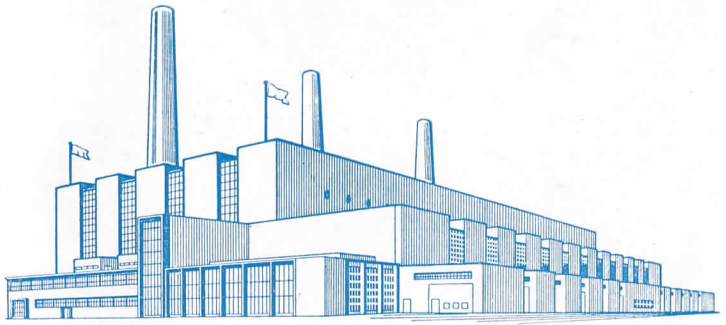
Carmarthen Bay Power Station

BRITISH ELECTRICITY AUTHORITY

SOUTH WALES DIVISION

Vernon D. Emmanuel
59 Parc Tyisha
Burry Port
Dyfed
SA16 0RR



CARMARTHEN BAY POWER STATION

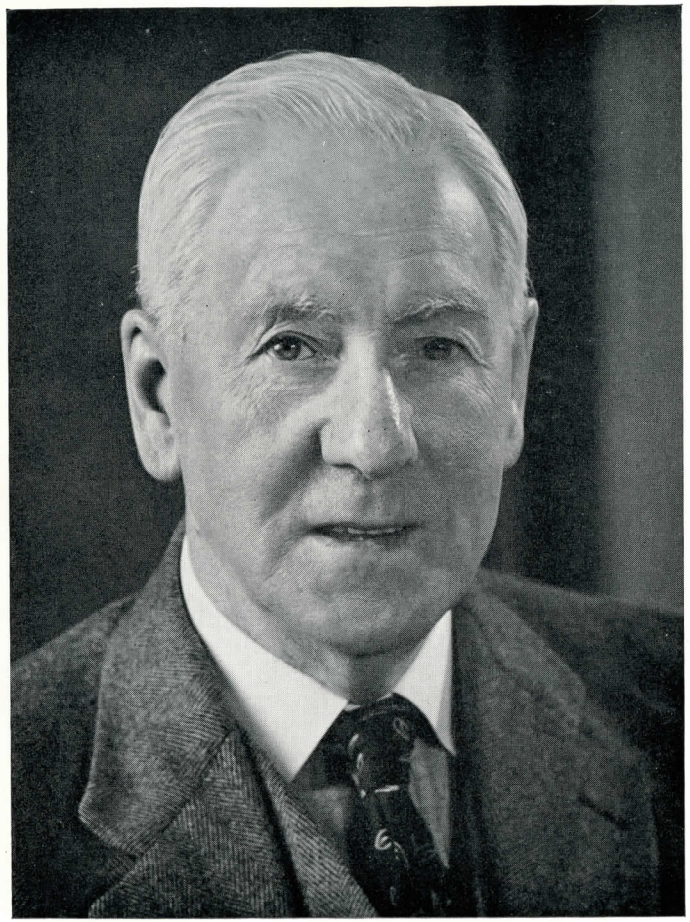
Opened by

SIR HENRY SELF, K.C.B., K.C.M.G., K.B.E., Comp. I.E.E.

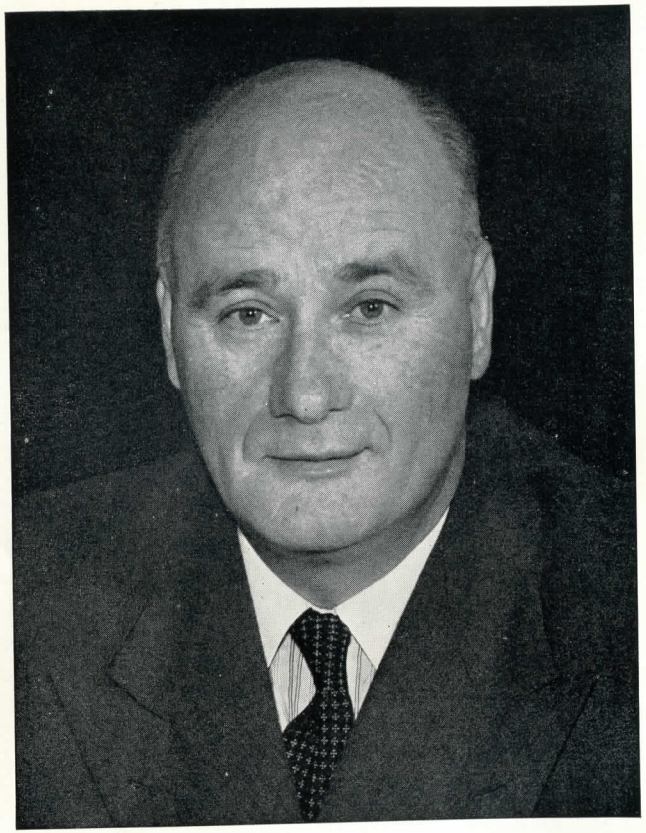
Deputy Chairman (Administration)

British Electricity Authority

27th August 1954



RT. HON. LORD CITRINE, P.C., K.B.E., Comp. I.E.E.
Chairman, British Electricity Authority



SIR HENRY SELF, K.C.B., K.C.M.G., K.B.E., Comp. I.E.E.
Deputy Chairman (Administration), British Electricity Authority

CARMARTHEN BAY POWER STATION

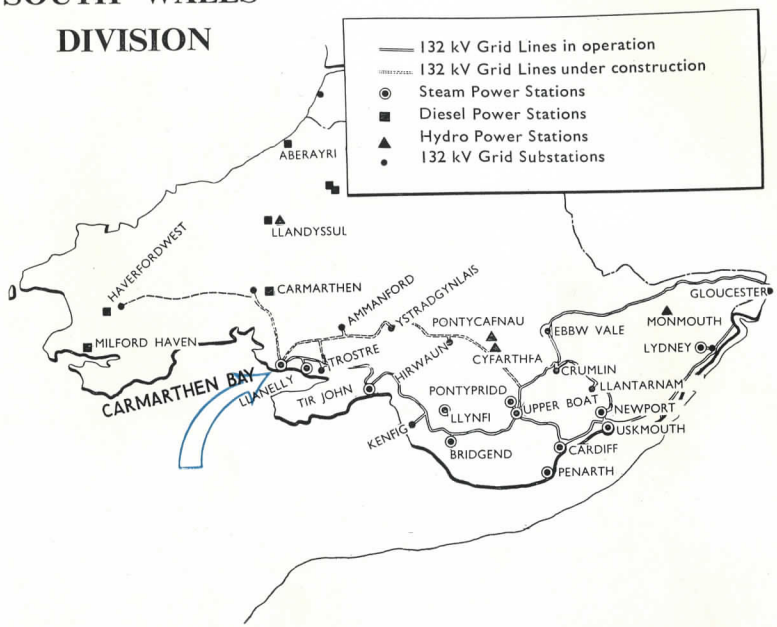
WHEN the electricity supply industry was nationalised in 1948, the overall supervision of the building of power stations in the southern half of the Principality became the responsibility of Mr. H. V. Pugh, M.I.E.E., M.I.Mech.E., who was appointed Controller of the South Wales Division of the British Electricity Authority, and his Generation Construction staff under Mr. T. H. Wood, M.I.Mech.E., A.M.I.E.E., who had been appointed Chief Generation Engineer (Construction) for the Division.

