Dr. Swanson stated that Kapasiwin Bay would have earlier open water, and that the main environmental effect of open water is that the weeds get a headstart in spring. She said that waterfowl are attracted to the lake by the open water, and that overwintering waterfowl have more chances to contract parasites.

[69] Dr. Swanson explained that public consultation is integral to the risk assessment process, in order to obtain an understanding of "acceptable impact" and "optimal balance to achieve proper mitigation". She said that TransAlta will be establishing a public advisory group and will have them appoint a third party expert. The time frame for releasing the report will be September 30, 1999. Dr. Swanson stated that the first phase will involve public consultation and problem formulation, the collection of weed data for Moonlight Bay, and measurements of the lake and modeling experiments over four seasons. Next, a risk characterization and consultation will have to be undertaken to determine the impacts and their acceptability.

[70] Mr. Watt addressed emissions trading and supported the concept under certain conditions. He added that the Wabamun plant operated at full capacity in 1975, and that the decision to generate power from the plant is economic, based on supply and demand. He said that there have been a number of cooling options identified, including: cooling towers, water mixing, wetlands, and aeration. However, he stated that TransAlta needs to determine what the public wants. Mr. Watt also explained that the electrical industry is undergoing deregulation, and that the end of the current projected life of the Wabamun plant is 2003. Before that time, an economic evaluation will be done to determine whether the plant will be decommissioned, or will continue to operate. He stated that TransAlta should know whether the plant will continue by September 1999.

7. Summary of Cross-examination of TransAlta Panel

[71] In response to a question from Mr. Kravinchuk regarding whether TransAlta would be prepared to be involved in an independent survey to resolve the issue of the 18 inch discrepancy in

benchmark levels, TransAlta stated that while they believed they had already participated once in such a study, they would be prepared to do so again.[31]

[72] A considerable amount of time was spent in cross-examination on the issue of the difference, if any, between fly ash and "soot". TransAlta took the position that Mr. Zon's claim regarding a black substance (he described as "soot") found layered in the snow on his property, could not be attributed to the plant because the matter emitted from the stacks is fly ash, which is grey in colour. Six bottles of fly ash were submitted to the Board.[32]

[73] In response to questions posed by counsel for Mr. Zon regarding the health impacts associated with the emission of fly ash, TransAlta stated that no analysis of health impacts had been done but that TransAlta was monitoring the scientific literature.

[74] In response to questions from the Board regarding whether there was any reason TransAlta could not harvest weeds in Moonlight Bay, TransAlta said there was no reason why they could not - excepting perhaps fish habitat. TransAlta said that it believes, based on the information present, that the present program is addressing the "effects" from the thermal plume.

[75] The Board asked TransAlta whether there were people on the lake who did not want a higher water level. TransAlta stated that there are people who accept the current level, but that it is fair to say that most would like *a higher level*, although how much more is not clear and depends on the height of each property owner's lot. In response to the Board's question regarding any environmental impacts associated with higher water levels, Dr. Swanson stated that higher levels simply shift the zone of weeds up the bank, though she anticipated no problems for fish or birds with higher levels.

[76] In response to the Board's questions regarding mercury and PCB monitoring, Dr.

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31 Cross-examination of TransAlta, Oct. 8, 1997.

32 Exhibit #46: The Board notes that the colours of fly ash were different between the samples.

Swanson stated that the outlet canal water is not monitored, but that the Food Inspection Branch, Health Canada, looks at the level of these contaminants in fish because there is a commercial fishery. Mr. Leaist added that in regard to the wastewater characterization done in 1991, that PCBs were monitored and that he could recall nothing found that would change routine monitoring procedures. Dr. Swanson said that with mercury, TransAlta sees no problem and that Lake Wabamun is actually an example of a low mercury lake.

[77] In response to the Board's questions regarding human safety concerns associated with open water during the winter months, Mr. Lindsay stated that approximately two people in the past 20 years have fallen into this open water and were killed. He added that the yearly average for vehicles falling through the ice is likely 2 to 3 vehicles/year. Mr. Lindsay personally knows of at least 2 or 3 snowmobiles that have fallen in. Regarding these tragedies, he stated that these mishaps all occurred within the area of influence from thermal pollution, that the drownings occurred near the canal, and that the 2 or 3 snowmobiles drove into open water near Point Alison during snowstorms.

[78] In response to the Board's questions regarding the relationship between increased temperatures and increased weed growth in the lake, Dr. Swanson stated that yes, there has been increased weed growth in Kapasiwin Bay. She explained that although light is a very important factor in weed growth, the increased temperature in the Bay seems to be the main cause for increased weed growth.

[79] The Board asked TransAlta whether the study currently scheduled for reporting in 1999 could be accelerated without causing a decrease in quality. Dr. Swanson stated that TransAlta is already squeezed for time, for various public consultation reasons.

[80] In response to the Board's questions regarding how TransAlta determined the length of time it required to address the impacts of deregulation and limitations on investment, Mr. Watt stated that it was more of a good guess as to the period of time necessary to make changes. He said that TransAlta would have more information available to it in 3 years and a more precise knowledge

of cost and true impact on the lake system, and a better idea of the risks. Dr. Swanson added that the issues associated with weed growth and thermal pollution require more time to do seasonal studies on weeds. She said that a field season in 1998, and maybe 1999 would be required to address the uncertainty in this area.

[81] The Board asked TransAlta why it would wait, knowing that the majority of people have a big problem with weeds. The Board also wanted an explanation of how the Appellants could prove with 95% certainty that the thermal pollution is linked to the increased weed growth, in the absence of a panel of aquatic scientists and unlimited resources. Dr. Swanson replied that, in the case of Moonlight Bay, common sense dictates that a decrease in lake level increases weeds. But, she added, the question of what is really controlling the ecosystem (including the lake level) has still not been answered.

[82] In response to a series of questions from the Board concerning TransAlta's submission that phosphorus is a limiting nutrient in the lake, but that a six-fold increase, referring to an earlier Approval, would still cause no problems, Dr. Swanson stated that phosphorus is of lesser abundance than nitrogen, but there is no shortage of phosphorous and that even a 6 fold increase in discharge would cause no increase in weed growth. She made the comparison to adding another bag of fertilizer on an already fertilized lawn, to say that there is "no effect". The Board pressed Dr. Swanson on the possible effects a six-fold increase in phosphorus might have on algae. She replied that the weeds keep the algae populations down, that shifts in algal populations have not been observed in Lake Wabamun, and that adding substantially more phosphorus would not cause a water quality problem. In response to the Board's concern that Dr. Swanson's message would make people think it acceptable to add more phosphorus to a lake, Dr. Swanson responded that it depends on the phosphorus content already in the lake.

