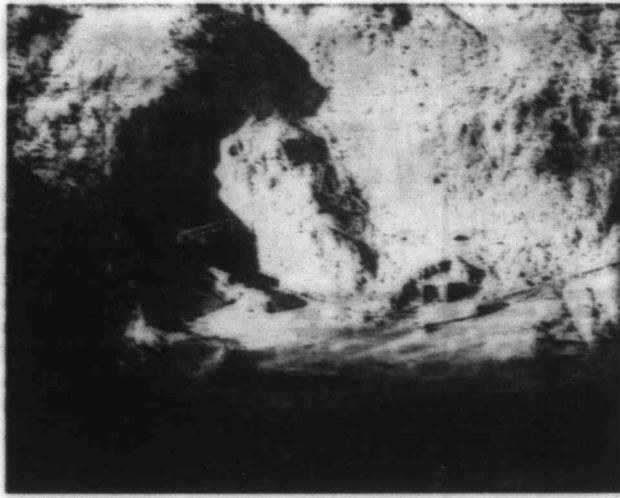




OLD JORDAN RIVER CABLE CAR.



NEW POWER TUNNEL AT UPSTREAM PORTAL.

JORDAN RIVER'S EYE TO FUTURE

By PATRICIA GOERTZEN

Power companies must ever look well to the future and it was in 1909 that preliminary work was begun on the project of power development at Jordan River which, in the early 1900s, gave employment to as many as 800 men. When the redevelopment of the Jordan River generating station is completed in 1971, up to approximately 450 men will have worked over a period of three years to establish a remote control, fully automatic power station totally eliminating the need of workmen.

While most Victorians have heard of Jordan River and know of it as the place where B.C. Hydro has a powerhouse from which the "juice" is sent to drive factory machines, run the washing machine, or percolate the coffee, they can have very little idea of the tremendous resources in the shape of plant and equipment, organization and engineering necessary before a single kilowatt of electricity can be transmitted over the wires.

As I sat across the desk from W. S. Walker, project manager at Jordan River, he explained how hydro-electric power companies must tuck away the most interesting and often spectacular part of their works and organization in places more or less remote and not always easy of access to the general public, and on occasion, withstand an attack of "unlightened" criticism.

It's interesting to note that 45 years ago the Post newspaper published a statement doubting the feasibility of a power plant at Jordan River, expressed as follows: "The mayor and council should do their best to block the Tramway Company's Jordan River scheme. It would be positively insane to agree to a proposal that would mean the distribution of \$2,000,000 which would come within the reach of merchants and working men of Victoria."

This pragmatic editorial may, in part, have

been prompted by the fact that, because there was no road through and accessibility was difficult, Jordan River seemed far-removed from Victoria.

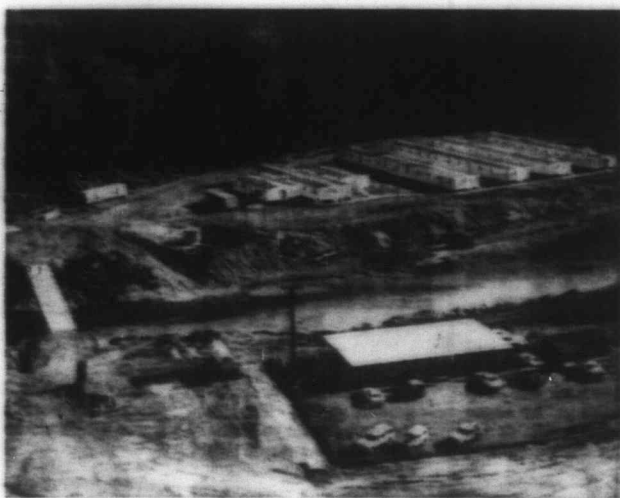
The fourth generating unit including the pressure pipeline, transformer, and switching equipment represented a: investment of approximately \$1,000,000. By comparison \$30,000,000 is involved in the redevelopment program which includes the installation of a steel penstock 5,350 feet long, the excavation of a three and a half mile tunnel, rehabilitation of Diversion and Bear Creek dams, and the construction of the new Elliott Dam, and the building of a new power plant.

