

RioTintoAlcan

An aerial photograph of a large reservoir, likely a dam, with a dense forest in the foreground and mountains in the background. The water is a deep blue, and the surrounding land is covered in green and brown trees. The sky is clear with some light clouds.

Working with water

BC Operations

Business overview

Rio Tinto Alcan is the global leader in the aluminium industry.

In October 2007, the former Alcan was acquired by leading international mining group, Rio Tinto. Rio Tinto Alcan emerged out of the integration of Alcan and Rio Tinto's existing aluminium business. This combination created the world's largest producer of bauxite and aluminium.

Rio Tinto combines Rio Tinto plc, a London listed public company headquartered in the UK, and Rio Tinto Limited, which is listed on the Australian Stock Exchange, with executive offices in Melbourne. The two companies are joined in a dual listed companies structure as a single economic entity, called the Rio Tinto Group.

The Group discovers, mines, processes and supplies a wide range of metals and minerals that are essential to humanity and to the improvement of living conditions for communities throughout the world. Rio Tinto's major products include aluminium, copper, diamonds, energy products, gold, industrial minerals (borates, titanium dioxide, salt and talc), and iron ore.

Rio Tinto Alcan's global headquarters is in Montreal, Canada. We are currently active on six continents and 27 countries and operate or have interests in six bauxite mines and deposits, ten alumina refineries, 23 aluminium smelters and 12 power generating plants including nine hydroelectric facilities.



Paul Henning
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Rio Tinto is deeply committed to the economic, environmental and social sustainability of the communities in which the Group operates. We set out to build enduring relationships with our neighbours that are characterised by mutual respect, active partnership and long term commitment.

BC Operations is key to Rio Tinto Alcan's sustainability and competitiveness in the aluminium industry. BC Operations, which includes Kitimat works aluminium smelter, Kemano Powerhouse and Nechako Reservoir are integrally linked.

The BC Operations team implements a water resource management plan to balance the interests of metal production, power generation, environmental stewardship and flood mitigation.

This brochure has been compiled to provide an overview of the Rio Tinto Alcan's activities in BC and to communicate the efforts made by our team towards responsible stewardship of the Nechako Reservoir water resource. We hope you find it interesting and informative. If you have any questions please contact us.



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BC Operations

Rio Tinto Alcan is a major presence in British Columbia, and is a significant contributor to the local economy.

Kitimat

Rio Tinto Alcan's BC aluminium smelter is located on the northwest coast at the head of Douglas Channel at Kitimat. The smelter, known as BC Operations, is one of the largest industrial complexes in the province.

BC Operations is powered by electricity generated at its Kemano Powerhouse using water impounded in Nechako Reservoir. The Nechako Reservoir, including the Kenney Dam and Skins Lake Spillway, the Kemano Powerhouse, and Kitimat smelter were all constructed in the early 1950's after the company was invited to do so by the British Columbia government in the 1940's. To this day the original Alcan Project remains the largest single private investment in the province's history.

The Kitimat smelter produces three types of aluminium products: value-added sheet ingot, extrusion ingot referred to as billet, and trilock ingot, that are sold to customers for re-melting. Ninety per cent of BC Operation's aluminium products are shipped to markets in Japan, Korea and southeast Asia.

BC Operations continues to work towards modernization of the smelter in Kitimat. The modernization project will increase smelter capacity to over 400,000 tonnes per year.

BC Operations wharf (right). Installing catenary on transmission line (top). Kemano Powerhouse (next page).



Focus on safety

The global financial crisis has affected all business sectors. There remains a global over supply of aluminium of more than 4.5 million tonnes. In the fourth quarter of 2008 aluminium prices dropped from a record high to a level lower than seen in more than a decade. The impact on BC Operations was evident, there were several months in 2009 when we were not cash positive. This required decisive action towards cost reduction.

These cost reduction initiatives were undertaken while maintaining protection of health, safety and environment as our top priority. Our entire BC Operations workforce helped to achieve the financial goals, and most importantly, did so while maintaining an excellent safety record. In 2009 we had our best overall safety statistics. We will remain focused on our target of Zero Harm, which will require a continued unified effort and a personal commitment from every employee at BC Operations.



