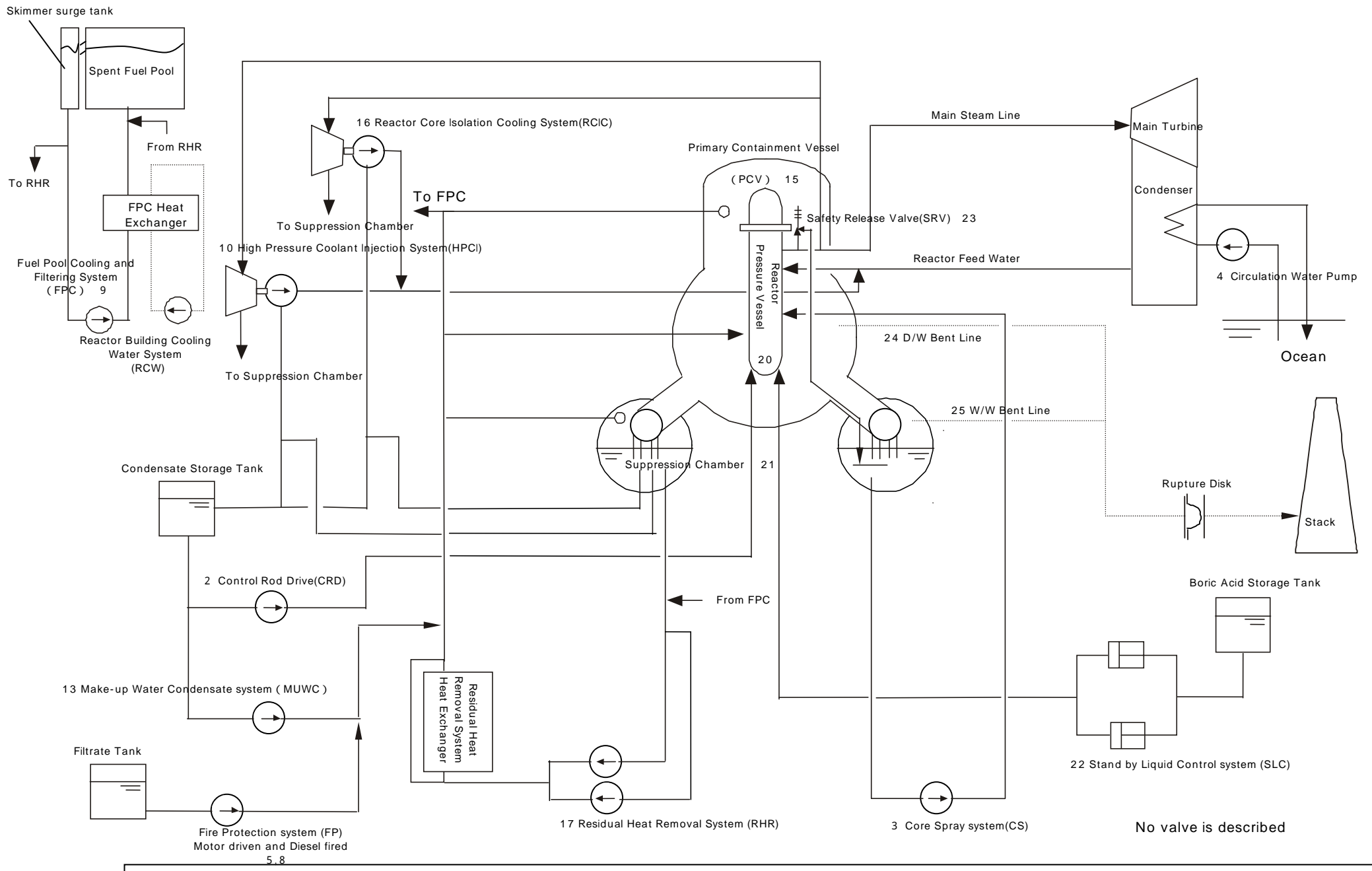