Every phase of production of the existing Jordan River plant has been 100 per cent Canadian and British. The supply and erection of the penstock was awarded to the Vancouver Engineering Works; the English Electric Company, of Canada, Ltd., manufactured and furnished the 18,000 horsepower waterwheels and auxiliaries, one 15,000 KVA generator and one 250 KW motor generator set; the furnishing of four 5,000 KVA single phase transformers was awarded to the Canadian Westinghouse Company; and the Canadian General Electric Company supplied the switchgear and control panel.

Major contracts on the redevelopment program were granted to Emil Anderson Construc-



OLD JORDAN RIVER TENT CAMP.



TODAY'S MOBILE HOME CONSTRUCTION CAMP.

PAGE 16—The Daily Colonist, Sunday, November 21, 1971

tion Co. Ltd., of Hope, B.C., for in the amount of \$7,497,578; Limited of Japan, the turbine \$864,000; and Mitsubishi Can generator, at \$913,251. The tants are International Power Consultants Limited, of Vanco

When the field gangs as installation of the fourth u more than 3,000 tons of be supplies were transported to out a single loss being record ment had to be transporte presented somewhat of a prot no harbor and the water was the tugs to bring the scows. Two lines were run ashore pulled alongside by hand, w loaded by an electric derrick.

Oldtimers recall a three from Victoria, arriving at the tug, and travelling by cable a few miles up the mountain, those early days are of when transients that the three shift coming, one going, and one crews had to chop through vi to contend with rugged terra and hard work.

In 1930 a tent camp was the powerhouse. Entertainment included Saturday night dan men paid a quarter and the being able to catch about 150 basketball games, and tennis.

Today the four camps are en trailers with electric heat men each, two men to a re laundry equipment is availabl The camp recreational fac tables, shuffleboard, game room. There is also a cormin Hard put for ideas on impr meeting one member propos vidually wrapped sugar cubes.

The three catering contr: ters, Evergreen Services Lt Services Limited offered the ing variety of food that wou bination Thanksgiving dinner The hourly-rated men are g board which costs the compan to \$12 a day.

In the early days there cents an hour, and the men w Payrolls were calculated in and the men were paid once carried brass tags with a s ponded on the payroll and " the rule.

R. Rosse, project manger for Emil Anderson Construc tioned that laborers wages u tract was \$4.18 an hour and every two weeks. Payrolls ar hourly rated men on the job Safety wasn't emphasize there were no records kept cidents and fatalities. Of cour as hard hats, ear plugs, safety boots were unknown. A doctor istered nurse, were employe and their services were shat company.

Now there is a first aid m well-equipped first aid room. If what the men have to say is Robertson, project safety dir excellent job in making eve cious. The project instituted a point system, for the shift cidents, with the winners recei

The first two generating and placed in operation in 191 at that time developing a tota er. A narrow gauge railway w 30 inches wide and five and a to carry supplies up the mo has been made as to the dispo but many people and museu an interest in it.

In 1914 it was decided to of the plant and a third gene horsepower was installed and In 1925 a carefully prepared p was drawn up covering the power requirements of Victo plan had as its objective t 18,000 horsepower additional t developed, for a total of 41,750

The first direct step tow stallation of the 18,000 horsepo made during the year 1929, tunnel through solid rock som to accommodate the intake four penstock.

The new power tunnel is s

Gen Co. Ltd., of Hope, B.C., for the power tunnel, in the amount of \$7,497,578; Nissho-Iwai Company Limited of Japan, the turbine and governor, for \$864,000; and Mitsubishi Canada Limited for the generator, at \$913,251. The engineering consultants are International Power and Engineering Consultants Limited, of Vancouver, B.C.

