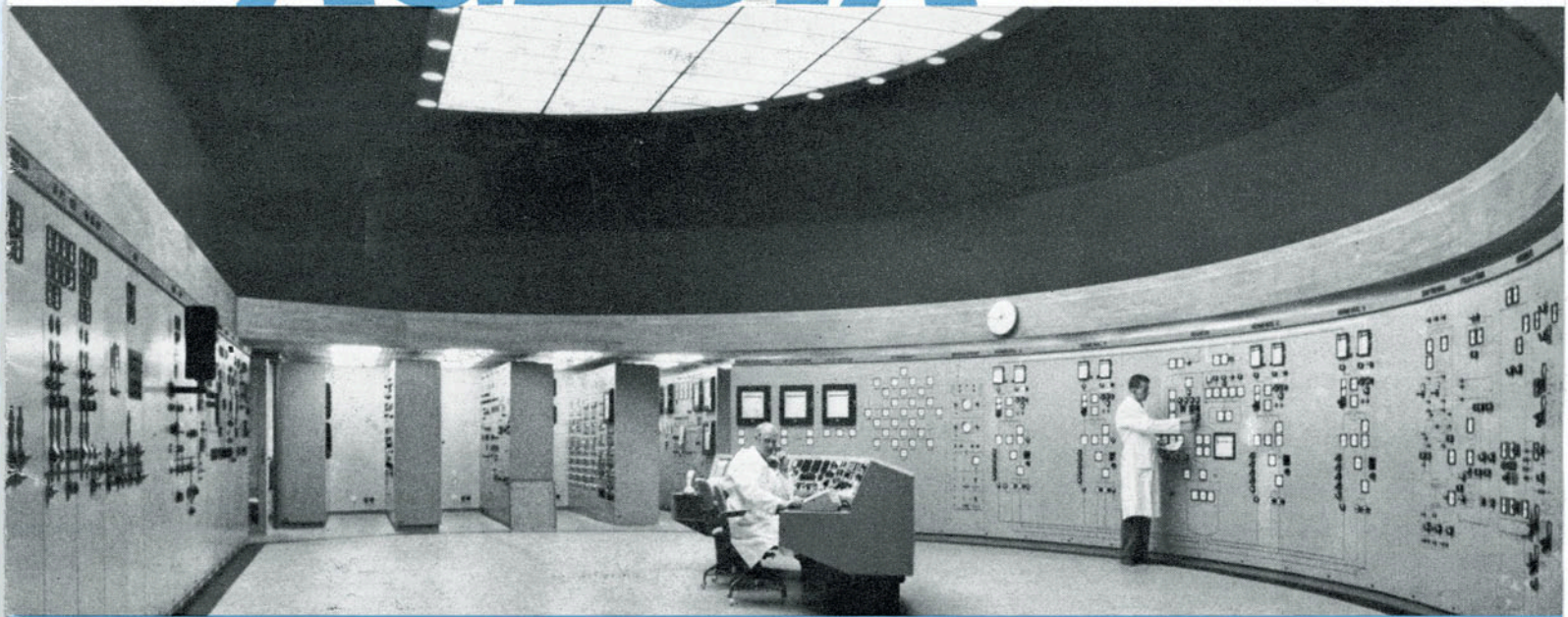
ÅGESTA

Sweden's First Grid-connected Nuclear Power Station



Ågesta Nuclear Power Station is open for group visits subject to prior notification to AB Atomenergi, Informationsbyrån, (Postbox, Stockholm 43, Sweden. Telephone: Stockholm 18 80 20) or directly to the Station, telephone 94 04 60. For space reasons groups should not exceed 50 persons. The tour, which is free of charge, usually takes at least 1½ hours.