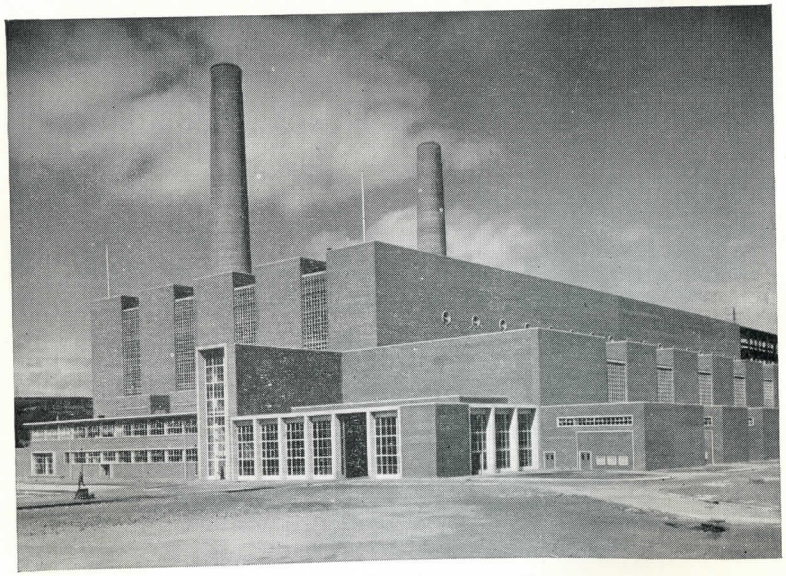
One of the power station projects in South Wales taken over at Vesting Day was the Carmarthen Bay station being built by Balfour, Beatty & Co., Ltd., for the Carmarthen Bay Power Station Co., Ltd. The architect was Sir Percy Thomas, O.B.E., J.P., D.L., LL.D., P.P.R.I.B.A. The inauguration of this power station is commemorated in this brochure. Ultimately it will have a generating capacity of 345,000 kilowatts.

In October 1951, Mr. Pugh was appointed Controller of the London Division and was succeeded by Mr. H. J. Bennett, A.M.I.E.E. In April 1953, Mr. Wood retired and was in turn succeeded by Mr. C. W. Priest, B.Sc.(Eng.), A.M.I.Mech.E., M.I.E.E.

Among those whose co-operation has materially assisted in the development of the station, the Authority wish to thank Carmarthenshire County Council; Burry Port Urban District Council; Llanelly Borough Council; Llanelly Harbour Trust; British Railways (Western Region); Docks and Inland Waterways Executive; Ministry of Housing and Local Government (Welsh Office); and local industrialists.

SOUTH WALES DIVISION





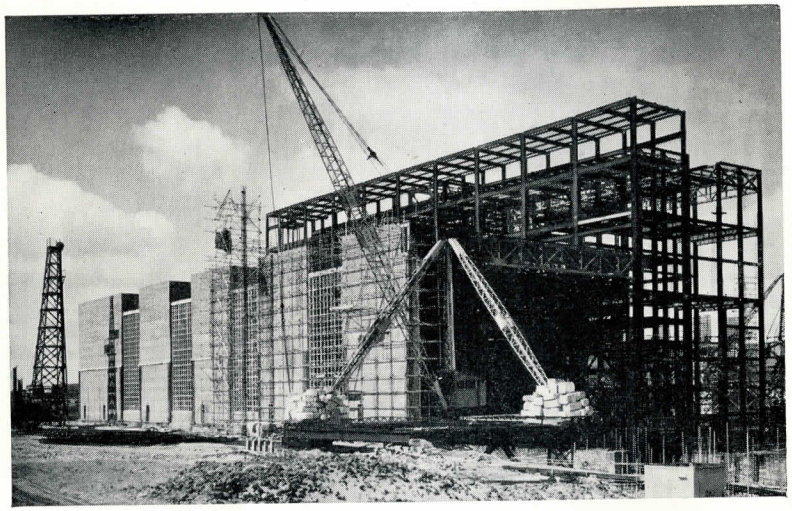
BRIEF HISTORY OF THE CONSTRUCTION

THE site of the Carmarthen Bay power station, on the Burry estuary, has an area of approximately 214 acres. It was originally marginal coastal land, subject in places to flooding: a disused copper works occupied a small portion.

Demolition and clearing work began on the 29th April, 1947. The opening of the site was marked by the felling of a 300 ft chimney which formed part of the old copper works, and, prior to actual construction, some eighteen months were spent on the demolition of these works and the removal of copper slag. The derelict buildings were levelled, the old underground flues filled in, and an area prepared for the reception of building materials. Considerable quantities of filling were imported to raise the level approximately eight feet for the construction of sidings; 4,800 yards of 21 feet roadway together with 1,000 yards of 15 feet secondary roads capable of withstanding the constant volume of traffic were built.

An amphibious "Dukw" and a large motor driven lifeboat were used for taking soundings, sea water temperatures and other necessary data.

Trial borings revealed that under the superficial slag deposits there was some 20 feet of fine brown sand below which was 40 feet of grey silty sand interlaced with clay seams. At a depth of 65 feet a thick seam of sandstone rock was encountered.



CONSTRUCTION PROGRESS

With the standing water level some 12 feet below the surface, a de-watering system had to be used for work to be carried out in the boiler house and turbine house excavations which were at 3 feet above and 12 feet below ordnance datum respectively.

The de-watering system, reputed to be the largest of its kind, maintained the working conditions required to construct the deep foundations some 40 feet below ground level. Electric pumps constantly prevented the ingress of water into the deep level workings, and diesel pumps were standing by ready to take over in emergency.

Excavation for the main building basements started in June 1948 and an approximate total of 5,500 reinforced concrete piles were driven from excavation level to support the turbine house and boiler house. A further 275 steel box piles were used to support ancillary buildings adjacent to these, consisting of canteen, workshop and office block.

The first set of 52,500 kilowatt capacity was commissioned on 28th June, 1953, and the second of similar capacity was commissioned on 30th September, 1953. By 1957 it is anticipated that another four

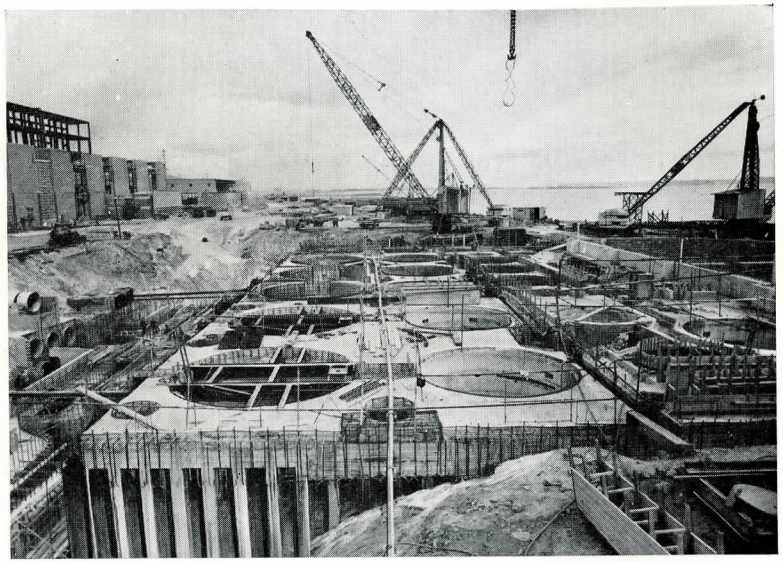
60,000 kilowatt sets will be installed, making the total capacity of the station 345,000 kilowatts.

