Interim Report

(Attachments)

December 26, 2011

Investigation Committee on the Accident at Fukushima Nuclear

Power Stations of Tokyo Electric Power Company

Table of contents

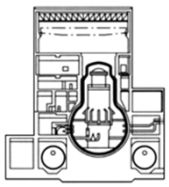
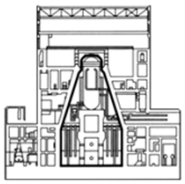
Attachment for Chapter V

References

This page intentionally left blank.

Attachment II-1

Overview of reactor facilities at the Fukushima Dai-ichi NPS

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Electric output (MWe)	460	784	784	784	784	1100
Thermal output (MWt)	1380	2381	2381	2381	2381	3293
Start of construction	Sep. 1967	May 1969	Oct. 1970	Sep. 1972	Dec. 1971	May 1973
Commissioning	Mar. 1971	Jul. 1974	Mar. 1976	Oct. 1978	Apr. 1978	Oct. 1979
Reactor type	BWR3	BWR4				BWR5
Reactor pressure vessel inside diameter (mm)	Approx. 4,800	Approx. 5,600	Approx. 5,570	Approx. 5,570	Approx. 5,570	Approx. 6,410
Reactor pressure vessel overall height (mm)	Approx. 20,000	Approx. 22,000	Approx. 22,000	Approx. 22,000	Approx. 22,000	Approx. 23,000
Reactor pressure vessel total weight (t)	Approx. 440	Approx. 500	Approx. 500	Approx. 500	Approx. 500	Approx. 750
Reactor pressure vessel design pressure (*1)	Approx. 8.62 MPa [gage] (87.9 kg/cm2 [gage])	Approx. 8.62 MPa [gage] (87.9 kg/cm2 [gage])	Approx. 8.62 MPa [gage] (87.9 kg/cm2 [gage])	Approx. 8.62 MPa [gage] (87.9 kg/cm2 [gage])	Approx. 8.62 MPa [gage] (87.9 kg/cm2 [gage])	Approx. 8.62 MPa [gage] (87.9 kg/cm2 [gage])
Reactor pressure vessel design temperature (C)	302	302	302	302	302	302
Number of fuel assemblies	400	548	548	548	548	764
Number of high burnup 8x8 fuels	68	-	-	-	-	-
Number of 9x9 fuels (type A)	-	-	516	-	-	-
Number of 9x9 fuels (type B)	332	548	-	548	548	764
Number of MOX fuels	-	-	32	-	-	-
Effective fuel rod length (m)	Approx. 3.66	Approx. 3.71	Approx. 3.71	Approx. 3.71	Approx. 3.71	Approx. 3.71
Number of control rods	97	137	137	137	137	185
Containment type	Mark I					Mark II
						
Containment overall height (m)	32	34	34.1	34.1	34.1	48.0
Containment diameter (m)	17.7 (sphere) 9.6 (cylinder)	20.0 (sphere) 10.9 (cylinder)	20.0 (sphere) 10.9 (cylinder)	20.0 (sphere) 10.9 (cylinder)	20.0 (sphere) 10.9 (cylinder)	25.9
Pool water volume in suppression chamber (m3)	1,750	2,980	2,980	2,980	2,980	3,200
Containment design pressure (*1)	Approx. 0.43 MPa [gage] (4.35 kg/cm2 [gage])	Approx. 0.38 MPa [gage] (3.92 kg/cm2 [gage])	Approx. 0.38 MPa [gage] (3.92 kg/cm2 [gage])	Approx. 0.38 MPa [gage] (3.92 kg/cm2 [gage])	Approx. 0.38 MPa [gage] (3.92 kg/cm2 [gage])	Approx. 0.28 MPa [gage] (2.85 kg/cm2 [gage])
Containment design temperature (C)	138 (D/W) 138 (S/C)	138 (D/W) 138 (S/C)	138 (D/W) 138 (S/C)	138 (D/W) 138 (S/C)	138 (D/W) 138 (S/C)	171 (D/W) 105 (S/C)
Spent fuel pool volume (% full core)	225	225	225	290	290	230
Spent fuel pool working temperature (C)	≦65	≦65	≦65	≦65	≦65	≦65
Spent fuel pool length (north-south: parallel to coastline) (m)	Approx. 7.2	Approx. 9.9	Approx. 9.9	Approx. 9.9	Approx. 9.9	Approx. 10.4
Spent fuel pool width (east-west: vertical to coastline) (m)	Approx. 12.0	Approx. 12.2	Approx. 12.2	Approx. 12.2	Approx. 12.2	Approx. 12.0
Spent fuel pool depth (deepest part) (m)	Approx. 11.8	Approx. 11.8	Approx. 11.8	Approx. 11.8	Approx. 11.8	Approx. 11.8
Spent fuel pool volume (m3)	Approx. 1,020	Approx. 1,424	Approx. 1,425	Approx. 1,425	Approx. 1,425	Approx. 1,497
Stockable number of spent fuels in pool	900	1,240	1,220	1,590	1,590	1,770
Number of spent fuels stored in pool (end of Dec. 2010)	292	587	514	1,331 (including 548 fuels extracted inside the reactor)	946	876
Number of new fuels stored in pool (end of Dec. 2010)	100	28	52	204	48	64

*1: The unit used in the application for the reactor establishment permit was kg/cm2 [gage].

Source: Tokyo Electric Power Company, “The impact of Tohoku-Chihou Taiheiyo-Oki Earthquake to Nuclear Reactor Facilities at Fukushima Dai-ichi Nuclear Power Station,” September 2011

Attachment II-2

Principle of power generation by boiling water reactor (BWR)

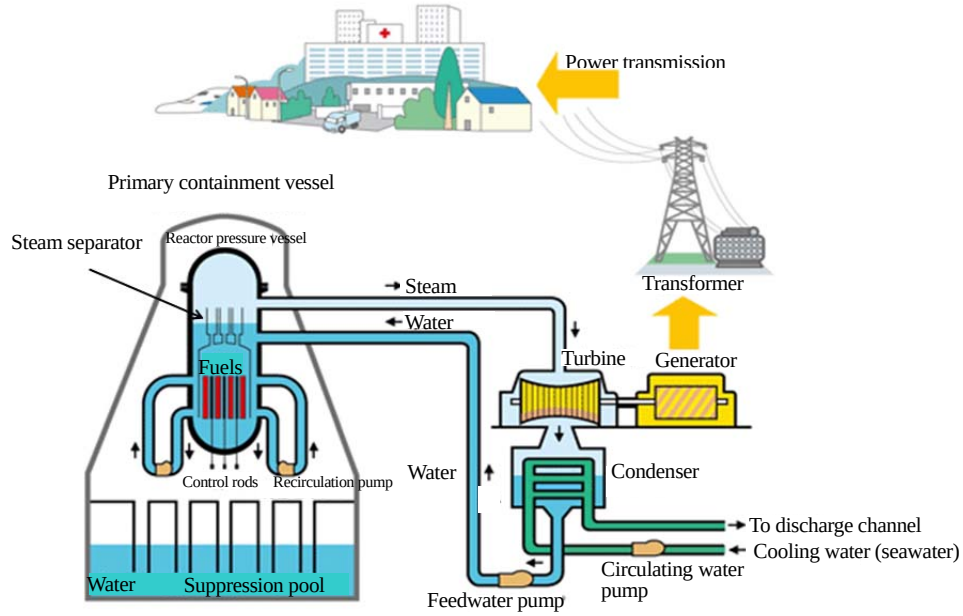
"Based on the link from the 'Disaster Prevention Network for Nuclear Environments' created by the Nuclear Safety Division, Ministry of Education, Culture, Sports, Science and Technology"

(1) Principle of nuclear power generation

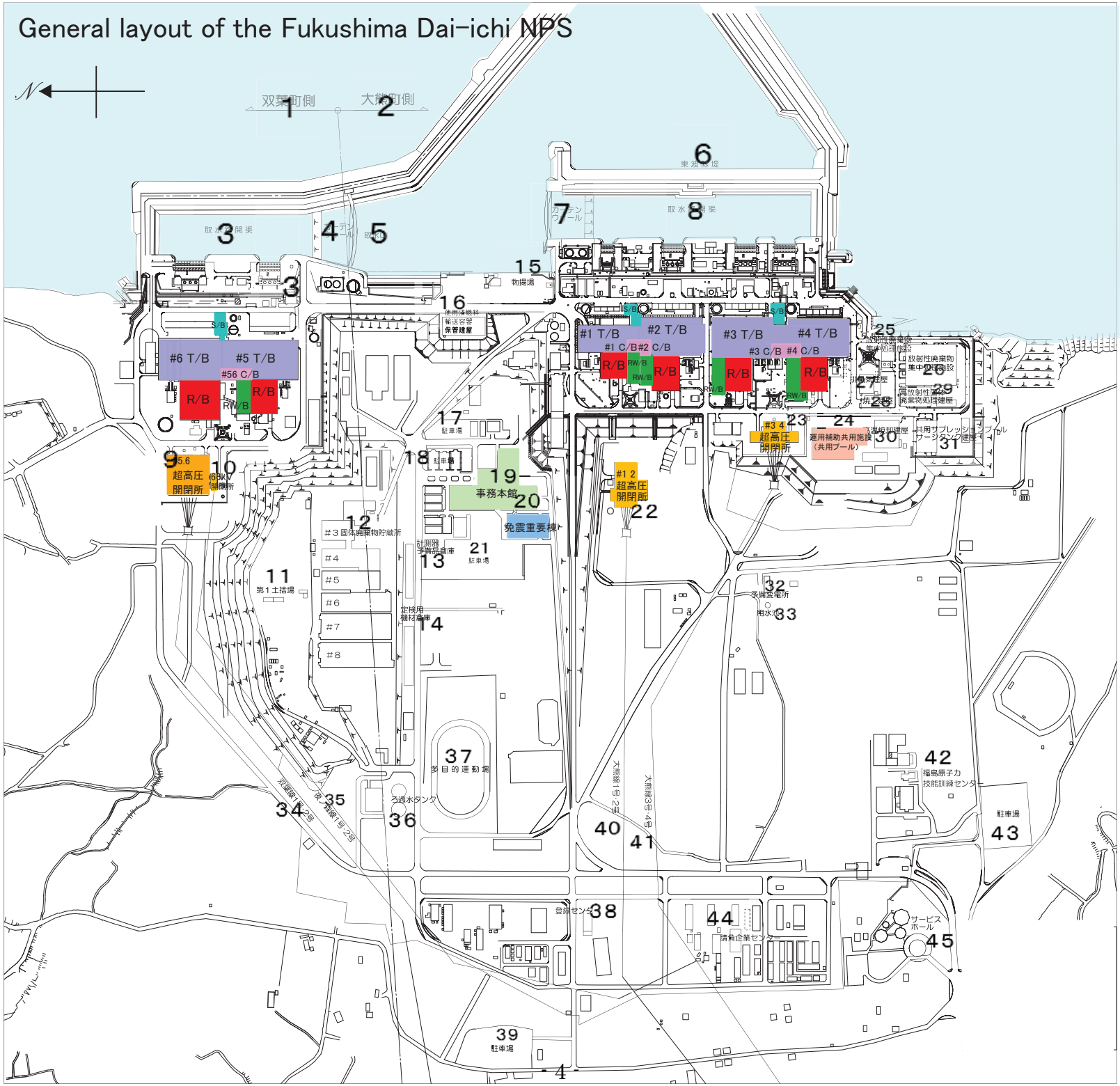
All power reactors existing in Japan are so-called light water reactors. Light water means normal water, and water is used in light water reactors in order to cool reactors when extracting thermal energy. Light water reactors are divided into boiling water reactors (BWRs) and pressurized water reactors (PWRs). As of the end of February 2011, fifty-four power reactors are in operation in Japan. In a BWR, steam produced inside the reactor directly rotates the turbine of the generator.

(2) Structure of boiling water reactor (BWR)

In a BWR, cooling water delivered by the feedwater pump and the recirculation pump flows along the fuel rods upward from the bottom of the reactor pressure vessel. Because the cooling water is heated by the fuel rods which are generating heat, the higher up it flows, the higher the water temperature becomes; it starts to boil along the way, emitting a mixture of water and steam upward. In a BWR whose electric output is comparable to 1,000,000 kW, the pressure of the cooling water is generally 7.0 MPa and the reactor exit stream temperature is 286 degrees Celsius in general. The steam separator located at the upper part of the reactor pressure vessel is to extract the steam from the boiling cooling water, and then, dry and deliver it to the turbine. The outline of a BWR nuclear power plant system is described in the figure below (the shape of the containment corresponds to that of Unit 6 in the Fukushima Daiichi Nuclear Power Station).



Based on 5-2, Graphical Flip-chart of “Nuclear & Energy Related Topics” 2011 by the Federation of Electric Power Companies of Japan



Explanatory note

- R/B Reactor building
- T/B Turbine building
- RW/B Reactor waste treatment building
- C/B Control building
- S/B Service building
- Common auxiliary facilities (shared pool)
- Ultrahigh voltage switchyard
- Main office building
- Seismic isolation building

Attachment II-3

Based on data and documents by Tokyo Electric Power Company

福島第一原子力発電所　配置図：General layout of the Fukushima Daiichi NPS

図上部　左⇒右

①双葉町側：Futaba-machi
②大熊町側：Okuma-machi
③取水路開渠：Intake channel open ditch
④カーテンウォール：Curtain wall
⑤取水口：Water intake
⑥東波防堤：　East breakwater
⑦カーテンウォール：Curtain wall
⑧取水路開渠：Intake channel open ditch

図中央部　左⇒右

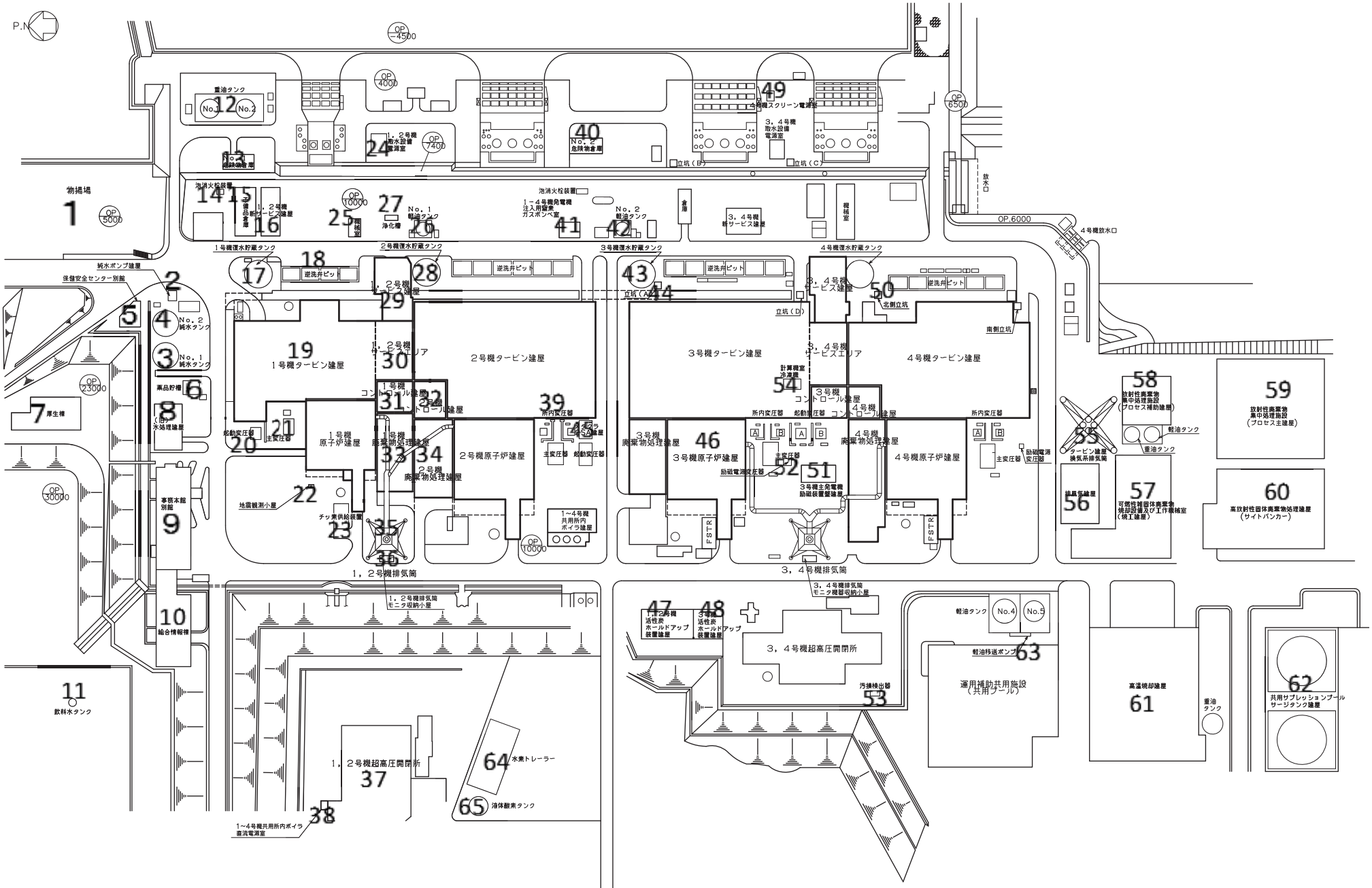
⑨超高圧開閉所：Ultrahigh voltage switchyard
⑩66ＫＶ開閉所：66 kV switching station
⑪第１土捨場：1st Spoil bank
⑫固体廃棄物貯蔵所：Solid waste storage
⑬計測器予備品倉庫：Storage for measurement equipment and spare items
⑭定検用機材倉庫：Storage for regular inspection equipment
⑮物揚場：Shallow draft quay
⑯使用済燃料輸送容器保管建屋：Spent fuel transportation cask storage building
⑰駐車場：Parking space
⑱駐車場：Parking space
⑲事務本館：Main office building
⑳免震重要棟：Seismic isolation building
㉑駐車場：Parking space
㉒超高圧開閉所：Ultrahigh voltage switchyard
㉓超高圧開閉所：Ultrahigh voltage switchyard
㉔運用補助共用施設(共用プール)：Common auxiliary facilities (shared pool)
㉕放射性廃棄物集中処理施設：Centralized radioactive waste treatment facilities
㉖放射性廃棄物集中処理施設：Centralized radioactive waste treatment facilities
㉗排風気建屋：Air-exhaust ventilation building
㉘焼工建屋：Combustion building
㉙高放射性固体廃棄物処理建屋：High activity solid waste treatment building
㉚高温焼却建屋：High temperature incineration building

㉛共用サプレッションプールサージタンク建屋：Common suppression pool surge tank building
㉜予備変電所：Auxiliary substation
㉝用水池：Reservoir

図下部　左⇒右

㉞双葉線 1 号・2 号：Futaba Transmission Line, L1 and L2
㉟夜ノ森線 1 号・2 号：Yorunomori Transmission Line, L1 and L2
㊱ろ過水タンク：Filtrate tank
㊲多目的運動場：Multi-purpose athletic field
㊳登録センター：Registration center
㊴駐車場：Parking space
㊵大熊線 1 号・2 号：Okuma Transmission Line, L1 and L2
㊶大熊線 3 号・4 号：　Okuma Transmission Line, L3 and L4
㊷福島原子力技能訓練センター：Skills Training Center
㊸駐車場：Parking space
㊹請負企業センター：Contractor center
㊺サービスホール：Service hall

Plant layout for Units 1 to 4 of the Fukushima Dai-ichi NPS



Based on data and documents by
Tokyo Electric Power Company

Attachment II - 4

Attachment II-4: Plant layout for Units 1 to 4 of the Fukushima Dai-ichi NPS

①物揚場：Shallow draft quay

②純水ポンプ建屋：Pure water pump building

③No.1 純水タンク：Deionized water tank 1

④No.2 純水タンク：Deionized water tank 2

⑤保健安全センター別館：Annex of the health and safety center

⑥薬品貯槽：Chemical storage

⑦厚生棟：Welfare building

⑧（旧）水処理建屋：(Former) Water treatment building

⑨事務本館別館：Annex of the main office building

⑩総合情報等：General information building

⑪飲料水タンク：Drinking water tank

⑫重油タンク：Heavy oil tank

⑬No.1 危険物倉庫：Dangerous object storage No. 1

⑭泡消火栓装置：Foam fire extinguishing equipment

⑮予備品倉庫：Spare item storage

⑯新サービス建屋：Units 1 and 2 new service building

⑰1 号機復水貯蔵タンク: Unit 1condensate storage tank

⑱逆洗弁ピット：Reversing valve pit

⑲1 号機タービン建屋：Unit 1 turbine building

⑳起動変圧器：Startup transformer

㉑主変圧器：Main transformer

㉒地震観測小屋:Seismic observatory

㉓窒素供給装置:Nitrogen-supplying device

㉔1，2 号機取水設備電源室:Power room for the water intake facility for Units 1 and 2

㉕機械室:Machine room

㉖No.1 軽油タンク：Light oil tank No. 1

㉗浄化槽:Septic tank

㉘2 号機復水貯蔵タンク：Unit 2 condensate storage tank

㉙1，2 号機サービス建屋:Units 1 and 2 service building

㉚1，2 号機サービスエリア：Units 1 and 2 service area

㉛1 号機コントロール建屋：Unit 1 control building

㉜2 号機コントロール建屋：Unit 2 control building

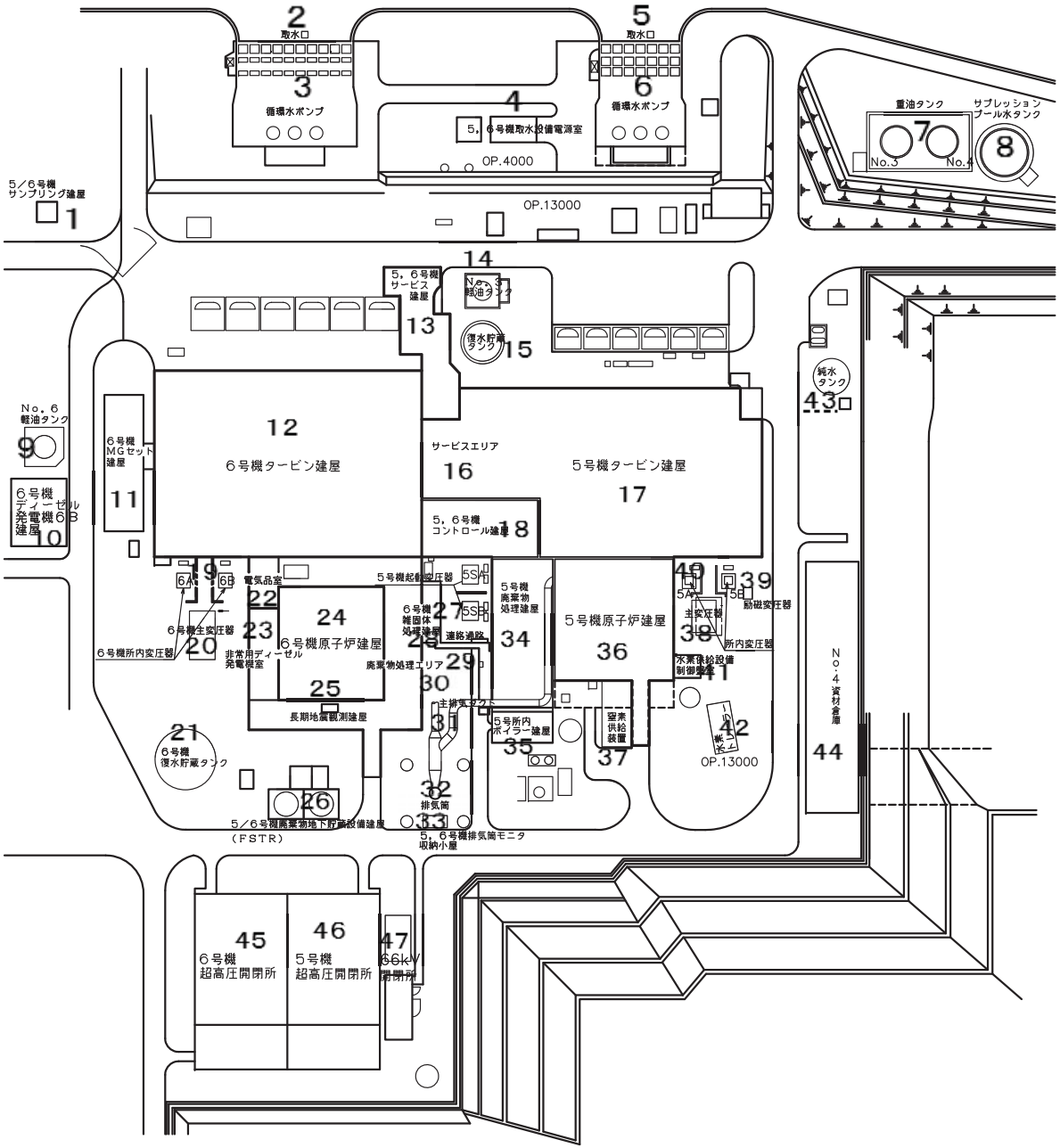
㉝1 号機廃棄物処理建屋：Unit 1 waste treatment building