AKTIEBOLAGET ATOMENERGI
THE SWEDISH ATOMIC ENERGY COMPANY

Liljeholmsvägen 32, Stockholm Sv, Sweden

ågesta

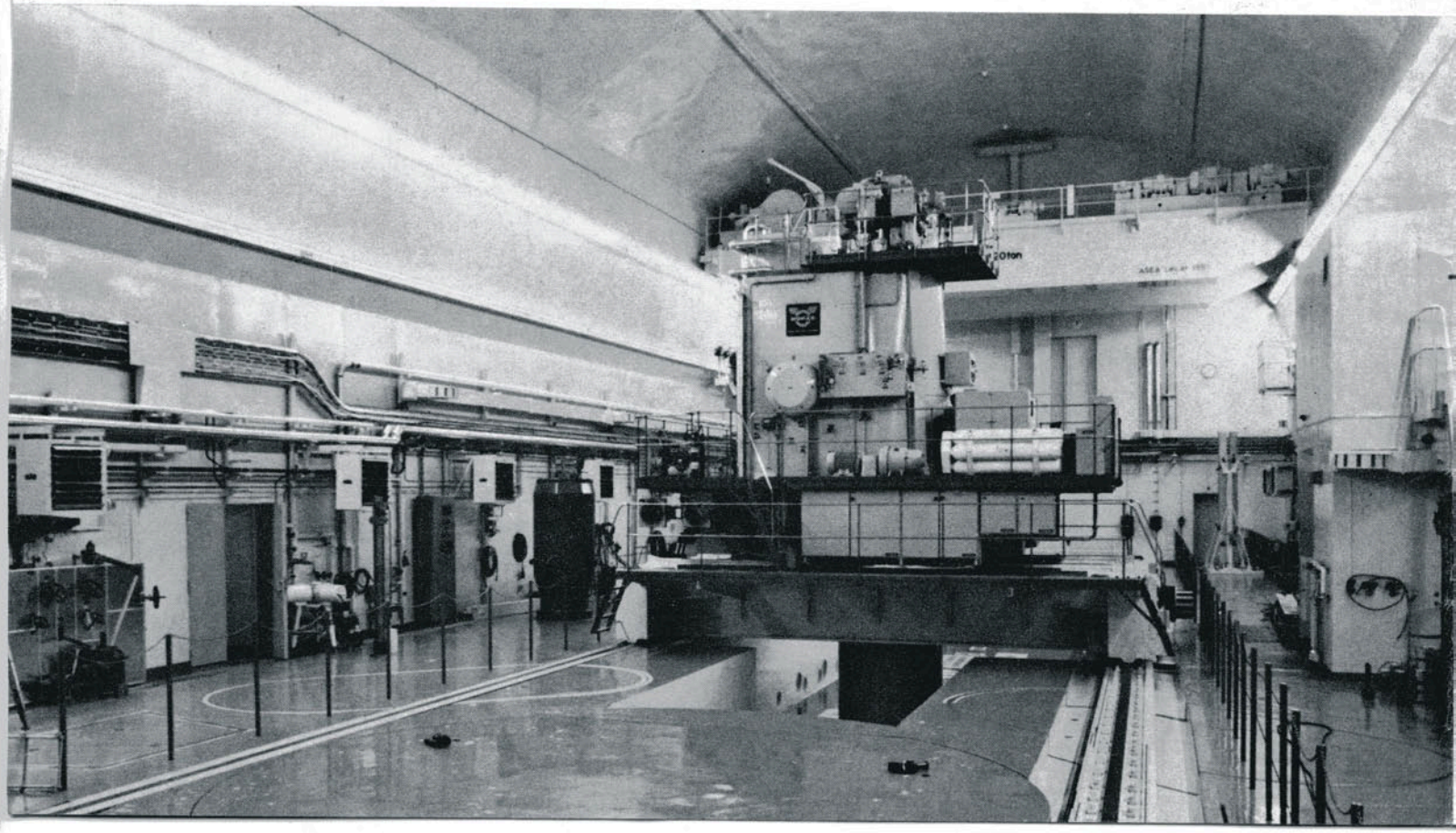
represents the important first step by Swedish industry in reactor development. It is the first nuclear power plant in the world of the pressure vessel type using natural uranium as fuel and heavy water both as moderator and coolant.