When the field gangs assembled for the full installation of the fourth unit in March, 1930, more than 3,000 tons of heavy materials and supplies were transported to Jordan River without a single loss being recorded. All heavy equipment had to be transported by water which presented somewhat of a problem since there was no harbor and the water was too shallow to allow the tugs to bring the scows alongside the wharf. Two lines were run ashore and the scows were pulled alongside by hand, where they were unloaded by an electric derrick.

Oldtimers recall a three to four hour trip from Victoria, arriving at this isolated camp by tug, and travelling by cable car to their homes a few miles up the mountain. Other memories of those early days are of when there were so many transients that the three shifts they had were one coming, one going, and one staying. The work crews had to chop through virgin forest and had to contend with rugged terrain using only horses and hard work.

In 1930 a tent camp was established next to the powerhouse. Entertainment and recreation included Saturday night dances for which the men paid a quarter and the ladies baked cakes; being able to catch about 150 trout in four hours; basketball games, and tennis.

Today the four camps are comprised of modern trailers with electric heat, housing about 40 men each, two men to a room, and automatic laundry equipment is available at all the sites. The camp recreational facilities include pool tables, shuffleboard, game tables, and a TV room. There is also a commissary at each camp. Hard put for ideas on improvement at a union meeting one member proposed a request for individually wrapped sugar cubes.

The three catering contractors, Cal Van Caterers, Evergreen Services Ltd., and Canas Camp Services Limited offered the men a mouth-watering variety of food that would do justice to a combination Thanksgiving dinner and an Irish Wake. The hourly-rated men are given free room and board which costs the company anywhere from \$7 to \$12 a day.

In the early days there was one wage, 25 cents an hour, and the men worked a 10-hour day. Payrolls were calculated in the Victoria office and the men were paid once a month. The men carried brass tags with a number that corresponded on the payroll and "no tag, no pay" was the rule.

R. Rose, project manager on the tunnel work for Emil Anderson Construction Co. Ltd., mentioned that laborers wages under their old contract was \$4.18 an hour and the men are paid every two weeks. Payrolls are computed for the hourly rated men on the job site.

Safety wasn't emphasized years ago, and there were no records kept with regards to accidents and fatalities. Of course such safety aids as hard hats, ear plugs, safety glasses, and safety boots were unknown. A doctor and his wife, a registered nurse, were employed on a full time basis and their services were shared with the logging company.

Now there is a first aid man for every shift, a well-equipped first aid room and an ambulance. If what the men have to say is any criterion, Cliff Robertson, project safety director, has done an excellent job in making everybody safety conscious. The project instituted a contest, based on a point system, for the shift with the least accidents, with the winners receiving a wristwatch.

The first two generating units were installed and placed in operation in 1912. Jordan River was at that time developing a total of 11,000 horsepower. A narrow gauge railway was laid, measuring 30 inches wide and five and a quarter miles long, to carry supplies up the mountain. No decision has been made as to the disposition of the railway but many people and museums have expressed an interest in it.

In 1914 it was decided to double the capacity of the plant and a third generating unit of 10,500 horsepower was installed and placed in operation. In 1925 a carefully prepared plan of development was drawn up covering the present and future power requirements of Victoria and district. This plan had as its objective the development of 18,000 horsepower additional to that already being developed, for a total of 41,750 horsepower.

The first direct step towards the actual installation of the 18,000 horsepower fourth unit was made during the year 1929, in the boring of a tunnel through solid rock some 220 feet in length to accommodate the intake end of the number four penstock.