㉞2 号機廃棄物処理建屋：Unit 2 waste treatment building

㉟1，2 号機排気筒：Stack for Units 1 and 2

㊱1，2 号機排気筒モニタ収納小屋：Monitoring equipment chamber for Units 1 and 2 stack
㊲1，2 号機超高圧開閉所　Ultrahigh voltage switching station for Units 1 and 2
㊳1～4 号機共用所内ボイラ直流電源室：DC power supply room for the common station-service boiler for Units 1-4
㊴所内変圧器：Auxiliary transformer
㊵No.2 危険物倉庫：Dangerous object storage No.2
㊶1～4 号機発電機注入用窒素ガスボンベ室：Nitrogen gas cylinder room for Units 1 to 4 generators
㊷No.2 軽油タンク Light oil tank No.2
㊸3 号機復水貯蔵タンク:　Unit 3 condensate storage tank
㊹立坑：Shaft
㊺メタクラ２ＳＡ建屋：Metal clad switch gear 2SA building
㊻3 号機原子炉建屋：Unit 3 reactor building
㊼1，2 号機活性炭ホールドアップ装置建屋：Units 1 and 2 charcoal building
㊽３号機活性炭ホールドアップ装置建屋：Unit 3 charcoal building
㊾4 号機スクリーン電源室：Power room of Unit 4 screen
㊿北側立坑：North shaft
(51)3 号機主発電機励磁装置盤建屋：Building for the energizing device of Unit 3 main generator
(52)励磁電源変圧器：Energizing power transformer
(53)汚損検出器：Contamination detector
(54)計算機室冷凍機：Computer room cooler
(55)タービン建屋換気系排気筒：Stack for the turbine building ventilation system
(56)排風気建屋：Air-exhaust ventilation building
(57)可燃性雑固体廃棄物焼却設備及び工作機械室（焼工建屋）：Miscellaneous flammable solid waste combustor and engineering machine room (combustion room)
(58)放射性廃棄物集中処理施設(プロセス補助建屋):Central radioactive waste treatment facilities (auxiliary processing building)
(59)放射性廃棄物集中処理施設（プロセス主建屋）：Central radioactive waste treatment facilities (main processing building)
(60)高放射線性固体廃棄物処理建屋（サイトバンカー）：High activity waste treatment building (side bunker)
(61)高温焼却建屋：High temperature incineration building
(62)共用サプレッションプールサージタンク建屋 : Common suppression pool surge tank building
(63)軽油移送ポンプ：Light oil transfer pump
(64)水素トレーラー：Hydrogen trailer
(65)液体酸素タンク：Liquid oxygen tank

Plant layout for Units 5 and 6 of the Fukushima Dai-ichi NPS



Created by Tokyo Electric Power Company

福島第一原子力発電所５号機及び６号機　配置図：Plant layout for Units 5 and 6 of the Fukushima Dai-ichi NPS

図上部　左⇒右

①５／６号機サンプリング建屋：Units 5 and 6 sampling building
②取水口：Water intake
③循環水ポンプ：Circulating water pump
④５，６号機取水設備電源室：Power room for Units 5 and 6 intake facilities
⑤取水口：Water intake
⑥循環水ポンプ：Circulating water pump
⑦重油タンク：Heavy oil tanks
⑧サプレッションプール水タンク：Suppression pool water tank

図中央部　左⇒右

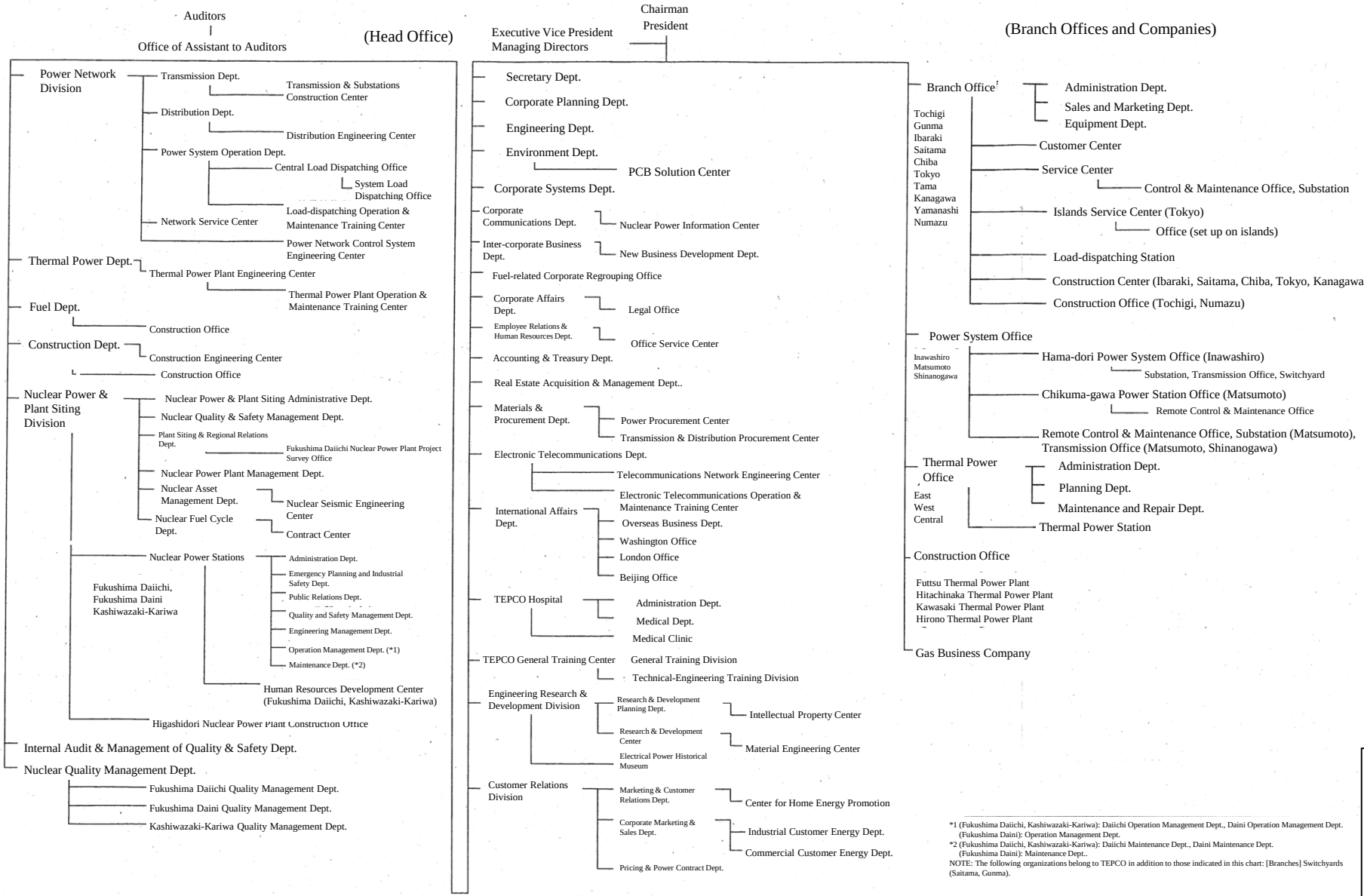
⑨Ｎｏ．６軽油タンク：Light oil tank No. 6
⑩６号機ディーゼル発電機建屋：Unit 6 diesel generator building
⑪６号機ＭＧセット建屋：Unit 6 MG set building
⑫６号機タービン建屋：Unit 6 turbine building
⑬５，６号機サービス建屋　：Units 5 and 6 service building
⑭Ｎｏ．３軽油タンク：Light oil tank No. 3
⑮復水貯蔵タンク：Condensate storage tank
⑯サービスエリア：Service area
⑰５号機タービン建屋：　Unit 5 turbine building
⑱５，６号機コントロール建屋：Units 5 and 6 control building
⑲６号機所内変圧器：Unit 6 auxiliary transformers
⑳６号機主変圧器：Unit 6 main transformer
㉑６号機復水貯蔵タンク：Unit 6 condensate storage tank
㉒電気品室：Electrical item room
㉓非常用ディーゼル発電機室：Emergency diesel generator room
㉔６号機原子炉建屋：Unit 6 reactor building
㉕長期地震観測建屋：Long-term seismic observation building
㉖５／６号機廃棄物地下貯蔵設備建屋：Units 5 and 6 filter sludge tank room
㉗５号機起動変圧器：Unit 5 startup transformers
㉘６号機雑固体処理建屋：Unit 6 miscellaneous solid treatment building
㉙連絡通路：Passageway
㉚廃棄物処理エリア：Waste treatment area

㉛主排気ダクト：Main exhaust air duct
㉜排気筒：Stack
㉝５，６号機排気筒モニタ収納小屋：Monitoring equipment chamber for the stack of Units 5 and 6
㉞５号機廃棄物処理建屋：Unit 5 waste treatment building
㉟５号所内ボイラー建屋：Unit 5 auxiliary boiler building
㊱５号機原子炉建屋：Unit 5 reactor building
㊲窒素供給装置：Nitrogen-supplying device
㊳主変圧器：Main transformer
㊴励磁変圧器：Energizing transformer
㊵所内変圧器：Auxiliary transformers
㊶水素供給設備制御盤室：Hydrogen-supplying facility control board room
㊷水素トレーラー：Hydrogen trailer
㊸純水タンク：Demineralized water tank
㊹Ｎｏ．４資材倉庫：Material storage No.4

図下部　左⇒右

㊺６号機超高圧開閉所：Ultrahigh voltage switching station for Unit 6
㊻５号機超高圧開閉所：Ultrahigh voltage switching station for Unit 5
㊼６６ＫＶ開閉所：66kv switching station

TEPCO Organization Chart



*1 (Fukushima Daiichi, Kashiwazaki-Kariwa): Daiichi Operation Management Dept., Daini Operation Management Dept. (Fukushima Daini): Operation Management Dept.
*2 (Fukushima Daiichi, Kashiwazaki-Kariwa): Daiichi Maintenance Dept., Daini Maintenance Dept. (Fukushima Daini): Maintenance Dept..
NOTE: The following organizations belong to TEPCO in addition to those indicated in this chart: [Branches] Switchyards (Saitama, Gunma).

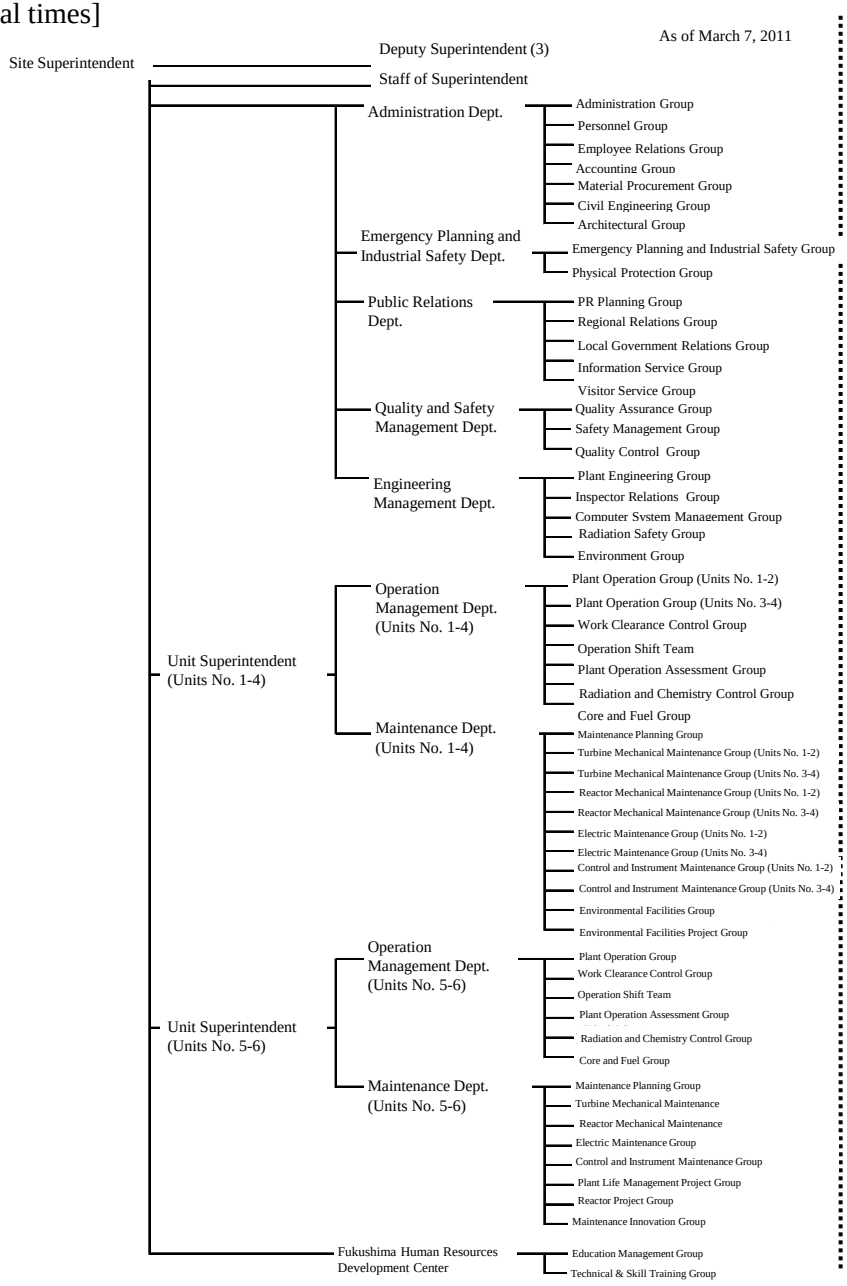
Created by Tokyo Electric Power Company

Attachment II-5

TEPCO organization at the Fukushima Dai-ichi NPS

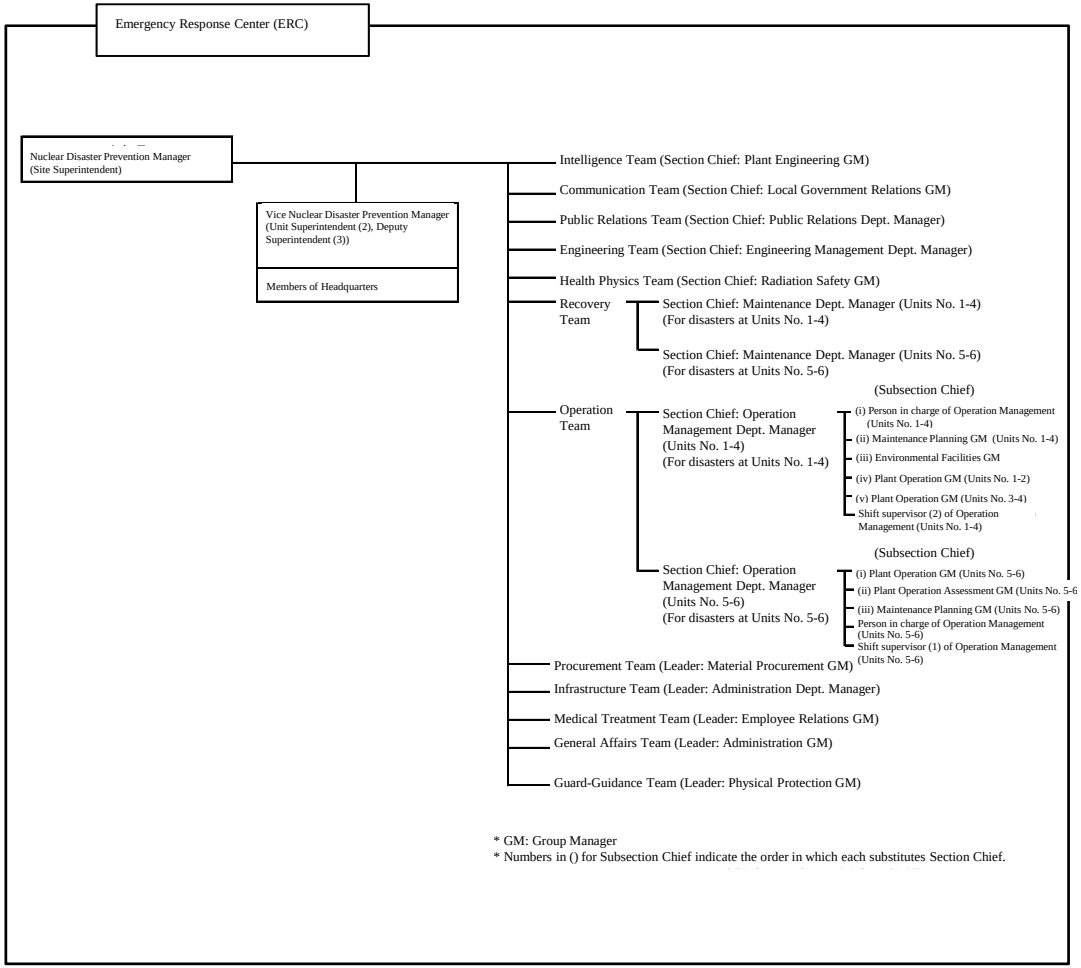
[At normal times]

As of March 7, 2011



[In a First Level Emergency] (after warning of an event specified in Article 10 of the Act on Special Measures concerning Nuclear Emergency Preparedness)
[In a Second Level Emergency] (after the occurrence of a situation specified in Section 1, Article 15 of the abovementioned Act)

As of February 1, 2011

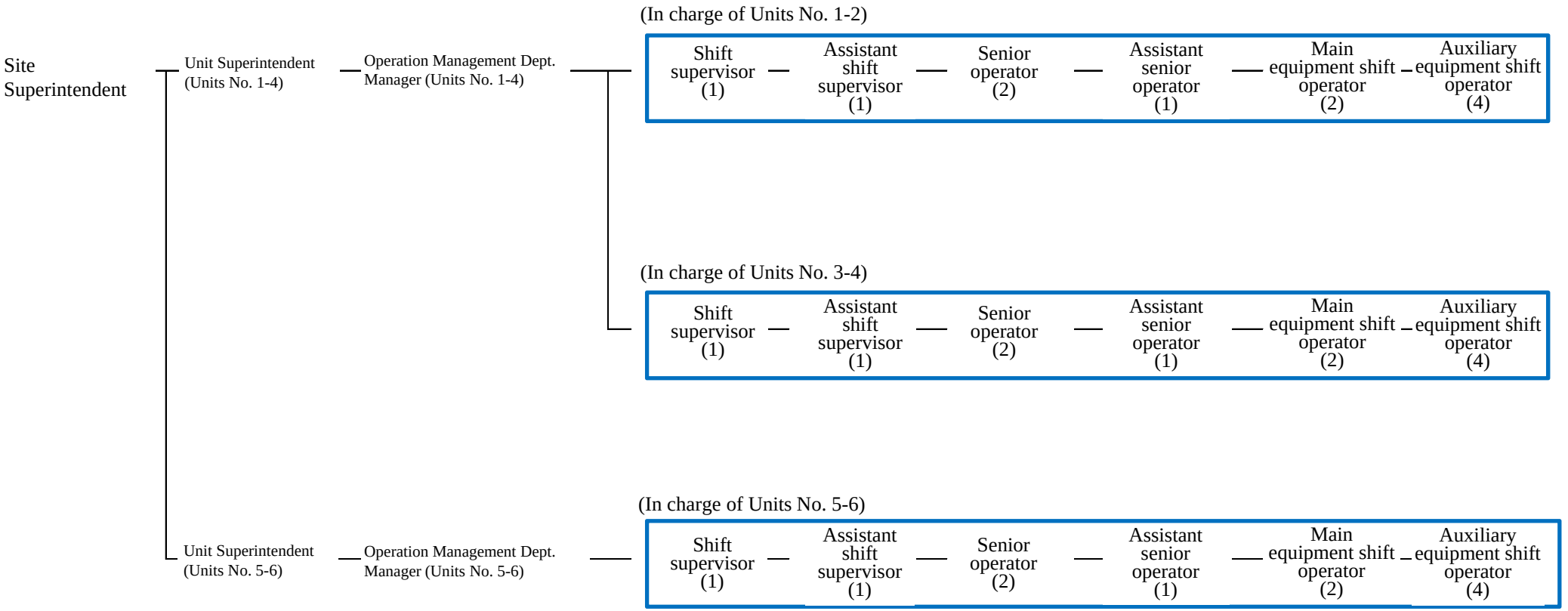


* GM: Group Manager
* Numbers in () for Subsection Chief indicate the order in which each substitutes Section Chief.

Based on data and documents by Tokyo Electric Power Company

Attachment II-6

Shift arrangements at the Fukushima Dai-ichi NPS

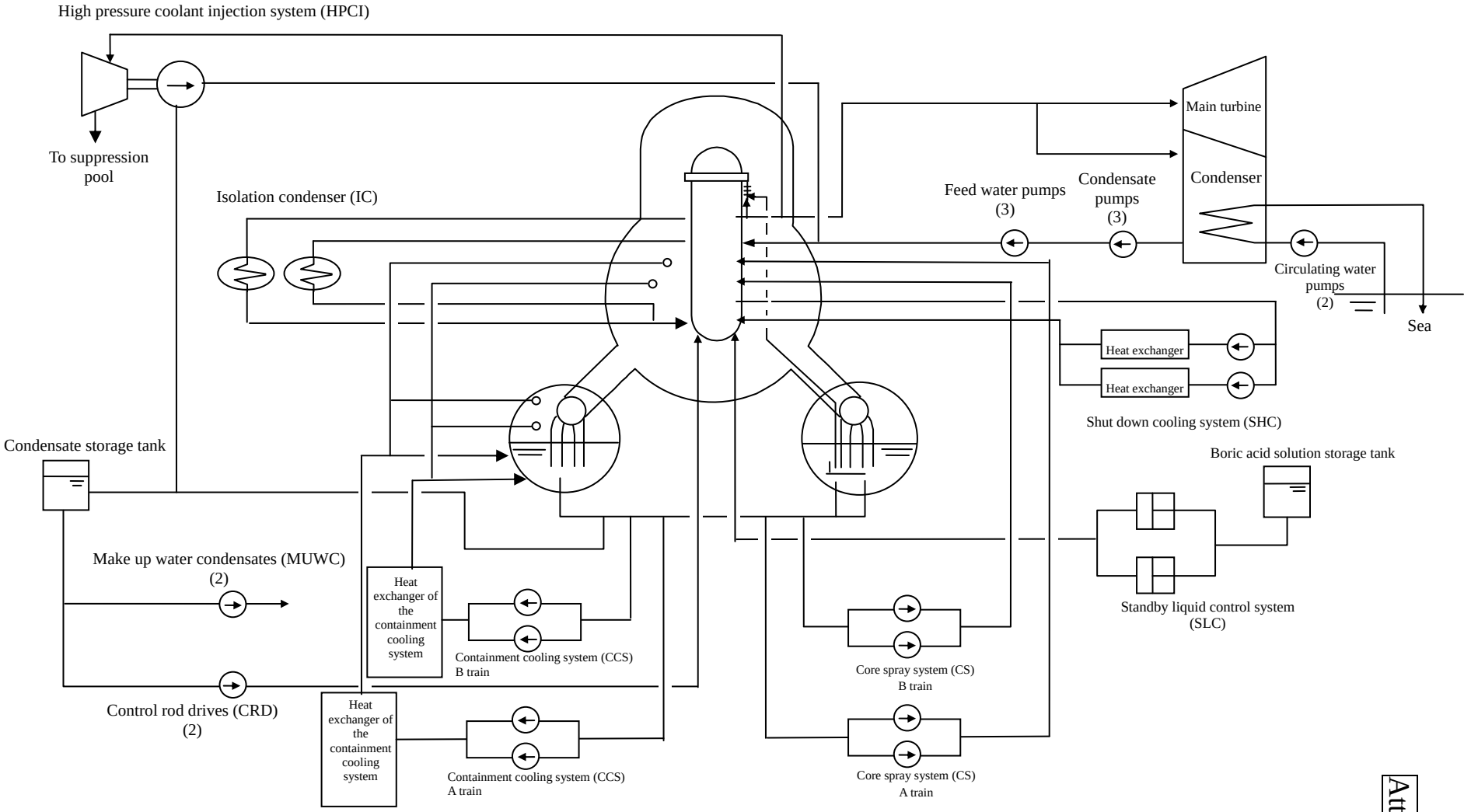


*1 One dedicated senior operator and main equipment shift operator are assigned to each plant.

*2 The number of operation shift team members may change depending on the circumstances at the relevant plant.