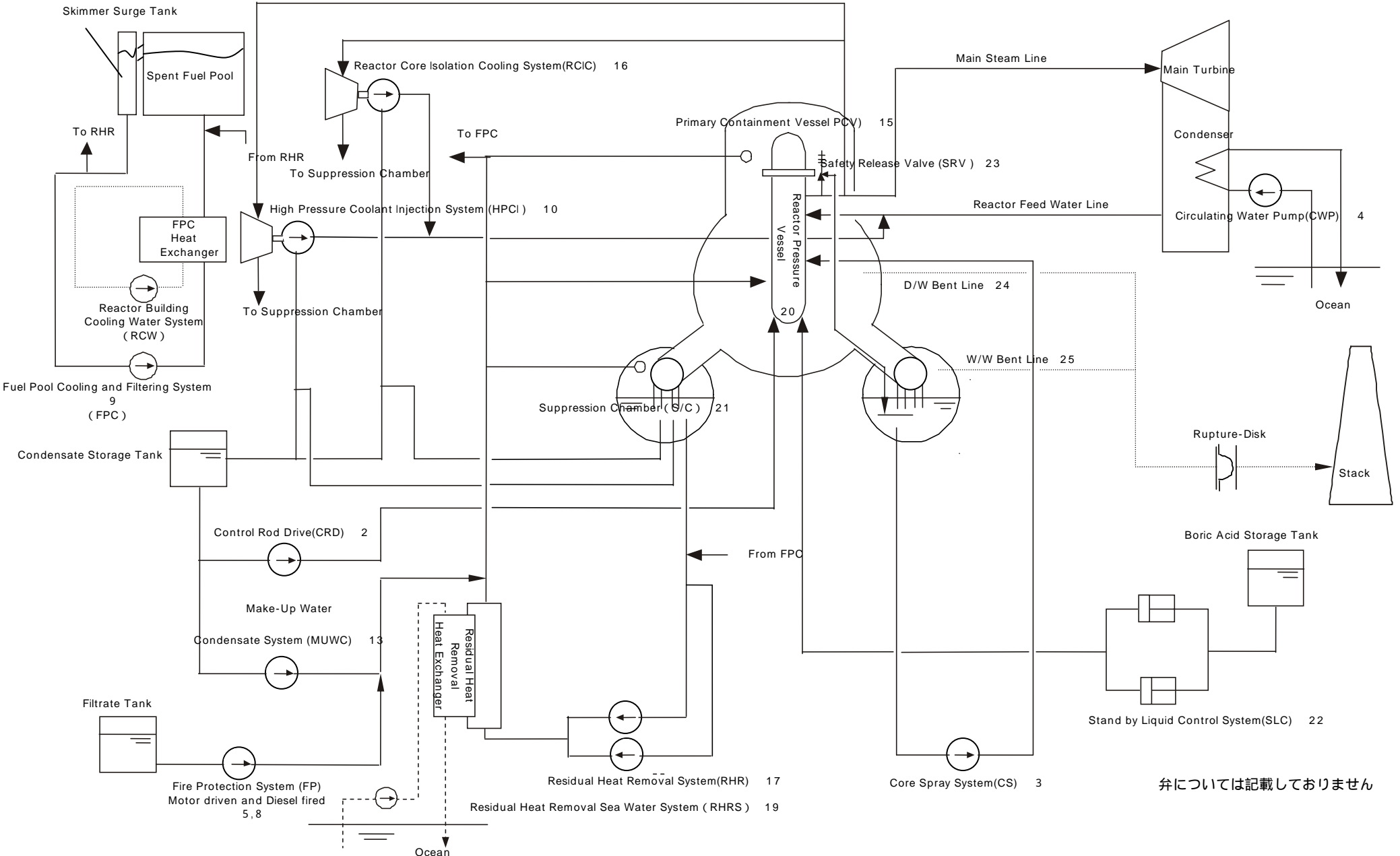