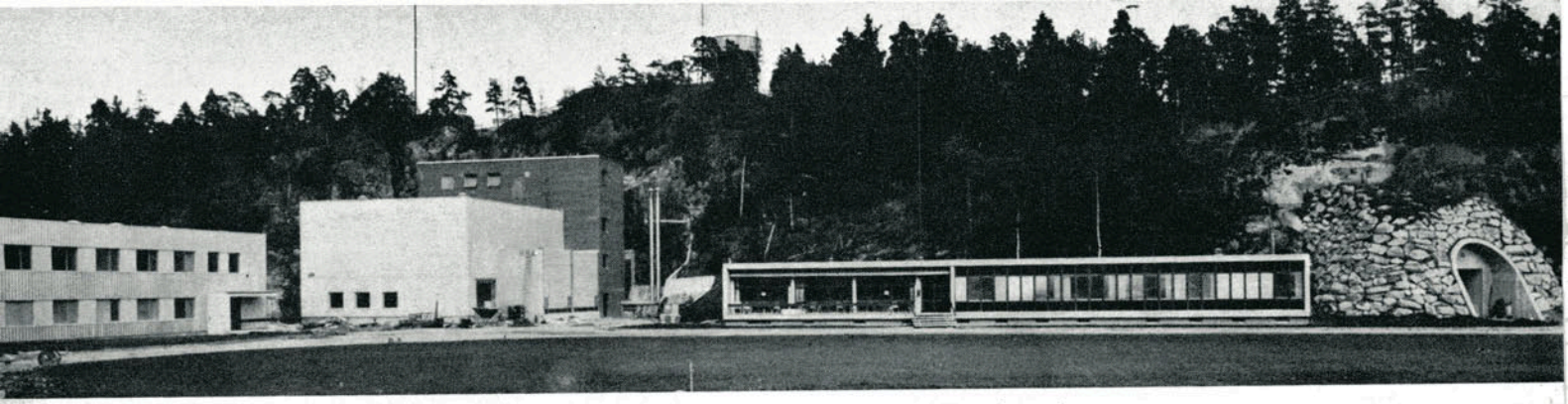
Ågesta puts Sweden among the few countries which at this early stage have gained direct experience in the design, manufacture, erection and operation of power reactors. Ågesta has been built in partnership by the Swedish Atomic Energy Company, the State Power Board and the Stockholm Electricity Authority.

The fuel for the reactor — designed and manufactured by the Atomic Energy Company — comprises 18 tons of uranium dioxide distributed between 140 fuel elements. The uranium is of domestic origin, extracted at a pilot plant at Kvarntorp, predecessor to the uranium plant at Ranstad. The fuel elements are lowered into the reactor vessel and surrounded by heavy water, which has the double functions of moderator and coolant. The neutrons which cause atomic fission are slowed down by the moderator, increasing their efficiency in promoting chain reaction. The reaction is controlled by control rods containing a material which absorbs neutrons.

Development continues in the Marviken nuclear power station on Vikbolandet, approximately 50 kilometres east of Norrköping. This will give 140,000 kW in the first stage and 200,000 kW when the planned internal nuclear steam superheating is introduced at a later stage. After Marviken the aim is to evolve economical reactor plants of 500,000 kW and up, which will be needed in the Swedish power supply system in the early 1970's. The research station at Studsvik plays a central role in this work. It is anticipated that by 1980 Sweden will have nuclear power stations with a total capacity of more than 4,000,000 kW.

The underground reactor hall is dominated by the refuelling machine, which in a sealed process installs and replaces fuel elements and control rods in the reactor.





This view of the Ågesta power station shows, left to right, the laboratories and workshops, turbine hall, office building, and the access tunnel to the underground reactor hall.

project logbook

Nov. 1956	Preliminary study for a reactor using natural uranium and heavy water, and intended for district heating.
Nov. 1957	First round fired for the blasting of the underground chaber at Ågesta.
Jan. 1960	Blasting of rock chamber completed.
Dec. 1962	Trial operation commenced with light water in the primary system; first trial charge of fuel elements and controls.
June 1963	Heavy water introduced and charging to criticality commenced.
July 1963	Reactor went critical — self-sustaining controlled chain reaction achieved — for first time.
Spring 1964	First operational period at full power, with continuous generation of heat and electricity.

contributions by Swedish industry

Swedish industry has determined to gain from the Ågesta project the maximum of technical experience. ASEA has acted as principal contractor for the reactor and been responsible for its erection. Important components, such as the reactor vessel and the refuelling machine, have been supplied by Uddeholm/Degerfors Järnverk and NOHAB, Trollhättan. Rosenblads Patenter and Jönköpings Mekaniska Verkstad were responsible for the steam generators. Pipework was installed by Värmebolaget-Naumburg. A large number of other firms have participated as subcontractors. Two Swedish enterprises — ASEA and the Johnson Group — can now quote fixed prices for nuclear reactors for erection in Sweden or abroad.