Based on the “Third Report on Regular Safety Review of the Fukushima Dai-ichi Nuclear Power Station Unit No.1” (November 2010) by Tokyo Electric Power Company

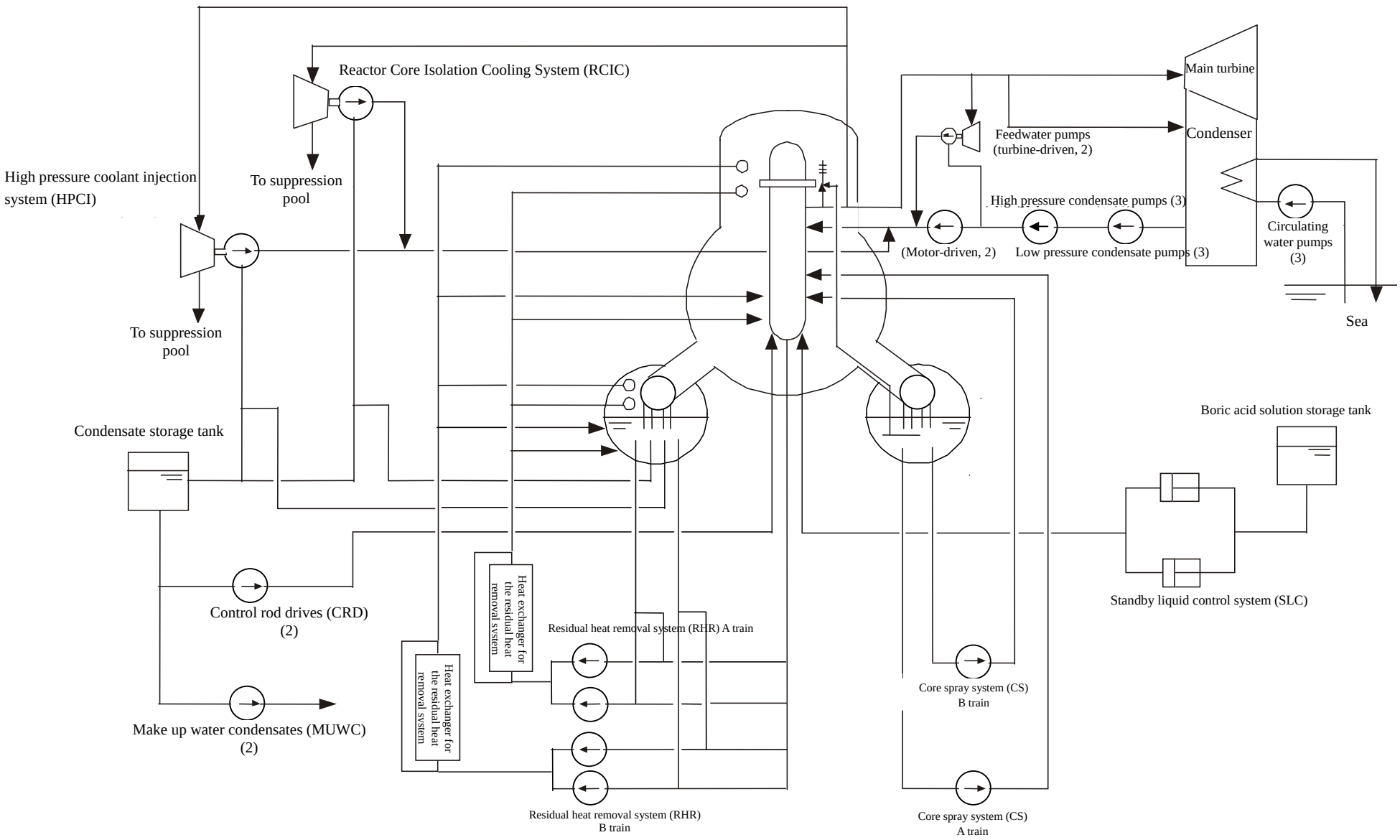
Attachment II-7



Reactor system configuration at Unit 1 of the Fukushima Dai-ichi NPS

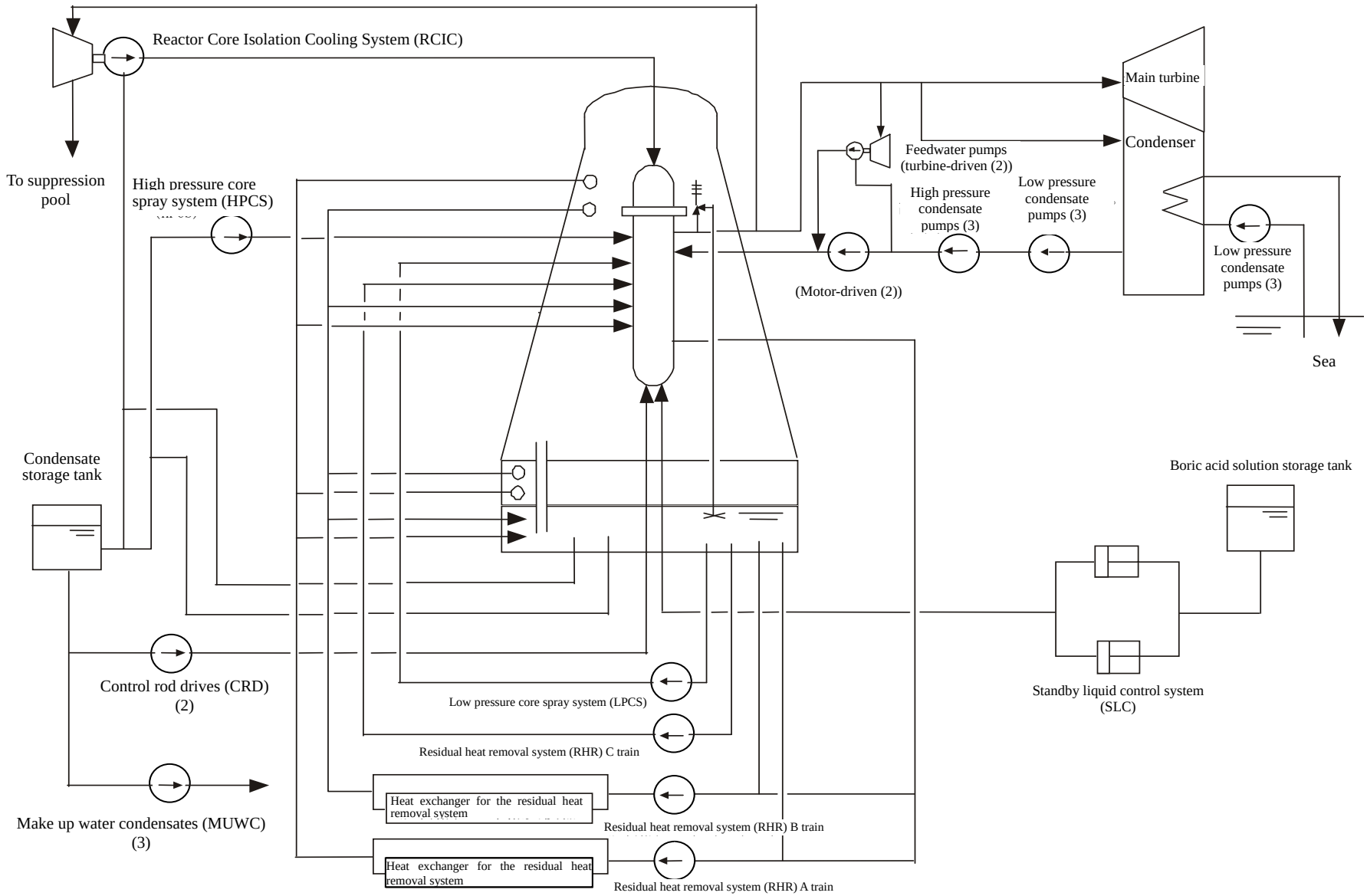
Source: Tokyo Electric Power Company, "Report on Accident Management Preparation at the Fukushima Dai-ichi Nuclear Power Station," May 2002

Attachment II-8



Reactor system configuration at Units 2 to 5 of the Fukushima Dai-ichi NPS

Source: Tokyo Electric Power Company, “Report on Accident Management Preparation at the Fukushima Dai-ichi Nuclear Power Station,” May 2002



Reactor system configuration at Unit 6 of the Fukushima Dai-ichi NPS

Source: Tokyo Electric Power Company, "Report on Accident Management Preparation at the Fukushima Dai-ichi Nuclear Power Station," May 2002

Prefecture	Personnel damage (number of persons)			Property damage (number of buildings)								
	Killed	Missing	Injured	Complete collapse	Partial collapse	Swept out	Total burn down	Partial burn down	Inundated above floor level	Inundated below floor level	Partial damage	Non-dwelling houses
Hokkaido	1		3		4				329	545	7	469
Aomori	3	1	61	311	853						121	1,194
Iwate	4,665	1,409	188	20,184	4,551		15		1,761	323	7,291	4,148
Miyagi	9,504	1,913	4,013	78,451	100,663		135		7,053	11,009	190,971	27,819
Akita			12								3	3
Yamagata	2		29	37	80							
Fukushima	1,605	221	241	18,432	57,850		77	3	62	339	133,492	1,071
Tokyo	7		90		11		3				257	20
Ibaraki	24	1	707	3,203	23,247		31		1,609	722	162,918	12,465
Tochigi	4		132	265	2,042						67,604	295
Gunma	1		38		7						16,154	195
Saitama			42	22	193		1	1		1	1,800	33
Chiba	20	2	251	783	9,221		15		153	720	34,237	660
Kanagawa	4		132		38						405	24
Niigata			3								9	7
Yamanashi			2								4	
Nagano			1									
Shizuoka			4							7	4	
Mie			1						2			9
Tokushima									2	9		
Kochi			1						2	8		
Total	15,840	3,547	5,951	121,688	198,760		281		10,973	13,683	615,277	48,412

Overview of damage caused by the Tohoku District - off the Pacific Ocean Earthquake and the ensuing tsunami (according to the latest information as of 16:00, December 1, 2011)

Based on the document (as of December 1, 2011) by the Emergency Disaster Countermeasures Headquarters, National Police Agency of Japan

Attachment II-9

Attachment II-10

Earthquake and tsunami data from the Japan Meteorological Agency

Date	Time	Information on hypocenter, magnitude, seismic intensity, tsunami, etc.		
		Hypocenter	Magnitude	Seismic intensity (Futabamachi, Fukushima)
March 11	14:46	Off the coast of Sanriku	9.0	Intensity 6 upper
	14:49	"Major tsunami warnings" were issued. (Fukushima Prefecture)		
	14:50	"The estimated arrival time of the tsunami" was announced as "15:10 with a projected height of 3 m		
	14:51	Off the coast of Fukushima Prefecture	6.8	4
	14:54	Off the coast of Fukushima Prefecture	5.8	4
	14:55	Off the coast of Ibaraki Prefecture	5.8	3
	14:58	Off the coast of Fukushima Prefecture	6.4	4
	(14:--)*	1.2 m backwash was observed in Soma point, Fukushima Prefecture.		
	15:05	Off the coast of Fukushima Prefecture	5.9	4
	15:06	Off the coast of Iwate Prefecture	6.4	3
	15:11	Northen Ibaraki Prefecture	5.6	2
	15:12	Off the coast of Fukushima Prefecture	6.1	4
	15:14	The announcement was made that "a tsunami arrived at the estimated arrival time with a projected height of 6 meters." (Fukushima Prefecture).		
	15:15	Off the coast of Ibaraki Prefecture	7.7	4
	15:25	Off the coast of Sanriku	7.5	3
	15:29	Off the coast of Sanriku	6.8	2
	15:31	The announcement was made that "a tsunami arrived at the estimated arrival time with a projected height of 10 meters." (Fukushima Prefecture)		
	15:38	Off the coast of Ibaraki Prefecture	5.5	2
	15:40	Off the coast of Iwate Prefecture	5.7	2
	15:44	Off the coast of Miyagi Prefecture	5.3	2
	15:46	Off the coast of Miyagi Prefecture	5.6	2
	15:48	Off the coast of Miyagi Prefecture	5.4	2
	15:49	Off the coast of Iwate Prefecture	5.8	2
	15:51	A tsunami water level of 9.3 m or higher was observed in Soma point, Fukushima Prefecture. (Announced by the Japan Meteorological Agency on April 13.)		
	15:57	Off the coast of Ibaraki Prefecture	6.1	3
	15:59	Off the coast of Fukushima Prefecture	6.7	2
	16:04	Off the coast of Miyagi Prefecture	5.8	2
	16:10	Off the coast of Fukushima Prefecture	6.0	2
	16:14	Off the coast of Ibaraki Prefecture	6.7	3
	16:16	Off the coast of Fukushima Prefecture	5.4	3
	16:22	Off the coast of Fukushima Prefecture	4.4	1
	16:25	Off the coast of Sanriku	6.4	2
	16:29	Off the coast of Iwate Prefecture	6.5	Intensity 5 lower
	16:34	Off the coast of Miyagi Prefecture	6.2	2
	16:36	Off the coast of Miyagi Prefecture	5.0	1

Date	Time	Information on hypocenter, magnitude, seismic intensity, tsunami, etc.		
		Hypocenter	Magnitude	Seismic intensity (Futabamachi, Fukushima)
March 11	16:40	Off the coast of Miyagi Prefecture	5.5	1
	16:54	Off the coast of Fukushima Prefecture	5.5	3
	17:05	Off the coast of Fukushima Prefecture	5.8	3
	17:12	Off the coast of Ibaraki Prefecture	6.6	3
	17:19	Off the coast of Ibaraki Prefecture	6.8	3
	17:31	Off the coast of Fukushima Prefecture	5.9	4
	17:35	Off the coast of Ibaraki Prefecture	5.2	2
	17:40	Off the coast of Fukushima Prefecture	6.1	4
	17:47	Off the coast of Fukushima Prefecture	6.0	2
	17:54	Off the coast of Fukushima Prefecture	4.8	1
	18:04	Off the coast of Ibaraki Prefecture	5.4	2
	18:15	Off the coast of Fukushima Prefecture	4.8	2
	18:19	Off the coast of Ibaraki Prefecture	5.0	1
	18:27	Off the coast of Miyagi Prefecture	5.3	2
	18:34	Off the coast of Fukushima Prefecture	4.8	2
	18:37	Off the coast of Ibaraki Prefecture	5.4	1
	18:42	Off the coast of Sanriku	5.6	1
	18:47	Off the coast of Sanriku	5.7	1
	18:52	Off the coast of Fukushima Prefecture	4.8	3
	18:55	Off the coast of Ibaraki Prefecture	5.3	2
	18:57	Off the coast of Ibaraki Prefecture	4.7	1
	18:59	Off the coast of Fukushima Prefecture	5.0	1
	19:10	Off the coast of Iwate Prefecture	6.2	2
	19:13	Off the coast of Miyagi Prefecture	5.3	1
	19:21	Off the coast of Fukushima Prefecture	5.5	3
	19:35	Off the coast of Fukushima Prefecture	5.0	2
	19:39	Off the coast of Miyagi Prefecture	4.9	1
	19:46	Off the coast of Ibaraki Prefecture	4.9	2
	20:00	Off the coast of Fukushima Prefecture	5.5	3
	20:07	Off the coast of Ibaraki Prefecture	4.7	2
	20:13	Off the coast of Ibaraki Prefecture	5.8	2
	20:17	Off the coast of Fukushima Prefecture	5.7	2
	20:20	Off the coast of Ibaraki Prefecture	5.7	2
	20:31	Southern Miyagi Prefecture	5.2	2
	20:36	Off the coast of Iwate Prefecture	6.7	3
	20:39	Off the coast of Miyagi Prefecture	5.5	2
	20:46	Off the coast of Ibaraki Prefecture	5.4	2
	20:56	Off the coast of Ibaraki Prefecture	5.4	1
	20:57	Off the coast of Iwate Prefecture	5.4	1

Date	Time	Information on hypocenter, magnitude, seismic intensity, tsunami, etc.		
		Hypocenter	Magnitude	Seismic intensity (Futabamachi, Fukushima)
March 11	21:13	Off the coast of Fukushima Prefecture	6.1	3
	21:15	Off the coast of Iwate Prefecture	5.9	2
	21:21	Off the coast of Fukushima Prefecture	4.9	3
	21:33	Off the coast of Sanriku	5.2	1
	21:49	Off the coast of Ibaraki Prefecture	5.2	2
	21:55	Off the coast of Miyagi Prefecture	5.1	3
	22:17	Off the coast of Ibaraki Prefecture	5.7	2
	22:33	Off the coast of Fukushima Prefecture	4.5	1
	22:34	Off the coast of Ibaraki Prefecture	5.6	1
	22:47	Off the coast of Fukushima Prefecture	4.7	1
	22:56	Off the coast of Fukushima Prefecture	5.3	2
	23:00	Off the coast of Ibaraki Prefecture	5.4	2
	23:10	Off the coast of Fukushima Prefecture	5.1	2
	23:44	Off the coast of Ibaraki Prefecture	4.9	2
	23:54	Off the coast of Ibaraki Prefecture	5.9	3
12-Mar	0:06	Off the coast of Fukushima Prefecture	5.3	2
	0:13	Off the coast of Ibaraki Prefecture	6.6	3
	0:15	Off the coast of Ibaraki Prefecture	5.4	2
	0:19	Off the coast of Ibaraki Prefecture	6.2	3
	0:24	Northern Gunma Prefecture	4.3	1
	0:26	Off the coast of Fukushima Prefecture	5.0	1
	0:32	Off the coast of Fukushima Prefecture	5.3	1
	0:42	Off the coast of Ibaraki Prefecture	5.5	1
	0:51	Off the coast of Fukushima Prefecture	5.2	1
	1:49	Off the coast of Ibaraki Prefecture	4.7	1
	1:57	Off the coast of Miyagi Prefecture	4.8	1
	2:30	Off the coast of Fukushima Prefecture	5.0	3
	2:56	Off the coast of Fukushima Prefecture	4.4	3
	3:11	Off the coast of Fukushima Prefecture	6.0	3
	3:44	Off the coast of Fukushima Prefecture	5.0	2
	3:59	Northern Nagano Prefecture	6.7	3
	4:02	Off the coast of Sanriku	6.3	2
	4:08	Off the coast of Ibaraki Prefecture	5.2	2
	4:09	Northern Nagano Prefecture	4.5	1
	4:16	Off the coast of Fukushima Prefecture	4.1	1
	4:24	Off the east coast of Chiba Prefecture	5.7	2
	4:31	Northern Nagano Prefecture	5.9	2
	4:45	Off the coast of Fukushima Prefecture	5.2	3
	4:46	Off the coast of Akita Prefecture	6.4	1

Date	Time	Information on hypocenter, magnitude, seismic intensity, tsunami, etc.		
		Hypocenter	Magnitude	Seismic intensity (Futabamachi, Fukushima)
12-Mar	5:11	Off the coast of Sanriku	6.4	2
	5:25	Off the coast of Fukushima Prefecture	4.9	2
	5:34	Off the coast of Fukushima Prefecture	5.0	2
	6:34	Off the coast of Fukushima Prefecture	4.8	3
	8:11	Hamadori, Fukushima Prefecture	4.6	2
	8:54	Off the coast of Fukushima Prefecture	5.0	2
	8:59	Off the coast of Ibaraki Prefecture	5.5	2
	9:25	Off the coast of Fukushima Prefecture	4.9	2
	10:04	Off the coast of Miyagi Prefecture	4.8	2
	10:12	Hamadori, Fukushima Prefecture	4.8	2
	10:13	Off the coast of Fukushima Prefecture	4.7	3
	10:35	Off the coast of Sanriku	5.8	1
	10:46	Off the coast of Fukushima Prefecture	5.2	2
	10:47	Off the coast of Fukushima Prefecture	6.8	3
	11:34	Off the coast of Fukushima Prefecture	5.2	2
	11:52	Off the coast of Fukushima Prefecture	5.0	2
	12:12	Off the coast of Ibaraki Prefecture	5.6	2
	13:06	Off the coast of Miyagi Prefecture	5.3	2
	14:14	Northen Ibaraki Prefecture	4.9	1
	14:45	Off the coast of Fukushima Prefecture	4.5	2
	15:18	Off the coast of Iwate Prefecture	5.5	2
	15:44	Off the coast of Ibaraki Prefecture	4.7	1
	16:36	Off the coast of Fukushima Prefecture	4.7	2
	19:53	Off the coast of Miyagi Prefecture	5.8	2
	20:20	"Major tsunami warnings" were changed to "tsunami warnings." (Fukushima Prefecture)		
	21:54	Off the coast of Sanriku	5.9	2
	22:15	Off the coast of Fukushima Prefecture	6.2	4
	22:24	Off the coast of Miyagi Prefecture	4.8	1
	23:14	Off the coast of Ibaraki Prefecture	5.2	1
	23:33	Off the coast of Ibaraki Prefecture	4.3	1
	23:43	Off the coast of Iwate Prefecture	5.9	2
13-Mar	3:09	Off the coast of Fukushima Prefecture	4.5	3
	5:41	Off the coast of Fukushima Prefecture	4.7	2
	6:58	Off the coast of Iwate Prefecture	5.4	1
	7:13	Off the coast of Fukushima Prefecture	6.0	3
	7:30	"Tsunami warnings" were changed to "tsunami advisories." (Fukushima Prefecture)		
	7:59	Off the coast of Fukushima Prefecture	4.4	2
	8:24	Off the coast of Miyagi Prefecture	6.2	4
	8:41	Off the coast of Fukushima Prefecture	5.2	1

Date	Time	Information on hypocenter, magnitude, seismic intensity, tsunami, etc.		
		Hypocenter	Magnitude	Seismic intensity (Futabamachi, Fukushima)
13-Mar	9:41	Off the coast of Ibaraki Prefecture	4.5	1
	10:26	Off the coast of Ibaraki Prefecture	6.6	2
	14:59	Off the coast of Fukushima Prefecture	4.7	3
	17:58	"Tsunami advisories" were cancelled. (Fukushima Prefecture)		
	20:37	Off the coast of Fukushima Prefecture	6.0	3
	21:44	Off the coast of Fukushima Prefecture	4.7	2
14-Mar	2:04	Off the coast of Fukushima Prefecture	4.4	1
	2:55	Off the east coast of Chiba Prefecture	5.7	2
	4:27	Off the coast of Fukushima Prefecture	4.2	1
	8:41	Off the coast of Ibaraki Prefecture	4.7	2
	10:02	Off the coast of Ibaraki Prefecture	6.2	3
	13:45	Off the coast of Fukushima Prefecture	4.7	2
	15:12	Off the coast of Miyagi Prefecture	6.5	3
	15:18	Off the coast of Fukushima Prefecture	5.2	3
	15:52	Off the coast of Fukushima Prefecture	5.2	3
	16:25	Off the coast of Ibaraki Prefecture	4.8	1
	18:07	Off the coast of Ibaraki Prefecture	4.8	2
March 15	3:35	Off the coast of Fukushima Prefecture	4.3	2
	3:41	Off the coast of Ibaraki Prefecture	5.6	2
	4:28	Off the coast of Miyagi Prefecture	5.0	1
	16:03	Northen Ibaraki Prefecture	4.9	2
	16:48	Off the coast of Fukushima Prefecture	4.3	1
	18:50	Off the coast of Fukushima Prefecture	6.3	2
	20:06	Off the coast of Fukushima Prefecture	5.2	2
	22:27	Off the coast of Fukushima Prefecture	6.2	4
	22:31	Eastern Shizuoka Prefecture	6.4	2
	22:37	Off the coast of Fukushima Prefecture	5.3	2
March 16	5:53	Hamadori, Fukushima Prefecture	4.5	1
	12:23	Off the coast of Fukushima Prefecture	4.6	2
	12:52	Off the east coast of Chiba Prefecture	6.1	3
	13:14	Off the coast of Fukushima Prefecture	5.6	4
	15:29	Off the coast of Iwate Prefecture	5.6	2
	18:15	Off the coast of Fukushima Prefecture	4.6	2
	20:45	Off the coast of Fukushima Prefecture	4.4	2
	22:39	Southern Ibaraki Prefecture	5.4	2
	22:54	Off the coast of Fukushima Prefecture	4.6	3
	23:46	Off the coast of Miyagi Prefecture	5.3	2
March 17	3:56	Hamadori, Fukushima Prefecture	4.4	1
	4:00	Off the coast of Fukushima Prefecture	4.5	1

Date	Time	Information on hypocenter, magnitude, seismic intensity, tsunami, etc.		
		Hypocenter	Magnitude	Seismic intensity (Futabamachi, Fukushima)
March 17	13:13	Off the coast of Iwate Prefecture	5.9	2
	17:25	Off the coast of Ibaraki Prefecture	5.4	2
	20:48	Off the coast of Fukushima Prefecture	4.4	2
	21:35	Off the coast of Fukushima Prefecture	5.1	2
	21:54	Off the coast of Ibaraki Prefecture	5.7	3
March 18	3:38	Off the coast of Fukushima Prefecture	4.7	3
	3:55	Off the coast of Fukushima Prefecture	5.7	2
	6:18	Off the coast of Fukushima Prefecture	4.5	2
	11:48	Off the coast of Fukushima Prefecture	5.1	2
	17:01	Off the east coast of Chiba Prefecture	5.4	2
March 19	4:53	Off the coast of Fukushima Prefecture	5.1	2
	8:32	Off the coast of Iwate Prefecture	5.7	2
	8:49	Off the coast of Fukushima Prefecture	5.3	2
	18:56	Northen Ibaraki Prefecture	6.1	4
20-Mar	5:48	Off the coast of Fukushima Prefecture	4.5	2
	10:30	Off the coast of Fukushima Prefecture	5.5	3
20-Mar	14:19	Hamadori, Fukushima Prefecture	4.6	2
	14:55	Off the coast of Fukushima Prefecture	5.4	3
	21:03	Off the coast of Iwate Prefecture	5.9	2
21-Mar	4:54	Off the coast of Fukushima Prefecture	4.6	3
	4:59	Off the coast of Fukushima Prefecture	4.2	3
	5:05	Off the coast of Fukushima Prefecture	4.5	2
	8:43	Off the coast of Fukushima Prefecture	4.6	1
	14:08	Off the coast of Ibaraki Prefecture	5.2	1
22-Mar	6:24	Off the coast of Ibaraki Prefecture	4.3	1
	16:18	Off the coast of Fukushima Prefecture	6.7	2
	17:33	Off the coast of Ibaraki Prefecture	4.7	1
	18:19	Off the coast of Fukushima Prefecture	6.4	4
	18:44	Off the coast of Sanriku	6.5	3
	21:04	Off the coast of Ibaraki Prefecture	5.9	3
	22:51	Off the coast of Ibaraki Prefecture	5.9	2
23-Mar	0:03	Off the coast of Ibaraki Prefecture	5.9	1
	7:12	Hamadori, Fukushima Prefecture	6.0	4
	7:34	Hamadori, Fukushima Prefecture	5.5	3
	7:36	Hamadori, Fukushima Prefecture	5.8	3
	7:53	Hamadori, Fukushima Prefecture	5.1	1
	18:55	Hamadori, Fukushima Prefecture	4.7	2
	19:43	Off the coast of Ibaraki Prefecture	5.1	2
24-Mar	8:56	Southern Ibaraki Prefecture	4.8	1