No valve is described

Outline of facility structure of Unit 1 of Fukushima Daiichi Nuclear Power Station

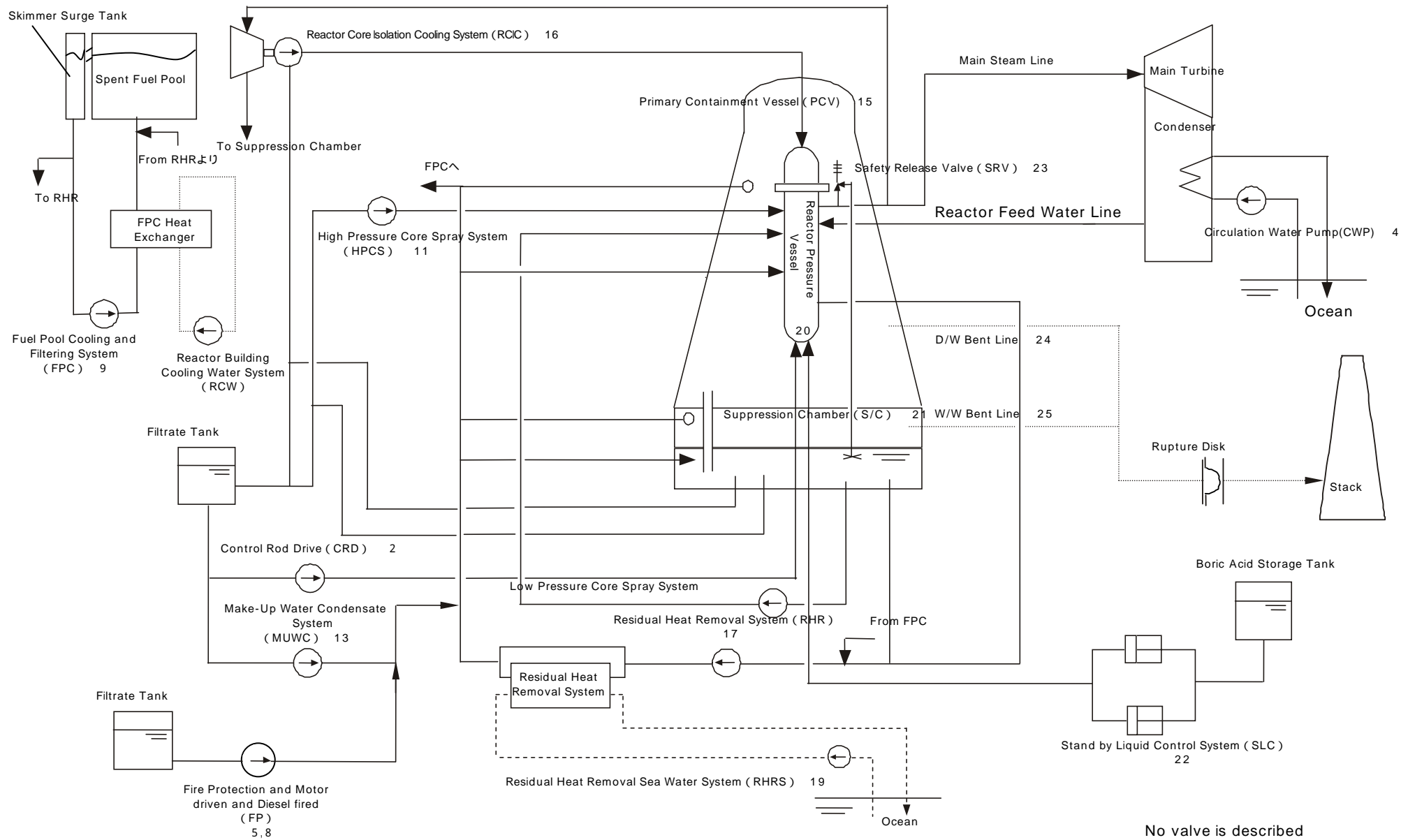


Outline of facility structure of Unit 2 to 4 of Fukushima Daiichi Nuclear Power Station