The new power tunnel is a horseshow type, 16

ISLANDER Crossword Puzzle

LAST WEEK'S CROSSWORD PUZZLE ANSWERS APPEAR ON PAGE 7

By M. Waltz

ACROSS

- 1 Wreaths.
- 5 Skin opening.
- 9 Out of date.
- 14 After: Fr.
- 19 Verbal contraction.
- 20 Straight forward.
- 21 Angry.
- 22 Legendary being.
- 23 Man of law: 2 words.
- 26 Conjecture.
- 27 Whirled.
- 28 Prime time.
- 29 Full of years.
- 31 Filbert or hazel.
- 32 Remove.
- 33 Transport trucks.
- 34 Smart.
- 35 Greek letters: Abbr.
- 38 Knowledge.
- 39 Lengthen.
- 41 Ceremonial vow: 2 words.
- 42 Reimbursed.
- 43 U.S. illustrator.
- 44 Headwear.
- 48 Arm muscle.
- 50 Moon goddess.
- 51 Like some

DOWN

- 2 Volunteer.
- 3 Scorched.
- 4 April: 1 word.
- 6 2 words.
- 7 Compass.
- 8 At liberty.
- 10 Feed on grass.
- 11 Apiece, in tennis.
- 12 Wooden nails.
- 13 Formal dress.
- 15 Long-necked bird.
- 16 Being: Lat.
- 17 Khan.
- 18 Aches.
- 19 Meanders.
- 20 Batter.
- 21 Legible.
- 22 Glow.
- 23 Abhor.
- 24 Jaundice.
- 25 Turn, in a way: 2 words.
- 26 Abominable.
- 27 Vapor.
- 28 Muscle.
- 29 Humus.
- 30 Ben: 1 word.
- 31 Workers.
- 32 Rational.
- 33 Reliable.
- 34 Sports equipment.
- 35 Deflect.
- 36 Skin condition.

EXCLAMATIONS

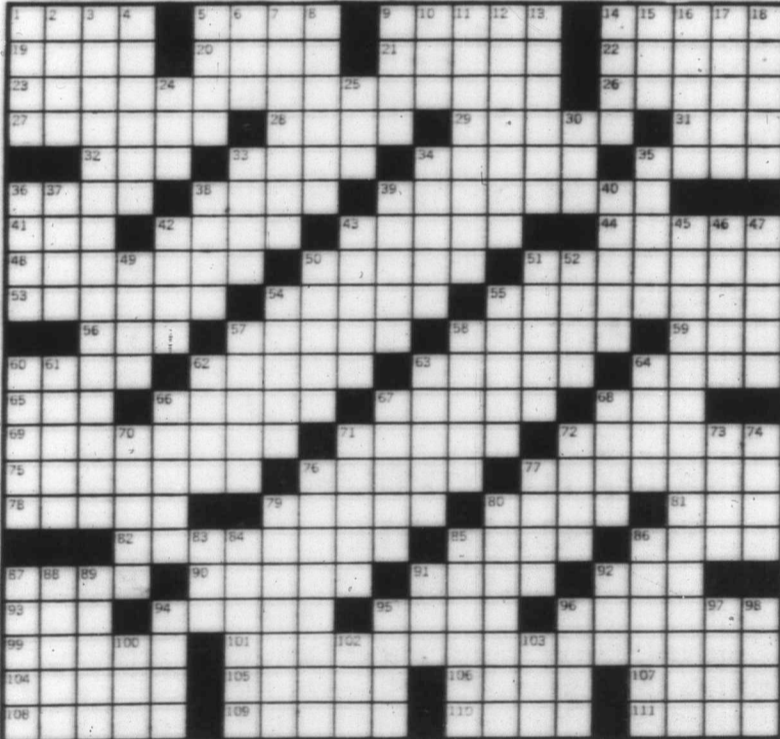
- 92 Exclamations.
- 93 Weight.
- 94 Palm tree.
- 95 Gait.
- 96 Repose.
- 99 Word with first or second.
- 101 The flag: 4 words.
- 104 Awake.
- 105 Western state.
- 106 Cassette item.
- 107 Swiss river.
- 108 Woes a KP job.
- 109 Wolfe and others.
- 110 Log or tide.
- 111 Pronoun.