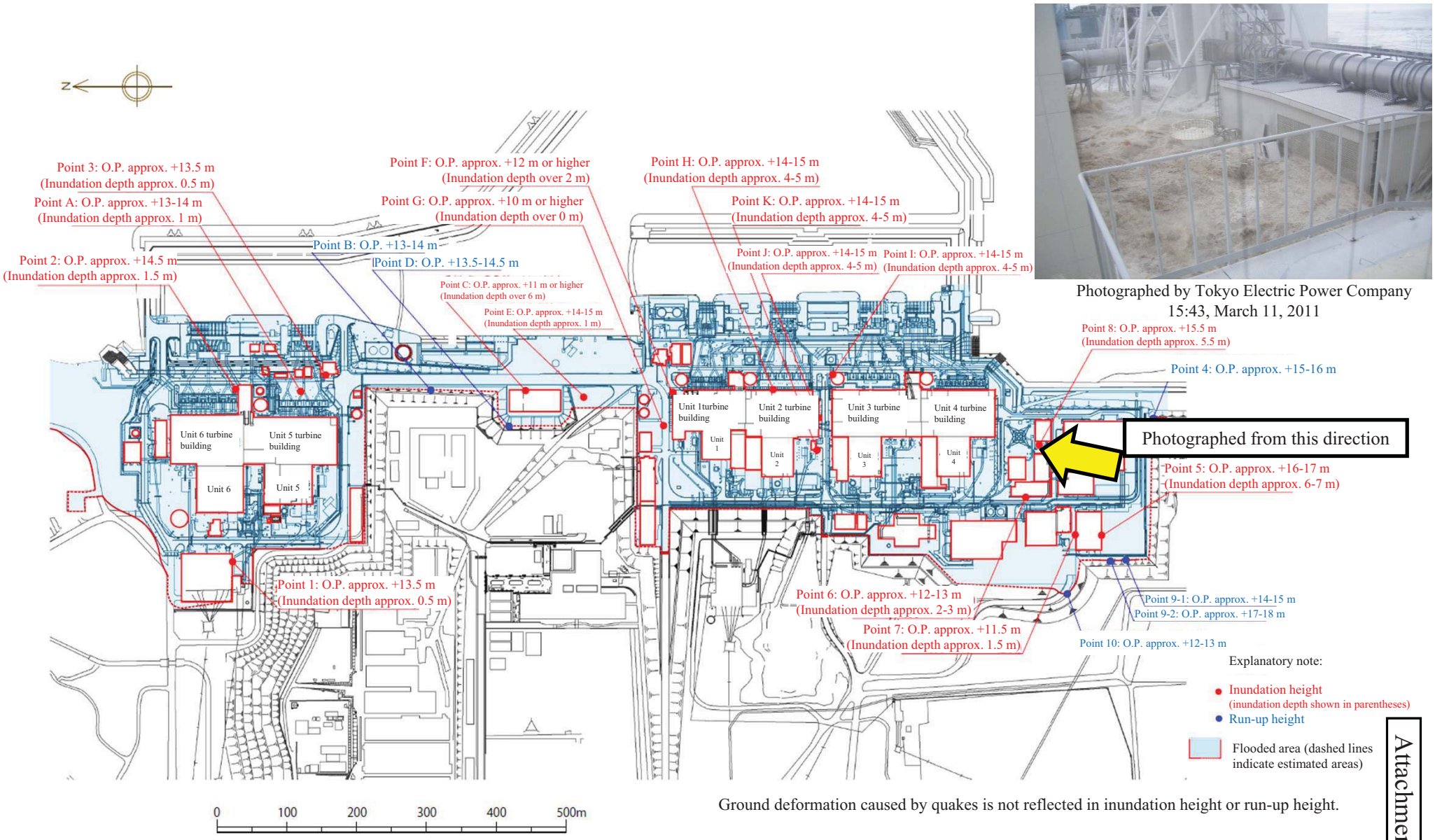
Date	Time	Information on hypocenter, magnitude, seismic intensity, tsunami, etc.		
		Hypocenter	Magnitude	Seismic intensity (Futabamachi, Fukushima)
24-Mar	17:20	Off the coast of Iwate Prefecture	6.2	3
25-Mar	2:08	Northen Ibaraki Prefecture	4.7	1
	3:16	Off the coast of Ibaraki Prefecture	4.3	1
	4:44	Off the coast of Miyagi Prefecture	4.8	1
26-Mar	19:18	Off the coast of Miyagi Prefecture	5.2	2
27-Mar	1:07	Off the coast of Ibaraki Prefecture	4.4	1
	20:08	Off the coast of Fukushima Prefecture	4.5	2
28-Mar	6:11	Off the coast of Ibaraki Prefecture	4.7	1
	7:23	Off the coast of Miyagi Prefecture	6.5	4
29-Mar	16:04	Off the coast of Fukushima Prefecture	4.3	3
	19:54	Off the coast of Fukushima Prefecture	6.6	3
30-Mar	22:00	Off the coast of Miyagi Prefecture	5.1	2
	22:19	Off the coast of Ibaraki Prefecture	5.0	2
31-Mar	16:15	Off the coast of Miyagi Prefecture	6.1	2

Explanatory note)

Earthquake with observed intensity 6 at Futabamachi, Fukushima Prefecture
Earthquake with observed intensity 5 at Futabamachi, Fukushima Prefecture
Earthquake with observed intensity 4 at Futabamachi, Fukushima Prefecture
Tsunami information and tsunami warnings/advisories

Based on the information on earthquakes, tsunamis and tsunami warnings/advisories

* The starting time of the first waves of the tsunami was unidentified from the tidal data due to changes in tidal level caused by quakes and other factors.



Photographed by Tokyo Electric Power Company
15:43, March 11, 2011

Ground deformation caused by quakes is not reflected in inundation height or run-up height.

Investigation results concerning the flooding of the Fukushima Dai-ichi NPS by the tsunami (level of inundation, water depth and flooded area)

Based on "The impact of Tohoku-Chihou Taiheiyo-Oki Earthquake to Nuclear Reactor Facilities at Fukushima Dai-ichi Nuclear Power Station" (September 2011) by Tokyo Electric Power Company

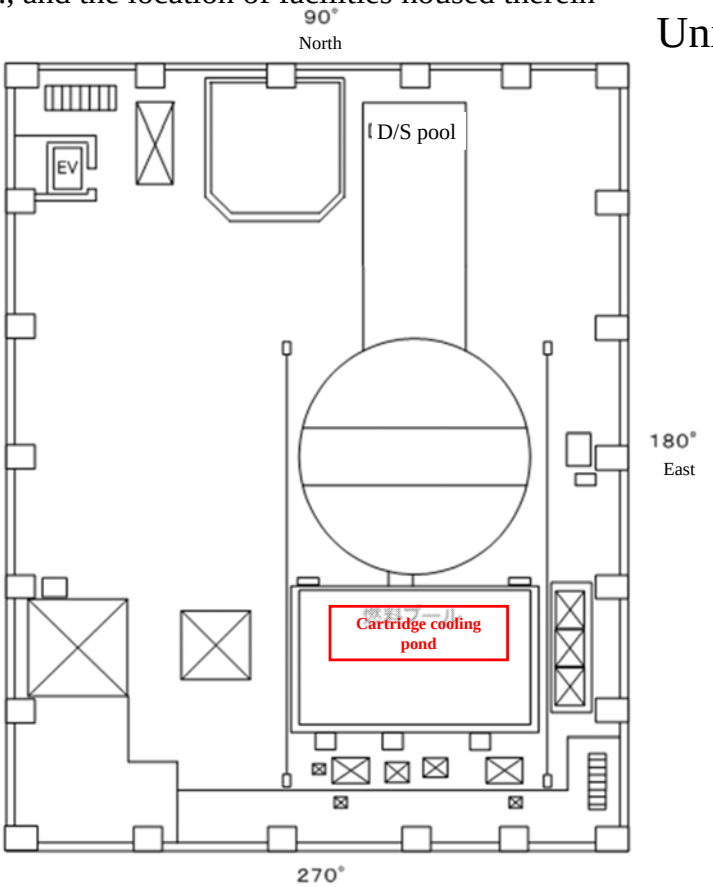
Attachment II-11

Radiation dose in R/B, T/B, etc., and the location of facilities housed therein

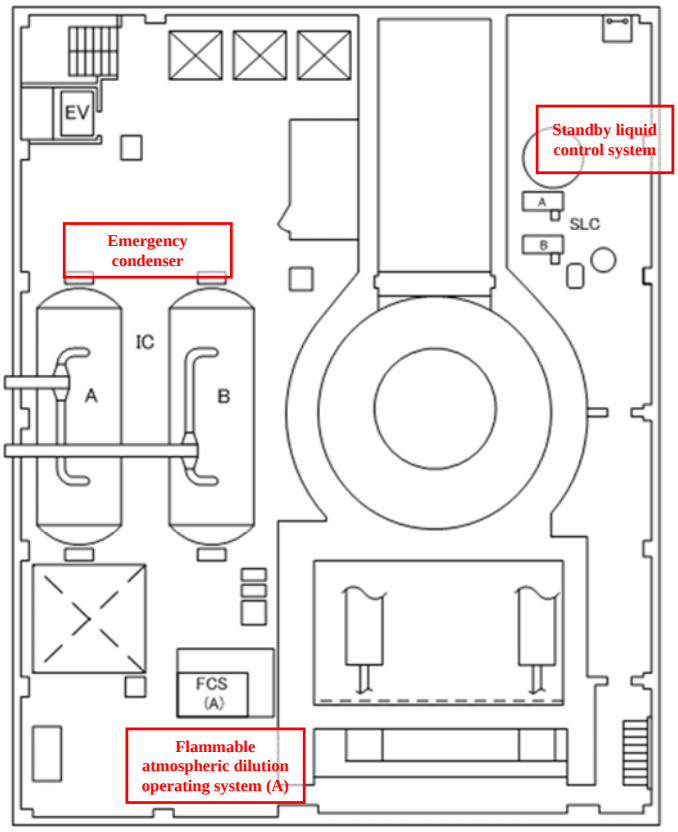
Unit 1

- This document describes the latest dose information provided by Tokyo Electric Power Company (TEPCO) while being based on the “Survey Map” which TEPCO created in order to organize past dose data for the purpose of radiation control.
- In addition, the document indicates the main facilities inside each building.
- The numbers in the figures indicate the radiation doses (mSv/h) measured at the respective spots. The colors circling the numbers correspond to the measurement dates listed in the margins of the figures.
- The radiation dose measurements were conducted for thirty-three days, from July 22 to October 1.

Unit for numbers in the document
-Dose: mSv/h



Fifth floor, R/B, Unit 1



Fourth floor, R/B, Unit 1

The parts colored in pale-blue in the documents on Units 1 to 4 indicate the areas considered to have been under water based on the level of residual water inside buildings as of October 4.