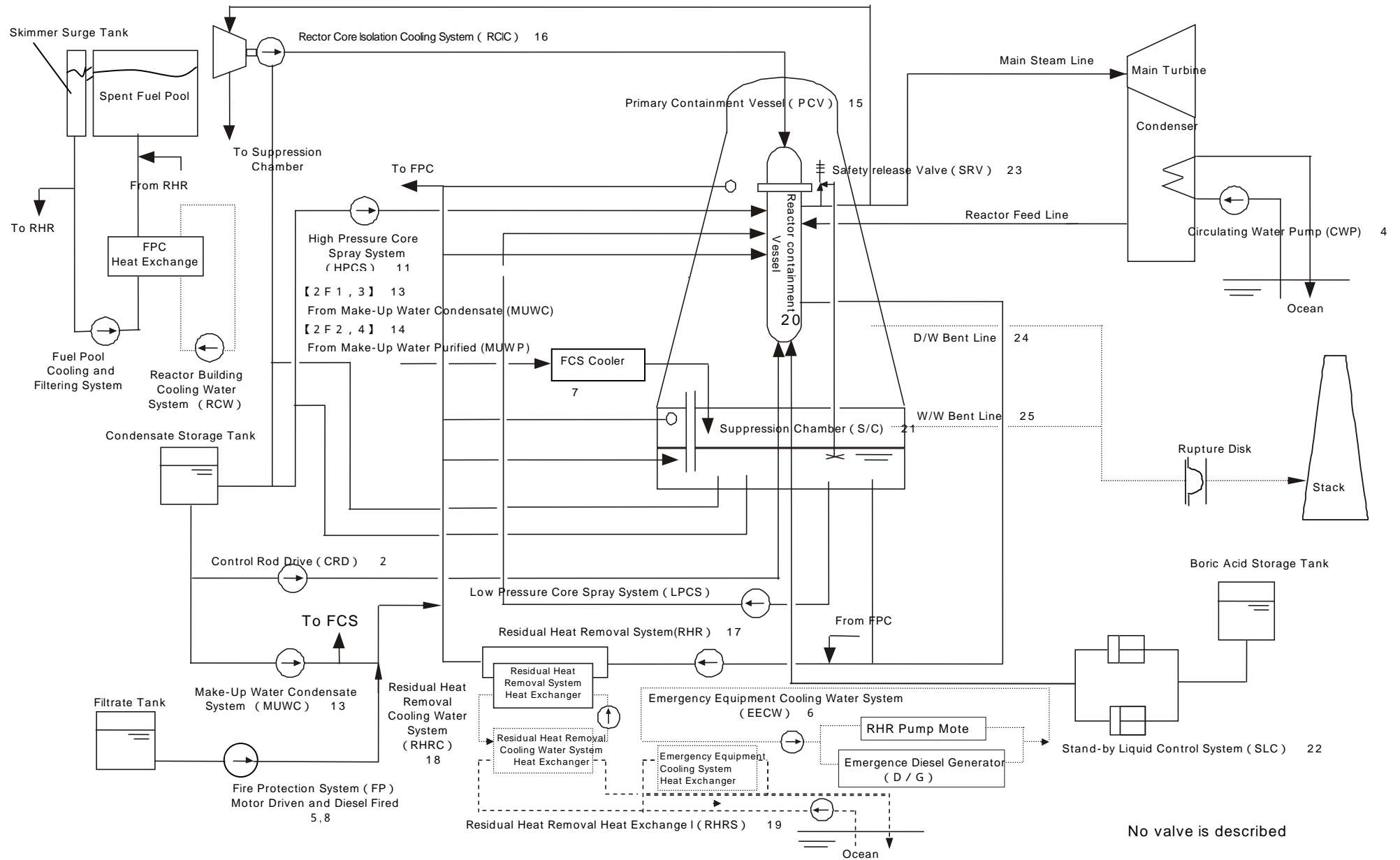


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Outline of facility structure of Unit 5 of Fukushima Daiichi Nuclear Power Station



Outline of facility structure of Unit 6 of Fukushima Daiichi Nuclear Power Station



Outline of facility structure of Unit 1 to 4 of Fukushima Daini Nuclear Power Station

Terminology at Nuclear Power Station

* Shown in exhibits

AO valve: Air Operated Valve

A valve works with compressed air.

APD: Alarm Pocket Dosimeter

An audible alarming personal dosimeter with a semiconductor detector; A wearer can record a subject and time of work on it.

CCS: Containment Cooling Spray System

*1 An equipment to spray water into a primary containment vessel (PCV) installed only in Unit 1 of Fukushima Nuclear Power Station in case its pressure and temperature increase due to a loss-of-coolant accident (LOCA). This is one of the alternative water injection methods in accident management.

CRD: Control Rod Drive

*2 Devices to pull out or insert CRs by a signal from Reactor Manual Control System. These pull out or insert CRs in normal situation. In case of emergency, the drives make CRs insert at high speed (scram) to prevent fuel from being damaged by manual or an automatic signal from RPS.