[83] The Board asked Dr. Swanson to explain how she is proposing to design a study to understand the impact of TransAlta on weed growth. Dr. Swanson said she needs to understand how much increase in temperature is necessary to see an increase in weed growth (dose response), and to

confirm initial conclusions that other issues related to water quality such as metals are not relevant, and then to prioritize these issues. She added she would also likely look at the water level - weed issue, do some laboratory studies and lake studies, set up reference transects, and compare nearby lakes.

[84] The Board asked Dr. Swanson to further explain the region of temperature influence as set forth in the Golder Report.[33] Dr. Swanson stated that the weed harvesting corresponds generally with the thermal impact area identified in this report. But she stated that she was not very sure about the extent of the region of thermal influence (the orange area in the figures), particularly at the mouth of Moonlight Bay, because of the limited data currently available. She clarified that Figure 5 of page 5 of the TransAlta's submission (Summary - Golder Report) was an estimate of the boundary of the 3^{o}C elevation of water temperature, while Figure 11 of page 15 showed the boundaries of the weed harvesting program. She acknowledged that these figures could not be taken as precise boundaries of the TransAlta thermal impact on weed growth. (The Board agrees.)

[85] With respect to Moonlight Bay, the Board asked Dr. Swanson for further clarification of her overall analysis that water depth has little to do with weed growth. Dr. Swanson stated that the total width of weed growth shifts with changes in water depth, but that light penetration is the key factor. In response to the Board's concern that a different argument was made in the hearing,[34] Dr. Swanson replied that the shape of a lake bottom plays a role. She agreed that the figures submitted would be relevant where the lake bottom appeared like the figure (i.e. relatively slow increase in depth), but she maintained that much of the shoreline of Lake Wabamun drops off rapidly so the effect illustrated in the figure would not apply. However, she had previously noted the Moonlight Bay is shallow throughout.

[86] The Board asked TransAlta why it would want a 70 kg/*day* limit on oil and grease in ash lagoon effluent rather than a maximum exceedance amount, given that there is no ongoing source

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[33] See Figure 5 at page 5, and Figure 11 at page 15 of the Summary-Golder Report, *supra* note 18.

[34] Written Submission of Blair Carmichael, *supra* note 16 at Tab 9, Exhibit G.

of oil and grease (only the possibility of an oil leak inadvertently entering the plant drains which drain into the lagoon). Mr. Dychkowski responded that this was a fair statement and that he had no answer.

[87] In response to the Board's questions regarding whether, in reaching her conclusions on fish consumption confidences in light of PCBs and metals, different consumption styles are accounted for, Dr. Swanson said that, yes, these styles were taken into account (including consumption of all organs and fat). She added that Health Canada takes a conservative view regarding consumption, including considering the manner in which fish are prepared, and the consumption of internal organs. She stated that Wabamun Lake is not listed anywhere in the Alberta Sports Fishing Guide, in terms of consumption advisories.

D. The Department

[88] The Director called a panel[35] to show that the Approval as issued was reasonable and should be maintained subject to the Agreement entered into between the Director, TransAlta, the Summer Village of Point Alison and Ms. Gwen Bailey and the Summer Village of Kapasiwin and Ms. Donna Thomas.

1. Mr. David Spink

[89] Mr. Spink, Director of Air and Water Approvals Division, stated by way of background, that his division had discussions early on with TransAlta and the Water Resources division in anticipation of the water level issue being raised as part of the Approval. Mr. Spink felt the lake level issue needed to be addressed and he extended the Approval by 1 year, to allow the proper parties time to deal with the lake level issue. Obviously, he said, the lake level issue was not

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[35] The witnesses called included Clement Ng (water chemistry), Randy Dobko (air quality), Ernie Hui (jurisdiction over lake level and amendments to license) and David Spink (granting of approval and thermal impacts).

resolved, and in May, 1996, an Approval was issued for TransAlta to build a sister water treatment plant to offset its impact on lake water levels.

[90] Mr. Spink described the 1996 meetings held to discuss TransAlta's activities at the lake, where it was clear that TransAlta's cooling water was a major issue. He said that a range of views were expressed at this meeting: from "get TransAlta off the lake now, or do something if it continues to operate" to "do something about the weeds." When his division received TransAlta's November 1996 renewal application, he said he looked at what could be done to address these issues through the water issues associated with this Approval.

[91] Mr. Spink described the factors considered by his division in issuing TransAlta's Approval: environmental impacts that need to be addressed by modifying the Approval; the cost of these new requirements; the benefits associated with these requirements; the numerical differences between the old and new requirements; and, whether there will be some opportunity available to facilitate the incorporation of new requirements if, for example, there will be an expansion in the near future for the facility.

[92] Mr. Spink stated that with respect to the Wabamun Approval, he decided that the division would go with the cooling water report and control plan (clause 4.2.19), because: of the deregulation concerns expressed by TransAlta; the impacts from cooling water have existed for a long time, and that these impacts have been aggravated recently by drought; the cost of controls (based on the information received) did not appear to reveal any inexpensive quick-fixes; the need for a report to revisit all alternatives and their associated impacts; he expected a renewal application from TransAlta within 2 years; and, he felt that September 30, 1999, gave TransAlta adequate time to submit a report and control plan, based on public consultation and based on TransAlta being in a better position in terms of knowing the impacts of deregulation on its operations.

[93] With respect to the weed issue, Mr. Spink, said that he addressed this issue in clauses 4.2.22 through 4.2.25. He agreed that the AEUB approval also addressed the weed issue, but he

believed this was also an environmental impact associated with the operation, that there were public concerns, and that his division should therefore address the issue in the Approval.[36] He added that weed harvesting is a secondary impact control measure.

[94] With respect to the interrelationship between lake level and aquatic weed concerns, the Director submitted[37]:

> "Recent low and historic minimum water levels (1995) have magnified the impact of weeds on the aesthetic and recreational uses of the lake. A plan to offset TransAlta's impact on lake levels was developed and implemented. The weed problems, however, resulted in a renewed public focus on TransAlta's once-through cooling water and at a Public Meeting in early 1996, a large group of cottage owners indicated that this would be an issue when TransAlta renewed its Environmental Protection and Enhancement Act (EPEA) approval for the Wabamun facility. This was the case and 50 Statements of Concern (SOC) and 12 Notices of Objection (NOC) were received regarding the EPEA approval renewal for the plant.
>
> In the SOCs and NOCs the lake level issue was often intertwined with the thermal discharge issue although for approval renewal purposes the issues are considered separate. Only the thermal discharge issue is considered an EPEA approval renewal issue."