Based on data and documents by Tokyo Electric Power Company

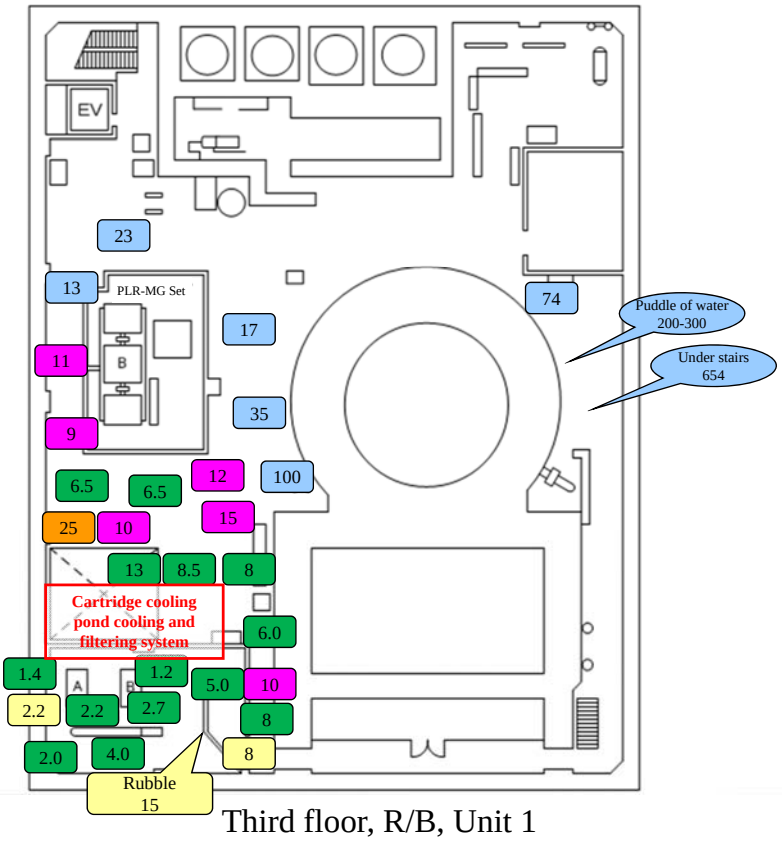
July 25, 2011

July 26, 2011

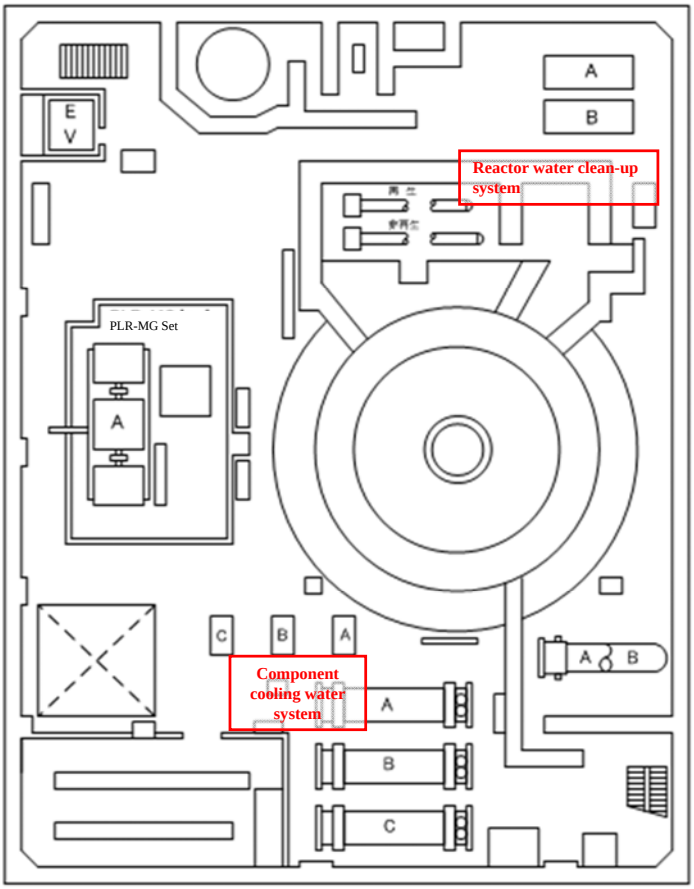
July 31, 2011

August 2, 2011

August 11, 2011

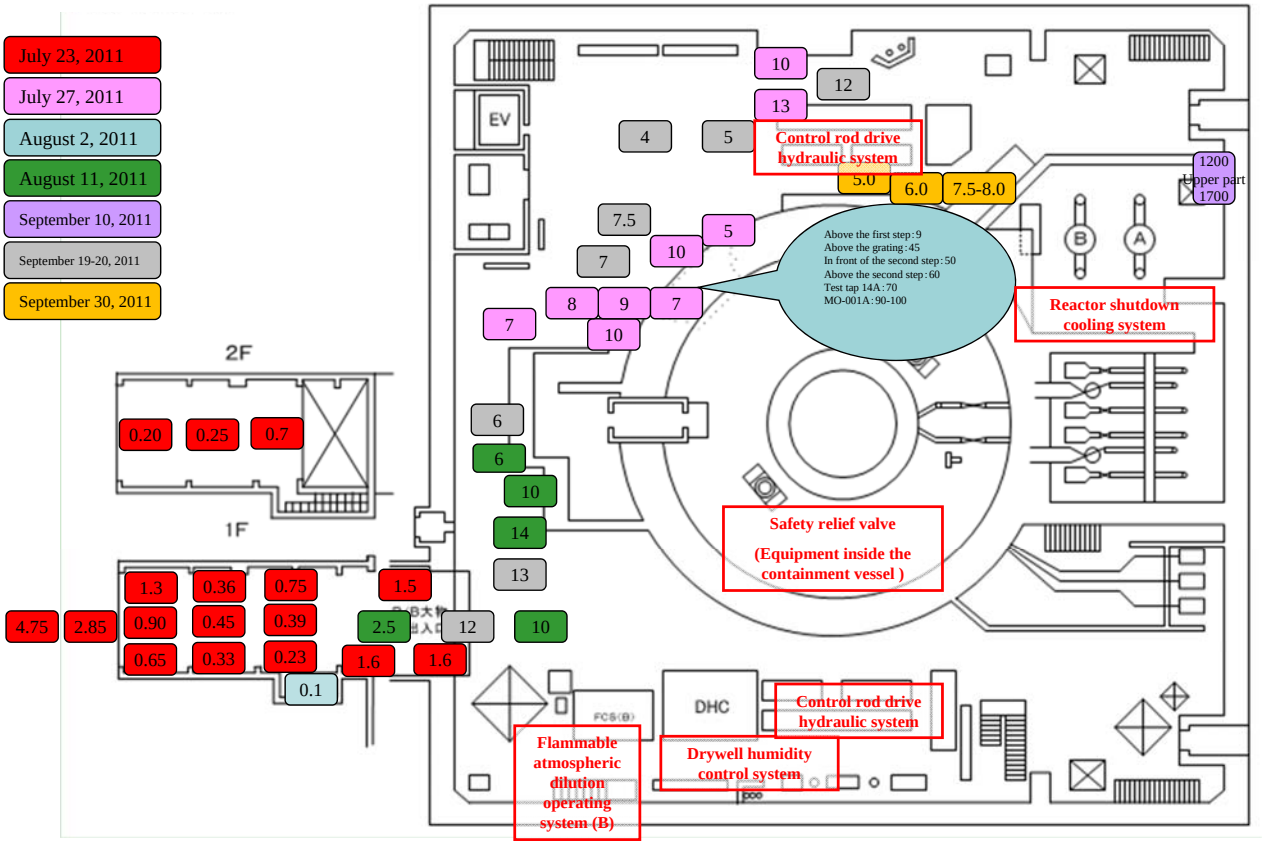


Third floor, R/B, Unit 1

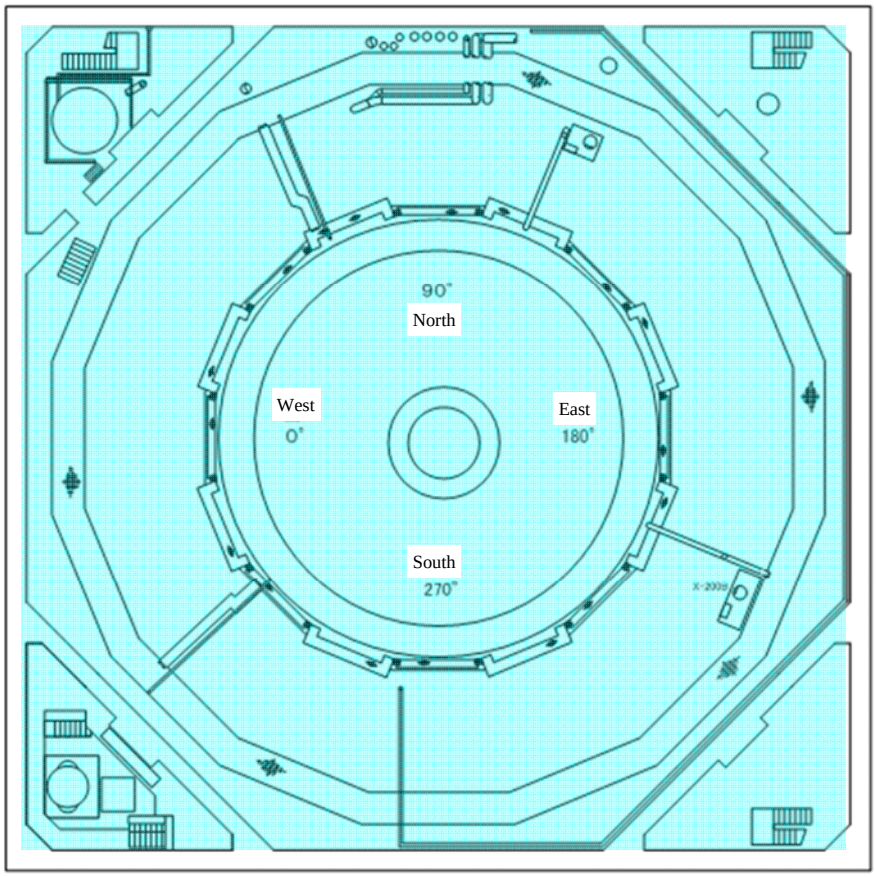


Second floor, R/B, Unit 1

Based on data and documents by Tokyo Electric Power Company

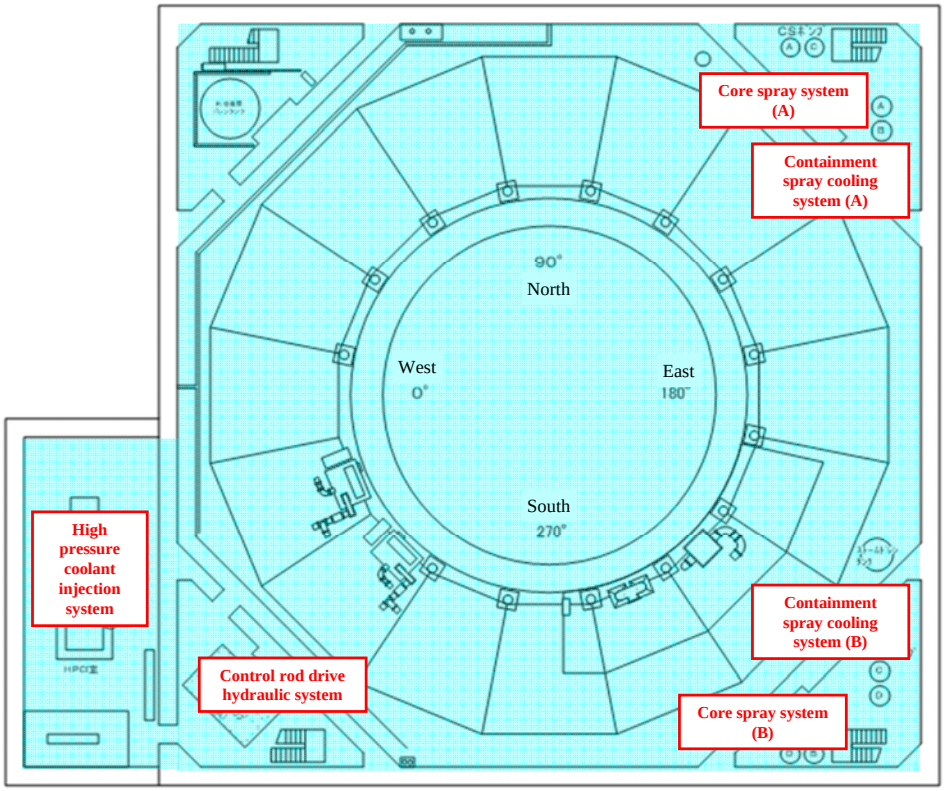


First floor, R/B, Unit 1

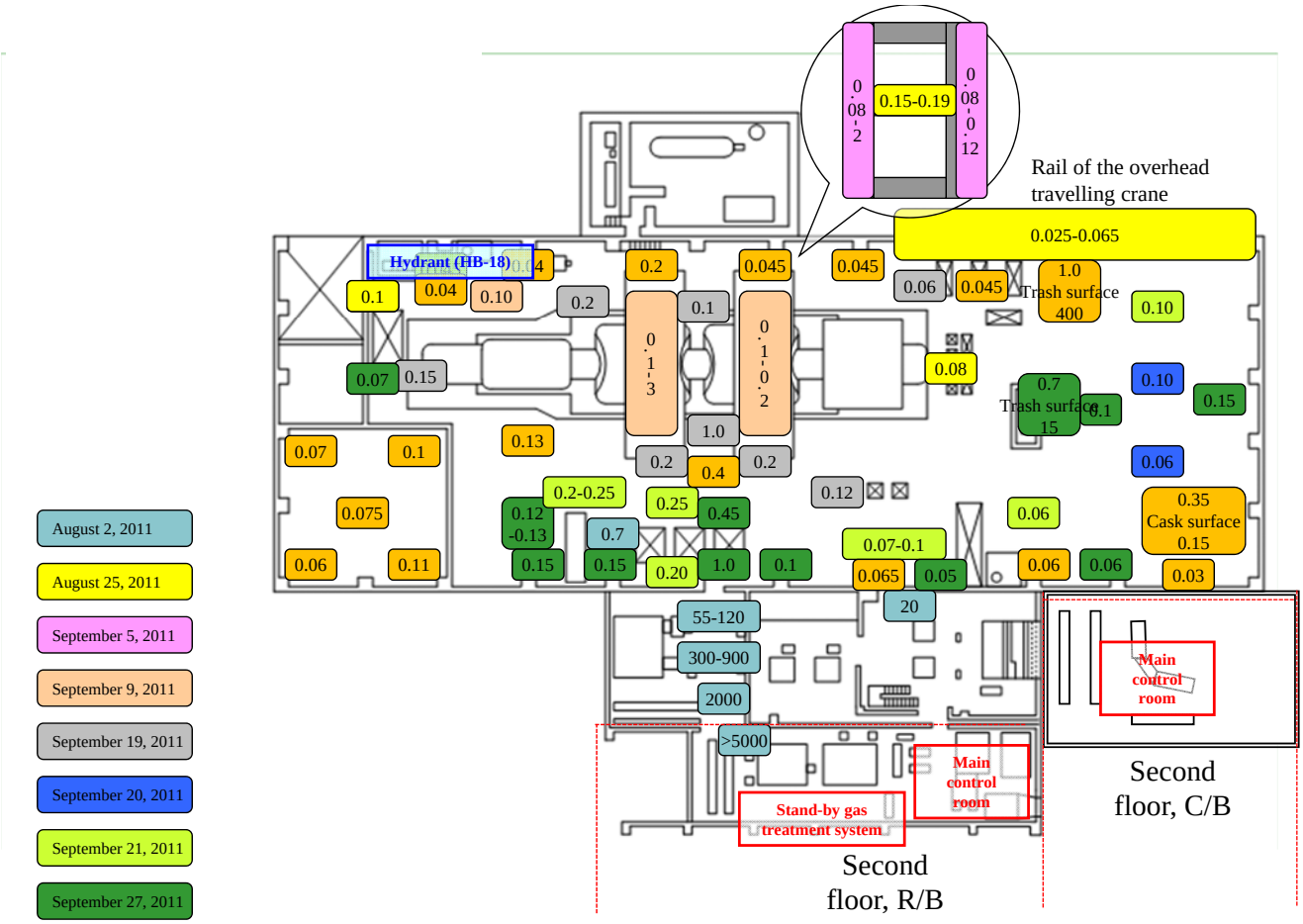


Basement mezzanine floor, R/B, Unit 1

Based on data and documents by Tokyo Electric Power Company



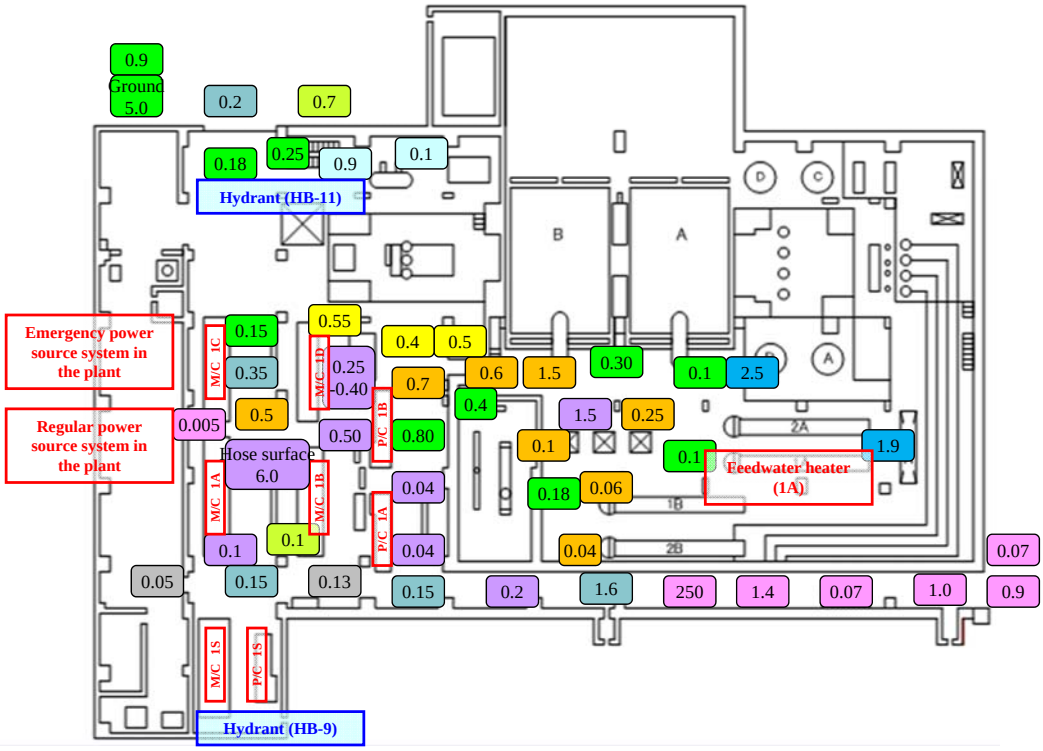
Basement floor, R/B, Unit 1



Second basement floor, R/B, Unit 1

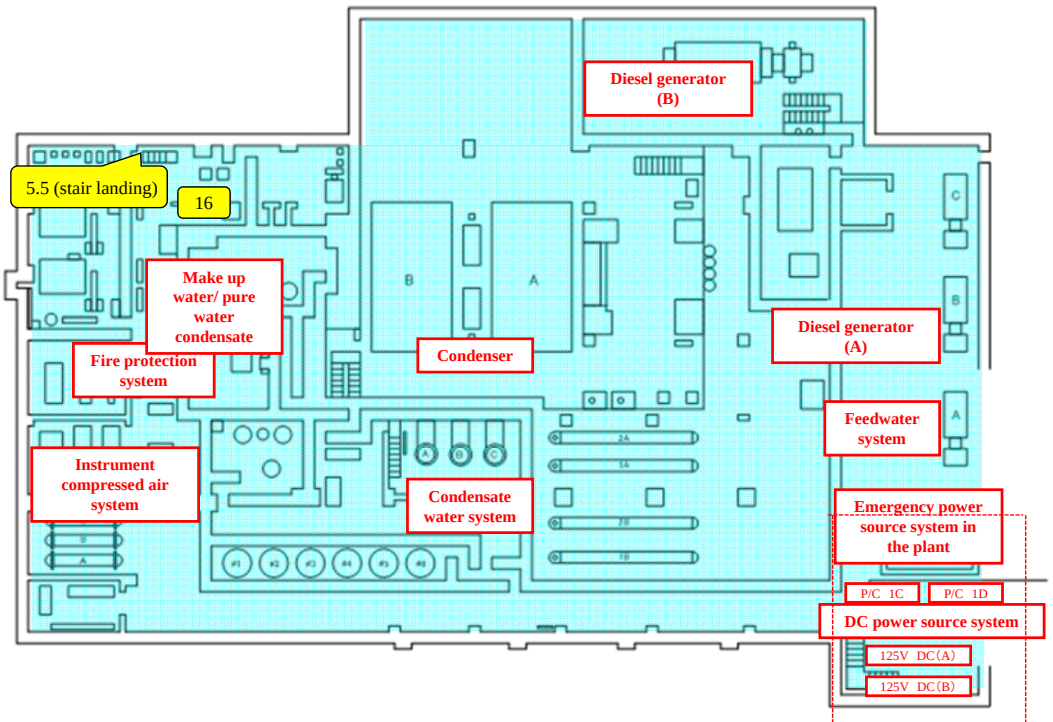
Based on data and documents by Tokyo Electric Power Company

July 27, 2011
August 3, 2011
August 25, 2011
September 19. 2011
September 21, 2011
September 26, 2011
September 27, 2011
September 30, 2011
October 1, 2011



First floor, T/B, Unit 1

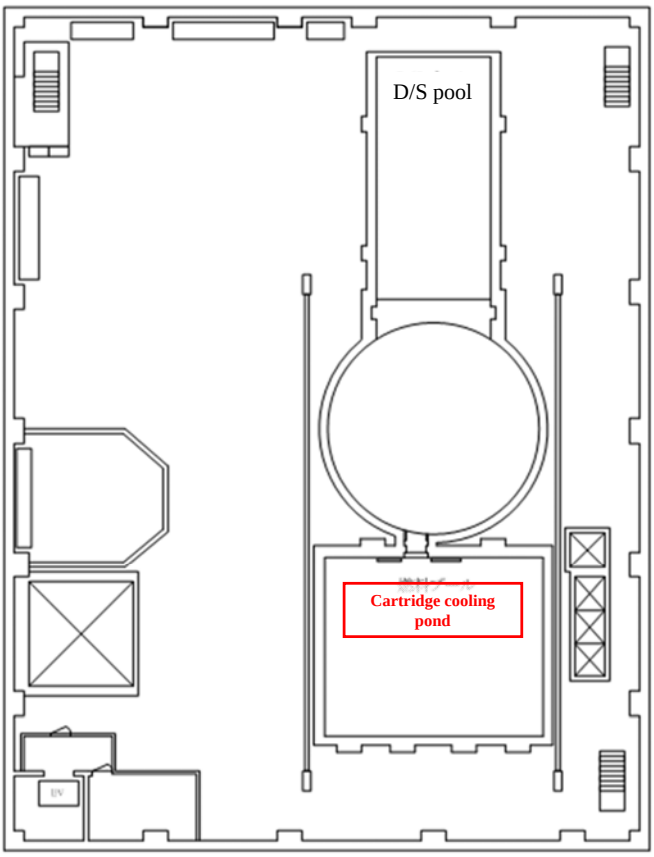
September 13, 2011



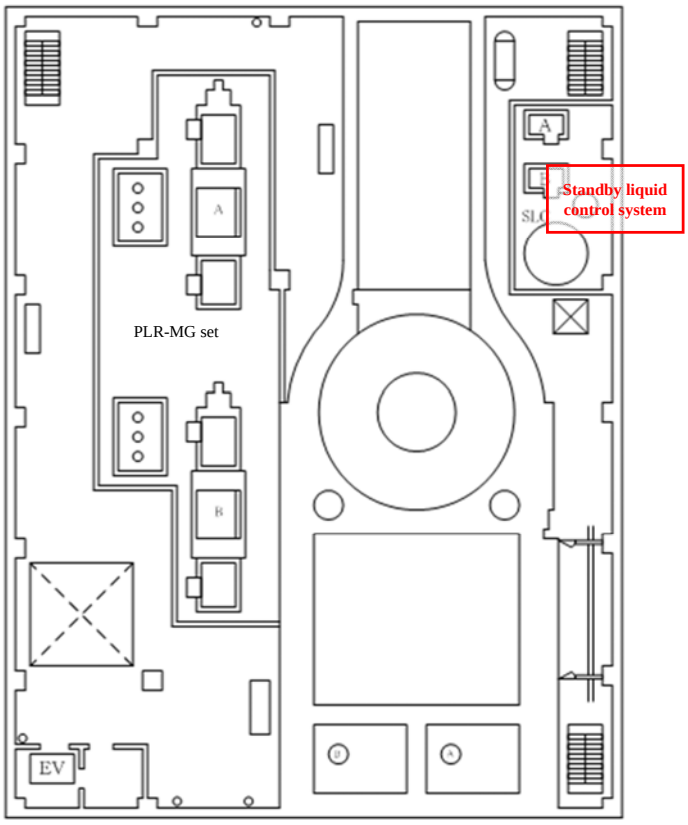
First basement floor, C/B

First basement floor, T/B Unit 1

Based on documents and data created by TEPCO

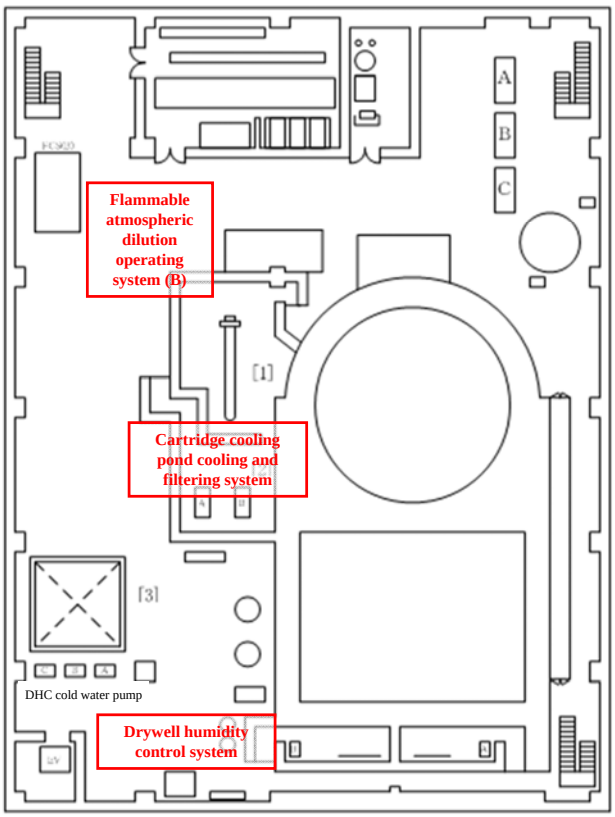


Fifth floor, R/B, Unit 2

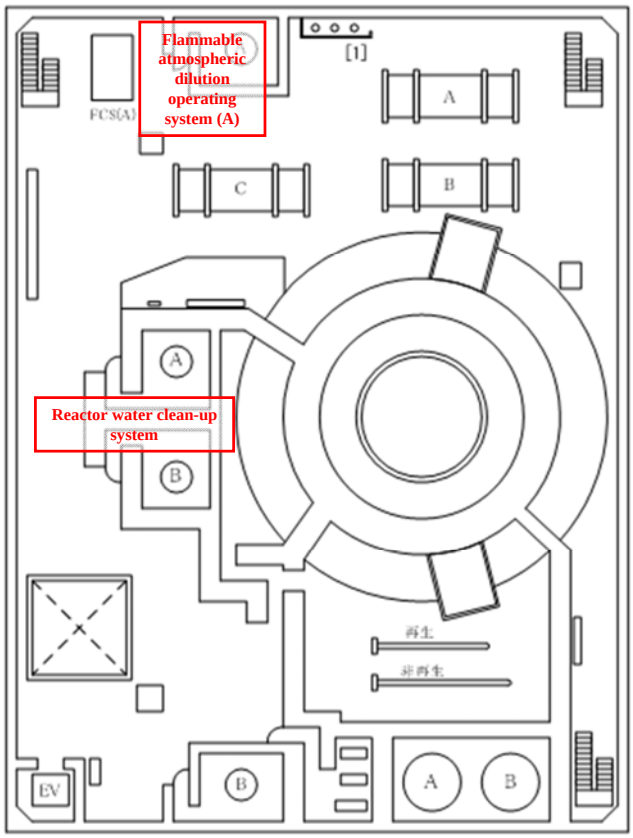


Fourth floor, R/B, Unit 2

Based on data and documents by Tokyo Electric Power Company

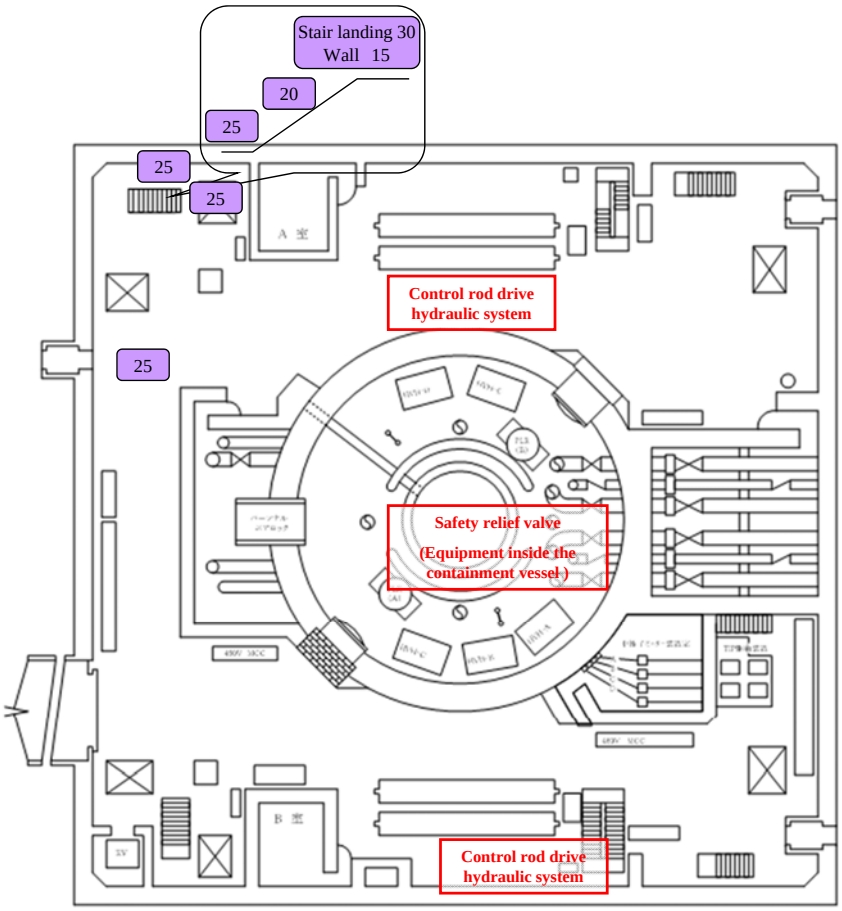


Third floor, R/B, Unit 2



Second floor, R/B, Unit 2

Based on data and documents by Tokyo Electric Power Company



Common auxiliary facilities

Shared pool building

Diesel generator (B)

First floor

Emergency power source system in the plant

M/C 2E

P/C 2E

DC power source system

125V DC (2D/G B)

First basement floor

M/C 2SA building

Emergency power source system in the plant

M/C 2SA

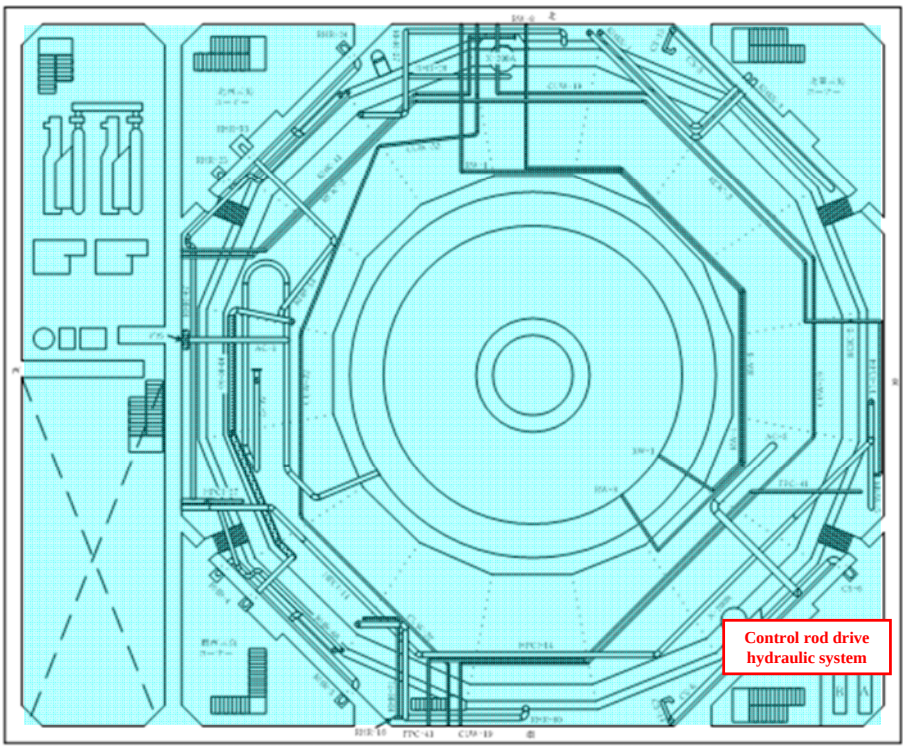
First floor

*Refer to Attachments II-3 and II-4 for the location of common auxiliary facilities (shared pool building).

*Refer to Attachment II-4 for the location of the M/C 2SA building.