BOREDOM

- 17 Boredom.
- 18 Printers' mark.
- 24 Man's nickname.
- 25 Navy man: Abbr.
- 30 Natl. Guard group: Abbr.
- 33 Nullify.
- 34 Lean.
- 35 Peasants.
- 36 Travel.
- 37 Garden.
- 38 Cafe au: 1 word.
- 39 Amelopa.
- 40 Oarlock.
- 42 Model.
- 43 Beats up.
- 45 Very aged: 3 words.
- 46 Phones: Collog.
- 47 Life: 1 word.
- 49 Cans.
- 50 Conflicts.
- 51 Groans.
- 52 Seep.
- 54 Seawater.
- 55 Design.
- 57 Loss: strength.
- 58 Magnificent.
- 60 European city.
- 61 Choose.
- 62 Forbidden.
- 63 Krone and krona.
- 64 Food: Collog.

DEEP VIOLET

- 66 Deep violet.
- 67 Flightless birds.
- 68 Peruse.
- 70 Dispense.
- 71 Fishing or hiking.
- 72 Obliterate.
- 73 Discredit.
- 74 Lebanese city.
- 76 Empty a radio device: 2 words.
- 77 Tibia or fibula.
- 79 Go before.
- 80 Loose cloak.
- 83 Forbid.
- 84 Go: detail: 2 words.
- 85 Reporter: Reston.
- 86 Jewish month.
- 87 Leather strip.
- 88 Bearlike: marcupial.
- 89 Bury.
- 91 Jackie's husband.
- 92 Venerable.
- 94 Skills.
- 95 Thomas: Abbr.
- 96 Dagger, old style.
- 97 Filtered.
- 98 Apppear.
- 100 Before.
- 102 Guest: 1 word.
- 103 See 55 Across.



11-21-71

feet in diameter, basically unlined using natural rock, with a concrete paved invert, and three and a half miles long. Breakthrough was as expected in the latter part of November, 1970. The miners drilled from 55 to 60 holes, using 12-foot drill steel and tried to pull an 11-foot round, using seven drills mounted on a jumbo. The continuous cycle of drilling, blasting, and mucking was aided by two unique features.

One being a sliding floor. This job is only the second time it has been used in B.C. It speeds up the mucking cycle and can be maintained at the face. Time is not wasted laying track and building sidings. It is 430 feet long, moves in three sections, and is driven by three small pneumatically controlled air pressure pumps, and travels about 30 inches a minute. It could be called a glorified switch.

The second feature, a laser beam, projects a

narrow beam to a target eliminating constant checks on position and frequent surveys. The laser shoots up to 5,000 feet, but was used up to 2,500 feet on this job.

The number four penstock, or pressure pipeline, was transported to Jordan River in the early 1900s on scows and was the heaviest ever built in B.C. It was 9,482 feet in length, and the weight of steel making up the entire pipeline was 2,317½ short tons. The pipe is rivetted steel throughout and there were 307,000 rivets that were driven by a machine capable of exerting a pressure of 150 tons per square inch.

After each section was completely fabricated

Continued on Page 13

The Daily Colonist—PAGE 11
Sunday, November 21, 1971

More Education Than Entertainment in New Hailey Novel

Detroit the Chromium-Plated Jungle

For a man who makes his living writing fiction it is axiomatic that he must constantly strive for greater perfection — a more polished style, more subtle characterization, finer craftsmanship; he cannot rest on his oars. For most writers of fiction life is hatred, lonely and, financially, not very rewarding.

An exception, in every department, is Arthur Hailey. His prose style is consistently wooden, his craftsmanship rudimentary, and his characterization unsubtle. And yet, his books are translated into every major language and sell in the millions, enabling him to live in privacy and splendor in the Bahamas. How does he manage it?

The easy answer is the Hailey formula, a central situation, usually suspenseful, around which revolves a series of sub-plots. This was the

formula successfully exploited in *Hotel* and *Airport*. It was also the formula of *In High Places*, his best, though least successful novel, probably because its content was wholly Canadian, which unfortunately seems to be the kiss of death in the international market.