CIRCULATING WATER PUMP HOUSE

As part of the initial scheme a portion of the foreshore was reclaimed to provide a site on which the circulating water pump house was subsequently built. A protective bund or embankment some 30 feet high by 700 feet long was constructed, enclosing the site on the seaward side and forming a strong breakwater protection for the pump-chamber excavations which proceeded in the land-locked area provided.

The pump house buildings above ground level are approximately 241 feet long by 134 feet wide by 50 feet high, with foundations down to rock level. The excavation for the pump house commenced in January 1951 and was completed by September of the following year. In the Burry estuary there is a rise and fall of tide of 30 feet; to drown the suction inlets of the circulating water pumps at all states of the tide it was necessary to construct a very deep pump house. An unusual method of construction was used. The excavation proceeded inside a sheet steel pile cofferdam; six reinforced concrete diaphragms were cast, forming a number of floors, and, within these diaphragms, circular openings were formed so that after casting the first diaphragm at five feet below ground level, excavation proceeded underneath. This process was repeated successively until the six diaphragms had been completed, the last forming the base of the pump house.

The diaphragms are two feet thick and common bricks and Winget blocks were used for vertical shuttering for the internal faces of the various cylindrical cells. A travelling shutter was used for the construction of the reinforced concrete walls which were built up from the base around the various openings, forming a number of deep cylindrical chambers. These are used for housing the pumps, screens, penstocks and associated equipment; the interstices on the outside of the cylindrical walls not required for housing plant were backfilled with sand pumped from a stock pile. The cofferdam piling was left in place as part of the structure, the diaphragm reinforcement having been welded to it to hold the diaphragms in position during construction.



CIRCULATING WATER PUMP HOUSE UNDER CONSTRUCTION

That part of the pump house below ground level was built to form three sections interconnected only by waterways fitted with sluice gates. Lifts are provided to give access to each section.

The intake and outfall culverts for the circulating water system, which were subject to the same conditions as the pump house, had also to be constructed in part on the foreshore, the bulk of the work being carried out between the high water and beyond the low water levels. The work was, therefore, subject to very difficult tidal conditions. Sheet steel cofferdams were built to allow the work to proceed in sections, the excavated sand being pumped from the cofferdams on to the foreshore. The inlet culvert is approximately 300 feet long with an invert level 25 feet below ordnance datum, and the discharge culvert is 560 feet long with an invert level 20 feet below ordnance datum. Both culverts were constructed of reinforced concrete and a travelling shutter was used for the construction of the culverts which have internal cross sectional dimensions of 19 feet by 15 feet. The piles used for the cofferdams were withdrawn or cut off at culvert level.

Approximately 3,100 tons of sheet steel piling were used for the construction of the circulating water pump house and associated works.

Between the pump house and the station, the intake flumes are of spun concrete pipes and the inlet and outlet flumes run the length of the turbine house; they are constructed in reinforced concrete to form a continuous cellular block, three flumes wide by three flumes deep. Six of the flumes are used for the inlet and three for the discharges.

TECHNICAL DETAILS

BUILDINGS AND CIVIL ENGINEERING

The 5,500 reinforced concrete piles that support the main buildings vary in length from 40 feet to 55 feet according to their location; the piles which are 14 inches square section were cast on site.

The ancillary buildings consisting of canteen, workshop and office block are supported on approximately 275 sheet steel box piles.

The main and ancillary buildings are constructed of fabricated steel framing with brick cladding. The turbine house is 740 feet long by 96 feet wide with the tank annexe and feed pump bay adjacent. The three boiler houses are situated at right angles to the northern wall of the turbine house with auxiliary switchgear annexes along each side of the boiler houses. Each boiler house is 225 feet long by 220 feet wide and has a single chimney 300 feet high from ground level constructed of brick and mounted on reinforced concrete pedestals which extend to boiler house roof level. Asbestos decking was used for roof construction and self-centering extensively used for floor construction.

Approximately 16,000 tons of structural steel work will have been used on the main buildings when completed.

The control room, generator transformers and station and unit transformers are placed along the south side of the turbine house and the main administrative block and workshops at the west end of the main building; the 132 kV switch house is 440 feet long by 110 feet wide and is situated on the east side of the main building; the main store which is separate from the main block is a two-storey building 153 feet long by 83 feet wide.

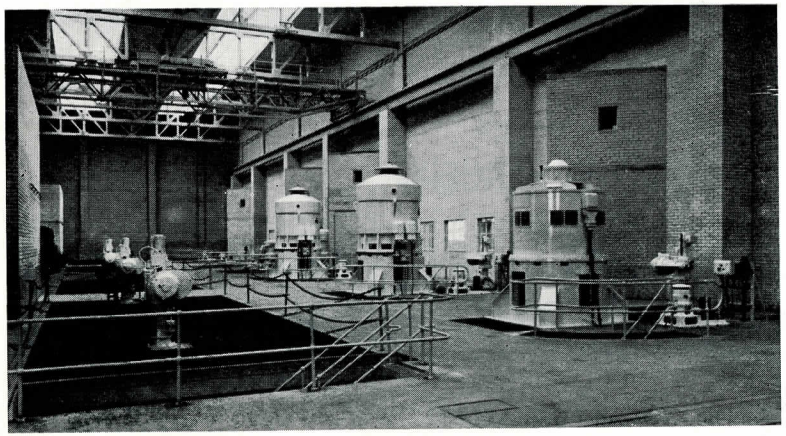
CIRCULATING WATER SYSTEM

Water for cooling purposes is drawn from the Burry estuary by means of seven vertical spindle two-stage axial flow circulating water pumps; each has a capacity of 3,156,000 gallons per hour.

The circulating water passes from the pump house through the surge shaft and inlet flumes to each turbine condenser. Each set is supplied with cooling water from one of these pumps, the seventh pump being held as a standby.

The discharge from each pair of sets is taken through one of the three outlet flumes to the outfall at a point some 1,080 feet upstream.