leading particulars

Thermal output, total	65,000 kW	Fuel (uranium dioxide)	18 tons	No. of control rods	29
Thermal output to district heating main	55,000 kW	No. of fuel elements	140	Pressure vessel, working pressure	35 kg/cm^2
Electrical output	10,000 kW	Temp. of heavy water, inlet	205°C	diameter	4.7 m.
Heavy water	67 tons	outlet	220°C	height	6.0 m.
				weight	63 tons

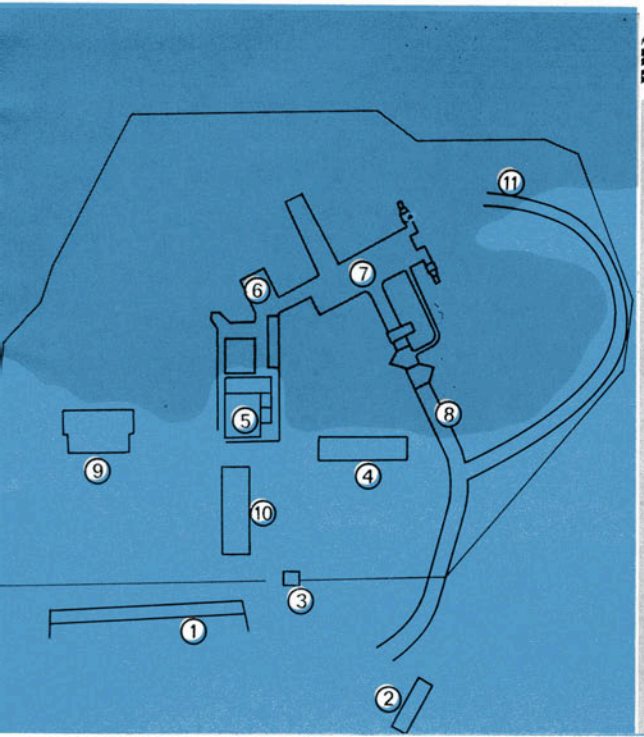
safety and responsibility

A nuclear power plant situated in the vicinity of a large city must clearly be designed in conformity with strict safety requirements. Such requirements were formulated right from the start of the design work for Ågesta, have been applied at all stages of manufacture and form the basis of the extensive inspections carried out on all components and for the power station operating instructions. Every system of significance from the safety aspect has been subject to multi-stage examination by the AB Atomenergi's safety experts, reporting to the national inspection authorities The Atomic Energy Board and the Radiation Protection Institute, before being approved for service. The reactor has been designed on fail-safe principles and the various systems automatically counter potentially dangerous abnormalities. Within broad limits, the control system can regulate the reactor in a satisfactory manner.

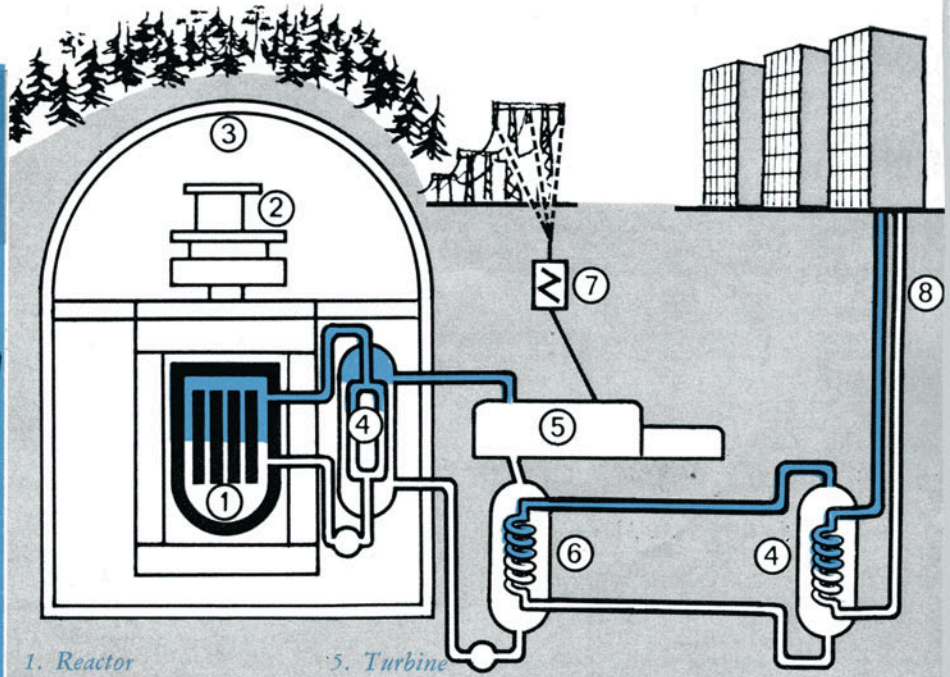
The treatment, control and discharge of effluents from the station are in accordance with judgements handed down by the Water Rights Courts. The radioactivity of the effluent is within the limits of variation in naturally occurring radioactivity.