CS: Core Spray System

*3 A Part of Emergency Core Cooling System; a system to spray cooling water from top of the reactor core and cool it in order to prevent fuel and fuel cladding tubes from being damaged due to overheating of fuel in case of a loss-of-coolant accident (LOCA). The system is installed in Units 1 to 5 of Fukushima Daiichi Nuclear Power Station.

CWP : Circulating Water Pump

*4 Steam which work at main turbine is cooled and condensed at main condenser. Sea water is used to cool main condenser and it is called Circulating Water Pump(CW). CWP is the pump to send sea water used as circulating water system.

D/D FP: Diesel Driven Fire Pump

*4 A pump installed in Fire Protection System; The pump automatically starts in case the pressure of the system decreases and motor-driven fire pump can't be operated.

D/W : Dry-well

The space inside primary containment vessel excluding the suppression chamber.

DWC : Drywell Cooling System

The facility which cool Dry-well during the reactor is running, and also to avoid severe temperature condition in the PCV during regular inspection

EECW : Emergency Equipment Cooling Water System

*6 The facilities to feed the fresh water coolant to coolers such as Emergency Diesel Generators, emergency air conditioner, etc (also feed coolant water to RHR pump motor) to make each emergency facilities be able to keep functions which is demanded at the loss-of-coolant accident,

FCS: Flammability Control System

In case of LOCA, as the temperature of fuel increases, fuel cladding tubes and water react, then flammable gas (hydrogen) is

generated and accumulated in a PCV.

In case the density of hydrogen exceeds a certain level, it reacts with oxygen (air) and burns explosively. Hence, the system controls the density of hydrogen below a safe level.

FP: Fire Protection System

*5 A fire protection system in a power station; The system has normal fire hydrants and carbon dioxide fire extinguishing systems etc. for oil fire.

The system can be used to inject water to a reactor in accident management.

FPC: Fuel Pool Cooling and Filtering System

* It is necessary to reduce heat and radioactivity from fission products in the fuel assembly to a workable level with keeping soundness after taking Spent-fuel out from the reactor for the reprocess. FPC is the filtering system to remove impurities and keep regulated level while cooling the pool water.

HCPI: High Pressure Coolant Injection System

*6 A part of Emergency Core Cooling System (ECCS); HCPI can inject coolant water into a reactor by a high pressure pump driven by a steam turbine. It works in case an accident when reactor pressure does not rapidly decrease such as relatively small pipe fracture.

The flow rate (capacity) of a pump is approximately ten times as high as that of RCIC, but lower than that of SHC or RHR (approximately 1,800 m³ in Units 2 to 5 of Fukushima Daiichi Nuclear Power Station). HCPIs are installed in Units 1 to 5 of Fukushima Daiichi Nuclear Power Station.

HPCS: High Pressure Core Spray System

A part of Emergency Core Cooling System (ECCS); HCPS can spray into a reactor by a motor driven high pressure pump which has an independent power supply source (a diesel generator). It works in case the pressure in a reactor does not rapidly decrease in an accident.

HCPSs are installed in Unit 6 of Fukushima Daiichi Nuclear Power Station and its subsequent plants except Unit 6 and 7 of Kashiwazaki Kariwa Nuclear Power Station (KK-6, 7) in TEPCO. (HPCF (High Pressure Core Flooder System) has similar function in KK-6, 7)

IA: Instrument Air-System

A system to supply compressed air to air-driven equipment and controllers of each building; The compressed air is clean, as moisture and dust etc. are removed to ensure their operation.

IC: Isolation Condenser

*7 Equipment that changes steam from a reactor back into water and decreases the pressure in a reactor in case the pressure increases (installed only in Unit 1 of Fukushima Daiichi Nuclear Power Station).

ITV: Industrial Television

A television camera installed to reduce radiation exposure of plant operators and to monitor works, leak of radioactive fluid, alarms of control panels and conditions of water intake equipment in winter etc.. A camera installed to monitor a site is generally called an ITV in the industrial world.

M/C: Metal-Clad Switch Gear

A power cabinet panel used in high-voltage circuits in a power plant; magnetic or vacuum breakers, protection relays and accessory instruments are compactly stored in a M/C. M/Cs consist of 3

systems; normal, common and emergent ones.

MCC : Motor Control Center

MCC is the power panel used for small scale in-site voltage circuit which is compactly storing molded case current breaker, magnetic switch and protective relay and used for auxiliary machine power panel at power station. It is comprise of 3 parts such as regular use, common and emergency.