[95] The Director submitted that the cooling water issue was dealt with directly in clauses 4.2.12 and 4.2.19-21 in the TransAlta Wabamun Approval renewal and indirectly in clauses 4.2.22-25. The Director submitted with regard to the development of a cooling water control plan,[38] that:

> "The major set of clauses dealing with the cooling water issue specify requirements for the preparation of a plan to eliminate or reduce the impact of thermal inputs into the lake. ... The

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36 The Director also submitted in his written submission, dated October 2, 1997, that:

> "The discharge of warm water into the lake is connected with the issues of aquatic weeds and winter ice. Approval Number 10323-01-00 established a cap on the temperature differential between inlet and outlet water, increased weed harvesting and required development of a thermal impact reduction or elimination program."

37 *Ibid*. at p.6.

38 *Ibid*. at p.7.

> target or goal for any option that reduces, as opposed to eliminates, impacts, is to meet the Alberta Ambient Surface Water Quality Interim Guidelines (AASWQIG) at the point of cooling water input. The guideline limit is that ambient water temperature not be increased by more than 3°C except possibly in areas in close proximity to the release. It has, however, been indicated that an environmentally attractive option with a greater temperature difference than 3°C would be considered."

[96] The Director also submitted that the second issue directly related to cooling water releases dealt with in the Approval is the establishment of an 11°C temperature difference between inlet and outlet based on an annual average. The purpose of this limit was to put a "cap" on thermal inputs which had gradually been increasing since 1991. It was viewed as an interim measure to ensure thermal inputs did not increase, and not as an impact reduction measure. He submitted that this requirement takes effect in January 1998, and that based on temperature data for the last two years, TransAlta would have to monitor its operation carefully to ensure compliance with this requirement.

[97] The third issue dealt with by the Director in the renewal Approval that related indirectly to cooling water releases was the requirement to provide an enhanced weed harvesting program proposal and, upon acceptance, to implement the plan. The Director explained that the AEUB approval for the Wabamun plant has specific requirements related to weed harvesting and that the previous EPEA approval had no clause related to weed harvesting. Based, however, on the public concerns raised and the environmental intervention nature of the harvesting, it was not considered inappropriate for these weed harvesting related clauses to be included in the renewed Approval.[39] He submitted that a plan for an enhanced weed harvesting program was received prior to the June 30, 1997 submission date requirement in the Approval, and that the plan has been reviewed and is acceptable to the Director.

[98] With respect to control options to deal with cooling water, the Director submitted that a request for a closed loop cooling water system in effect translates to a request for installation of

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[39] *Ibid*. at p.8.

cooling towers and/or cooling ponds. He stated that these types of facilities can have undesirable impacts, (e.g. noise, fogging, aesthetics, etc.) on those living close to such facilities. Therefore, in his view, the reasonable approach is to examine and evaluate all possible options with all affected stakeholders before a decision is made on the best method of controlling cooling water releases. The Director disagreed with the Appellants assertions that cooling water release options have been studied *ad infinitum*. He stated that aeration and wetlands are two control options that were not reviewed at the 1980 ERCB hearing and which appear to have some advantages. The Director submitted that these options should be evaluated relative to previously identified options such as cooling towers and ponds. The Director added that:

> "The time period specified in the approval (or at least in the Resolution Agreement) for this evaluation is considered appropriate based on the 3 year term of the approval following which it is expected that a decision will have been made by TransAlta on the long term future of the plant. The Director submits that it appears that the implementation of the control plan would then be part of the next approval renewal if the plant is going to continue to operate."[40]

[99] With respect to ambient temperature monitoring requirements, the Director noted that the previous Approval and this renewal contain no ambient monitoring requirements (unless the cooling water inlet channel temperature monitoring is considered ambient monitoring). He added that the Appellants could request further monitoring.

[100] The Director submitted that his decision to issue the Approval renewal was reasonable. He stated in his written submission:[41]

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40 Director's Closing Argument, dated November 5, 1997 at p.4.

41 Director's Written Submission, *supra* note 36 at p.13.

"In sum, the public issue regarding the cooling water releases from the Wabamun Power Plant is largely related to associated impacts on weed growth. A review of the literature on weed growth in the lake would indicate that the impact of cooling water is very localized and not a major factor in the overall extent of weed growth in the Kapasiwin Bay area. The absence of noted significant environmental impacts associated with the cooling water releases,[42] combined with the uncertain future of the facility and the significant cost of eliminating the release, make it difficult to justify requiring any immediate major control actions. However, the release is not consistent with current guidelines for cooling water releases. Therefore, if a long term operating approval is requested for the facility at the time the current approval expires, then a plan for eliminating or reducing the impact of cooling releases from the plant will be required. In the interim, the current approval requires ongoing weed harvesting to mitigate the impact the cooling water has on weed growth and associated nuisances."

2. Mr. Ernie Hui

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[42] *Ibid*. at p.10, wherein the Director summarized the following key findings and conclusions of the Golder Report with respect to the impacts of the cooling water releases from the Wabamun power plant:

- approximately 5% of the surface area of lake and 1% of lake volume is affected by the cooling water plume if 3^{o}C is used as no effect level;
- open water in winter, as a result of cooling water releases, ranges from 1.5 to 7% but can go higher;
- 2/3 of heat from thermal release is transferred to water and 1/3 to the atmosphere;
- factors affecting plant growth are light, temperature, nutrients, waves and sediment type but temperature, nutrients and water level do not appear to be major factors in the case of Lake Wabamun;
- cooling water releases appear to impact aquatic species variation and biomass production but not the aerial extent or density of plants;
- cooling water may have a small impact on pike spawning (within 100 m of outlet channel);
- possible fish mortalities associated with cooling water are being investigated and may be due to supersaturation of gas when cooling water mixes with lake water (called gas bubble disease);
- may be an issue with higher parasitic levels in birds frequenting cooling discharge areas due to higher number of snails in the plume which carry parasitic organisms;
- some waterfowl that would normally migrate over winter in the open water area of the lake.

[101] Ernie Hui, Controller of Water Resources, testified about jurisdiction over lake level, diversion of water by TransAlta, and the amendment to TransAlta's licence to provide for the diversion of water from the North Saskatchewan River into Wabamun Lake to mitigate evaporation losses attributable to thermal discharge into the lake. In his written submission, Mr. Hui outlined his position to be in accord with the section 87 jurisdictional Decision of the Board in that the historic level of the lake and the level that the lake should be at are not relevant to the appeal. (The relevant issue, of course, is the interplay between lake levels and environmental impacts on the lake caused by TransAlta.) Mr. Hui offered to provide an historic review, if necessary, at the hearing.