CIRCULATING WATER PUMPS



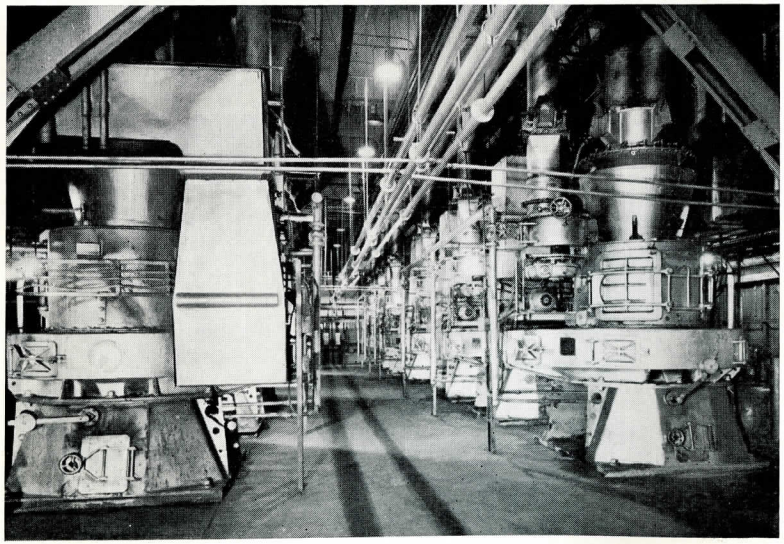
Due to the large tidal range, three of the pumps are driven by variable speed A.C. motors and the remaining four by fixed speed motors.

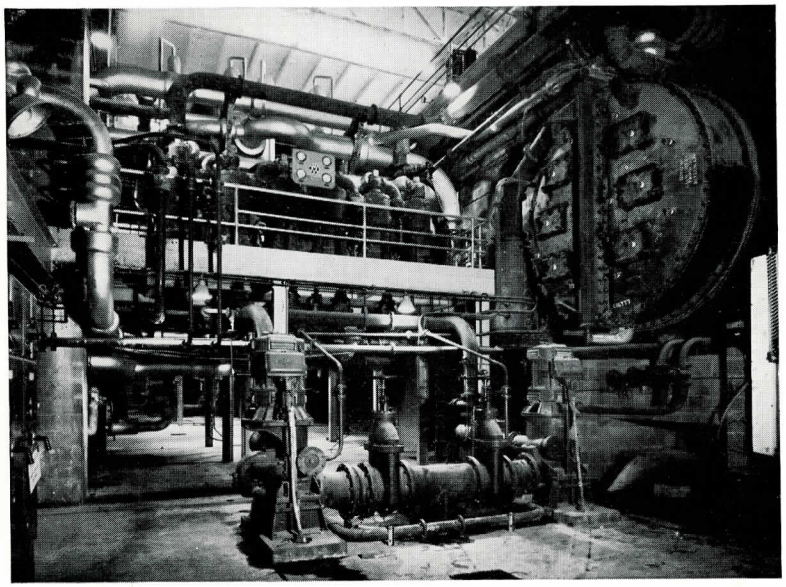
BOILER PLANT

Each of the three boiler houses is designed to accommodate six boilers with a steaming capacity per boiler of 240,000 lb/per hour at a pressure of 940 lb per square inch and a temperature of 925 degrees Fahrenheit but only five boilers per boiler house are being installed initially; the total of 15 boilers will provide sufficient steaming capacity to allow full output of the six generating sets.

Coal is fed from the bunkers into the pulverising plant consisting of three pressure type mills for each boiler; nine down draught burners at the front of the furnace chamber are fired initially from an electrically ignited oil lighting-up system. The draught plant consists of two induced draught, forced draught and primary air

PULVERISING MILLS





CONDENSER

fans per boiler; the induced fans and forced draught fans are driven by variable speed motors. Each forced draught fan takes its suction from the top of the boiler-house and delivers air through a rotary air heater from which a system of ducting distributes air to the combustion chambers. The combustion gases leaving the boiler pass through the economiser, air heaters, mechanical tubular dust collectors and finally through an electrostatic precipitator before being released to the main flue and chimney.

The superheaters are multiloop type, with surface-type attemperators between primary and secondary stages, for control of final steam temperature. Gas by-passing arrangements are also provided.

The economiser is of the multiloop type, disposed in two banks, arranged in parallel on the water side. With feed temperature of 365 degrees Fahrenheit, the estimated temperature at the leaving end of the economiser is 502 degrees Fahrenheit.

Automatic boiler control governs combustion, steam pressure and temperature.

The steam from each set of boilers is delivered to a steam receiver which supplies the associated turbine and the six receivers are interconnected individually and in pairs to make the best use of the boiler capacity.

COAL HANDLING PLANT

Approximately ten miles of marshalling sidings within the station boundary provide facilities for 600 wagons of coal awaiting discharge and 300 empty wagons awaiting removal.

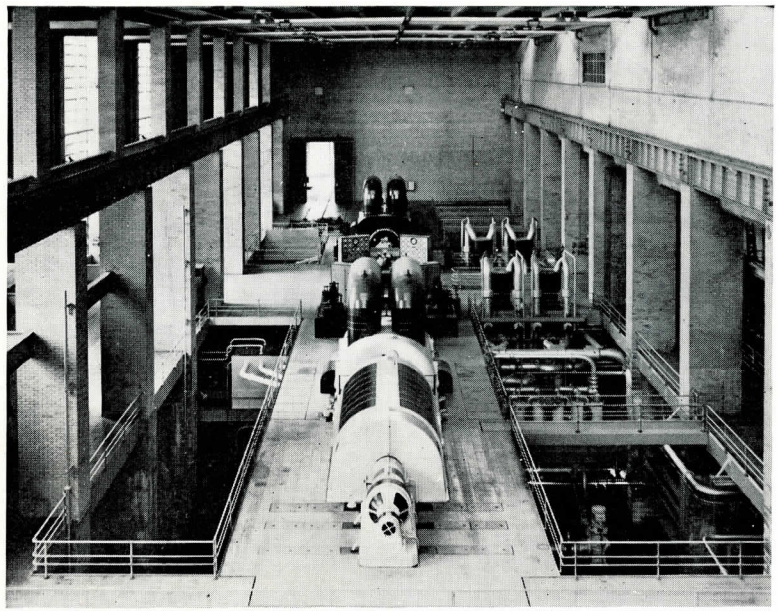
The striking feature of this handling plant is that apart from the wagon tipplers themselves, which are a little way away from the boiler house, none of the coal handling equipment is visible externally. The aesthetic appearance of this station received very careful consideration in the early stages, and it was essential to avoid gantries which would spoil the architectural features of the building. By using belt and gravity bucket conveyors and a space in the chimney base, the handling plant has been completely masked.

The normal coal traffic feeds two tipplers per boiler house and coal is discharged from the tipplers and conveyed to the bunkers after crushing and screening by means of belt and bucket conveyors having a capacity of 75 tons per hour.

The storage area is capable of accommodating 140,000 tons of coal and for stocking purposes the coal is discharged from wagons by tippler on to a stocking-out conveyor after which it is stocked and reclaimed when required by bulldozers and carry-alls, transferred to a travelling telpher and thence into rail wagons for carriage to the boiler house tipplers.

