THE DENNISTON INCLINE

DESIGNING THE INCLINE

The Westport Colliery Company was formed in 1878 to undertake a large scale mining operation on the 600 metre high Mt Rochfort Plateau. Planned works included a railway line up the Waimangaroa River to Conns Creek, an incline railway from there up to the Plateau and a mine in the nearest seam of good coal. Their biggest challenge was lowering coal down the hill. They engaged brothers Henry and Robert Young, Scottish-born civil engineers based in Westport, to design a gravity-operated incline as recommended earlier by mining engineer James Burnett.

BUILDING THE INCLINE

Construction, which began in 1878, was daunting. It utilised materials and manpower from near and far. Construction workers, including Maori from the Westport pa, were housed in tent camps. Progress was so successful that on Friday 24 October 1879 Miss Mary Burns, daughter of the company's general manager, had the honour of wielding a hammer to drive the last spike home and open the inclined railway.

The first consignment of coal was sent down the Incline in April 1880.

Brakehead Walk takes you to a view of the Denniston Incline. See page 74 for a map of the walk.

The view at the top of the Incline shows the recently constructed track awaiting ballasting. A bridging pole supports a tail rope used for temporary trolley haulage of material to the Brakehead. The men are cutting rock for building work with the 'hammer and tap' method, using a hand-held drill and sledgehammer. It is said that highly-skilled Cornish stonemasons were responsible for many of the carefully constructed walls and arches that can be seen today around the Brakehead Walk.

MIDDLE BRAKE

CONNS CREEK BRIDGE

CONNS CREEK BRIDGE

MIDDLE BRAKE

CONNS CREEK YARDS

"It was a bold and enterprising company that would undertake such a great engineering work, and a bold engineer who ventured to recommend the carrying of it out, but their efforts have been crowned with success."

Report to the Minister of Mines

THE WESTPORT TIMES
October 24, 1879

Completion of the Westport Colliery Company's Incline Railway

Today we witness the successful completion of a marvellous undertaking. We see an iron road connecting the summit of the mountain with the plains below, rendering available the vast wealth contained in these, the most extensive coalfields in the southern hemisphere.

Mr Day with a gilded driving hammer (which had been made on the spot by the Company's blacksmith) entered a gilded spike in the sleeper and said "... This work has not been accomplished without the experience of many an anxious day on my part as day after day I stood at the bottom watching the trolley bearing away the permanent way, never sure when something might snap, and, of course, with unknown results."

Miss Burns then took the hammer, and with three well directed blows and a miss drove the spike home amidst vociferous cheering.

INCLINE STATISTICS

CLIENT:	Westport Colliery Company (later became Westport Coal Co.)
CONTRACTOR:	Peter Day, Dunedin, tender price £13,000
TOTAL INCLINE LENGTH:	1670 metres
TOTAL VERTICAL DROP:	518 metres
UPPER INCLINE:	664 metres (vertical drop 253 metres), 2 minutes per truck
LOWER INCLINE:	1006 metres (vertical drop 263 metres), 2.5 minutes per truck
STEEPEST SECTIONS:	1 in 1.34 on the Upper Incline and 1 in 1.3 on the Lower Incline
RAILS:	1067mm gauge, allowing standard NZ Railway wagons to be used
SPEED OF WAGONS:	Up to 50 km/h
WAGON WEIGHT:	11 tons fully laden (7 tons of coal trimmed to the rear to reduce spillage)
AVERAGE WAGONS PER HOUR:	15 each way
HIGHEST YEARLY TOTAL CARRIED:	348,355 tons in 1910
TOTAL COAL CARRIED:	1,600,000 tons over the lifetime of the Incline
CONSTRUCTION WAGES:	12 shillings per 8 hour day; considered high enough to attract good workers
OFFICIALLY OPENED	Friday 24 October 1879
FIRST WAGON OF COAL	First wagon of coal descended April 1880
CLOSED	Wednesday 16 August 1967

GRAHAME KYLE DEPARTMENT OD CONSERVATION WESTPORT

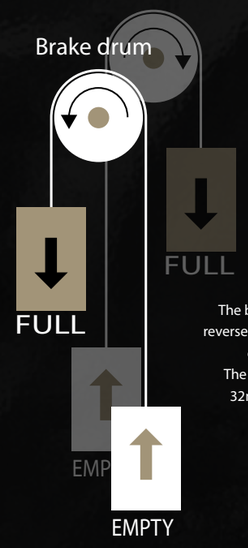
THE DENNISTON INCLINE *continued*

THE EIGHTH WONDER

The Denniston Incline was a highly efficient system for delivering coal 518 metres in altitude from Rochfort Plateau to Conns Creek yards and was one of the steepest railways in the world. Locals acknowledged it as 'The Eighth Wonder of the World'.