[102] Mr. Hui explained that the Department requested TransAlta conduct a study of its operations at Wabamun Lake to determine the impact of TransAlta operations. From the study done for TransAlta, the conclusions were that TransAlta *did* have an impact on the lake. Based on this study, and TransAlta's public consultation process, the Controller amended TransAlta's existing 1984 Water Resources licence to divert water from the North Saskatchewan River to account for the additional water diversion into Wabamun Lake.

[103] The amendment to TransAlta's license includes conditions that require TransAlta to discharge volumes of water into Wabamun Lake and once the elevation reaches 724.55 m, to submit a plan to the Controller on how TransAlta will maintain the elevation as specified in the amendment conditions. Mr. Hui submitted that the direction of the Minister on the issue of lake level elevation in Wabamun Lake is clearly enunciated in a Ministerial letter dated March 18, 1996;[43] that the most appropriate level at this time is 724.55 m and that is what the existing "weir" is operating at now. Further, once the elevation is reached, the Minister by his letter has directed that staff review the elevation in relation to effects. Mr. Hui submitted that the Minister has recently confirmed that once the elevation reaches 724.55 m the issue of the appropriate lake level will be reviewed.[44]

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[43] *Ibid*. at Appendix H.

[44] Mr. Hui submitted that the effective lake level has been below 724.55 m since 1992.

3. Mr. Clement Ng

[104] Mr. Clement Ng and the Director testified in relation to the ash lagoon wastewater release and once through cooling water quality. In their written submission, Mr. Ng and the Director explained the factual background related to the need for cooling water and the ash lagoon. They also summarized the related approval requirements, and past performance relative to these requirements, and stated:[45]

> "In sum, measurements of the discharge into Lake Wabamun from TransAlta's ash lagoon indicate a very good record in complying with their approval's limits. Contaminant loading into the lake has been reduced significantly since the 1977 lagoon was built and the bottom ash handling system was modified. Bioassay tests in the past consistently indicated that discharge from the ash lagoon to be non-toxic; therefore, bioassay testing of this release has been reduced from 4 times per year to once per year on the basis that toxicity is not expected. Although some metals are higher than those specified in Alberta Ambient Surface Water Quality Guideline, but (sic) are considered within acceptable levels."

[105] He noted that recent sampling of the inlet and outlet water for heavy metals indicated no change between inlet and outlet waters.

[106] The Director also stated that he is advised that fish sampling in 1980's for PCBs, pesticides and metals did not disclose contamination problems that affect the quality of fish. The current sampling focuses on mercury and no problems have been indicated.

4. Mr. Randy Dobko

[107] Mr. Randy Dobko testified with respect to the control of air contaminant emissions. He stated that generally, coal combustion is the primary air impact associated with the Wabamun

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[45] Director's Written Submission, *supra* note 36 at p.19.

power plant, but that there are other impacts associated with coal hauling, crushing and storage and ash disposal. He outlined the basis of emission control strategies with respect to air contaminants produced from coal combustion, the approval requirement/limits for each air emission source, the performance relative to these requirements, and the ambient monitoring requirements and results. Mr. Dobko submitted that generally, particulate emissions have been decreasing due to ongoing initiatives by TransAlta such as chemical conditioning of flue gas, installation of modern controllers, improved maintenance and operations of precipitators and/or baghouses.

[108] He noted that the Department had received no complaints on particulate deposition. In his opinion, any problems are related to surface activities - not stack emissions.

[109] In summary, the Director believes the Approval is sound except with the thermal input issue. With regard to the latter, he added that he was not in a position to "do otherwise". The Director stated that it was his fervent hope that when he receives TransAlta's renewal, that an action plan will address the thermal input issue.

5. Cross-examination of the Director and Department Panel

[110] Mr. Ferner, counsel for TransAlta, questioned the Director on the issue of the 3°C thermal input benchmark, and specifically on whether the Department recognizes a mixing zone where the guideline could not apply. The Director replied that for any options that continue to have thermal input, the Department wants a 3°C delta T at the point of release, and that the Department has communicated this verbally to TransAlta.

[111] In response to TransAlta's question whether it is helpful to have chronic toxicity information, as opposed to acute toxicity information, the Director responded that chronic toxicity tests can reveal impacts that are non-lethal in the short term. The Director added that having this kind of data could bring closure to concerns regarding potential chronic effects of some metals being released in the ash lagoon effluent.

[112] TransAlta asked Mr. Dobko whether Alberta Environmental Protection has developed a policy to deal with the air emissions issues related to PM_{10} and $PM_{2.5}$, and whether it was premature for the Department to put conditions on licenses related to PM_{10} and $PM_{2.5}$. Mr. Dobko responded that the Department is one stakeholder in the Canadian Council of Ministers of the Environment (CCME) process, that the Department is actively involved and is trying to be pro-active and consistent with the scientific documents put forth by Environment Canada.

[113] Mr. Secord, on behalf of Mr. Nick Zon, questioned the Director on the process he followed in approving TransAlta's application. In response to specific questions from Mr. Secord as to how the Director could find TransAlta's application "complete" before receiving a response from TransAlta to a lengthy letter from Mr. Ng that had asked TransAlta for further information and explanation on a number of matters, the Director explained that there is a difference between what is "administratively complete" and what it "technically complete". In other words, for the purposes of an application being administratively complete, the Director asks whether there is sufficient information in the application to allow a stakeholder to get a clear sense of what a company proposes to do.

[114] Mr. Secord referred to section 3(1)(k) of the Approvals and Registration Procedure Regulation[46] which states:

> 3(1) an application must be made to the Director and must be accompanied by the following information relative to the activity, the change to the activity or the proposed amendment, addition or deletion of the term or condition:
>
> ...
>
> (k) the justification for the release of substances into the environment as a result of the activity, the change to the activity or the amendment, addition or deletion, as the case may be; ...

[115] He asked the Director why this requirement was inapplicable to TransAlta, given that

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[46] AR 113/93 as amended.

the Wabamun plant emits 1700 tons of fly ash into the atmosphere, and uses Lake Wabamun for its thermal cooling water. The Director responded that he believes that this requirement is addressed in TransAlta's application, because the application explains where the emissions are generated, how they are controlled, and "ergo", why TransAlta needs to be able to release resultant emissions into the environment.