Kemano

Kemano Power Station has eight generators with a combined capacity of 860 megawatts of electrical power production. When operating at full capacity Kemano uses water from Nechako Reservoir at an average rate of approximately 140 cubic metres per second. Over the past two years average annual power production was 830 megawatts, an average of 540 megawatts was used for smelter operation and the remainder was sold to BC Hydro.

Rio Tinto Alcan's transmission line from Kemano to Kitimat is 80 kilometres long, with a total of 301 transmission towers and two catenary suspension cables, the second of which was installed after an avalanche destroyed a tower in 2007. The transmission line has twin towers in high avalanche risk areas in order to minimize risk of losing all power to the smelter. The smelter requires a constant supply of electricity, a loss of supply for as little as four hours could result in complete smelter shutdown. Restarting a smelter would take over nine months.

Aluminium production in Kitimat starts and ends at the wharf. Alumina, a refined aluminium ore, is transported to Kitimat by ocean vessel. Once smelted into aluminium the metal is cast into ingots and then loaded onto ships for delivery to customers.



Water management

Rio Tinto Alcan optimises the management of water resources by balancing the interest of the Nechako Reservoir water resource.

Kenney Dam, located approximately 90 kilometres southwest of Vanderhoof, along with the nine other smaller dams at Skins Lake, Bear Lake and Cutoff Creek, form the Nechako Reservoir, which has a surface area of 87,000 hectares and a basin size of 14,040 kilometres square. The Nechako Reservoir stores and diverts up to 65 per cent of the headwaters of the Nechako Watershed to the Kemano Powerhouse and the remaining 35 per cent is discharged from Skins Lake Spillway into the Nechako River via the Cheslatta Watershed.

Inter-agency collaboration

Rio Tinto Alcan utilises seven meteorological stations spread throughout the Nechako region. The data is collected via satellite and is shared with various utility and governmental agencies. They allow reservoir managers to assess the water situation in real time and predict inflow from snow melt. The information provides the basis for probability scenarios that allow the management of water flows.

Precipitation and water inflows to the Nechako Reservoir are a major source of uncertainty. Water must be carefully managed to ensure fisheries are protected and smelter operations are secure. A shortage can put business at risk while too much water can pose flood risks to downstream communities. The Nechako Reservoir has a relatively shallow live storage capacity due to a restriction at Tahtsa Narrows. This means that storage capacity is used quickly in times of high inflow and stored volume can not compensate for consecutive low inflow years.

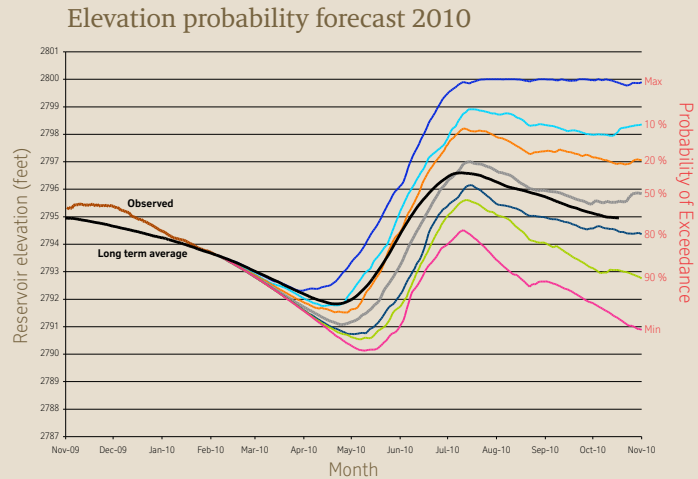
A minimum of 36.8 cubic metres per second of water is delivered to the Nechako River, plus any additional water required to mitigate summer water temperature. The annual average delivery over the past 22 years is 69 cubic meters per second.

Skins Lake Spillway. Swimming off the wharf at the Spillway Campground (next page).



Reservoir elevation forecast

Forecasting reservoir condition is an exercise in statistics. The past 55 years of meteorological observation data is used to determine the probability that certain conditions could occur in the future. Probability scenarios for reservoir elevation over the next nine months indicate that reservoir elevation will likely be near normal and there is low risk of a requirement for high Skins Lake Spillway discharge. The percentages stated represent 'probability of exceedance', indicating the probability that future reservoir level will be above the line shown.