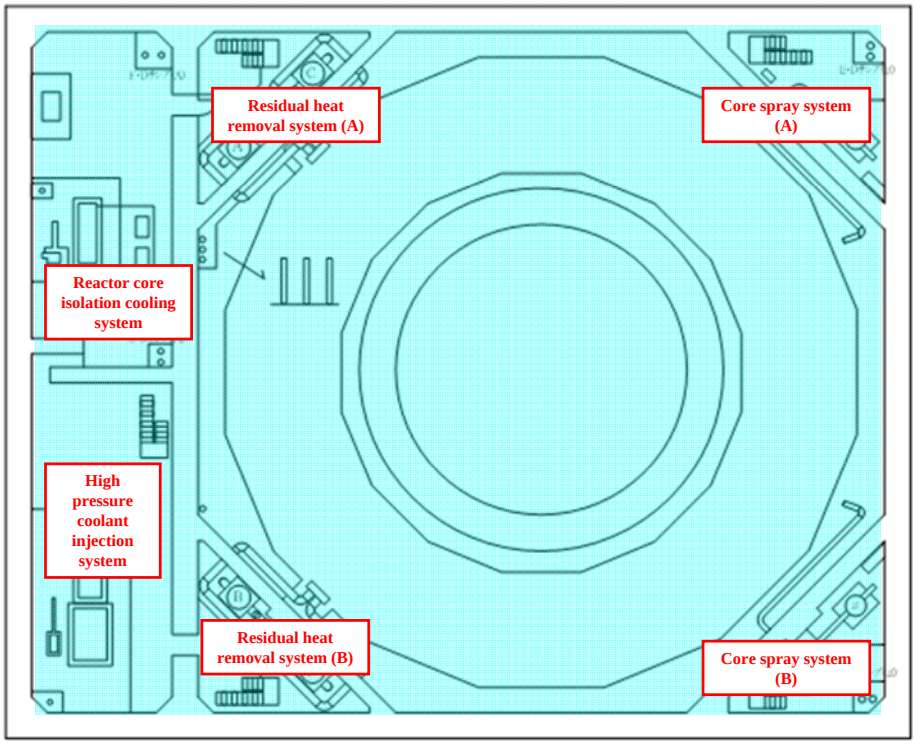
September 15, 2011

First floor, R/B, Unit 2

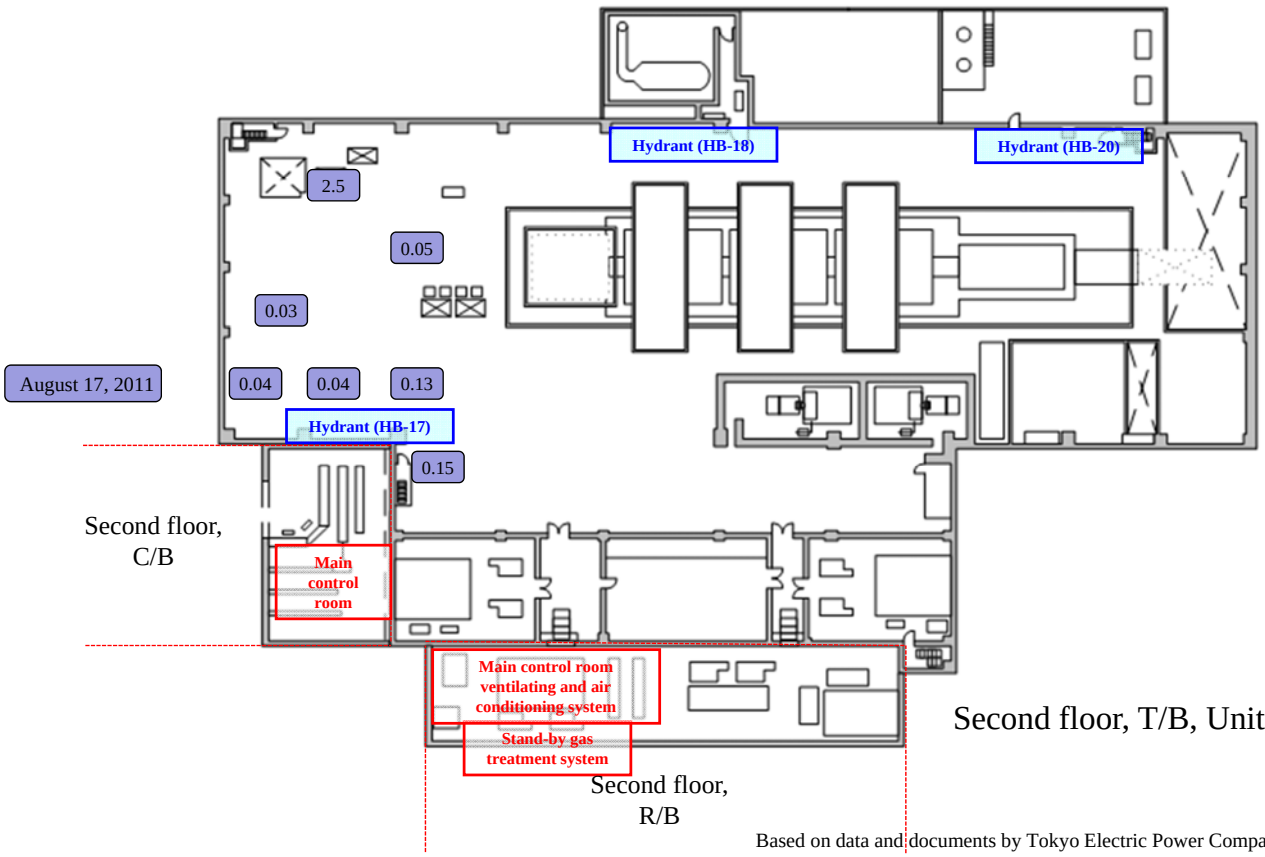


Basement mezzanine floor, R/B, Unit 2

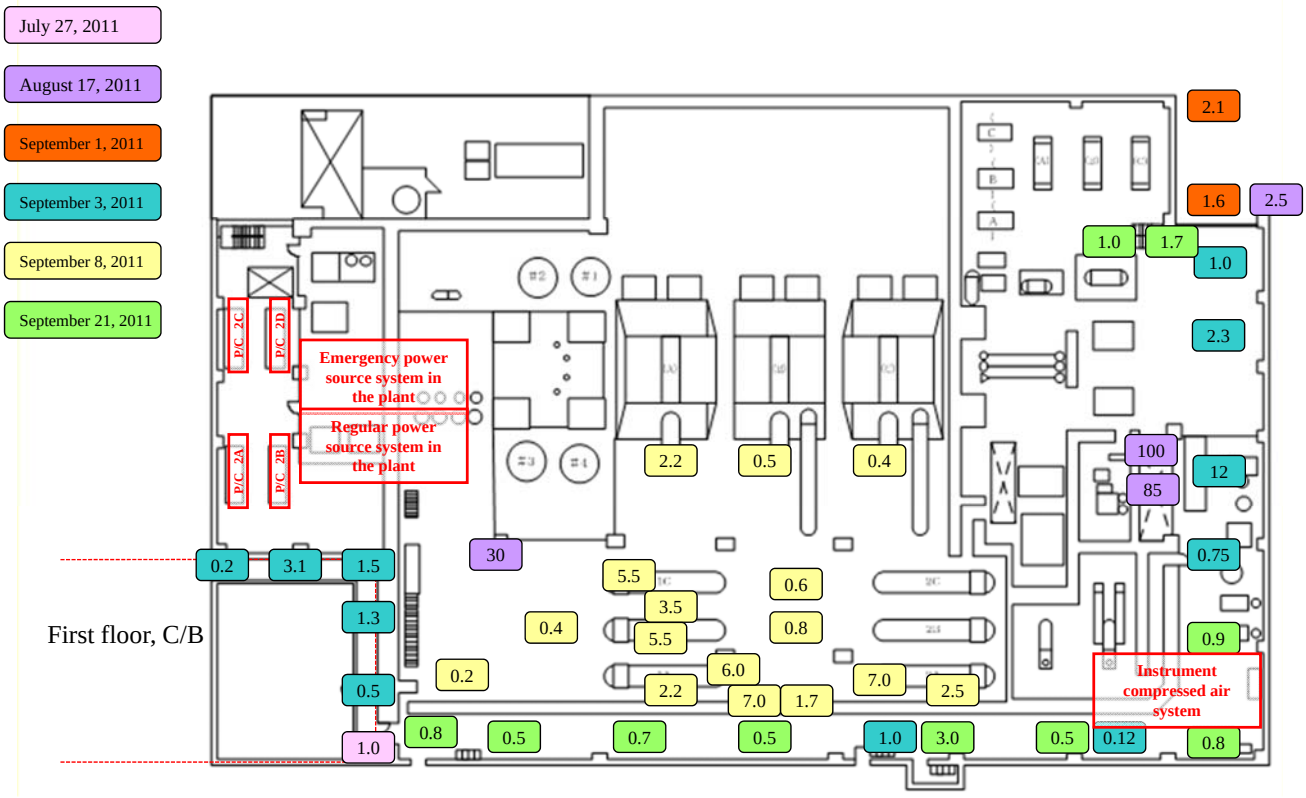
Based on data and documents by Tokyo Electric Power Company



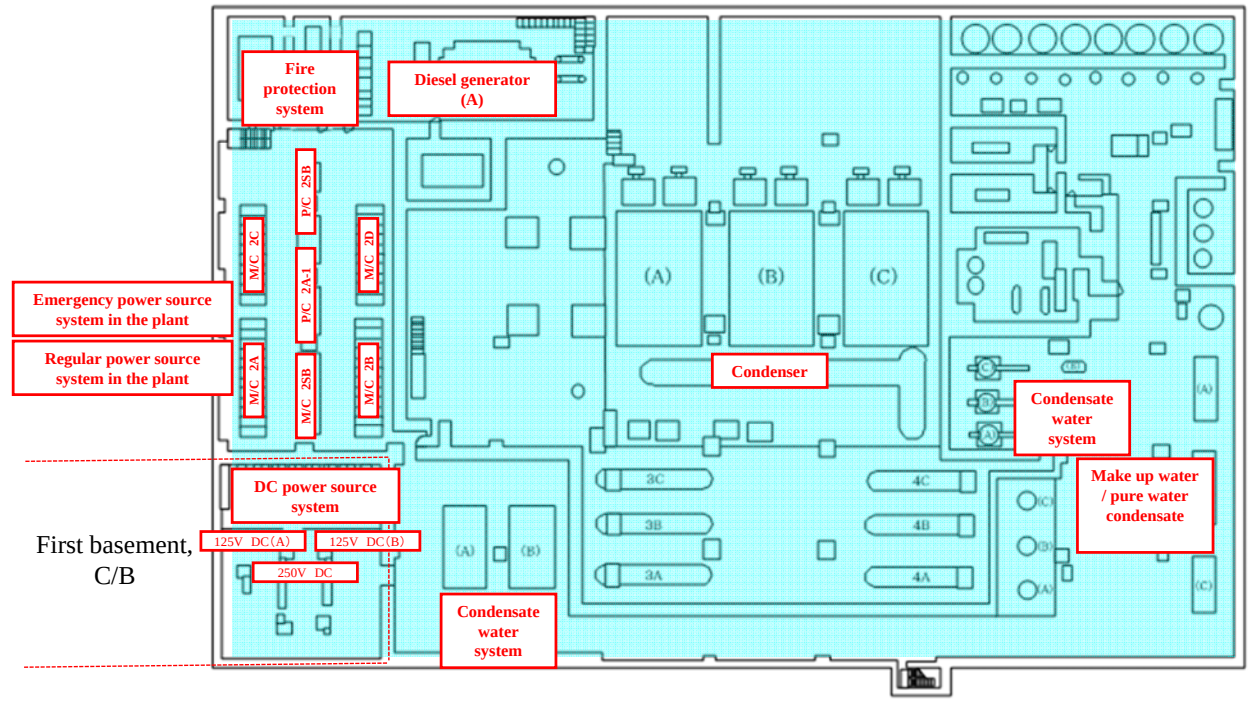
First basement floor, R/B, Unit 2



Based on data and documents by Tokyo Electric Power Company

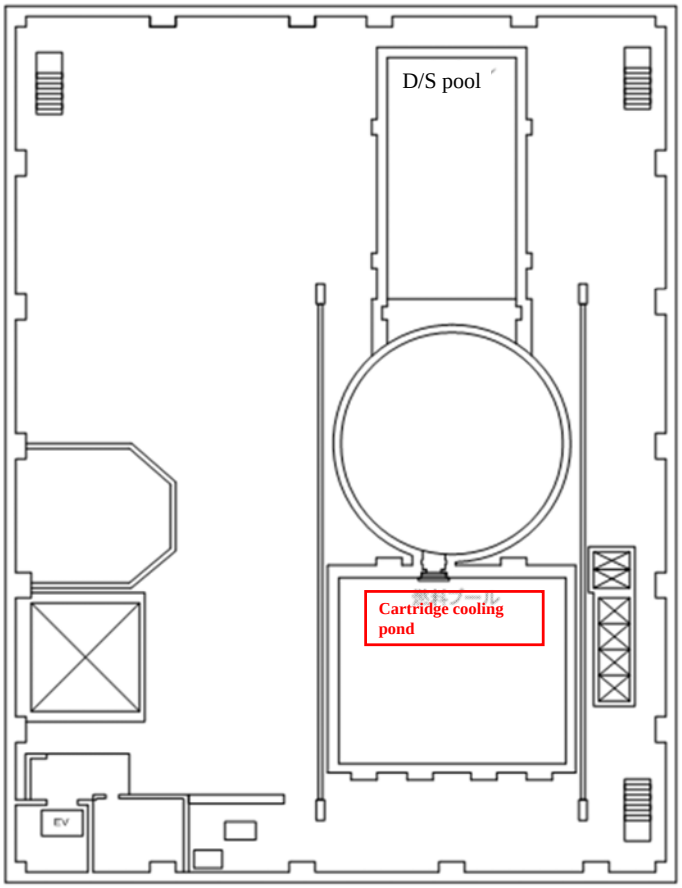


First floor, T/B, Unit 2

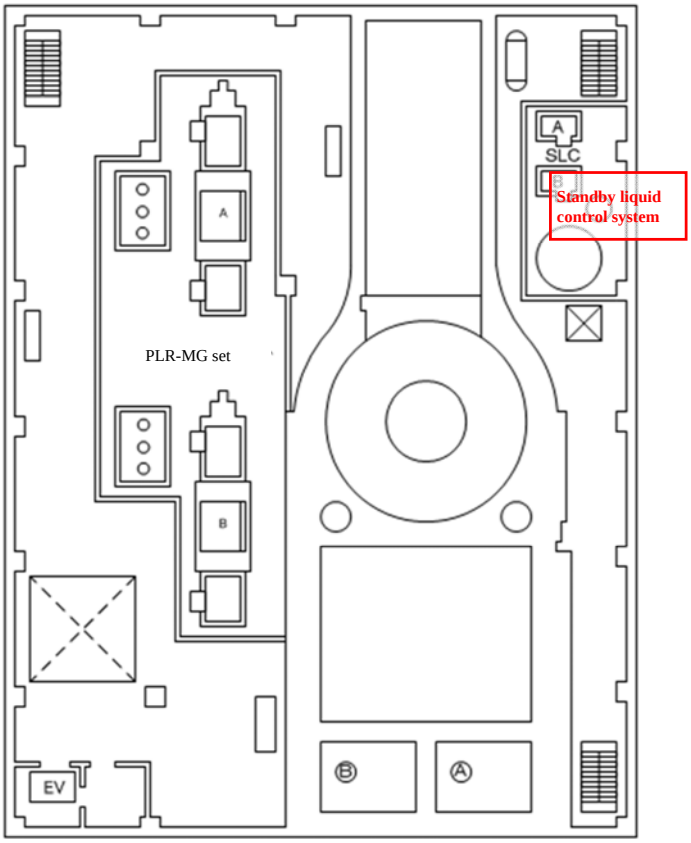


First basement floor, T/B, Unit 2

Based on data and documents by Tokyo Electric Power Company

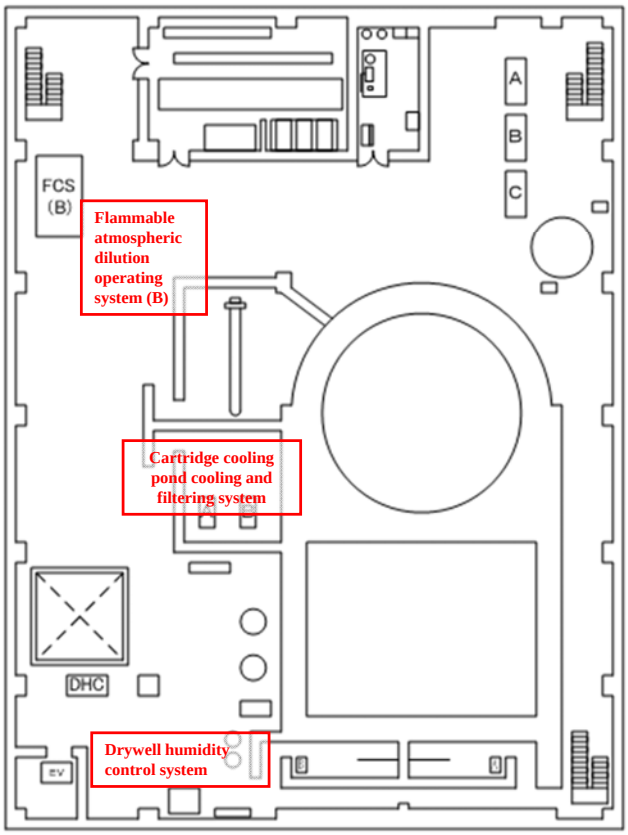


Fifth floor, R/B, Unit 3



Fourth floor, R/B, Unit 3

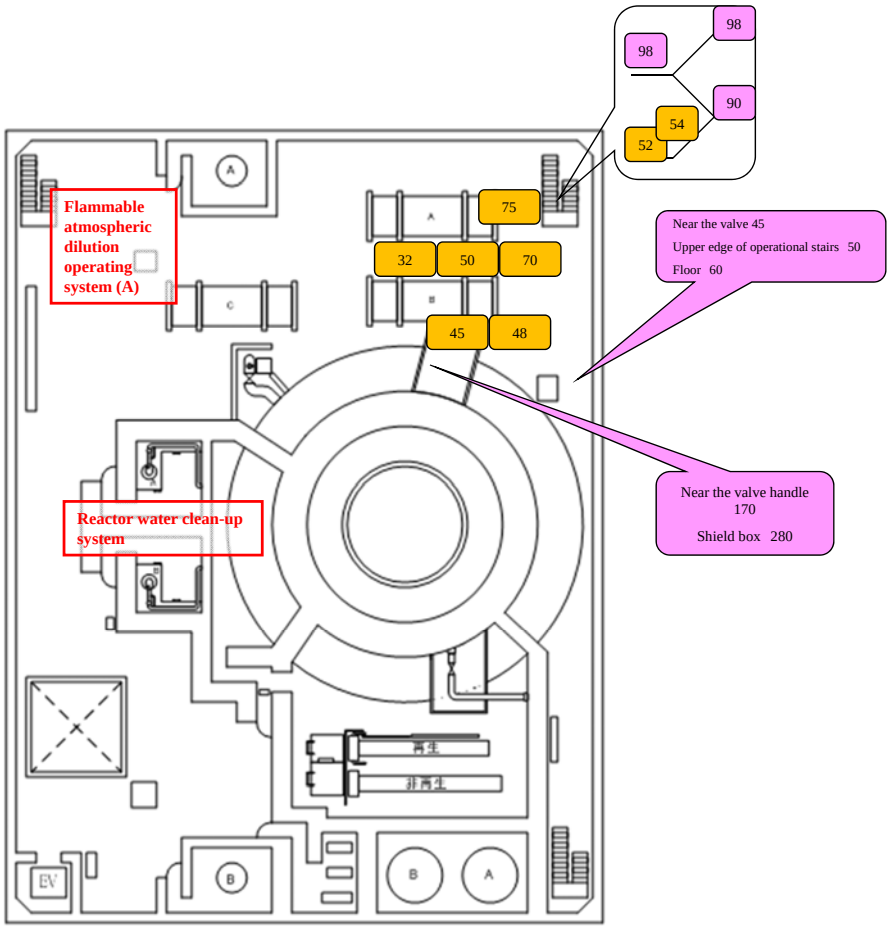
Based on data and documents by Tokyo Electric Power Company