HOW IT WORKED

The Incline worked with a simple counter-balance system: the weight of a full wagon going down pulled an empty wagon up. Huge hydraulic brakes slowed the coal-laden wagons as they descended the steep grades. The raising and lowering cable drums were on the same shaft so the ascending wagon aided braking. There were in fact two inclines. The upper was controlled from the Denniston Brakehead and the lower, from Middle Brake. The system was designed that way partly because it was not possible to get a straight line down the hillside and partly so that over the entire incline four wagons could be lowered and raised at the same time.

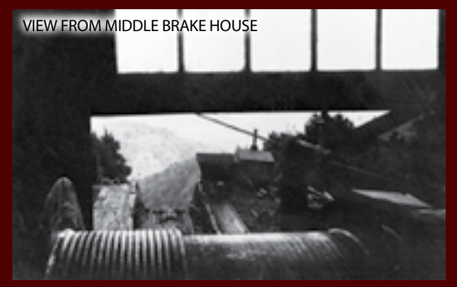


The brake drum was reversed for the next pair of wagons. The steel rope was 32mm diameter.

BELOW The Denniston Incline from Conns Creek about 1880 before vegetation had grown back beside the line obscuring many of its features. A short way up is the arched bridge over Conns Creek and above that the viaduct on which the steepest grade of the lower incline was located.

DEPARTMENT OF CONSERVATION WESTPORT

WAGON DESCENDING UPPER INCLINE



VIEW FROM MIDDLE BRAKE HOUSE

WAGON DESCENDING LOWER INCLINE

"The only time there was no danger on the incline was when it wasn't working"

Maurice Clayworth

DANGERS AND ACCIDENTS ON THE INCLINE

Men on the Incline worked among fast-moving wagons, heavy machinery and cables that changed in an instant from stationary to moving, slack to taut. Unceasing vigilance was needed to avoid losing fingers or being run over by an 11-tonne wagon. In the early years of operation, with no telegraph and no doctor at Denniston, injured people could lie for hours without medical attention. Runaways were not common but they did occur if the cable was not secured before letting the wagon over the edge, if the cable broke or if the winding brake ran out of water.

"On the last occasion of my visiting the mine a sad accident occurred to a little boy, four years old, who fell off the stage at the screens ... There is no road to Westport, no telegraphic communication and no proper trolley on the railway. In this case the child laid sixteen hours without medical attendance and then died ..."

Report by Inspector Binns to the Undersecretary of Mines 1883

Platelayer Run Over

[BY TELEGRAPH-PRESS ASSOCIATION]

WESTPORT, 24th June. A platelayer was run over by a full truck of coal this morning. Both legs were amputated below the knees.

EVENING POST 25 JUNE 1912

TERRIBLE ACCIDENT ON THE W.C.C. INCLINE

The repeated predictions of a fatal casualty on the Westport Incline on account of the absence of a track for foot passengers, were fulfilled in a fearful manner this afternoon, by an accident resulting in the immediate death of Mr Joseph Brown and the serious injury of Mr William Harrison – both early and respected residents of the district.

It appears that the two unfortunate men were ascending The Incline in an empty truck, when the shackling of the descending loaded truck broke, and the full truck, thus released, dashed into the empty one, killing Mr Brown instanteously and inflicting some serious injuries upon Mr Harrison. The latter was brought to Westport by train at 3:10p.m. and taken to the Hospital. Mr Brown was Member of the County Council for the Riding of Wareatea North; he had lately taken charge of the London Butchery, Waimangaroa. Brown leaves a wife and eight children. Mr Harrison is a store and boarding house keeper at Denniston.

WESTPORT TIMES 15/02/1884

TERRIBLE ACCIDENT AT WESTPORT.

WESTPORT, February 12.

A terrible accident occurred on the Westport Coal Company's incline this afternoon. Joseph Brown, butcher, and member of the County Council; William Harrison, storekeeper of Waimangaroa and Denniston, respectively, were ascending in an empty truck when the shackling of a descending loaded truck broke. The full truck dashed into the empty one, killing Brown instantly, and seriously injuring Harrison. The latter was brought into the Hospital. Brown leaves a wife and large family.