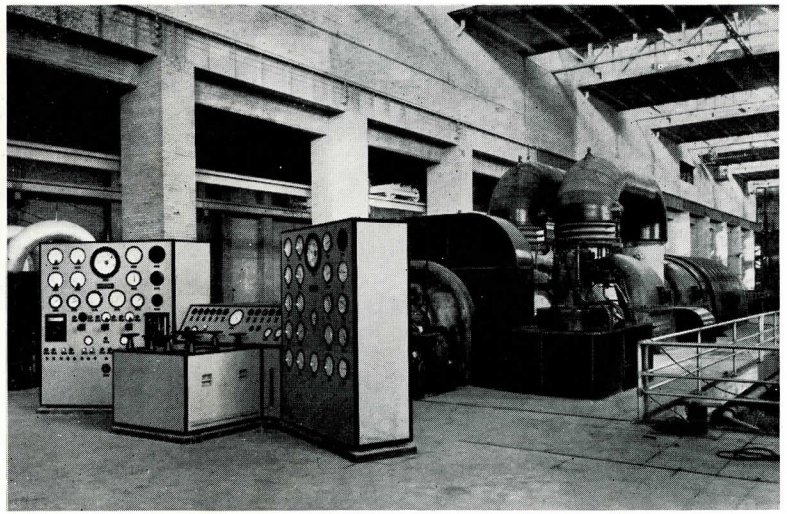
TURBO-ALTERNATORS

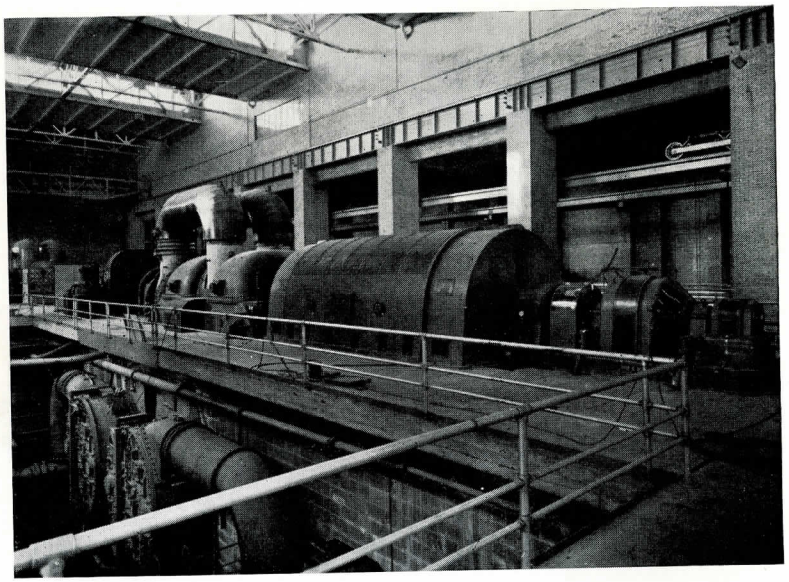
The plant already commissioned consists of two 3-cylinder type 52,500 kilowatt, 3,000 r.p.m. turbines with air cooled alternators.



TURBINE HALL

TURBINE CONTROL PANEL





ONE OF THE [redacted] 52,500 KILOWATT TURBO-GENERATORS WHICH THE STATION WILL HOUSE

BOILER FIRING AISLE

The remaining four will have an output capacity of 60,000 kilowatts at 3,000 r.p.m., these alternators being hydrogen cooled.

Each turbine will be supplied with steam at 900 lb per square inch, 900 degrees Fahrenheit. The condensers are designed for a 29-inch vacuum at a cooling water inlet temperature of 58 degrees Fahrenheit.

After passing through the turbine the steam is exhausted into twin condensers, the air being extracted by two three-stage steam operated air ejectors. The condensate is then removed by vertical extraction pumps which deliver direct to the low pressure stages of the feed heating system, through a high level full duty type de-aerator direct contact heater and thence through the boiler feed pump to the high pressure feed heat stages before final delivery to the boiler.

The alternators generate at a voltage of 11,800 and the output is fed direct into a 63,000 kVA transformer which steps the pressure up to 132,000 volts.

FEED WATER SYSTEM

Three electric pumps and one steam pump are supplied for working in conjunction with two turbo-alternators and five boilers. The pipework on the suction and discharge sides is so arranged that one of the electric feed pumps acts as a standby to each of the main electric pumps. In addition the steam driven pump can operate as a standby to any of the electric pumps.

Feed water make-up obtained from the town's unfiltered supply passes through a water softening plant and evaporating plant. The present softening plant has a capacity of 40,000 lb per hour and there is one live steam evaporator of 20,000 lb per hour capacity per set which feeds into the feed suction line. Feed water treatment by chemical injection into the feed suction line and the boiler drums is provided. A conservator tank is provided for the collection of clean drains and to facilitate boiler emptying without loss of feed water.

ASH HANDLING PLANT

In the first boiler house each boiler is fitted with a dry ash hopper. The ash is discharged at intervals from the hopper to sluiceways and thence to the ash sump, together with the dust collected from the mechanical arrestors, precipitators and flues and is pumped to ashing grounds on the east side of the station. Duplicate ash, sealing and overflow pumps and one ash crusher are provided. As the length of the ash discharge line is 5,000 feet booster ash pumps are used.

The second and third boiler houses will be similarly equipped except that water filled ash hoppers will be installed. Interconnection is provided so that any ash sump can deal with adjacent boiler houses in case of emergency.

The high pressure sluicing water is supplied by four sluice pumps situated in the circulating water pump house.

ELECTRICAL EQUIPMENT

The alternators feed into the Grid transmission system via six main transformers each with a no-load ratio of 11,800/141,600 volts, the first two being of 63,000 kVA capacity and the remaining four 72,000 kVA capacity.

The station auxiliary supplies are obtained from two station transformers of 10,000 kVA capacity with a no-load ratio of 132,000/3,457 volts and from six unit transformers of 6,000 kVA capacity with a no-load ratio of 11,800/3,457 volts. They are all located in houses along the south side of the turbine house and are all water cooled. The generator and station transformers are fitted with on-load tap changing gear.

The unit and station transformers feed the auxiliary network which consists of 3,300 volt, 150 MVA and 415 volt, 25 MVA air insulated air-break gear. The unit and station boards are situated in the switchgear room in the tank annexe with boiler boards, etc., situated in switchgear annexes adjacent to the boiler houses. Air cooled auxiliary transformers of 250 and 500 kVA capacity and no-load ratios of 3,300/433 volts are housed with the switchgear. In addition to these supplies a 150 kVA emergency diesel set maintains essential services in the event of a complete shutdown.

The station battery supplies the direct current for the 132,000 volt and other switchgear, also some emergency lighting.

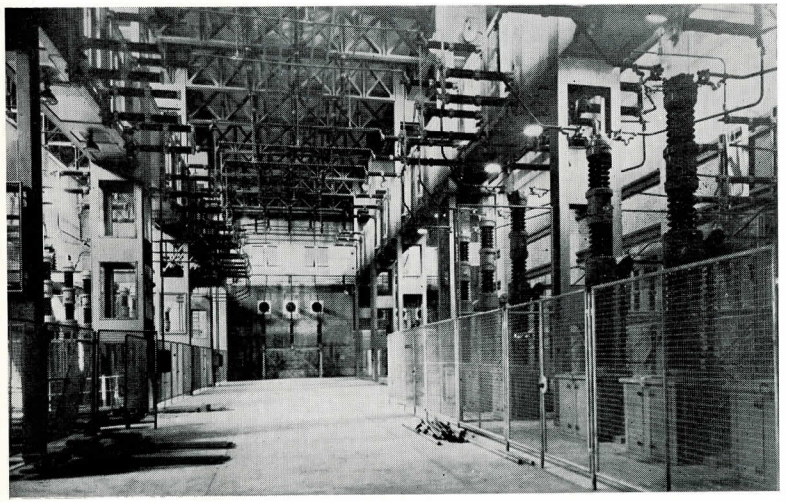
Cable tunnels below the main banks of switchgear, running across and the full length of the turbine house, facilitate cable lay-out and maintenance.