Key Plan

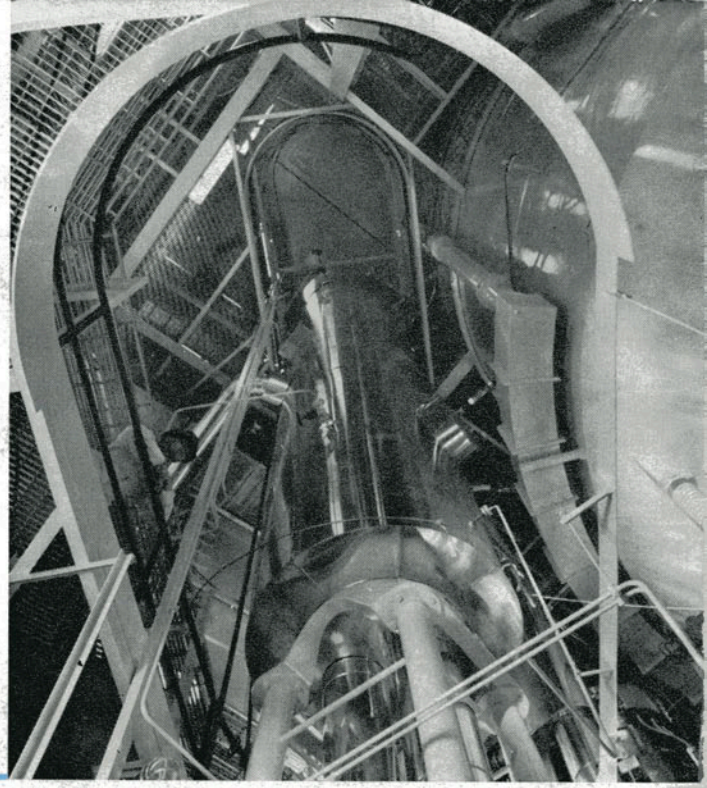
1. Car park. 2. Information. 3. Gatehouse. 4. Administration. 5. Turbine hall. 6. Control room. 7. Reactor hall. 8. Access tunnel. 9. Waste disposal. 10. Laboratory and workshops. 11. Ramp to cooling-tower level.



Energy released in nuclear fission is converted into heat. This is carried by the heavy water to four large steam generators in which ordinary water is turned to steam. The steam drives a turbogenerator and is subsequently condensed, the heat then given off being transported through a 3.5-kilometre conduit under the Magelungen Lake to the suburb of Farsta. From further heat exchangers the heat is distributed to homes and other buildings in the suburb.



1. Reactor
2. Refuelling machine
3. Steel lined containment
4. Heat exchanger
5. Turbine
6. Condensor
7. Transformer
8. District heating pipes



One of four main steam generators at Ågesta. At right is seen the concrete shield surrounding the reactor vessel.

Further information about Ågesta in particular and Swedish nuclear power in general can be obtained from AB Atomenergi, Information Office, Stockholm 43, Sweden. Tel. 18 80 20.

September 1965. SL-Reklam STÅLHAMMAR/ZETTERQVIST 652514

Ågesta Nuclear Power Station

is situated 4 kilometres south of the shopping centre at Farsta, to which the "T-banan" (underground) runs. There is no bus service to Ågesta but taxis are available at Farsta. There is a car park at the power station.

Tours commence in the information building outside the power station area.

Visitors are usually given a general orientation on the power station and its role in the Swedish nuclear power programme, shown a film and given an opportunity to ask questions. In the power station they are shown the turbine hall, control room and — by closed circuit TV — the reactor hall.

The film about the Ågesta power station, entitled "Atoms in Everyday Life", describes the arrangement of the station and the manufacturing at Swedish factories of the more important components. An animated section demonstrates the conversion of nuclear energy to electricity and heat. The film (25 min., 16 mm., optical sound track) is available to schools, institutions, associations, etc.