Later.

The Doctor has pronounced Harrison out of danger. Brown's back and neck were broken. Brown leaves a wife and eight children.

WEST COAST TIMES 13 FEBRUARY 1884

THE DENNISTON INCLINE *continued*

BELOW Incline workers, like all mine workers, put their lives in the hands of their team. Trust was paramount. A careless mistake by one could cause the death of another. These Middle Brake workers (left to right) are acting engineer Dave Caldwell, Jack Tinetti, Herman Fayen, Frank Eckersley Snr, Harry Thomson and Pat Dowse.

FRIENDS OF THE HILL MUSEUM, PETER ROBERTSON COLLECTION

"The hookmen had a very dangerous job ... as the wagon came over the brow they had to put their hands on the wagon and run backwards, uncouple the wagon and throw the hook into the dish. This was assisted by the rope-puller swinging the rope just as they were ready. He couldn't afford to miss out on this because you'd soon be mincemeat."

"If the rail's wet on a misty day or a damp day and you're running quietly ... you might get a bit lax in your observance and before you knew where you were there was a big wagon flashing past. Only on one occasion I nearly got lumbered ... I just happened to wake up in time and take a header for the bush. You just did a big double somersault."

"One of the most dreaded things on the Incline were runaways ... it's an awesome sight when you see them go. There's no noise, they just go".

Bill Byrne

DEATHS on The Incline & Brakehead

DANIEL WOULDES (12)
15 August 1883 – INCLINE
Rode incline in empty wagon. Found with leg severed under second work trestle.

JOSEPH BROWN
12 February 1884 – INCLINE
Coupling broke while riding incline. W. Harrison seriously injured.

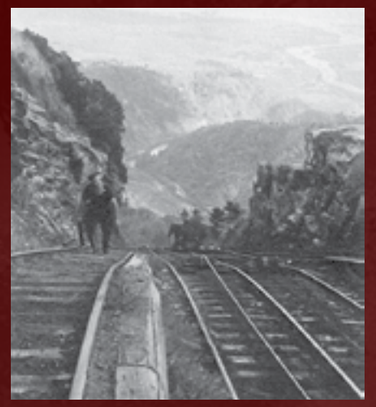
ALEX BROWN (young boy)
5 November 1889 – INCLINE
Killed by railway truck at screens while trespassing.

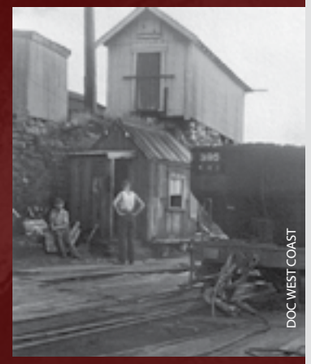
THOMAS DUNCAN (12)
Fell over retaining wall at Middle Brake.

ALEX TAIT (33)
4 December 1890 – INCLINE
Run over by railway wagon.

JOHN CHAMPION (15)
12 January 1905 – BRAKEHEAD
Struck by railway wagon.

HOLLAND ECKERSLEY (57)
12 March 1934 – INCLINE
Run over by railway wagon





DOC WEST COAST

DOC WEST COAST

(TOP) BRAKEHEAD VIEW
A Q wagon awaits descent at the top of the Incline. The haulage cable used on the Incline was 32mm diameter steel rope.

(BOTTOM) UPPER INCLINE VIEW
If the Incline had not closed in 1967, it probably would have closed the following year when the Inangahua Earthquake buried part of the upper incline under a large rockfall.