[116] Mr. Secord referred to Mr. Ng's deficiency letter of January 10, 1997, to note that it states thermal pollution in the lake is a major concern. The Director responded that thermal pollution is a major concern because "we" have a guideline (3°C) for these particular kinds of releases, and the Wabamun plant represents a situation where there is *non-compliance* with the guideline.[47]

[117] Mr. Secord asked the Director whether he considered that TransAlta could ask the AEUB to bring into its rate base solutions to the issue of using Lake Wabamun as its cooling mechanism. The Director responded that this was not a large consideration, but that it was raised at least two times in the course of the approvals process.

[118] Mr. Secord questioned Mr. Ng on the administrative process followed in approving TransAlta's application. He asked where the "paper trail" was to show the Board how the Department dealt with TransAlta's Approval. Mr. Ng stated that he had no paper trail. In response to a series of questions from Mr. Secord related to the specific dates that the Department received letters from TransAlta, and the Golder Report, the Director could provide no record of exact dates. The Director could provide no written evidence of a critique done by the Department. He explained, however, that it is the Departments approach to ask people to verbally let him know if they took exception to anything in the report. Mr. Ng did recall Ms. Pat Mitchell and Mr. Mike Sullivan

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[47] Mr. Secord asked the Director to explain to whom he refers when he uses the term "we". The Director responded that he uses it, in these circumstances, to include TransAlta. He views himself as independent from TransAlta, yet recognizes "our" approach to dealing with all stakeholders is to deal cooperatively. He added that he recognizes that the decision is "ours" when it comes to regulating.

stating that they had no problem with the Golder report. The Director personally reviewed the Golder Report and did not identify any weaknesses in it. He stated that he recalls receiving the report two or three weeks before signing the Approval.

[119] Mr. Secord questioned the Director on the plausibility of setting emissions charges. In other words, Mr. Secord asked whether there was anything wrong in principle with letting TransAlta pay for polluting Lake Wabamun. The Director responded that he was not sure the legislation allowed him to do so,[48] although he recognized that it is a regulatory approach that has been used in the Netherlands. The Board notes that in November 1996, a Final Report entitled A Fresh Look at Economic Instruments was prepared for the Canadian Council of Ministers of the Environment, encouraging economic instruments in regulatory reform initiatives and referencing evidence of the efficiency of economic instruments.

[120] The Board asked the Director whether he had any thoughts with regard to human safety issues raised in relation to winter ice problems around the thermal outflow. The Director said

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[48] Note that the Act does allow for this concept. One of the purposes set forth in section 2 of the Act states:

> 2 The purpose of this Act is to support and promote the protection, enhancement and wise use of the environment while recognizing the following:
> ...
> (i) the responsibility of polluters to pay for the costs of their actions;

Section 13 of the Act states:

> 13 The Minister may, in accordance with the regulations, establish programs and other measures for the use of economic and financial instruments and market-based approaches, including without limitation
>
> (a) emissions trading,
> (b) incentives,
> (c) subsidies,
> (d) emission, effluent and waste disposal fees, and
> (e) differential levies,
>
> for the purposes of protecting the environment, achieving environmental quality goals in a cost effective manner and providing methods of financing programs and other measures for environmental purposes.

it does present some difficulties, and that his Department would look at it further, and that the Board may wish to make a recommendation to the Minister in this regard.

[121] The Board asked the Director whether, given what he had heard in the course of the hearing, he had any other thoughts on how the Approval could be improved to address the new information raised at the hearing. The Director responded by saying that in retrospect, and knowing what he knows today, he would have required: some monitoring of the inlet and outlet canal water; some chronic toxicity monitoring on the ash lagoon waste water release; and perhaps been more specific in terms of those clauses that relate to the control plan, in terms of citing the 3°C delta T Guideline as a general target against which options are considered and evaluated. In his closing written argument, the Director provided the Board with specific recommendations in this regard.[49]

III. THE ISSUES AND THEIR CONSIDERATION

A. Lake Level, Weeds and Thermal Input

[122] The two issues of primary concern to most, if not all, of the Appellants involved in this appeal related to TransAlta's impacts on the lake level and aquatic weed concentrations in Lake Wabamun. During direct oral submissions, under cross-examination by the Department, and in written argument, the Appellants expressed that, essentially, they would not be "here today" if the lake levels were higher. Several of the Appellants have been involved in trying to address the lake level issue for a considerable period of years, have utilized a number of administrative and advocacy avenues, and are, understandably, frustrated by a perceived unresponsiveness to their concerns. The Appellants identified that one of the main issues they want dealt with, is the breach in the weir on Wabamun Creek.

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[49] Director's Closing Argument, *supra* note 40 at p. 9.

[123] During the course of the hearing, the Board heard argument from the Appellants that impacts on aquatic weeds and the lake level from TransAlta's thermal input are likely greater than any studies have determined, because: (1) of very low lake levels during the past 5 year period; (2) the Wabamun plant has been operating at higher capacity than during the period the Beak study was undertaken; and, (3) there has been a steady increase in the temperature of the outfall water (noted by the Director and TransAlta). The Board received from the Appellants and accepts as factual the numerous photos and accounts of increased weed biomass and distribution during the period of low water levels.

[124] In addition to evidence given by the Appellants, TransAlta admitted that impacts of thermal pollution "accumulate" in situations of low water level, that temperature is the main factor causing an increase in the biomass of aquatic plants in Kapasiwin Bay, that those most affected by weed growth own land along Kapasiwin Bay and Point Alison, that it is common sense that low water is causing an increase in aquatic plant growth in Moonlight Bay, and that TransAlta's activities account for an average annual decrease in lake level of 1.5 inches due to enhanced evaporation.[50] In addition, it became evident that the studies/reports relied on by TransAtla in estimating the extent of impacts caused by its thermal pollution were dated and possibly misleading due to reduced plant operations during the period of study, incomplete data sets, and the short time period of the studies.

[125] The Director stated during cross-examination, and in final written arguments, that based on the information and discussions that had occurred subsequent to the issuance of the Approval, that some amendments to the Approval would be appropriate. The Director proposed an amendment that relates to thermal input:[51]

(i) referencing the 3^{o}C delta T Alberta Ambient Surface Water Quality Interim Guideline as a bench mark in the clause(s) (4.2.19-21) requiring a thermal input

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50 Task Force Report, *supra* note 27 at p.11.

51 Director's Closing Argument, *supra* note 40 at p.9.

> control plan and report. The purpose would be to clearly indicate the Department's expectation that any options involving continued release of cooling water to the lake be evaluated in terms of costs and impacts/benefits in relation to meeting the 3°C guideline at the point of release to the lake; ..."