MAIN SWITCHGEAR

The main switchgear operates at 132,000 volts and the arrangement is unusual for this country. The normal outdoor switchgear is housed in a "hall type" building which protects the equipment from the effects of salt spray and results in a considerable saving of floor space.

The switch house is 320 feet long, 90 feet wide and 50 feet high. It is divided into two main halls, east and west, by a central block which houses the feeder and busbar protective gear, compressed air and CO_2 fire fighting equipment, low voltage A.C. and D.C. distribution boards, offices and store accommodation and a room for the main busbar section switch. There is a basement of cellular construction under the whole building for cables and air lines. This has 92 compartments and provides a rigid floor.

132 KV SWITCHHOUSE



Each half of the building has accommodation for 10 circuit-breakers with associated isolators and connections for a double busbar layout. The reserve busbar in each half is in the form of a "U" running along the north, south and central block walls and the two halves are coupled together via isolators and through wall bushings. The main busbar runs down the whole length of the middle of the building and has a section switch with through wall bushings in the central block. Normally all the busbars, which are 38 feet above floor level, are supported by porcelain insulators suspended from the underside of the roof trusses. Access to these busbars for maintenance purposes is by overhead trolley on rails fixed to the underside of the roof trusses and between the busbars. Normally the trolleys are parked over platforms at the ends of the building and entry to them cannot be obtained until the appropriate busbars are earthed.

The busbar and feeder by-pass isolators are mounted vertically above circuit-breaker level, the main and reserve busbar isolators being erected back to back with a screened off passage-way between, from which platforms can be lowered for maintenance work on any isolator. The feeder isolators are mounted horizontally on steel structures in accordance with standard outdoor practice. Electrical and Castell interlocks ensure correct operation and safeguard personnel.

Along the north wall there is provision for eight feeder and two reactor circuits. The feeders are all overhead lines which connect the station and the rest of the Grid system. Two circuits are connected to Tir John with supply points at Llanelly and Trostre ; a third circuit will be connected to Ebbw Vale and a fourth to Upper Boat, both with supply points at Hirwaun, Ystradgynlais and Ammanford. A fifth circuit will be connected to Carmarthen and a sixth to Haverfordwest; the remaining two circuits are spare. The overhead line terminal towers are erected near the switch house wall to enable the lines to be connected directly to the switchgear without the use of cables.

Along the south wall there is provision for six generator, two station transformer and two bus-coupler circuits. The generator and station transformer circuits are cable-connected to their respective

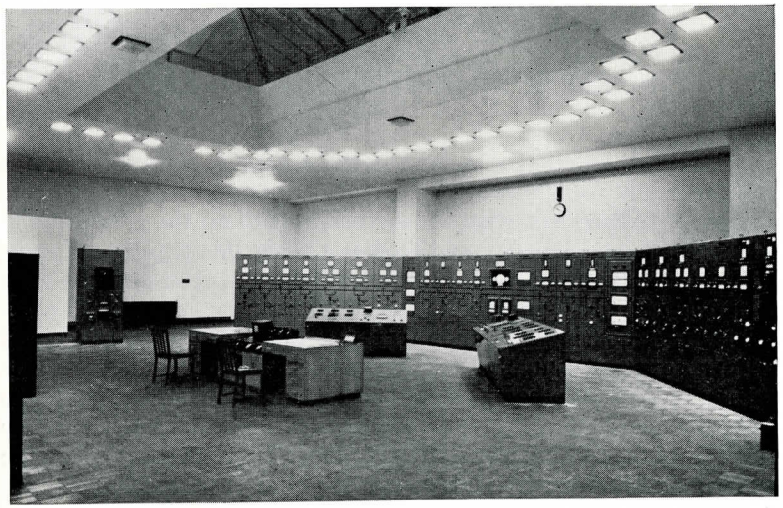
transformers by single core 132,000 volt oil-filled cables laid direct in the ground and terminating in end boxes on the transformers and cable sealing ends at the switch house. The three sealing ends for each circuit are housed in a separate compartment; these compartments are built along and outside the south wall. Single-phase voltage transformers with a ratio of 76,200/63·5 volts are also installed in these compartments.

Paper and oil-insulated condenser bushings are used to carry through walls 132,000 volt inter-connections between (*a*) overhead lines and cables and (*b*) their respective switch units and also for inter-connecting the busbar sections. The bushings are fitted with porcelain weather shields at both ends and accommodate all the protective current transformers.

Air conditioning or heating to minimise the risk of flashover is unnecessary as all insulators are porcelain or porcelain clad.

The risk of fire is almost negligible as very little oil is used. The only items of equipment containing oil are voltage transformers,

CONTROL ROOM



Civil and Plant Details

CIVIL WORKS

CIVIL ENGINEERING CONSULTANTS:—
Balfour, Beatty & Co. Ltd.

MAIN BUILDINGS

TURBINE ROOM
Length 740 ft.
Width 96 ft.
Height above ground level 60 ft.
Depth below ground level 26 ft.

TANK ANNEXE
Length 713 ft. 6 in.
Width 30 ft.
Height above ground level 113 ft.
Depth below ground level 26 ft.

BOILER HOUSES (3)
Dimensions of each:
Length 225 ft.
Width 220 ft.
Height above ground level 113 ft.
Depth below ground level 13 ft.

WELFARE AND OFFICE BLOCK
Length 208 ft.
Width 48 ft.
Height above ground level 31 ft.
Number of reinforced concrete piles 5,517.
Average length of piles 55 ft.
Structural steelwork 16,000 tons.
No of bricks 11,500,000

CHIMNEYS (3)
Height above ground level 300 ft.
Internal diameter at exit 20 ft.
Type of construction, brick with concrete pedestal.

STORES BUILDING
Length 153 ft.
Width 83 ft.
Height 36 ft.

132 kV SWITCH HOUSE (HALL TYPE)
Length 440 ft.
Width 110 ft.
Height above ground level 50 ft.
Structural steelwork 1,186 tons.
Foundations: Raft construction.

CIRCULATING WATER PUMP HOUSE
Length 240 ft.
Width 130 ft.
Height above ground level 47 ft.
Depth below ground level 55 ft.
Number of diaphragms 6.
Structural steelwork 509 tons.

CIRCULATING WATER CULVERTS
Length of intake 300 ft.
Pump house to turbine room 180 ft.
Length of culverts in turbine room 750 ft.
Length of discharge 560 ft.
Type of construction: Reinforced concrete and spun concrete pipes.

RAILWAY SIDINGS
Total length of sidings 10 miles.
Capacity of full wagon sidings 600 wagons.
Capacity of empty wagon sidings 300 wagons.
Handling rate 700 tons per hour.

TURBO-ALTERNATORS

Manufacturer: Metropolitan-Vickers Ltd.
Turbines: Six—Multistage impulse type turbines, 3 cylinder, operating at 900 p.s.i. and 900°F.
Speed: 3,000 r.p.m.
Alternators: Nos. 1 and 2—52·5 MW air cooled. Nos. 3 to 6—60 MW hydrogen cooled.
Hydrogen pressure: 0·5 p.s.i. gauge
Voltage: 11·8 kV.