ACTION ON THE INCLINE

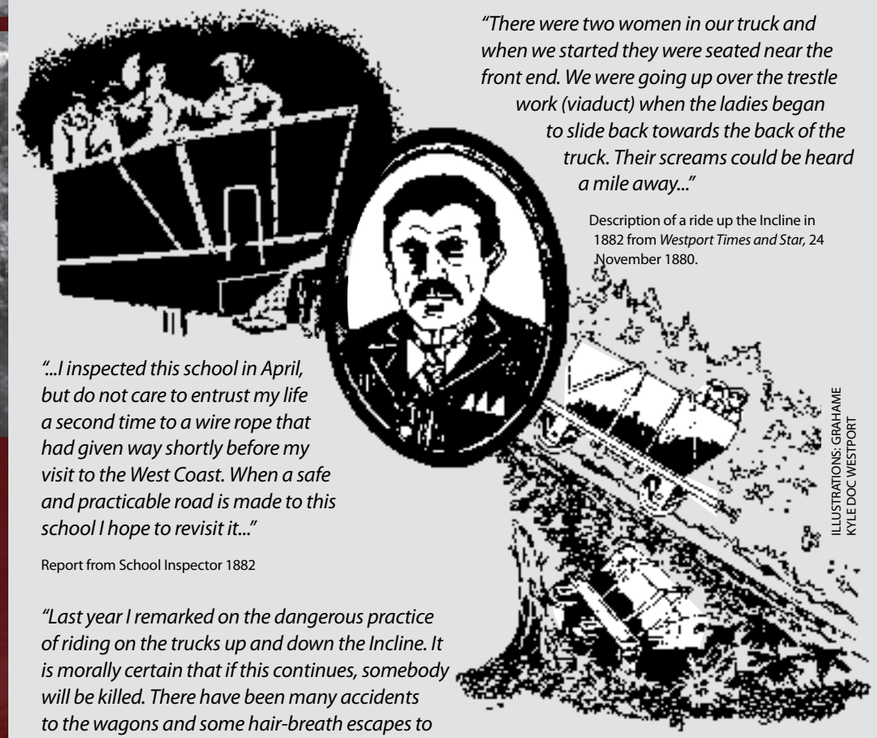
Max Higgins left school at 15 and became an apprentice fitter and turner. Over the years of working for the company he spent many hours repairing the Incline, but the Incline did not stop during working hours. Max once spent a day squatting beside a faulty bearing, pouring on castor oil between each wagon as it raced past. Castor oil was thinner than engine oil and kept the bearing cool until it could be replaced that evening. Saturdays were set aside for major repair work.

DOC WEST COAST

In the early days the only means of access to Denniston was via a perilous journey up the Incline in a Q wagon.

"There were two women in our truck and when we started they were seated near the front end. We were going up over the trestle work (viaduct) when the ladies began to slide back towards the back of the truck. Their screams could be heard a mile away..."

Description of a ride up the Incline in 1882 from *Westport Times and Star*, 24 November 1880.



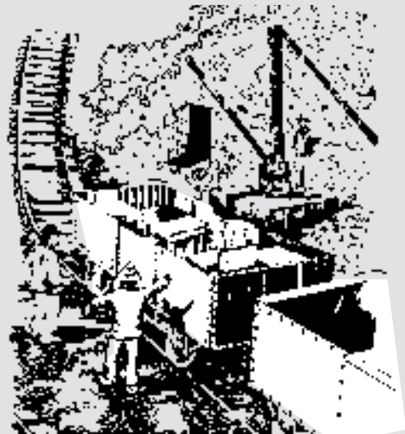
ILLUSTRATIONS: GRAHAME KYLE DOC WESTPORT

"...I inspected this school in April, but do not care to entrust my life a second time to a wire rope that had given way shortly before my visit to the West Coast. When a safe and practicable road is made to this school I hope to revisit it..."

Report from School Inspector 1882

"Last year I remarked on the dangerous practice of riding on the trucks up and down the Incline. It is morally certain that if this continues, somebody will be killed. There have been many accidents to the wagons and some hair-breath escapes to passengers. The difficulty stopping it is that no proper road exists."

Report from Inspector Binns to Undersecretary of Mines 1883



"... the hopper jumped out of the chassis of the empty wagon and rolled down the incline ... the chassis turned upside down across the rails ... the chassis broke loose ... there were just two streaks of flame from the rails... it hit the full wagon on the bridge. The full wagon ran through middle brake, through the front of the cabin ... hit the winch house, landed upside down in the ditch ..."

Bill Bryne

Before a road was built in 1902, all household furniture was brought up the Incline in wagons. Despite being illegal, people rode the wagons; going down they perched on the ledge of the chassis and held tight to the top edge of the hopper.