Over the past 55 years conditions varying from drought to extreme wet have led to instances of flooding, ice jams, curtailment of power production, and reduction in aluminium smelting capacity. These occurrences are a reminder that the Nechako Watershed is a complex and dynamic system. The past three years clearly illustrate this water management challenge.

Record reservoir inflow

The second highest water year (1 November to 31 October) on record since reservoir operation began was 2006-2007. Snow-pack levels peaked at 172 per cent of the long term average, and total reservoir inflow for the year was 166 per cent of the long term average. Eight out of 12 months saw precipitation that was greater than 120 per cent of the long term average. This resulted in a total of over 3,183,000,000 cubic metres of water above the normal amount being released from Skins Lake Spillway. Although this was the second wettest year on record in fact the timing of the snow melt and the rain resulted in the highest recorded reservoir

daily inflow. Without using Nechako Reservoir live storage and Kemanó Powerhouse, flows in the Nechako River at Vanderhoof could have reached 1,400 cubic metres per second, however due to active management peak flow at Vanderhoof reached a maximum of 787 cubic metres per second. Skins Lake Spillway discharge was higher than usual for most of the year, starting in February and extending to the following winter.

In contrast, in the 2007-2008 water-year four out of the first five months had precipitation totalling less than 50 per cent of the long term average. This translated into the beginning of the 2007-2008 water-year being one of the driest five-month periods on record. By the end of the 2007-2008 water-year the average inflow reached 91 per cent of the long term average.

The most recent water year was similar to the preceding water year with inflows at 91.8 per cent of long term average. The reservoir level at the start of the current water year is close to the long term average and inflow is so far 104 per cent of the long term average. Snow pack accumulation in the mountains around Nechako Reservoir is normal for this time of year.

The Kitimat Modernization Project will not alter water flows or change environmental conditions in the Nechako River, Nechako Reservoir, or in the Kemanó River.



Environment

Our commitment to environmental stewardship of natural resources is reflected in our reservoir operation and flow management plan.



Nechako White Sturgeon Release Vanderhoof.

Endangered species

Nechako White Sturgeon is a species of special concern to Rio Tinto Alcan. The Nechako Watershed population is genetically unique from other white sturgeon stocks. In August 2006 the species was listed as endangered under the federal Species at Risk Act. We are a member of the team dedicated to understanding the decline in abundance of this unique fish. Over the past four years Rio Tinto Alcan has worked with the provincial government, Freshwater Fisheries Society of BC and Carrier Sekani Tribal Council to conduct monitoring, research and operate a pilot conservation hatchery. In 2009 the Pilot Sturgeon Hatchery released over 70,000 sturgeon larvae into the Nechako River at Vanderhoof. Progress in implementation of the Recovery Plan provides optimism but there is still much work to be done. Rio Tinto Alcan is committed to continuing our support of the sturgeon recovery initiative and finding solutions to promote a healthy sturgeon population.

In the first three years of the sturgeon hatchery program, students from across School District 91 participated in the release of thousands of juvenile sturgeon.



Here Cassidy Threlkeld from Mapes Elementary School is releasing a juvenile Nechako white sturgeon she named Bubbles.

Acipenser transmontanus
White sturgeon.

Floodplain management

Management of water delivery to the Nechako River has a measurable influence on the frequency of occurrence and magnitude of high flows. An analysis of observed maximum discharge in the Nechako River at Vanderhoof compared to estimated potential discharge which would have occurred if Nechako Reservoir was not operational indicates that flow management has eliminated 92 per cent of flow events above 600 cubic metres per second. Historically discharge in the Nechako River would have reached greater than this level in nearly all years. High flows play an ecological role that can be in conflict with human interests and development within the floodplain. Surveys indicate that in the District of Vanderhoof low level flooding begins at a river discharge of approximately 525 cubic metres per second, larger scale flooding begins at 600 cubic metres per second.