MO Valve: Motor Operated Valve

A MO valve is a valve that opens or closes driven by a motor. It drives by receiving an electric signal of logical circuits of the system.

MP: Monitoring Post

MPs are installed at several points around a power-generating site; where a dose rate of gamma ray is measured. A vehicle which can monitor during its travel is called a monitoring car.

MSIV : Main Steam Isolation Valve

Main Steam Piping penetrates Primary Containment Vessel (PCV) to turbine. Therefore isolation valves are set inside and outside at Main Steam Piping and is completely shut off are penetrating not to release the steam including radioactivity materials from the systems in the case of piping damaged.

MUWC: Make-Up Water System (Condensate)

*8 A system that supplies water by pumps (condensate transfer pumps) for multi purposes required to operate a power plant. (Water source is Condensate Storage Tank. Water is basically clean-upped water which used in a reactor etc.. It is a little radioactively contaminated, but its density is low.)

Though not for an emergent use, the system can be used to inject water into a reactor in accident management. The flow rate of a pump is approximately 70 m³/h and lower than that of RCIC.

MUWP : Make-Up Water System (Purified)

- 14 A system to supply pure water which carries the amount and pressure needed for smooth operation and maintenance of the power station to equipments, piping, valves etc. installed inside of each building as well as their ancillary facilities.

P/C: Power Center

A power cabinet panel for low-voltage circuits in a power plant; air circuit breakers (ACBs), protection relays and accessory instruments are compactly stored in a P/C. P/Cs consist of 3 systems, normal, common and emergent ones.

PCV: Primary Containment Vessel

*9 A steel vessel where main reactor equipment such as a reactor pressure vessel are stored; in case a loss-of-coolant accident (LOCA) occurs, a PCV contributes to the containment of radioactive materials and confines a radioactive leak around a site of a power plant. A PCV consist of a dry well that has no water and suppression chamber (wet well).

P&ID: Piping and Instrumentation Diagram

A diagram where plant equipment were classified based on systems and pipes, valves, pumps and instruments etc. are shown in designated codes.

R/B: Reactor Building

A building that a Primary Containment Vessel and auxiliary

equipments are stored; the inside of a R/B is kept in a negative pressure for radioactive materials not to emit to the outside of the R/B that leak from the PCV in case an accident occurs. A PCV is also called a Reactor Secondary Containment Vessel.

RCIC: Reactor Core Isolation Cooling System

*10 In case that, during normal operation, a main condenser cannot be used due to the closure of a main steam isolation valve from any cause, a RCIC and a Residual Heat Removal (RHR) System work together, inject cooling water into a reactor by a turbine driven pump works by steam from a reactor, remove decay heat of the fuel and decrease reactor pressure. In addition, it is used as an emergency water injection pump to maintain the water level of a reactor in case a feed water system breaks down etc..

The flow rate of a RCIC pump is approximately 96 m³/h, approximately one-tenth as high as that of an HCPI (in case of Units 2 to 5 of Fukushima Daiichi Nuclear Power Station) and therefore not so high.

RHR: Residual Heat Removal System

*11 A system (a part of Emergency Core Cooling System (ECCS)) to cool coolant (to remove heat decay) by pumps or heat exchangers or inject water to maintain reactor water in case of emergency after a reactor is shut down; A RHR has enough capability to make a reactor achieve cold shutdown. The performances of both a flow rate of pumps and heat exchangers are so high that a RHR has the following operation modes.

- (1) Shut Down Cooling mode
- (2) Low Pressure Coolant Injection mode (ECCS)
- (3) PCV spray mode

- (4) Suppression Chamber cooling mode
- (5) Emergency thermal loading mode

RHRC : RHR Cooling Water System

- 18 A system to supply fresh water to RHR heat exchanger, mechanical seal cooler for RHR pump and low pressure core spray system (LPCS) as a coolant . This is installed in Unit 1 to 4 of Fukushima Daini Nuclear Power Station and Unit 1 of Kashiwazaki-Kariwa Nuclear Power Station.

RHRS : RHR Sea Water System

- 19 A coolant from residual heat removal system is cooled through heat exchanger. The function of this system is to supply seawater to cool the coolant from residual heat removal system.