Third floor, R/B, Unit 3

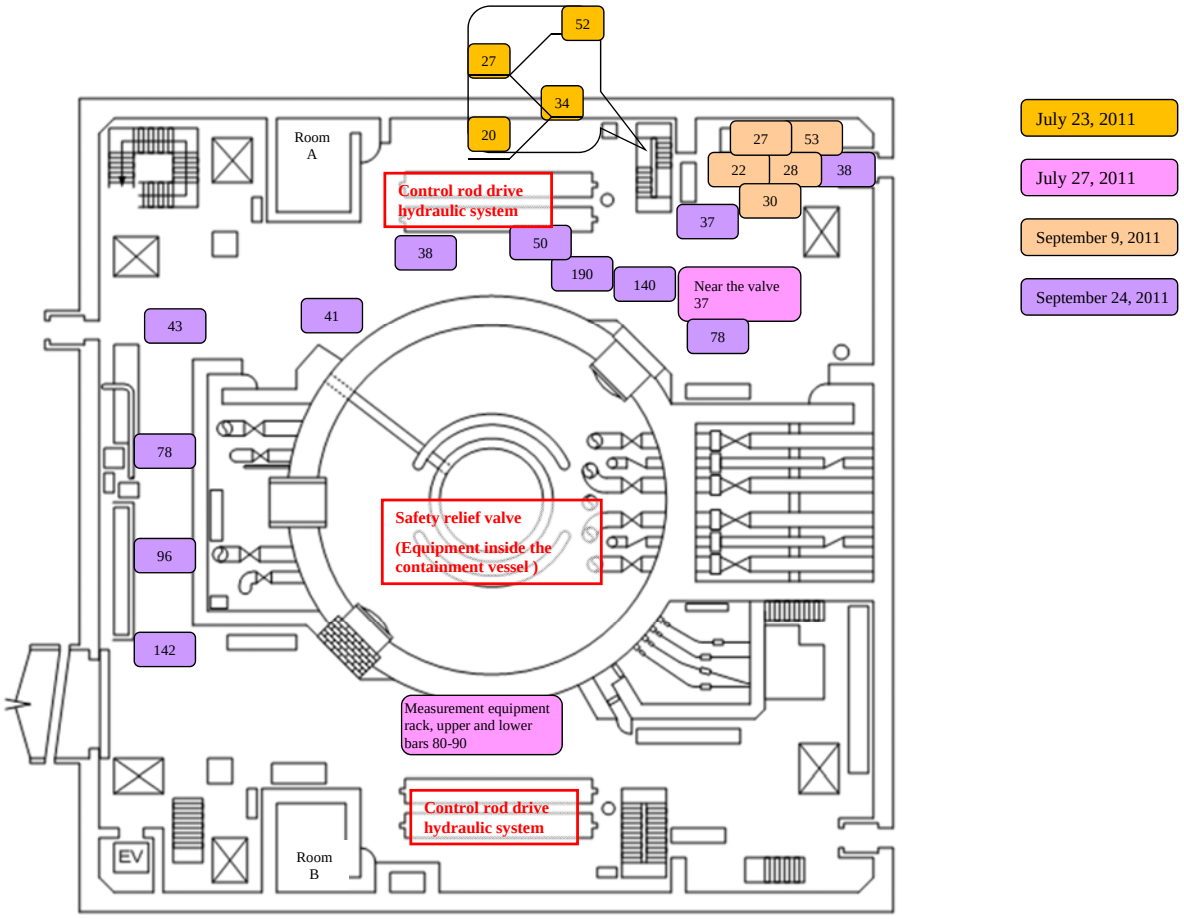
July 26, 2011

July 27, 2011

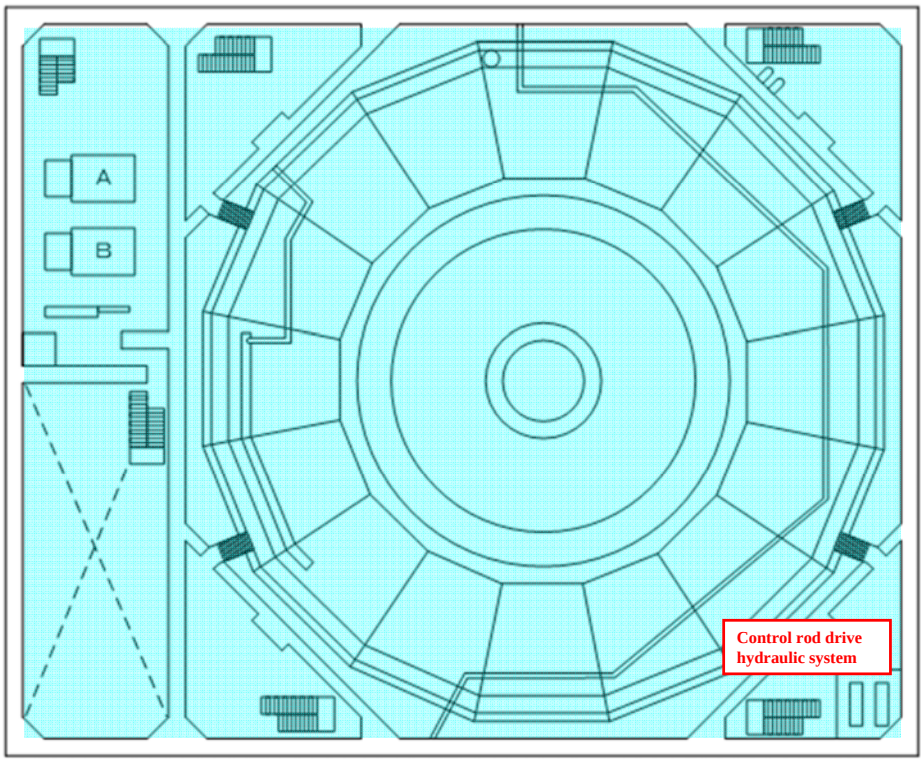


Second floor, R/B, Unit 3

Based on data and documents by Tokyo Electric Power Company

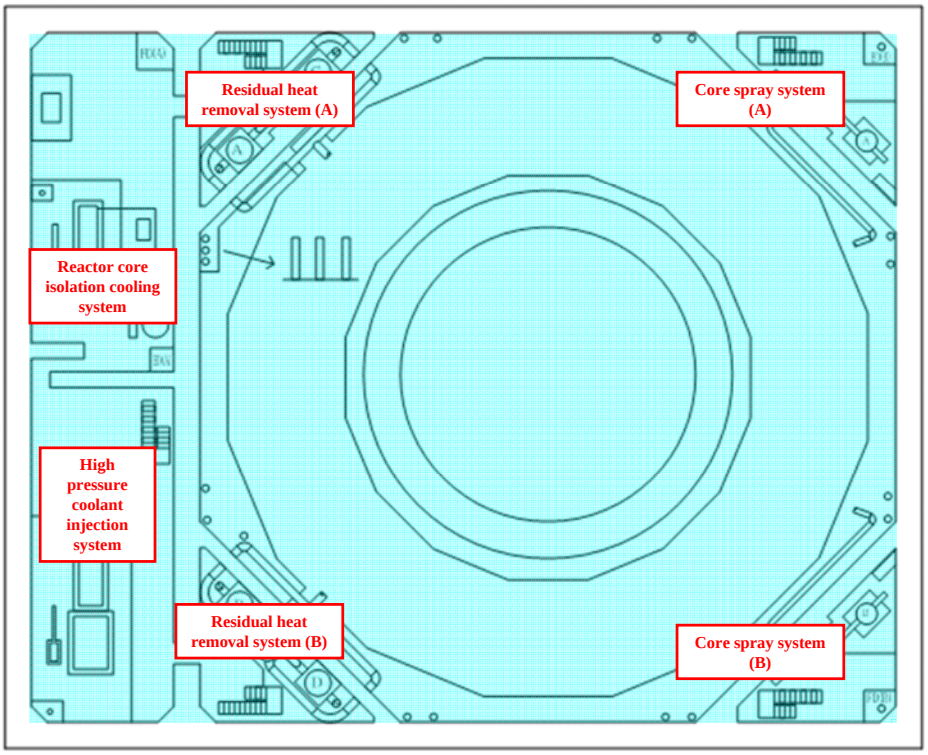


First floor, R/B, Unit 3

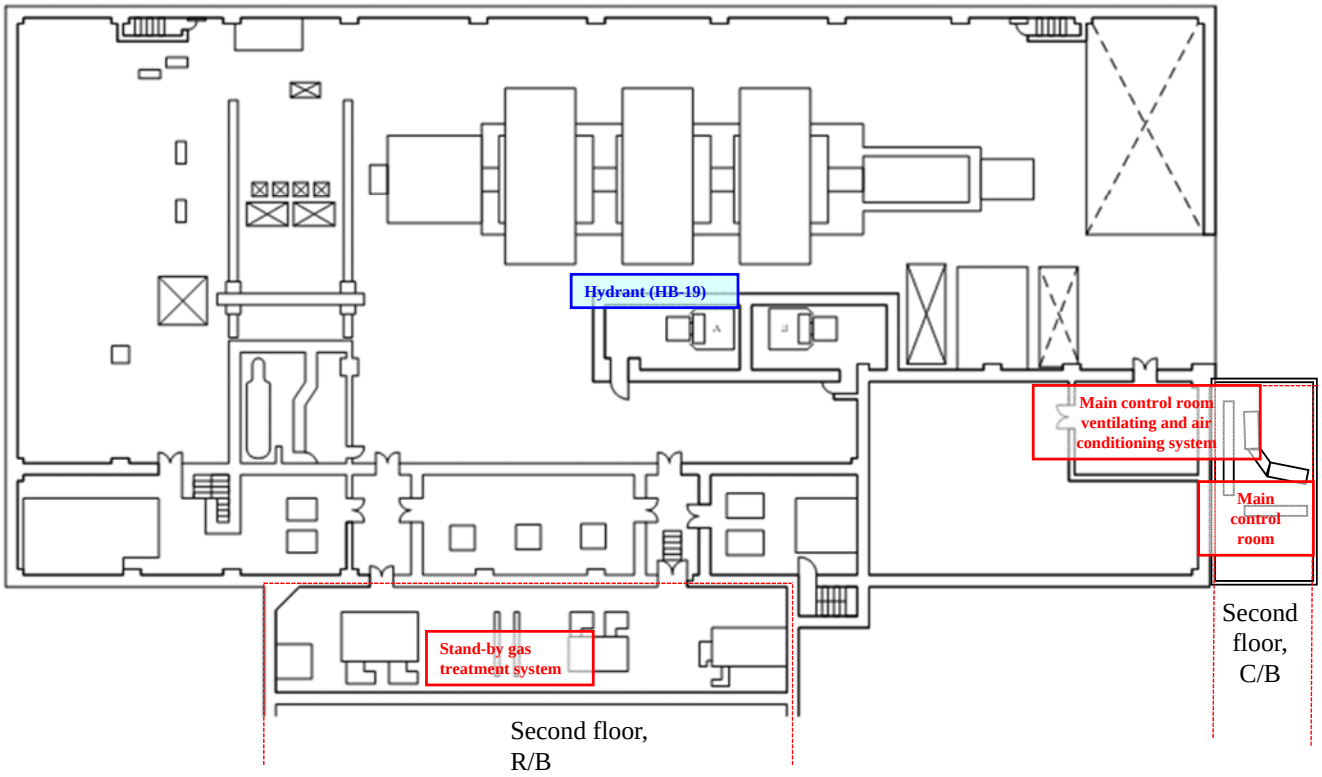


Basement mezzanine floor, R/B, Unit 3

Based on data and documents by Tokyo Electric Power Company



First basement floor, R/B, Unit 3

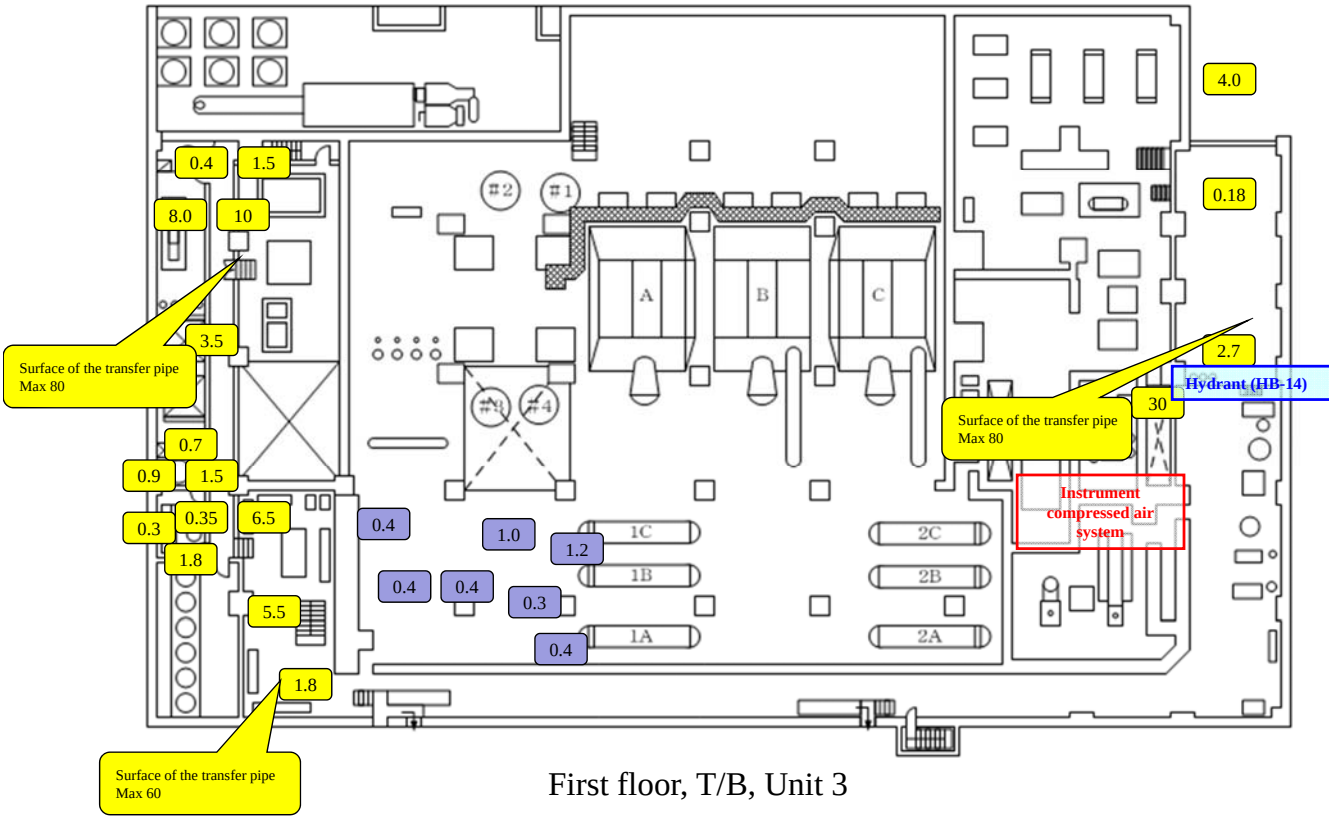


Second floor, T/B, Unit 3

Based on data and documents by Tokyo Electric Power Company

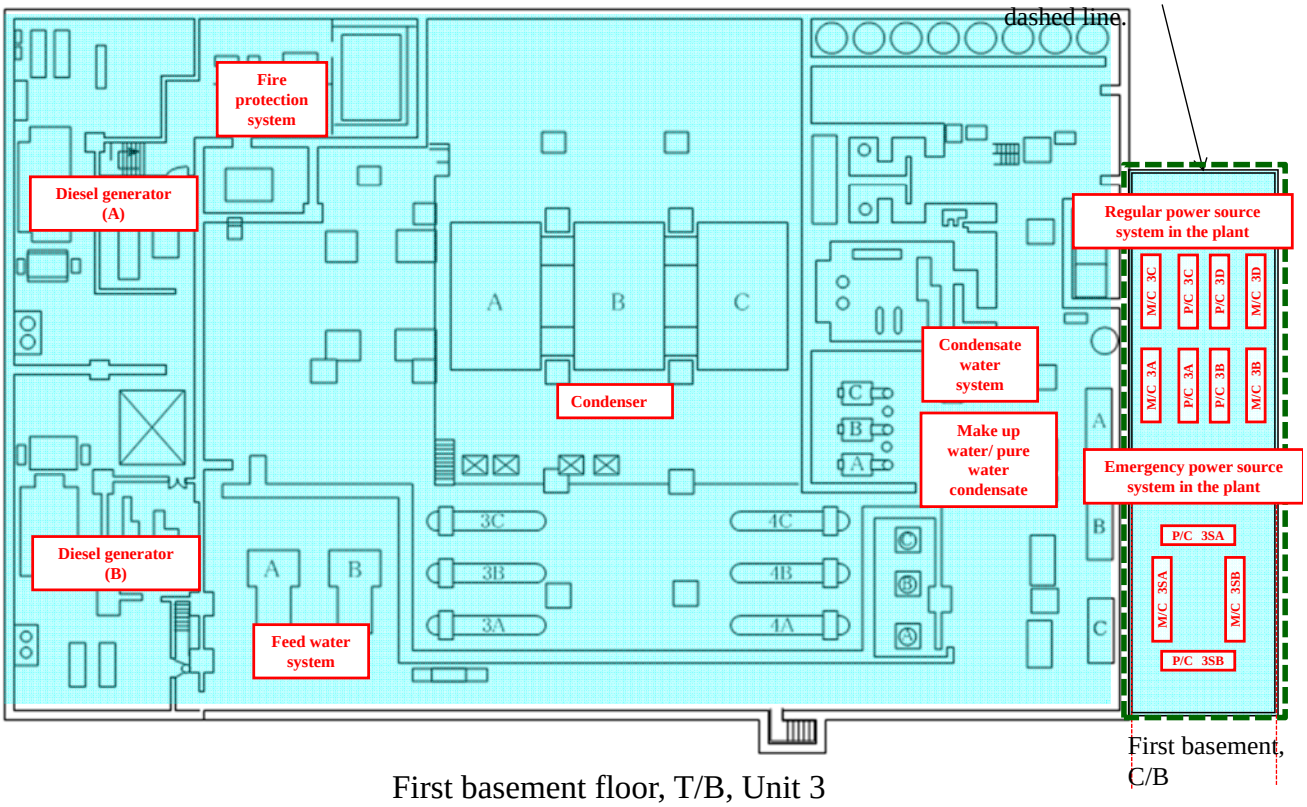
July 22, 2011

September 15, 2011



First floor, T/B, Unit 3

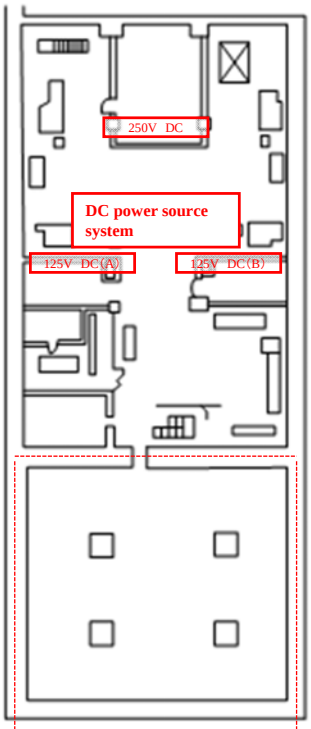
The basement mezzanine floor, T/B, Unit 3 is located above the area in the green dashed line.



First basement floor, T/B, Unit 3

Based on data and documents by Tokyo Electric Power Company

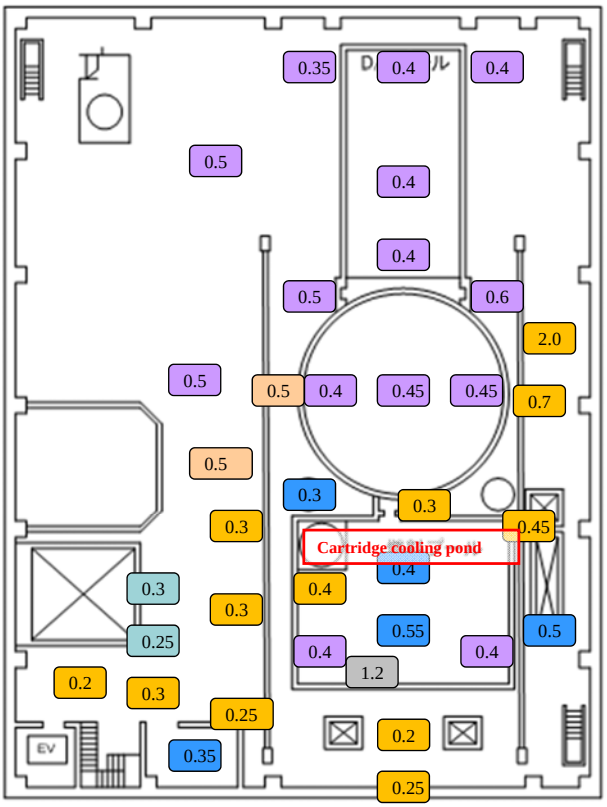
This basement mezzanine floor is located above the area in the green dashed line on the first basement floor, T/B, Unit 3.



Basement mezzanine floor, C/B

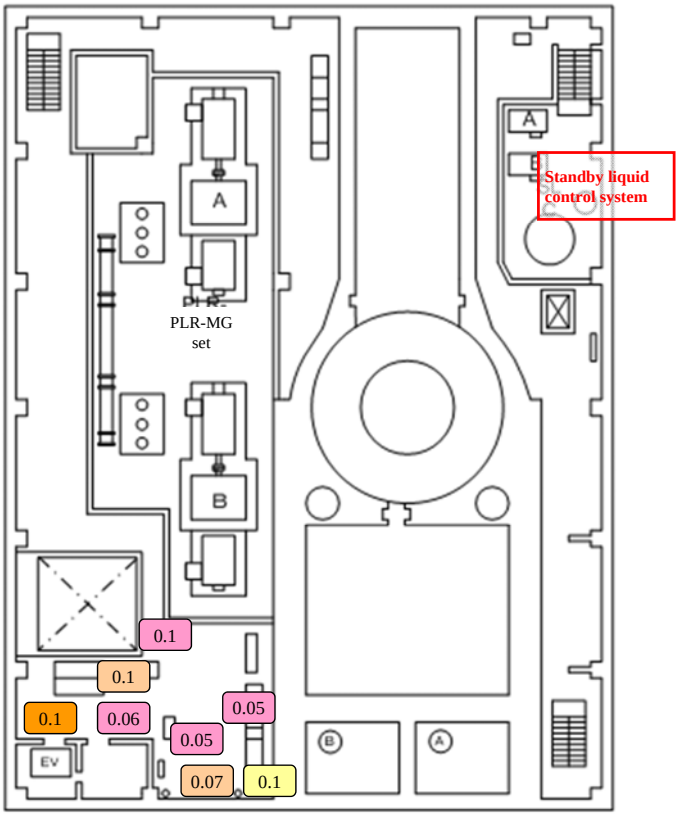
Basement mezzanine floor, T/B, Unit 3

Based on data and documents by Tokyo Electric Power Company



August 2, 2011
August 9, 2011
August 26, 2011
September 19, 2011
September 20, 2011
September 30, 2011

Fifth floor, R/B, Unit 4

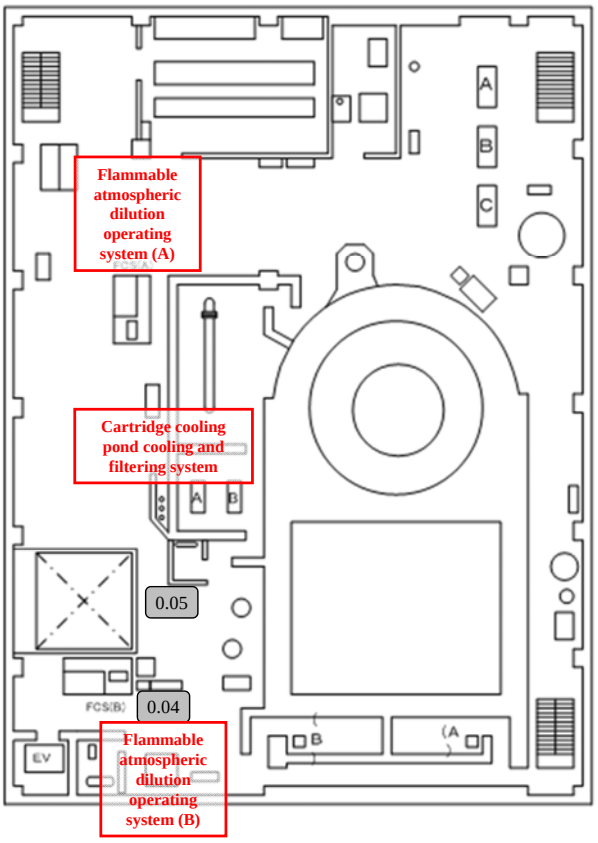


July 25, 2011
July 26, 2011
July 29, 2011
July 31, 2011

Fourth floor, R/B, Unit 4

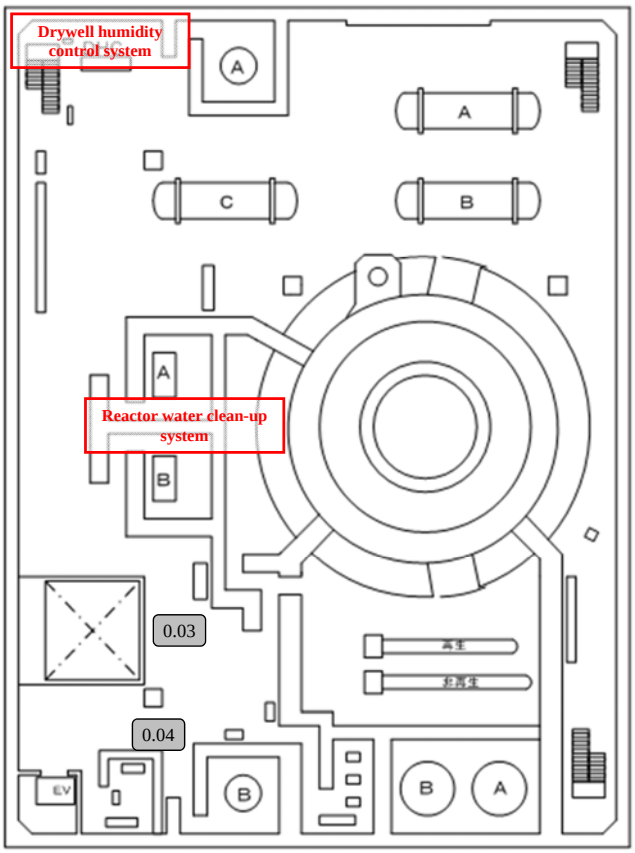
Based on data and documents by Tokyo Electric Power Company

July 28, 2011



Third floor, R/B, Unit 4

July 28, 2011



Second floor, R/B, Unit 4

Based on data and documents by Tokyo Electric Power Company

July 23, 2011

July 29, 2011

August 3, 2011

September 21, 2011

Common auxiliary facilities

Shared pool building

Diesel generator (B)

First floor

Emergency power source system in the plant

M/C 4E

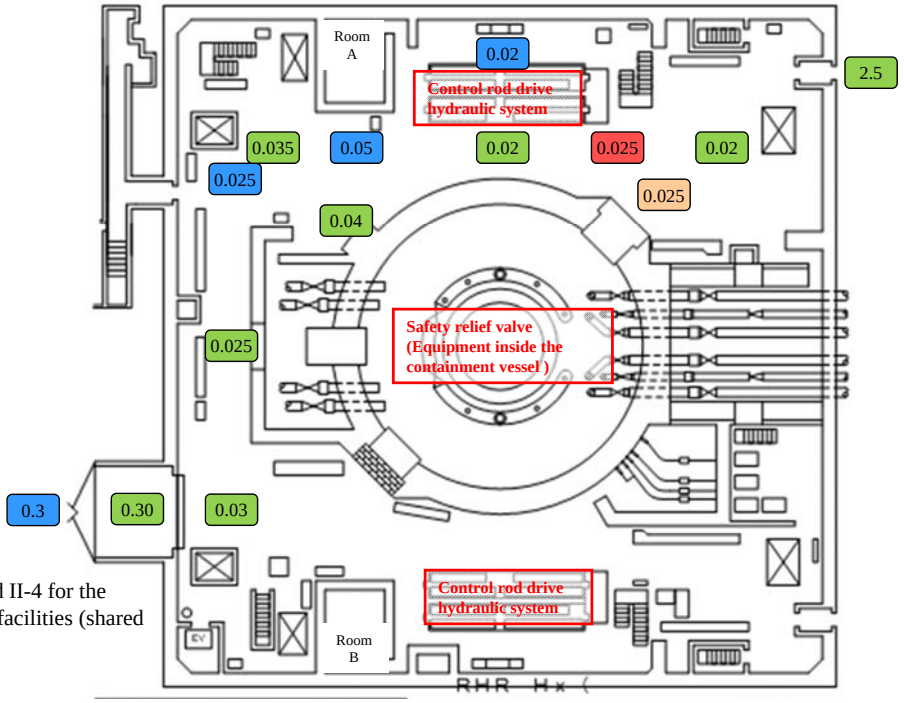
P/C 4E

DC power source system

125V DC (4D/G B)

First basement floor

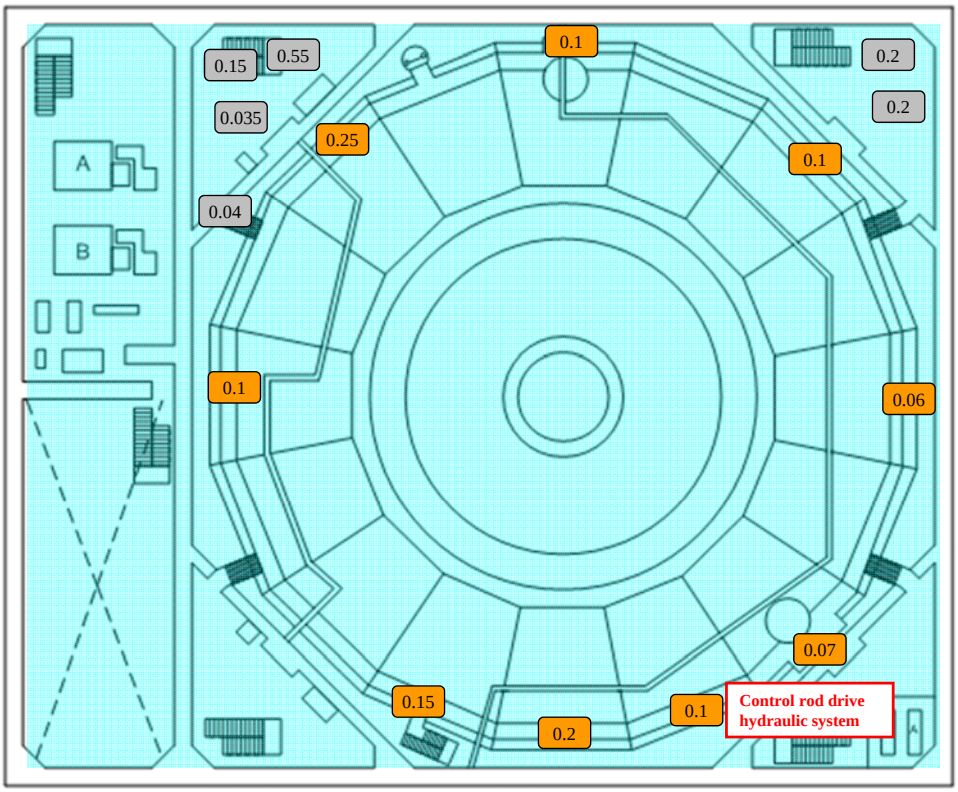
*Refer to Attachments II-3 and II-4 for the location of common auxiliary facilities (shared pool building).