[126] The Board notes that the degree to which TransAlta's Wabamun plant has caused an increase in weeds and a decrease in water levels is plagued in no small manner by a paucity of *recent* studies on the matter. Establishing the nexus between terms in TransAlta's Approval, or omissions therein, as they relate to lake levels, and impacts on the integrity of the Wabamun Lake ecosystem, and how these terms and impacts relate to the health of those parties directly affected by the Approval - requires *current* information. Clearly, using Lake Wabamun as a cooling mechanism for the Wabamun plant is not desirable and the Board expects the Director to be aggressive in using his regulatory discretion to compel TransAlta to reduce environmental impacts to Lake Wabamun, <u>including</u> Moonlight Bay.

[127] Mr. Secord, on behalf of Mr. Nick Zon, proposed that TransAlta adopt an emissions charge/fee for its air and thermal emissions. In his written reply, Mr. Secord addressed the various arguments raised by the Department and TransAlta that an emission charges system was, among others: an issue outside the purview of this appeal; discriminatory because TransAlta would be treated differently than other power plants in Alberta; and, not possible under current legislation.[52] In response, Mr. Secord noted:

> ..."TransAlta is in a class of its own, no other power plant is permitted to use a natural lake as a cooling pond. TransAlta is also in a special or unique situation, because it is exceeding the Alberta Ambient Surface Water Quality Guidelines which have been made pursuant to s.14 of the EPEA. ... The fact that it is being permitted to exceed the Guidelines puts TransAlta in a special class which we submit makes TransAlta a highly appropriate candidate for an emission charges system. It is clearly using the natural environment in lieu of appropriate pollution control equipment."...

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[52] Mr. Secord, on behalf of Mr. Nick Zon, Written Reply, dated November 12, 1997.

[128] The Director took the position that the application of an emission charge to TransAlta for its use of Wabamun Lake as a source and receptor for once through cooling water is inappropriate in this Approval.[53] The Director explained that in the long-term the Department may develop economic instruments that would apply to environmental releases such as the TransAlta Wabamun's once through cooling water release, but that such economic instruments would have to be developed in consultation with stakeholders and applied in a fair and equitable manner to all affected industry. The Director said that it was his opinion that since no regulations had been developed that establish emission fees, he had no authority to require emission fees through an approval. The Director stated that he appreciated the principle of the argument being presented by the Appellants regarding an emission charge, but that without the appropriate policy and legislative frameworks, that it is premature and indeed impossible to consider emission charges in this approval.[54] On this point the Board is in full agreement with the Director, but again we reference the recent CCME 115 Report A Fresh Look at Economic Instruments as proof of achievable alternatives.

[129] The Board is aware that TransAlta is attempting to address the enhanced evaporation caused by its operations, through water transfers from the North Saskatchewan River. The Board is also aware that the Department is attempting to deal with TransAlta's thermal input in a stop-gap manner, by putting a "cap" on the outflow water temperatures in the Approval. The Department explained its reason for doing so, in light of the unknown operating life of the plant and the costs associated with addressing the thermal pollution issue in a way that would result in compliance with the Alberta Ambient Surface Water Quality Interim Guidelines. In addition, the Agreement tendered at the hearing also addresses some of the concerns regarding thermal input, by requiring monitoring of outflow and ambient lake temperatures, and by speeding up the preparation and submission of a TransAlta's thermal input control plan.

[130] The Board heard from the Appellants that the process put in place by the Approval for

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53 Director's Closing Argument, *supra* note 40 at p. 4.

54 *Ibid.* at p.5.

addressing thermal input is too slow, and that there are no ramifications put in place to address non-compliance by TransAlta with the requirement to produce a control plan. Yet, the Board heard evidence from TransAlta, that speeding up the preparation and submission of the control plan from the already advanced date set in the Agreement (April, 1998) would be close to impossible.

[131] The Board concludes that the extent of TransAlta's impact on weed growth is more pervasive than earlier studies reveal. In reaching this conclusion, we point to the markedly reduced lake levels of the last 5 years (partly due to TransAlta, and partly due to a breach in the weir and drought), the gradual increase in outflow water temperature noted by the Department, the likely accumulation of impacts arising from the intervening years since the study was conducted, the extent of thermal influence in the lake (1000 m), and the low water levels in the lake and in particular in Moonlight Bay. The Board further notes that the lake level effect on weed growth illustrated[55] should be operative in those areas of concern of the Appellants. The Board notes that TransAlta is in the process of purchasing new aquatic weed harvesting equipment[56] that would allow for harvesting to occur in shallower waters. Given the foregoing, the Board finds that it is appropriate to direct that TransAlta *extend* its weed harvesting activities to include (once again) Moonlight Bay, more of Kapasiwin Bay and the Point Alison area, at least until TransAlta's water transfer scheme has caused lake levels to return to the level of 724.55 or until new thermal impact studies convince the Director that a more expansive weed harvesting program should be discontinued. In the meantime, while more studies to prove causation of weed growth may be needed, at present and until such studies confirm or disprove causation between lake levels and weed growth, TransAlta should continue to cut weeds in the areas plausibly affected by their operations.

[132] The Board agrees with the Director that TransAlta is in non-compliance with the Department's Alberta Ambient Surface Water Quality Interim Guideline. We strongly agree with the Director and that the thermal input amendment proposed by him should be added to the existing

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55 Written Submission of Blair Carmichael, *supra* note 16 at Tab 9, Exhibit G.

56 TransAlta Written Submission, *supra* note 10 at Tab 7.

Approval regarding specifically additional monitoring of the inlet and outlet cooling water, and referencing the 3°C delta T as the new benchmark.

[133] On the basis of the evidence heard, and all written submissions, the Board believes that the terms of the Agreement entered into between the Director, TransAlta, the Summer Village of Point Alison and Ms. Gwen Bailey and the Summer Village of Kapasiwin and Ms. Donna Thomas dated August 7, 1997, are reasonable and consistent with the purposes of the Act in promoting citizen input, protecting Alberta's ecosystems and offering responsive solutions to a serious problem.[57]

[134] The Board notes that in the Ministerial letter dated March 18, 1996, the Minister directs that his staff review the weir elevation in relation to effects once the lake water level of 724.55 is reached. The Board agrees that this is an appropriate action to address the Appellants' concerns.