RPS: Reactor Protection System

A system to immediately make an emergency shut down for (scram) a reactor in case transient conditions may have resulted in or are expected to result in impairment of safety in a reactor due to the inoperative of equipment or erroneous operation by operators etc.

RPV: Reactor Pressure Vessel

*12 A vessel inside which fuel assemblies, control rods (CRs) and core internals are stored and which generates steam by nuclear reaction of fuel

S/B: Service Building

A building which has a main control room, a radiation control room and checkpoints etc. required to operate a power plant.

S/C: Suppression Chamber (Suppression Pool)

*13 Equipment installed only in a boiling water reactor (BWR). A S/C always has approximately 3,000 m³ of cooling water (in case of Units 2 to 5 of Fukushima Daiichi Nuclear Power Station). In case of a loss-of-coolant accident (LOCA), the pressure in a PCV increases because of water and steam emitted from the reactor. A S/C is the equipment to reduce the pressure in a PCV by receiving and cooling reactor water and steam through vent tubes etc. in case of LOCA. In addition, S/C is also used as a water source for Emergency Core Cooling System (ECCS).

SHC: Shut Down Cooling System

A system to cool coolant (reactor water) and remove decay heat by pumps and heat exchangers after a reactor is shut down; A SHC has enough capability to make a reactor achieve cold shutdown and the performances of both a flow rate of pumps and heat exchangers are high.

Equipment in a dedicated system is installed only in Unit 1 of Fukushima Nuclear Power Station (A SHC has no heat exchanger, but heat was emitted to the ocean by other systems).

(Units other than Unit 1 of Fukushima Daiichi Nuclear Power Station have the cooling function, "SHC mode" in a RHR system)

SLC: Stand by Liquid Control System

*14 Back-up equipment for control rods that shut down a reactor by injecting sodium pentaborate solution with high capability of neutron absorber in case control rods cannot be inserted from any cause when a reactor is in operation.

SRV: Safety Relief Valve

*15 Valves to allow steam to escape to a suppression chamber automatically or manually from a main control room to preserve a

reactor pressure vessel in case the pressure in a reactor abnormally increases (Escaped steam is cooled and compressed by pressure suppression pool water); A SRV also has another function as an Automatic Depressurization System (ADS) in a Emergency Core Cooling System (ECCS).

TAF: Top of Active Fuel

Zero point of a water-level gauge of fuel range; the most upper part where pellets of fuel assemblies exist.

T/B: Turbine Building

A building where main turbines, a generator, main condensers, reactor feed water pumps and turbine auxiliary equipments etc. are stored.

Accident management

To prevent expansion of potential severe accident in case it happens or to mitigate the effect by utilizing existing equipments to the full when actual severe accident takes place. Usually, this term is referred to as general activities including organizing the manual, enhancing equipment, education and training for the above purpose.

Stand by Gas treatment system

A system to reduce the amount of radioactive iodine and radioactive materials in particle inside reactor building to be released outside while maintaining the pressure in the building negative as well as automatically closing ventilation system when radioactive material leakage accident takes place in the reactor.

Emergency ventilation system in main control room

A equipment to maintain the environment in main control room clean by recirculating the air inside as well as automatically isolating the room from the air outside when radioactive material leakage accident takes place in the reactor.

Paging

A communicating equipment in the plant consisted of handset station and speaker. Handy to operate and enables to talk make an announcement clearly under high noise environment.

To vent a PCV

A measure to emit part of air in a PCV including radioactive materials (Most of which is nitrogen) and decrease the pressure to prevent the abnormal increase in pressure in a PCV and preserve a PCV.

There are 2 vent lines, D/W and W/W each of which has large and small AO valves. After two lines join together, there are MO valves and rupture-disks and then the lines lead to a stack.

*16 D/W vent line *17 W/W vent line

Pit for Back Wash Valve

A place where valves are installed to reverse the current of seawater in narrow tubes so that narrow tubes of condensers can be cleaned

Leakage test for RPV

A test for confirming leakage in RPV after making RPV boundary pressurized at normal operation level. This test, which is conducted at every regular inspection, is conducted while controlling the temperature inside the reactor above the minimum operating temperature.

Shallow Draft Quay

A part of port facility in a power station where equipment transported by ship are unloaded

END