In his latest novel, *Wheels*, the formula is again in evidence, although in this instance there is no central suspenseful situation — unless you can get worked up over the designing of a new car.

No, the easy answer won't suffice, the real answer is that in his earlier days Hailey was an investigative reporter, one of the best of his kind in Canada. This early apprenticeship taught him how to brighten a story by digging up little known but pertinent facts. It was a lesson he never forgot.

It is for this reason that every Hailey novel contains documentation which is an education you won't easily find elsewhere. And it is this that keeps the reader's attention riveted to a Hailey novel from the first sentence to the last.

Long after you forgot what *Hotel* was all about you probably recalled the description of how bartenders defraud management and how much silverware is rescued from the garbage.

I'd be hard-pressed to recount the plot of *Airport* but I vividly recall

WHEELS, by Arthur Hailey; Doubleday; 371 pages; \$8.75.

the method employed by airlines to handle pregnancies in their stewardesses.

In *Wheels*, Hailey does it again. This novel is about the automotive industry in Detroit and Hailey's indefatigable research has uncovered facts which will make him as unwelcome around the headquarters of the Big Three as a cobra at a picnic.

He tells us, for example, that on Fridays and Mondays absenteeism on the assembly line is at its peak thanks to roistering weekends, and in consequence cars turned out on those days are "shoddily put together."

Executives ordering for themselves or friends, and big dealers ordering for favored customers, usually insist on having cars made in midweek.

Information of this kind is freely scattered throughout the narrative.

You'll learn of shady auto dealerships where the public and manufacturers get fleeced; of the racial strain between black workers and white foremen; of the pressures on plant managers to keep the production line moving at all costs "no matter how the trick is done."

And of the bitterness felt by se-

nior executives against consumer-minded critics like Ralph Nader (thinly disguised as Emerson Vale, author of *Unsafe in Any Need*). And of the spy system, worthy of Paris couturiers, where each maker finds out about the others' new designs.

We also vicariously attend executive meetings, work with the men on the assembly line and accompany test drivers trying out new models.

How did Hailey manage to ferret everything out? Any top newspaperman who has done in-depth reporting knows how it's done and, as I mentioned earlier, Hailey was one of the best.

Sub-plots have their quota of crime, sex, moguls struggling with their consciences and moguls without any, but as this review indicates, *Wheels* should be read not so much for its fictional content as for its probing and disturbing picture of the auto industry.

Entertainment and education are always blended in Hailey's work, but in *Wheels* education predominates. The book appears at the moment when Detroit is battling simultaneously on three fronts — competition, consumerism, and 1975, the deadline set by the U.S. congress for production of a new safe, pollutionless car.

Nagging Nader adds to the strain. Reporter Hailey is likely to aggravate it still more.

Continued from Page 12

In the shop, it was taken to a special shed, where all mill scale and rust was removed, both inside and out, by a sand blasting process, after which they were taken to a dipping department where the sections were heated in a preheating oven to about 375 degrees Fahrenheit. In this way the whole section was given a thorough coating of protective material.

All clearing and grading for the penstock was carried out by the company's forces, the excavation work for the most part, was done by gasoline shovel. The heavy grade, immediately back of the present powerhouse, was excavated by drag line.

The new penstock, manufactured in Yugoslavia by Energoinvest, is about a mile in length and commences right outside the tunnel with a diameter of 10 feet, three inches, decreasing to around 10 feet and ending at the powerhouse, the 121 pieces have braces in the end, and were transported to Jordan River by barge and tested there. No rivets — the new penstock has welded seams and uses dresser couplings, providing a form of flexible joint. It seems to be a well kept company secret how an apparent mixup in bids resulted in this firm being awarded the contract for the penstock.

The old penstock will probably be dismantled and sold for scrap.