B. Water Quality (with respect to chemistry and effects on fish)

[135] In the course of the hearing, issues related to thermal input were addressed by parties in the context of the aquatic weed and lake level issues. Concerns related to water quality (with respect to chemistry and effects on fish) were generally dealt with separate from the thermal input

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[57] Sections 2(a)(g)(j) of the Act states:

> 2 The purpose of the Act is to support and promote the protection, enhancement and wise use of the environment while recognizing the following:
>
> (a) the protection of the environment is essential to the integrity of ecosystems and human health and to the well-being of society;
>
> ...
>
> (g) the opportunities made available through this Act for citizens to provide advice on decisions affecting the environment;
>
> ...
>
> (j) the important role of comprehensive and responsive action in administering this Act.

issues. Concerns were raised by the Appellants that the Approval does not go far enough in monitoring and restricting the quantities of oil and grease, metals, and phosphorus being released into the lake by TransAlta. It was suggested that TransAlta be charged a fee for dumping these substances, and that it is nonsensical to "fertilize" the lake and then cut the weeds. The Board heard from the Appellants that water quality has deteriorated at the lake, in part, because of reduced water levels, and that monitoring provisions should be added to the Approval to address the chemical makeup of the effluent. Several Appellants were also concerned with the potential contamination of fish by PCBs and mercury although there was no evidence of PCB emissions from TransAlta.

[136] Dr. Stella Swanson, on behalf of TransAlta, gave evidence as to the sources of phosphorus in the lake, and from TransAlta's activities. She stated that phosphorus is the limiting nutrient in the lake, and that the main source of phosphorus is lake sediment. She said that phosphorus is a concern, in terms of emissions from the ash lagoon, but that the weeds already have enough available to them in the sediments. With respect to heavy metals, Dr. Swanson stated the ash lagoon to be the main TransAlta source, but that the effluent from the ash lagoon has not changed the quality of water in the lake.

[137] During the course of the hearing, the Board heard concerns from the Appellants with regard to the amount of oil and grease permitted to be discharged in the ash lagoon effluent. The Board also heard from TransAlta that the licence limit on oil and grease appears to be substantially higher than it needs to be. The Board suggests that if the concern is with background levels of oil and grease then a net level could be set, but there appears to be no need for an oil and grease discharge level as high as in the Approval.

[138] Based on the information and discussions that occurred subsequent to the issuance to the Approval, the Director submitted that the following amendments to the Approval to address water quality issues raised by the Appellants, would be appropriate:[58]

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[58] Director's Closing Argument, *supra* note 40 at p.9.

(ii) adding a clause requiring 2/yr monitoring of inlet and outlet cooling water for the elements listed in Table 4.2-3 and for iron;

(iii) amending Table 4.2-2 to include 2/yr chronic toxicity using fathead minnows, ceriodaphnia and selenastrum.

[139] The Board agrees with the Appellants that water quality issues on Lake Wabamun must be considered in relation to TransAlta's operations at the lake. Therefore, the Board agrees with the Director that it is appropriate to recommend that increased monitoring of the inlet and outlet canals be done for the elements set out above, and that chronic toxicity tests be conducted on the ash lagoon effluent. The monitoring and the tests should be conducted frequently (such as 6 times/year) until the Director is satisfied that chronic toxicity is not a problem for this effluent.

C. Air Quality

[140] Concerns were raised regarding the massive amount of particulate matter being released by TransAlta's Wabamun plant in the atmosphere, that this particulate matter may be contributing to the increased "ooze" in the water near Mr. Nick Zon's property, and that he has noticed a black substance in the snow on his property. Appellants expressed concerns regarding monitoring of stack emissions for mercury, and the orientation of devices for monitoring stack emissions from the Wabamun plant.

[141] Mr. Leaist, on behalf of TransAlta, addressed air emissions issues. He told the Board about a similar complaint regarding a substance found in the snow, and explained that a metals profile of the particulates showed that the substance was not from coal dust, but was instead vehicle exhaust. Mr. Leaist stated that the black substance Mr. Zon complained of could not be coal dust because there would be a trail from the mine to his property, although no party presented any evidence with regard to such a trail.

[142] With regard to heavy metals, Mr. Leaist stated that these are emitted from the plant

(including chromium, cadmium, selenium, and copper). He said that 10 kg of mercury and 20 kg of lead are emitted annually from the stacks, and that there are currently no Canadian air quality standards for emissions of these substances.

[143] Under cross-examination by the Appellants, TransAlta stated that it has undertaken no analysis of health impacts of fine particulates from its stack emissions but that the company was monitoring the scientific literature.

[144] Mr. Dobko, on behalf of the Department, submitted that generally, particulate emissions have been decreasing due to ongoing initiatives by TransAlta such as chemical conditioning of flue gas, installation of modern T/R controllers, improved maintenance and operations of precipitators and/or baghouses. He added, under cross-examination, that the Department is trying to be proactive and consistent in dealing with the emerging air emissions issues related to PM_{10} and $PM_{2.5}$, and the scientific reports and documents being produced by Environment Canada.

[145] The Board shares the concerns of all parties regarding the potential health issues arising in the emerging air emissions issues related to PM_{10} and $PM_{2.5}$. The Board is of the opinion that the Department and TransAlta should anticipate the proposed new Canadian air quality guideline for fine particulate matter and determine whether the Wabamun plant operations will be in complete compliance with these proposals. This should include a determination of the size profile of TransAlta's emissions so this contribution to ambient $PM_{2.5}$ can be judged.

[146] Regarding Mr. Zon's "black substance" found in the snow on his property, the Board is unable to draw any conclusions relating air emissions from TransAlta to this substance. The Board does, however, share the concerns regarding the amount of mercury and lead annually emitted from TransAlta's stacks, particularly since there are currently no Canadian standards for emissions of these substances. The Board's concerns are exacerbated by evidence that suggested the Wabamun plant operates in a manner that is markedly less efficient in terms of particulate emissions than its sister plant, the Keephills plant. Statements put forth by Mr. Dobko, on behalf of the Department,

suggesting that "Best Available Technology" be determined in terms of "what is best for the particular plant" did little to allay the Board's concerns related to the total quantity of the air emissions released. Concerns raised by the Appellants regarding the location and accuracy of air emission measurement devices must be resolved by the Department and TransAlta.

[147] With the foregoing concerns expressed, the Board is of the opinion that the Director's discretion for matters relating to air emissions has been properly exercised and his approval requirements are just and reasonable. The Board will recommend to the Minister that a clause be added to the Approval requiring TransAlta to document to the Director's satisfaction the location and accuracy of air emission measurement devices.

D. Winter Ice

[148] During the course of the appeal, the Board became aware of what it considers to be **serious** human safety issues associated with the open water and thin ice caused by TransAlta's thermal input into Lake Wabamun. The Appellants expressed concern for the safety of winter recreationists and fishers, and several participants at the hearing including TransAlta, told the Board of specific drowning incidents, and situations where snowmobiles and vehicles went through the thin ice or drove into the open water.