CONDENSING PLANT
Nos. 1 and 2
Twin condensers 2 pass.
Capacity 330,000 lb/hr.
Cooling water 44,000 g.p.m.
Vacuum 29 in. (Bar 30 in.) with C.W. at 58°F.

Nos. 3 to 6
Twin condensers 2 pass.
Capacity 377,000 lb/hr.
Cooling water 50,000 g.p.m.
Vacuum 29 in. (Bar 30 in.) with C.W. at 58°F.

FEED HEATING PLANT
Five stage.
Two L.P. heaters
One de-aerator.
Two H.P. heaters.
Final feed temperature:
Nos 1 and 2—365°.
Nos. 3, 4, 5 and 6—380°. Full Load.

STEAM RAISING PLANT

BOILERS
Manufacturer: Babcock & Wilcox, Ltd.
No.: 15.
Capacity: 240,000 lb/hr, 940 p.s.i., 925°F.
Type: High head, single drum P.F.
Furnace heating surface: 4,375 sq ft.
Furnace volume: 21,900 cu. ft.
Superheater: multiloop draining type with primary and secondary heating surface:
Primary 8,150 sq ft.
Secondary 2,900 sq ft.
Attemperators: surface type, two per boiler.
Economisers: multiloop type.
Heating surface: 9,600 sq ft.

AIR HEATERS
Manufacturer: James Howden & Co., (Land) Ltd.
No. per boiler: Two.
Contra-flow Ljungstrom vertical type.
Heating surface (each) 34,200 sq ft.

FIRING EQUIPMENT
P.F. mills: Babcock & Wilcox, Ltd, Type 'E,' size 44, three per boiler.
P.F. burners: 10 in vertical type, nine per boiler.
Oil lighting-up equipment: four pressure atomising oil burners.

F.D. FANS
Manufacturer: Davidson & Co. Ltd.
Type: 60¾ in dia. single inlet backward bladed.
Capacity: 39,700 c.f.m. at M.C.R.
No. per boiler: Two.

I.D. FANS.
Manufacturer: Davidson & Co. Ltd.
Type: 81 in dia. single inlet radial bladed.
Capacity: 62,000 c.f.m. at M.C.R.
No. per boiler: Two.

P.A. FANS
Manufacturer: Davidson & Co. Ltd.
Type: 72½ in dia. single inlet backward bladed.
Capacity: 26,000 c.f.m.
No. per boiler: Two.

DUST COLLECTORS
Manufacturer: Prat-Daniel (Stanmore) Ltd.
Type: 3 R.A.S.5 (12 x 15) tubular.
Capacity: 60,800 c.f.m.
No. per boiler: Two.

ELECTROSTATIC PRECIPITATORS
Manufacturer: Sturtevant Engineering Co., Ltd.
No per boiler: One.

FEED PUMPS
Manufacturers:
Harland Engineering Co., Ltd.
G. & J. Weir & Co., Ltd.
Electric feed pumps—
Capacity: 550,000 lb/hr.
Speed: 3,000 r.p.m.
No.: Nine.
Steam feed pumps—
Capacity: 550,000 lb/hr.
Speed: 5,000 r.p.m.
No.: Three.

TANKS

Manufacturer: Braithwaite & Co. (Structural) Ltd.
Town main storage (1): 23,000 gals cap.
Reserve feed water (6): 26,300 gals cap.
Raw water (3): 23,000 gals cap.
Treated water (2): 26,300 gals cap.

EVAPORATORS

Manufacturer: Aiton & Co., Ltd.
Type: Triple effect.
Capacity: 20,000 lb/hr.

CIRCULATING WATER PLANT

PUMPS

Manufacturer: Vickers Armstrong, Ltd.
Type: Axial flow, 2-stage, propellor type.
Number: Seven.
Capacity: 52,600 g.p.m. at 365 r.p.m. against a total head of 25 ft.

MOTORS

Manufacturer: Laurence, Scott & Electromotors Ltd.
Three A.C. variable speed 935/193 b.h.p., 472/262 r.p.m.
Manufacturer: British Thomson Houston Co., Ltd.
Four constant speed 560 b.h.p., 365 r.p.m.

C.W. SCREENS

Manufacturer: F. W. Brackett & Co., Ltd.
Type: Central Flow band type 60 in.
Capacity: 3,156,000 gals/hr.
Number: Seven.

COAL HANDLING PLANT

Manufacturer: Babcock & Wilcox, Ltd.

CONVEYORS

Six belt 24 in. size.
Twelve gravity bucket.
Capacity: Each conveyor 75 tons per hour.

COAL CRUSHERS

Type: 36 in. x 36 in. flextooth.
No.: Six.
Capacity: Each 75 tons per hour.

SCREENS:

Type: "Niagara" single deck.
No.: Six.
Capacity: Each 75 tons per hour.

COAL RECLAIMING TRANSPORTER

Capacity: 100 tons per hour.

TIPPLERS

Manufacturer: Strachen & Henshaw, Ltd.
Capacity: 240 tons per hour.
Maximum lift: 24½ ton wagon.
No.: Seven.

STOCKING-OUT CONVEYOR

Manufacturer: Rhymney Engineering Co., Ltd.
Type: Belt.
Capacity: 125 tons per hour.

BUNKERS

Manufacturer: South Durham Steel & Iron Co., Ltd.
No.: Three per boiler house.
Capacity: 375 tons per boiler.
Construction: Steel.

COAL STORAGE AREA

Capacity: 140,000 tons.

ASH HANDLING PLANT

Manufacturer: B.V.C. Industrial Constructions Ltd.

ASH HOPPERS

Type:
5 boilers—dry hopper.
10 boilers—water filled hoppers.

ASH SUMPS

One per boiler house.

PUMPS PER BOILER HOUSE

Two ash pumps 1,600 g.p.m.
Two ash booster pumps 1,600 g.p.m.
One h.p. sluicing pump.
Two sealing water.
Two overflow.

ASHING AREA

85 acres.

ELECTRICAL PLANT

132 kV SWITCHGEAR

Manufacturer: Ferguson Pailin Ltd.
Type: Air blast.
Rupturing capacity: 2,500 MVA.

3·3 kV SWITCHGEAR

Manufacturer: British Thomson Houston Co., Ltd.
Type: Air break.
Rupturing capacity: 150 MVA.

415 VOLT SWITCHGEAR

Manufacturer: British Thomson Houston Co., Ltd.
Type: Air break.
Rupturing capacity: 25 MVA.

TRANSFORMERS

Manufacturer: A.S.E.A.
Six Generator Transformers—
Nos. 1 and 2—63 MVA.
Nos. 3 to 6—72 MVA. No load ratio 11·8/141·6 kV.
Two Station Transformers—
10 MVA. No load ratio 132/3·457 kV.
Six Unit Transformers—
6 MVA. No load ratio 11·8/3·457 kV.

AUXILIARY TRANSFORMERS

Manufacturer: Hackbridge & Hewittic Electric Co., Ltd.
Capacity 250 and 500 kVA, 3·3 kV/433 V.