One of the first items on the agenda in 1925 for the increased 18,000 horsepower program was the reconstruction and enlargement of the main flume. This is a timber box waterway, a little more than five miles in length, which conveys water from the main diversion and storage dam to the balancing reservoir at Forebay, from which latter the huge steel penstocks leading to the turbines in the powerhouse at sea level, draw their supply. The magnitude and difficulty of this work can be appreciated when it is explained that more than 6,000,000 feet b.m. of timber was used in the rebuilding and that the flume had to be kept in full commission during the four years work was in progress. B.C. Hydro forces reboxed the flume in 1968 using 10,000 sheets of plywood. Capacity of the flume is 257 cubic feet per second.

The new tunnel will take the place of the flume and will deliver 245,000 horsepower, with a

Jordan River's Eye to Future

net head of 870 feet. To date there has been no decision on the disposal of the flume.

Diversion dam is an ambursen type and was the highest of its kind when built in 1912-13. Original specifications on this dam called for concrete mixed to the consistency known as "sloppy." Impounding capacity, 705,300,000 cubic feet of water.

Bear Creek dam, earth embankment, hydraulic-fill process, is five miles upstream from Diversion dam. It will have been raised about five feet, a low level outlet gate will have been added, as will two 30 inch culverts.

Both Diversion and Bear Creek dams have received a slight face-lifting.

The new Elliott dam is named for J. M. Elliott, retired, who was employed at the Jordan River plant for 45 years and was superintendent there for 22 years. This dam is a concrete gravity type structure and will have a crest length of 430 feet, height from the lowest foundation will be 117 feet, volume of concrete in the dam, approximately 35,000 cubic yards.

The old powerhouse is 211 feet long and 47 feet wide. The new power station will be 80 feet long and 90 feet wide and will house a single turbine and generator unit the speed of which will be 257 rpm with an operating head of water of 1,050 feet maximum and 860 feet minimum. In place of the water wheels used in the old units there will be a rotor and shaft. The bore diameter of the rotor is 227½ inches and the rotor rim inside is 143 inches. Weight of the generator is 1,230,000 pounds, the heaviest shipping part being 60,000 pounds. The heaviest shipping part of the turbine is the shaft which is 160,000 pounds. The inlet valve to the turbine weighs 120 tons.

On completion this new large turbine and generator unit will produce up to 150,000 kilowatts of power feeding into the Vancouver Island system at 138,000 volts.

The valves and governor of the 18,000 horsepower generating unit installed in 1930 were of a special type. The two water wheels on this unit are supplied with water through a flanged cast steel wye, which is bolted to a companion flange rivetted to the end of the pressure pipeline immediately behind the unit foundation.

To the branches of the breeches pipe are bolted the main valves, which are of the cylindrical balanced type. These valves were unique on the Island system being a distinct departure from the commonly known gate valves. Water is supplied to the wheels through short inlet bends connected to the flanges of the main valves and then through the nozzle under the regulation of the "sewer" governing device.

The novel design of the governing device is based on the rapid destruction of the energy of the jet of water. This is obtained by placing blades in the nozzle at a slight angle to the normal direction of the water stream so that the jet issuing from the nozzle is no longer cylindrical in shape but is dispersed in a hollow conical form, so diverting the jet from the buckets of the impulse wheel. These blades, normally withdrawn into the hollow spearhead, are carried by a sliding ring which is connected to the speed governor. When a sudden drop in the load occurs and the speed of the machine rises as a consequence, the governor will cause the blades to be pushed forward into the waterstream, imparting to it a whirling motion, causing it to lose its useful energy.

History was made in the annals of the B.C. Electric Company on Vancouver Island in 1930 when "juice" flashed into the new Bay Street substation for distribution throughout Victoria and its surrounding municipalities when the new generating unit of 18,000 horsepower at Jordan River, which took a year to instal, was given a trial run and first "put on the line."

A handful of courageous men with a dream and an eye to the future turned an almost entirely unknown mountain stream into the development of hydro-electric power in 1909. They lived in tents and, with sweat and song, faced a venture on a scale which, at that time, seemed almost fantastic and was proclaimed a major engineering feat throughout the continent.

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Sunday, November 21, 1971