[149] As important as scientific studies may be to air or water impacts, there is no conceivable study that could compensate for the preventable loss of human life.

[150] During the hearing, the Board asked the Director for his thoughts with regard to human safety issues raised in relation to winter ice problems around the thermal outflow. The Director undertook to have his department look at the issue, and suggested that the Board might wish to make a recommendation to the Minister in this regard. In his written closing argument, the

Director addressed this issue[59], and proposed the following clause be added to the Approval (which the Board essentially adopts):[60]

> "The approval holder shall confirm that it has reviewed with the local authorities, and any other relevant safety/health agencies, the public safety issues associated with open water and thin ice in Lake Wabamun, in the area impacted by its cooling water release, and developed and implemented a plan to address these public safety issues."

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59 The Director stated that while he shared the Board's concern regarding this public safety issue, that he takes the position that general public safety issues related to the activities of a company, such as access, restrictions, lighting and warning signs, are the overall responsibility of the company. He added that "by attempting to address these types of public safety issues through its regulatory approvals, the Department incurs the real risk of sharing liability should an accident occur. For this reason the Department has, for example, consciously remained silent in its Water Resources Act approvals regarding general public safety warnings and measures that could be applied to approved work." ...(Director's Closing Argument, *supra* note 40 at p. 6.)

60 *Ibid*.

[151] The Board agrees with the Director, and expects that everything should be done to prevent such tragedies. Therefore, the Director's proposed amendment will receive priority as the Board's first recommendation to the Minister.[61]

IV RECOMMENDATIONS

[152] The Board recommends to the Minister of Environmental Protection that Approval No. 10323-01-00 be varied as follows:

1. By adding the following safety clause:

   "The approval holder shall confirm in writing with the Director that it has thoroughly reviewed with the local authorities, and all other relevant safety/health agencies, that public safety issues associated with open water and thin ice in Lake Wabamun, in the area potentially impacted by its cooling water releases are developed and implemented in a plan that fully addresses public safety issues of lake users."

2. That the Approval be modified according to the following terms:

   The approval holder shall develop and document a report, which outlines all the options available to reduce or eliminate the impact of thermal input into Lake Wabamun. The report shall include, at a minimum:

   (a) a cost estimate for each option;
   (b) an estimate of the time required to implement each option;
   (c) a preliminary outline and discussion of the environmental implications and benefits of each option; and

   (d) an indication of which options will be pursued for possible implementation and the further analysis that will be conducted to select the preferred options(s).

   The approval holder shall submit the report required in 4.2.19 to the Director no later than April 1, 1998.

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[61] The Director added that it would be his advice that the amendment take a form similar to the requirement for an emergency plan according to clause 3(1)(n) in the Approval Procedure Regulation (AR 113/93).

The approval holder shall develop and document a report on measures that will be taken to reduce or eliminate the impact of thermal inputs into Lake Wabamun. The report shall include, at a minimum:

(a) a definitive proposal and implementation schedule;
(b) a detailed assessment of the environmental implications of the proposed option; and
(c) the rationale for selecting the proposed option over the other options identified in the report referred to in clause 4.2.19.

The approval holder shall submit a draft of the report required in 4.2.21 to the Director no later than April 1, 1999 and the final report no later than September 30, 1999.

The approval holder shall consult with the public in the planning for and preparation of the reports referred to in 4.2.19 and 4.2.21 and provide a summary of this consultation process and the input received in the report referred to in clause 4.2.21.

3. That the Approval be amended to require monitoring the temperature of outlet water compared to the ambient temperature of the lake and that the ambient temperature be measured at points in the lake outside the zone of influence of thermal discharge from the Wabamun plant.

4. By referencing the $3^{o}C$ delta T Alberta Ambient Surface Water Quality Interim Guideline as the new benchmark in the clause(s) (4.2.19-21) requiring a thermal input control plan and report.

5. By adding a clause requiring two year monitoring of inlet and outlet cooling water for the elements listed in Table 4.2-3 and for iron, to be conducted frequently (such as six times per year) to satisfy the Director.

6. By amending Table 4.2-2 to include chronic toxicity using fathead minnows, ceriodaphnia and selenastrum, to be conducted frequently (such as six times per year) until the Director is satisfied that chronic toxicity is not a problem for this effluent.

7. By requiring TransAlta to expand its weed harvesting program to the Director's satisfaction, that includes harvesting in Moonlight Bay, Kapasiwin Bay, and Point Alison region, until such time as further studies prove to the Director's total satisfaction that TransAlta's thermal impacts do not continue to affect these areas, or until the lake levels return to a minimum 724.55 m, whichever occurs first.
8. By adding a clause requiring TransAlta to document to the Director's satisfaction the location and accuracy of air emission measurement devices.

9. By reviewing the oil and grease limit to lower it to a level which more accurately reflects

what TransAlta can achieve. In this regard, a request to retain the solvent extract residue from the oil and grease analysis for chromatographic determination of its composition in the event of an exceedance would provide a means to avoid spurious results.[62]

[153] Further, with respect to section 92(2) and 93 of the *Environmental Protection and Enhancement Act*, the Board recommends that copies of this Report and Recommendations and of any decision by the Minister be sent to the following:

1. All Appellants including those who provided written submissions to the Board;

2. The Summer Village of Kapasiwin and The Summer Village of Point Alison;

3. Ms. Donna Thomas and Ms. Gwen Bailey;

4. Mr. Stan Rutwind, Head, Environmental Law Section, Alberta Justice, representing the Director of Air and Water Approvals Division, Alberta Environmental Protection; and.

5. Mr. Steven Ferner, representing TransAlta Utilities Corporation.

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62 During the course of the hearings, it was revealed that the current approval limits set for TransAlta with respect to oil and grease in the ash lagoon effluent did not accurately reflect the low levels of these substances actually released in the effluent stream, nor did the limits accurately reflect background levels of oil and grease in lake water from boat motors.

V. COSTS

[154] The Board's decision on costs will follow in due course.

Dated on December 9, 1997 at Edmonton, Alberta.

Dr. William A. Tilleman, Chair

Dr. Steve E. Hrudey

Dr. Ted W. Best

ORDER

I, Ty Lund, Minister of Environmental Protection:

____ Agree with the Recommendations of the Environmental Appeal Board and order that they be implemented.

_____ Do not agree with the Recommendations of the Environmental Appeal Board and make the alternative Order set out below or attached.

_____

_____

_____

_____

Dated at Edmonton this _____ day of _____ 1997.

"Original signed by"
Honourable Ty Lund
Minister of Environmental Protection

___ Refer to Attachments (only if applicable)