LIGHTING

Metropolitan-Vickers Electrical Co., Ltd.

DIESEL SET

Manufacturer: National Gas & Oil Engines Ltd.
Capacity: 150 kVA.

CRANE

Manufacturer: Cowans, Sheldon & Co., Ltd.
Type: 130 ton turbine room crane.

132 kV CABLE CONNECTIONS

Manufacturer: Pirelli General Cable Works, Ltd.
Generator and Station Transformer Cables: 132 kV single core oil filled.

MAIN AND SUB-CONTRACTORS NOT MENTIONED IN CIVIL ENGINEERING AND PLANT SECTIONS

Foundations and superstructure, river works and pump house, railway sidings, L.P. pipework, L.V. cabling	Balfour, Beatty & Co. Ltd.
Dewatering system	Millars Machinery Co. Ltd.
Steelwork	South Durham Steel & Iron Co. Ltd.
Windows (Metal)	Henry Hope & Co. Ltd.
Windows (Glascrete)	J. A. King & Co. Ltd.
Floors	Self-Sentering Expanded Metal Co. Trussed Concrete Steel Co. Ltd. Universal Asbestos Manfg. Co. Ltd. Bettles & Co. Ltd.
Floor finishes	Prodorite Ltd. A. M. Macdougall & Sons Ltd.
Roof decking	Universal Asbestos Co. Ltd.
Asphalting	Wm. Briggs & Sons Ltd. General Asphalte Co. Ltd. Faldo Asphalte Co. Ltd.
Precast stonework	Gloucester Stone Co. Ltd.
Staircases	Frederick Braby & Co. Ltd. Haywards Ltd.
Painting	E. Edgar Williams & Sons. Ian Williams & Co. Ltd. Baxter Bros.
Concrete pipes	Sharp Jones & Co. Ltd.
Hot water and space heating	G. N. Haden & Co. Ltd.
Chimneys and brick flues	Chimneys Limited.
Precipitator casings	J. L. Kier & Co.
Boiler control instrument panels	Bailey Meters & Controls Limited.
Thermal insulation	Newalls Insulation Co. Ltd.
H.P. valves	Dewrance & Co. Ltd. Hopkinsons Ltd.
L.P. valves	Alley & McLellan Ltd. Blakeborough & Sons Ltd.
H.P. pipework	Stewarts & Lloyds Ltd.
Water treatment plant	Paterson Engineering Co. Ltd.
Chemical injection plant	Permutit Co. Ltd.
Vacuum cleaning plant	Sturtevant Engineering Co. Ltd.
Air compressors	Broom & Wade Ltd.
Locomotives	Andrew Barclay, Sons & Co. Ltd.
Caterpillar tractors	Jack Olding & Co. Ltd.
Carryalls	Frederick Myers & Co. Ltd.
415 *V fusegear*	Simplex Electric Co. Ltd.
Batteries and rectifiers	Alton Battery Co. Ltd.
Cables	Britannic Cable Co. Pirelli General Cable Co. Ltd. B.I.C.C. Co. Ltd. Hackbridge Cables Ltd.
132 *kV transmission lines*	British Insulated Callender's Construction Co. Ltd.
Lighting and heating circuits 132 *kV switch house*	R. Alger & Sons Ltd.

BRITISH ELECTRICITY AUTHORITY

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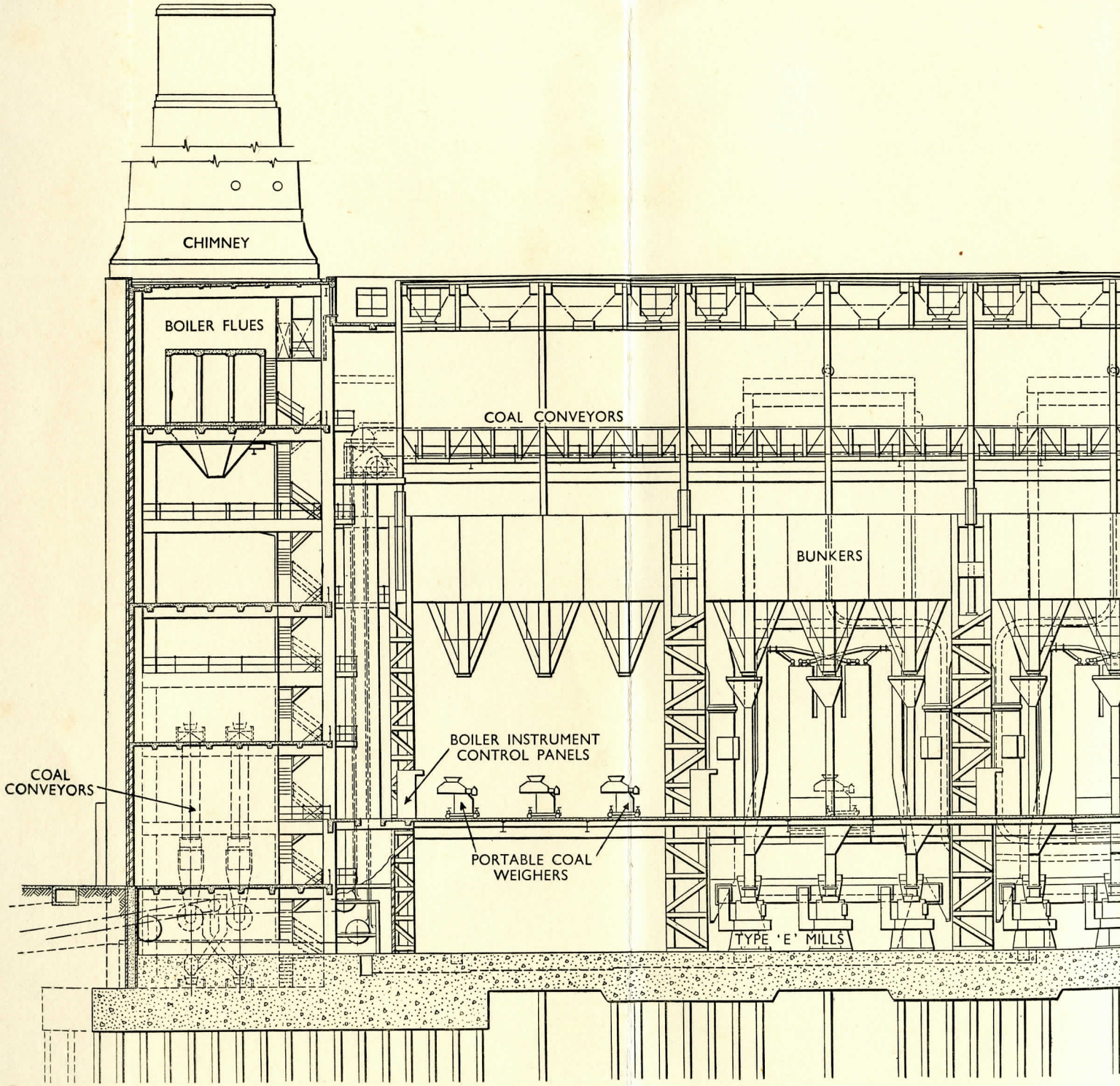

CARMARTHEN BAY

SECTION THROUGH BOILER HOUSE & TURBINE ROOM