Electricity purchase agreement

Rio Tinto Alcan and BC Hydro reached a new Energy Purchase Agreement in 2007 for the sale of electricity generated by Rio Tinto Alcan at Kemano. This agreement was approved by the BC Utilities Commission (BCUC) in February 2008 as an agreement that is considered to be in the best interest of BC ratepayers. Reaching this new agreement, which terminates at the end of 2034, was one of the conditions for proceeding with the smelter modernization project we announced in 2006. It includes a 'Smelter First' provision to protect aluminium operations at the new smelter which will have an firm consumption of about 700 megawatts. It is important to note that the new agreement and electrical sales schedule and the Kitimat Modernization Project will not alter the amount of energy produced at Kemano nor the amount of water used from Nechako Reservoir. Flow in the Kemano River and discharge from Skins Lake Spillway into the Nechako Watershed will remain within the current operating regime. We will continue to manage the Nechako Reservoir to ensure compliance with all existing agreements and in keeping with our commitment to environmental stewardship.

Nechako Fisheries Conservation Program

Water flows to the Nechako River are managed to achieve specific targets, including the number of Chinook salmon returning to the Nechako River and minimizing water temperature above 20 degrees Celsius for the protection of sockeye salmon. The Nechako Fisheries Conservation Program, a joint initiative of the Federal and Provincial governments and Rio Tinto Alcan, conducts the Nechako River Annual Water Allocation and Summer Temperature Management Program. These programs are proven to be an effective means of protecting salmon in the Nechako River. High summer temperatures in the Nechako River have been mitigated by flow management and Chinook salmon habitat in the Nechako River remains abundant and of high quality. The number of Chinook salmon returning to spawn in the Nechako River has met the target of 1,700 to 4,000 fish in 18 of the past 22 years. The Nechako Fisheries Conservation Program believes that returns lower than the target are not a result of water management.

Chinook salmon spawn in the Nechako River between late August and early October. In 2009 the estimated number of Chinook salmon returning to spawn was 2,289 fish.

Oncorhynchus tshawytscha
Chinook salmon.



Looking forward

The sustainability of our BC Operations is a top priority.

Kitimat Modernization Project

The Kitimat Modernization Project continues to push forward although at a much slower pace than was initially hoped. However, the economic downturn dictates that an investment of this size and nature proceed with extra caution. The obvious benefits modernization will bring, increased efficiency and decreased emissions, are fundamental to remaining competitive and sustainable. We remain focused on the successful completion of Kitimat Modernization Project as soon as market conditions allow. Economic indicators suggest that the coming year may be as difficult as 2009 but Rio Tinto Alcan remains optimistic about the long term future of the aluminium sector.

Healthy forests

The pine beetle infestation in BC has resulted in a significant decrease of forest cover on Rio Tinto Alcan property in the Nechako Reservoir area. Rio Tinto Alcan, in partnership with Skin Tye, Nee Tahi Buhn and Cheslatta Carrier nations, has now completed harvest of the dead trees and has replanted more than 1 million tree seedlings over 1,200 hectares. This will reduce wildfire hazard and enhance the regrowth of a healthy forest.

Pine beetle affected forest in the Nechako Watershed.





Climate change

Rio Tinto believes that emissions of greenhouse gases (GHG) resulting from human activities are contributing to climate change. Avoiding human caused changes to the climate is an important international goal. To help achieve this goal our climate change programme will undertake initiatives in three key areas:

1. Reducing emissions from our operations.
2. Understanding and developing low emission product pathways by working with others on supply chain emissions and on breakthrough technologies.
3. Engaging with governments and stakeholders to advocate sound and efficient domestic and international policies.

We aim to progressively reduce the GHG emissions and energy footprint of our operations. As a capital intensive business, changing our emissions profile is a long term challenge for us however by acting responsibly locally, we contribute to long term global sustainability.

The aluminium industry generates approximately one per cent of GHG emissions in the integrated production of aluminium products. However, aluminium also reduces GHG emissions through its properties as one of the world's lightest, strongest and most recyclable materials. At Rio Tinto Alcan, we are promoting energy efficiency by providing lightweight transportation components and encouraging increased recycling. We are also working to increase the GHG efficiency of aluminium smelting by developing low-emissions technologies.

Engagement and support of our communities and stakeholders will be crucial to Rio Tinto becoming a leader in climate change.



Dendroctonus ponderosae
Mountain Pine Beetle (actual size)

Rio Tinto Alcan

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Skins Lake Spillway

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