DEPARTMENT OF CONSERVATION WESTPORT

FRIENDS OF THE HILL MUSEUM

FRIENDS OF THE HILL MUSEUM

ALEXANDER TURNBULL LIBRARY, WELLINGTON, N.Z. 1353

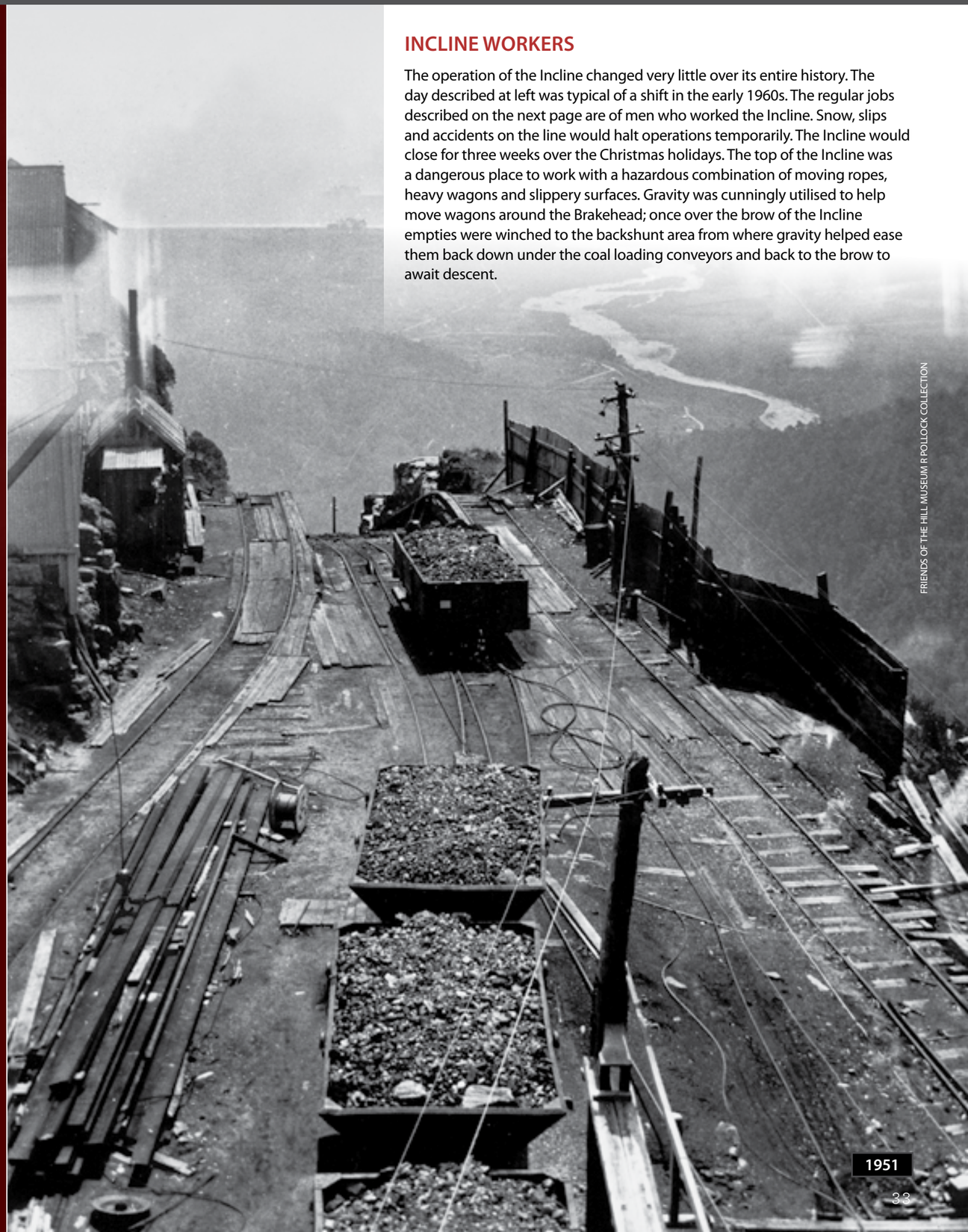
THE DENNISTON INCLINE *continued*

A DAY IN THE LIFE

START-UP 5.45am – 7.00am	The upper brakeman, the upper section roadman and the other Incline workers went by bus to the Brakehead at Denniston. A full wagon was hooked up ready to be lowered.
7.00am – 7.30am	The upper section roadman, or ganger, walked down the hill checking the rails. At Middle Brake he received the first full wagon from Brakehead, unhooked it and attached a cable to the nearby empty wagon. The full wagon was gravity-run along the line and attached to the lower incline cable. When the middle brakeman arrived on foot from Conns Creek the two eased the wagon onto the main rope ready to be lowered.
7.30am – 7.35am	The first full wagon descended the lower section. The rest of the crew for Middle Brake rode the empty wagon up from Conns Creek.
DAILY ROUTINE 7.35am – 2.00pm	A full wagon was eased over the edge and lowered to Middle Brake. There the full wagon was unhooked and set waiting until the empty wagon arrived from below. Just as the empty wagon arrived, the full wagon was gravity-run along the line to be attached to the cable that had brought the empty one up. The arriving empty wagon was gravity-run to the other end of Middle Brake, attached to the top section cable and, after a signal, pulled up to the Brakehead. As each wagon arrived at Conns Creek, its number was noted on a tally sheet. The hook and cable were detached, then attached to an empty wagon. When the signal was given this empty wagon was pulled up to Middle Brake. The full wagon, with its brake released, was then gravity-run to join a train that eventually would be taken to Westport. Meanwhile, the empty wagon was pulled up to Middle Brake and another full wagon came down the Incline. This process was repeated about every four minutes. Smoko and the half hour lunch break were usually spent playing euchre.
SHUTDOWN 2.00pm – 2.30pm	After informing Middle Brake, the top section brakeman sent down the last full wagon. After the last empty was received, unhooked and gravity-run down to the back shunt, the workers caught the bus home. At Middle Brake the last full wagon was received, unhooked and gravity-run along to the next cable. The upper incline cable was attached to an empty wagon and left ready for the morning. All workers except the brakeman rode down the Incline on the last full wagon. With no-one to receive it, the last ascending wagon was stopped at Middle Brake by short lengths of charred beech wood laid on the rails. The brakeman walked down to Conns Creek.
EXTRA HOURS	Sometimes the Incline operated until 5 or 6pm if extra coal was required to fill a ship in port. Saturdays were for maintenance when incline workers who wanted overtime would realign tracks, renew sleepers, shovel coal off the rails, maintain roller boxes and put new hooks on cables if required. Because of the steep angle and wagon vibration, rails crept downhill. The problem of rails jamming was solved by replacing some sections with shorter and shorter rails. A new cable was laid about once a year.

INCLINE WORKERS

The operation of the Incline changed very little over its entire history. The day described at left was typical of a shift in the early 1960s. The regular jobs described on the next page are of men who worked the Incline. Snow, slips and accidents on the line would halt operations temporarily. The Incline would close for three weeks over the Christmas holidays. The top of the Incline was a dangerous place to work with a hazardous combination of moving ropes, heavy wagons and slippery surfaces. Gravity was cunningly utilised to help move wagons around the Brakehead; once over the brow of the Incline empties were winched to the backshunt area from where gravity helped ease them back down under the coal loading conveyors and back to the brow to await descent.



FRIENDS OF THE HILL MUSEUM R POLLOCK COLLECTION

1951

THE DENNISTON INCLINE *continued*

MEN ON THE JOB

BRAKEMEN

- Operated the hydraulic brakes.
- Specialists in a highly responsible position.
- Extra brakeman loaded wagons.

DONKEYMAN

- Operated the brakehead donkey winch that pulled empty wagons up a slight grade from the bins so they could be gravity-run back down to the loading area.

HOOKMEN

- Hooked and unhooked the main rope.
- Tallied wagons at Conns Creek.
- Signalled brakemen when wagons were ready to be pulled up.

ROPE PULLERS

- Pulled rope clear as empty wagon came over brow of hill.
- Prepared hook and rope for next wagon.
- Eased weight of full wagon onto main rope with the special 'Sampson' cable.

ROADMEN

- Walked the tracks checking for faults.
- Oiled rollers and shovelled coal from rails.
- Put in shorter rails as track crept downhill.

GANGER

- In charge of roadmen.
- Organised work to be done on the Incline.

TRIMMER

- Trimmed coal to back of wagon to prevent spillages.
- Helped with the blocks.

FOREMAN

- Continuously checked Incline from top to bottom.
- Inspected ropes and splices.

WAGON EXAMINER

- Checked wagon brake and repaired where necessary.
- If brakes could not be fixed on the spot, wagon sent back to NZR at Westport.

BOWS MAN

- Attached the large, hook-like 'Bows' which fitted between the wagon and brake cable.

RUNNER-OUT

- Gravity-ran wagons to the end of the yards for the train to pick up.

FRIENDS OF THE HILL MUSEUM R HALE COLLECTION