First floor, R/B, Unit 4

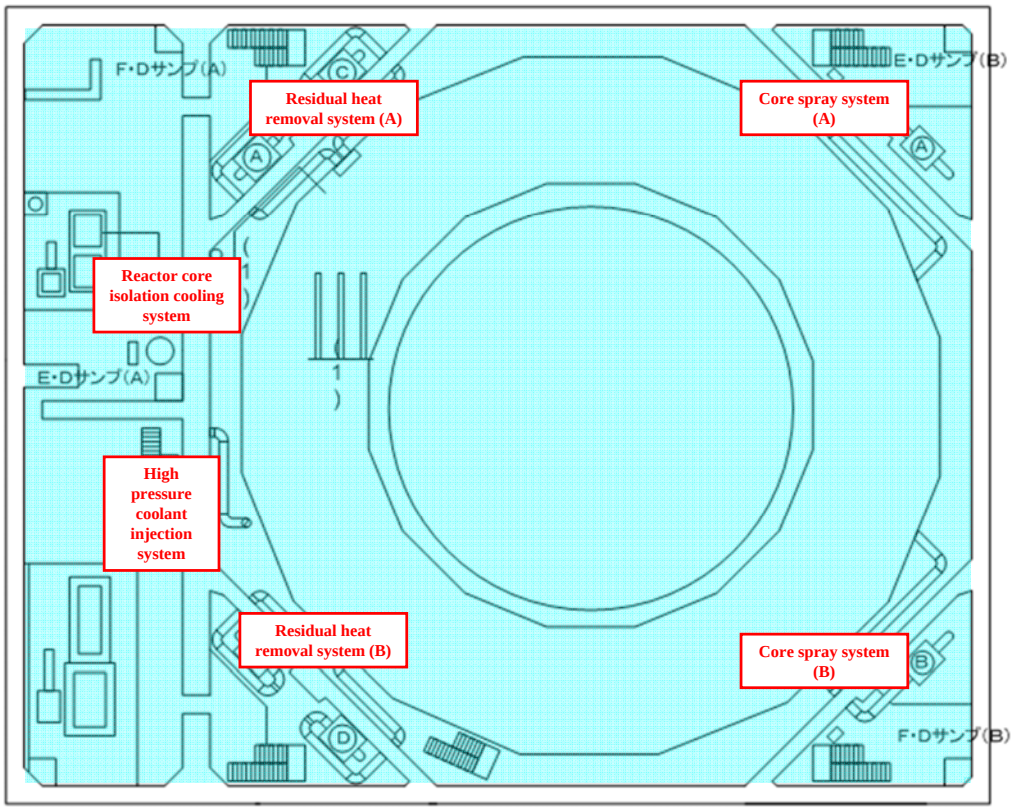
July 26, 2011

July 28, 2011



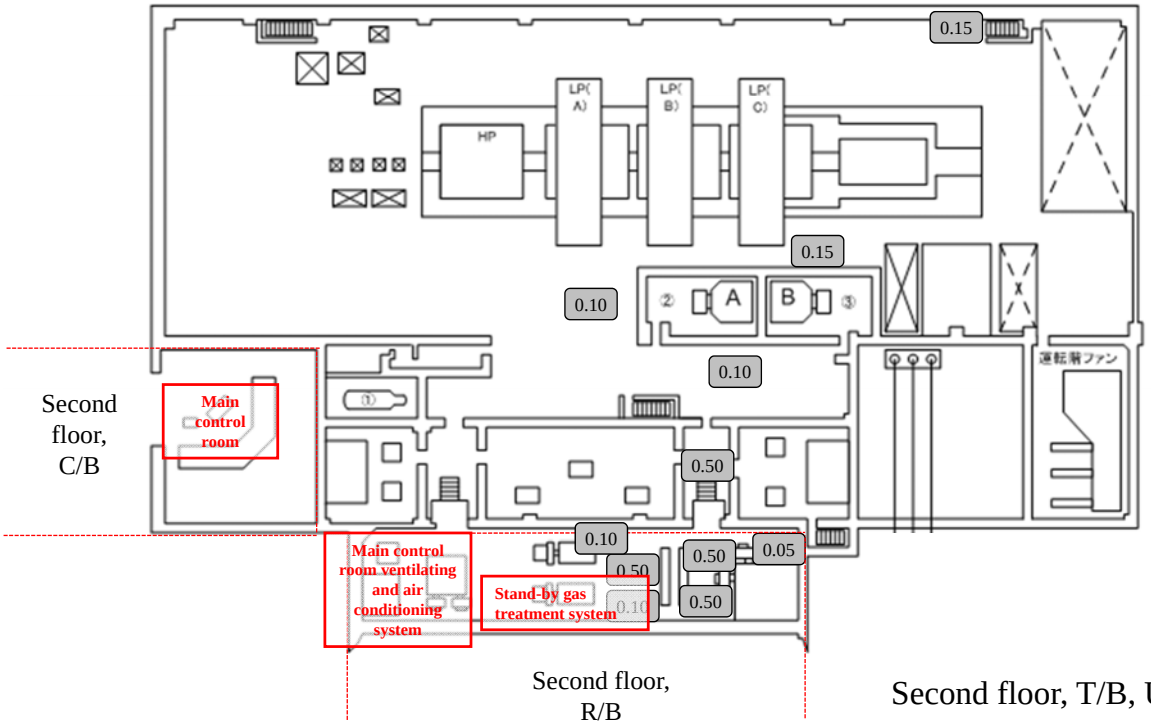
Basement mezzanine floor, R/B, Unit 4

Based on data and documents by Tokyo Electric Power Company



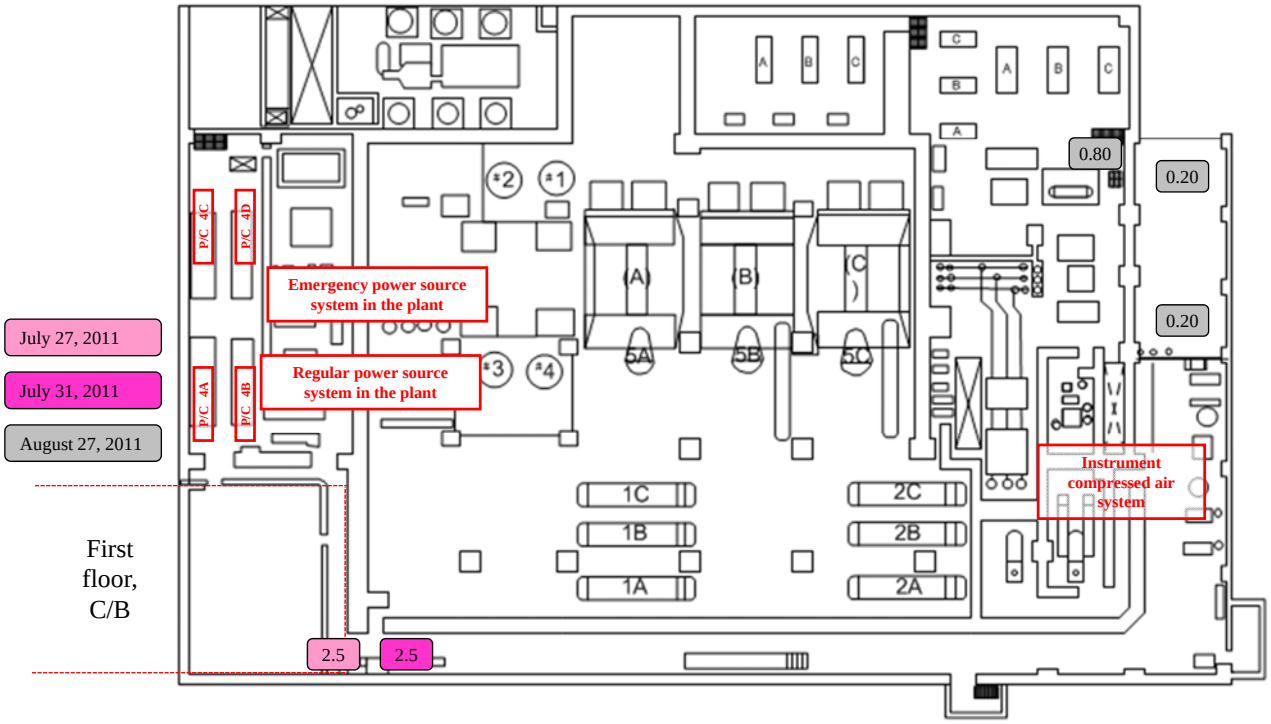
First basement floor, R/B, Unit 4

August 27, 2011

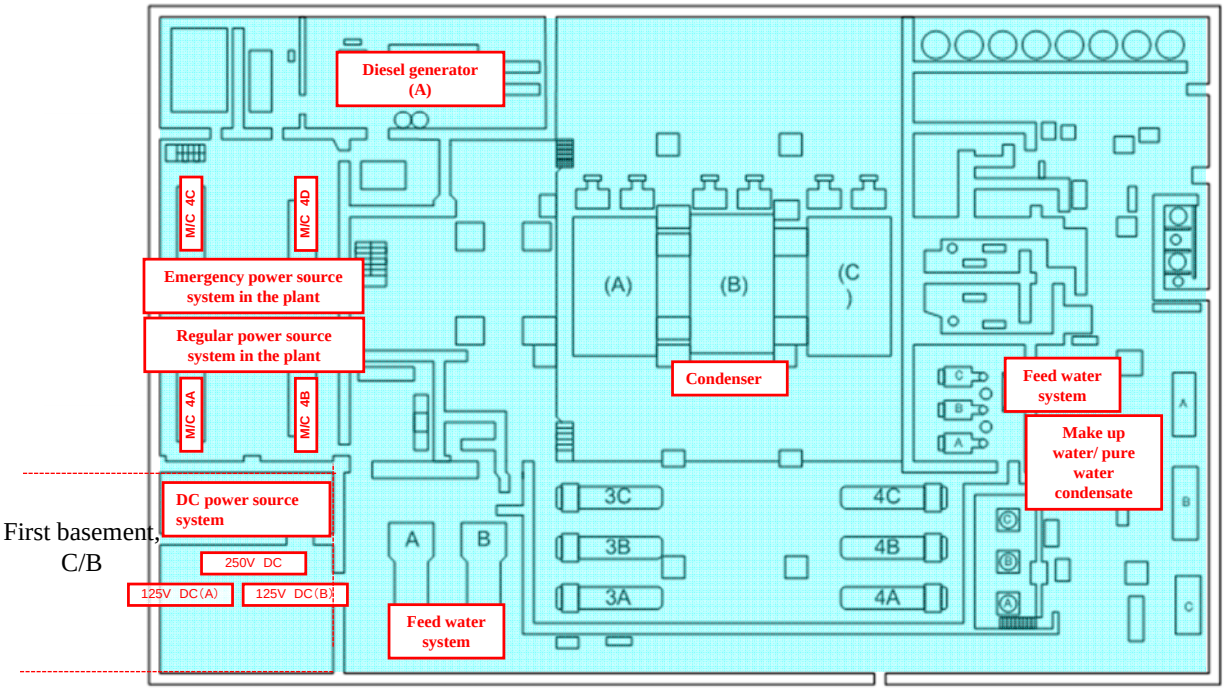


Second floor, T/B, Unit 4

Based on data and documents by Tokyo Electric Power Company



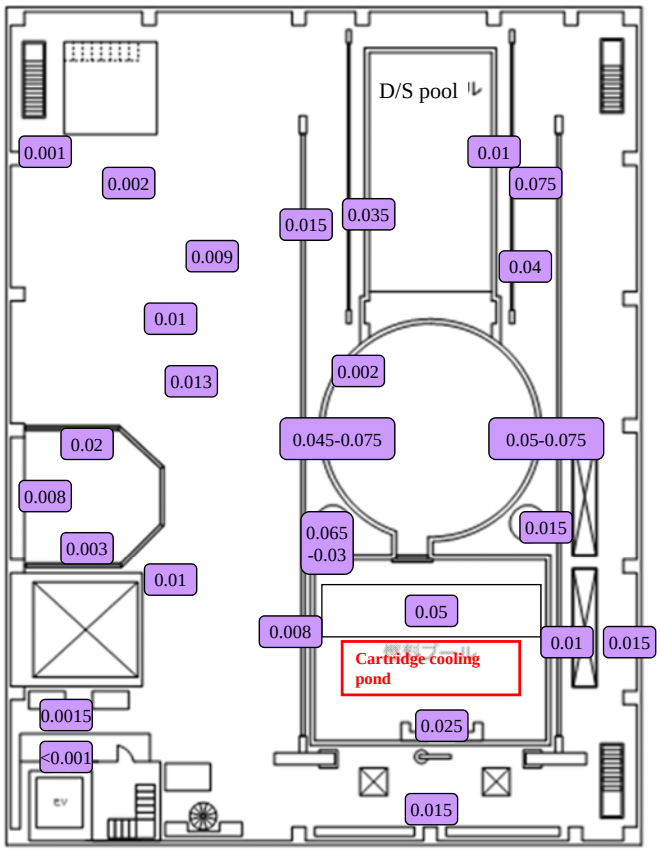
First floor, T/B, Unit 4



First basement floor, T/B, Unit 4

Based on data and documents by Tokyo Electric Power Company

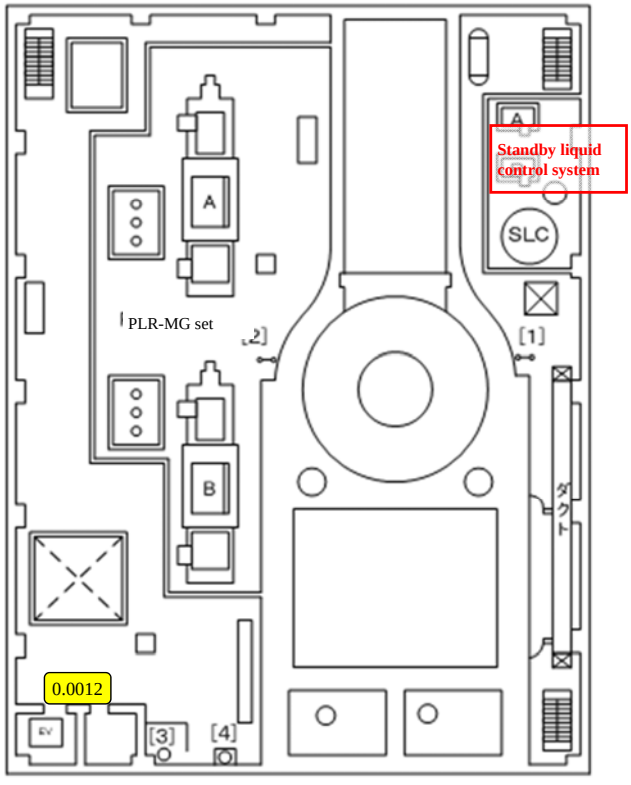
September 26, 2011



Fifth floor, R/B, Unit 5

The parts colored in pale-blue in the document indicate the areas where workers of Tokyo Electric Power Company confirmed residual water puddles from August 18 to 30.

July 22, 2011

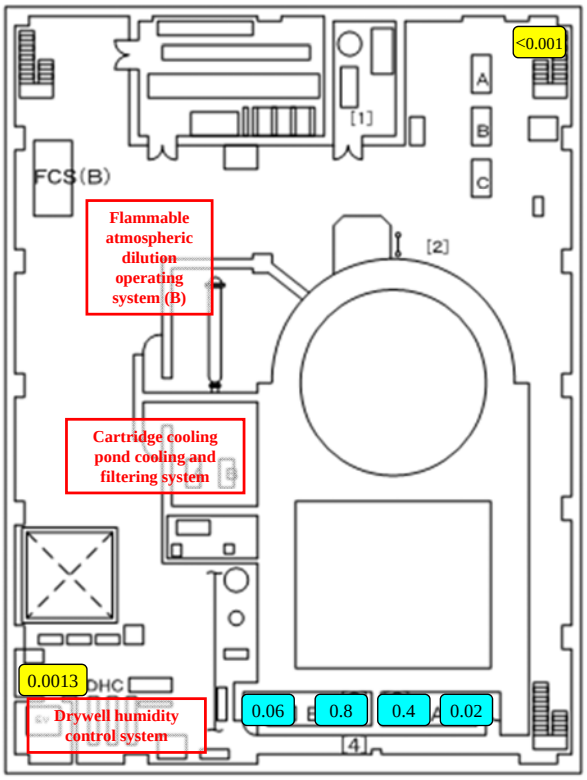


Fourth floor, R/B, Unit 5

Based on data and documents by Tokyo Electric Power Company

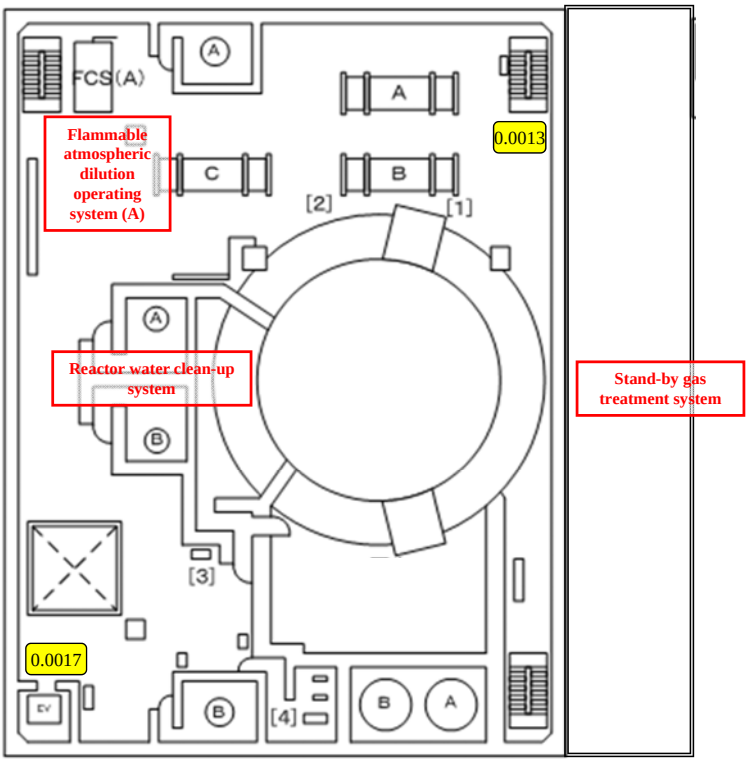
July 22, 2011

September 29, 2011



Third floor, R/B, Unit 5

July 22, 2011

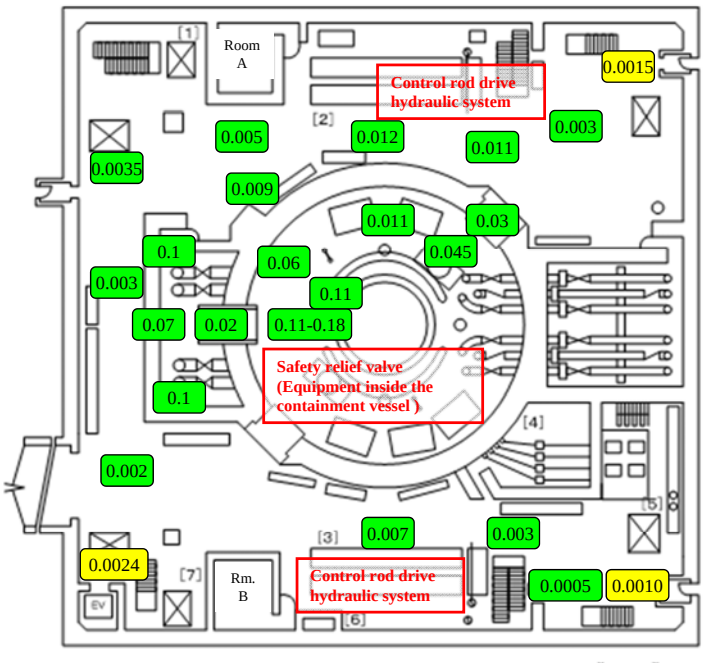


Second floor, R/B, Unit 5

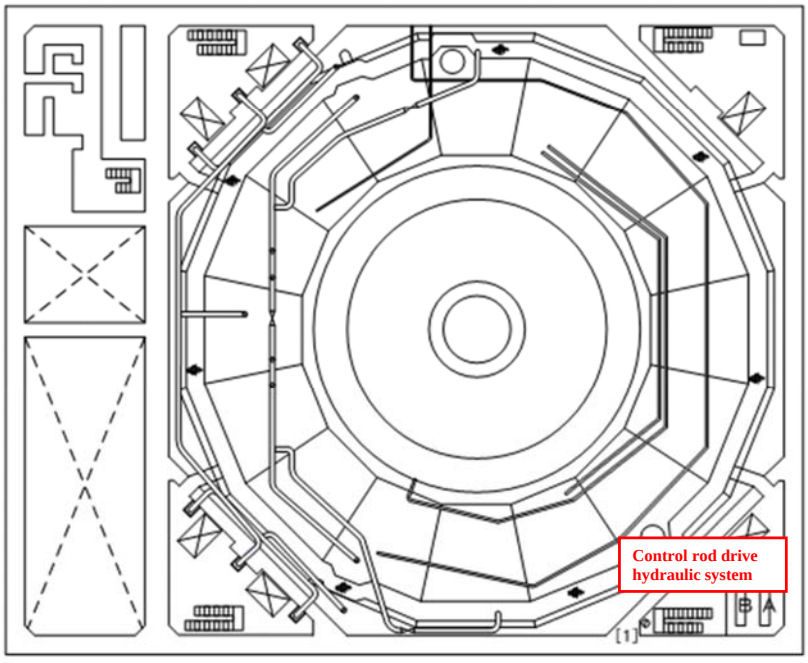
Based on data and documents by Tokyo Electric Power Company

July 22, 2011

September 27, 2011

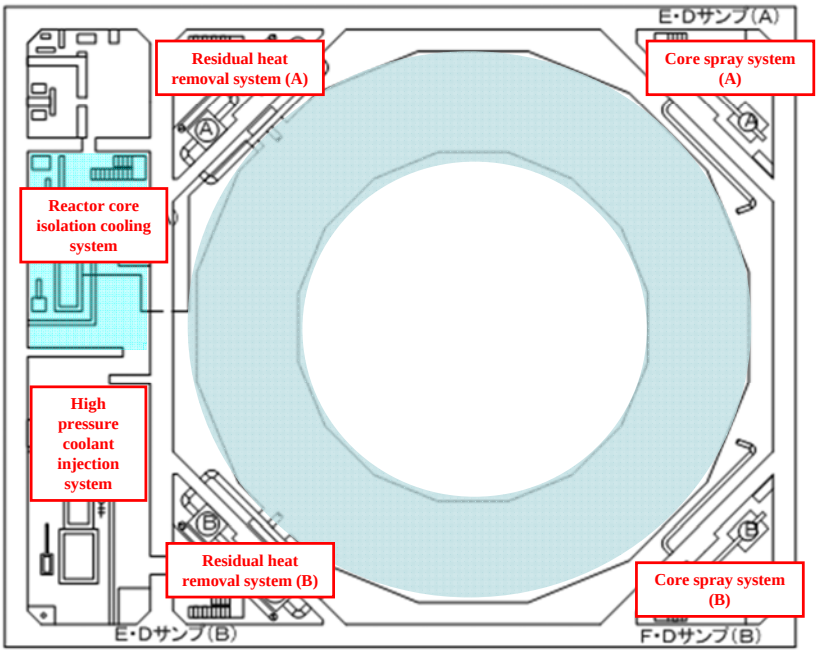


First floor, R/B, Unit 5



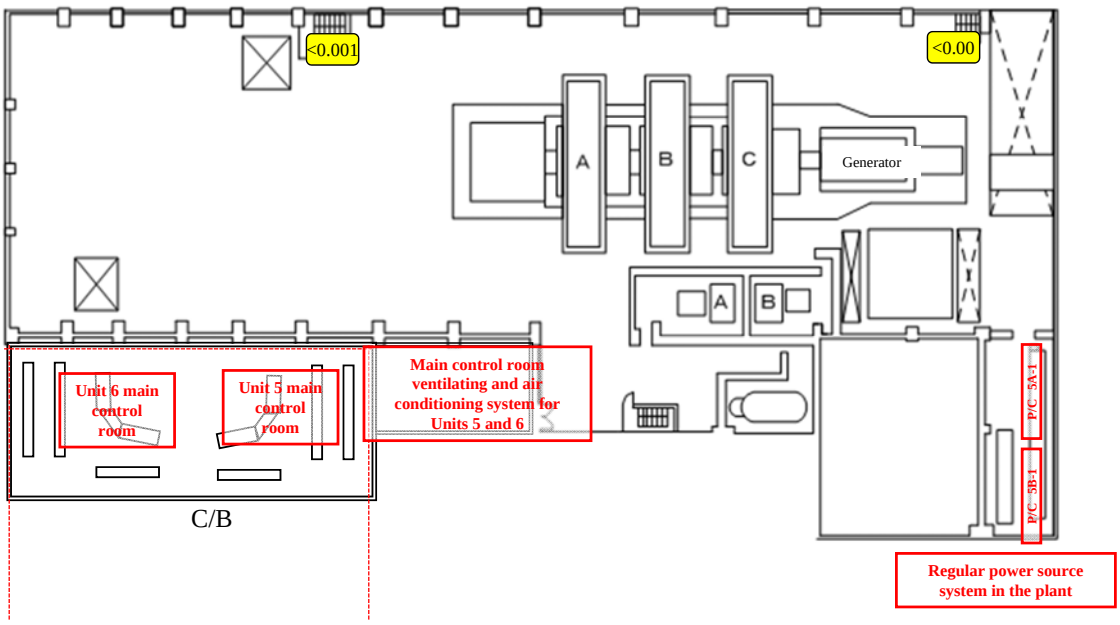
Basement mezzanine floor, R/B, Unit 5

Based on data and documents by Tokyo Electric Power Company



First basement floor, R/B, Unit 5

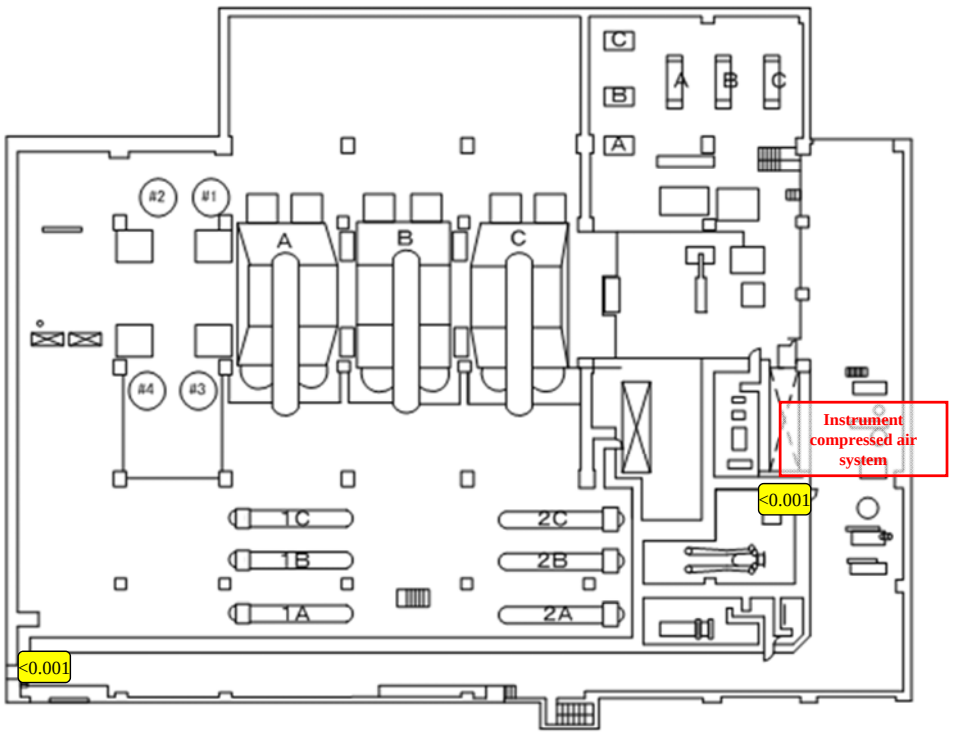
July 22, 2011



Second floor, T/B, Unit 5

Based on data and documents by Tokyo Electric Power Company

July 22, 2011

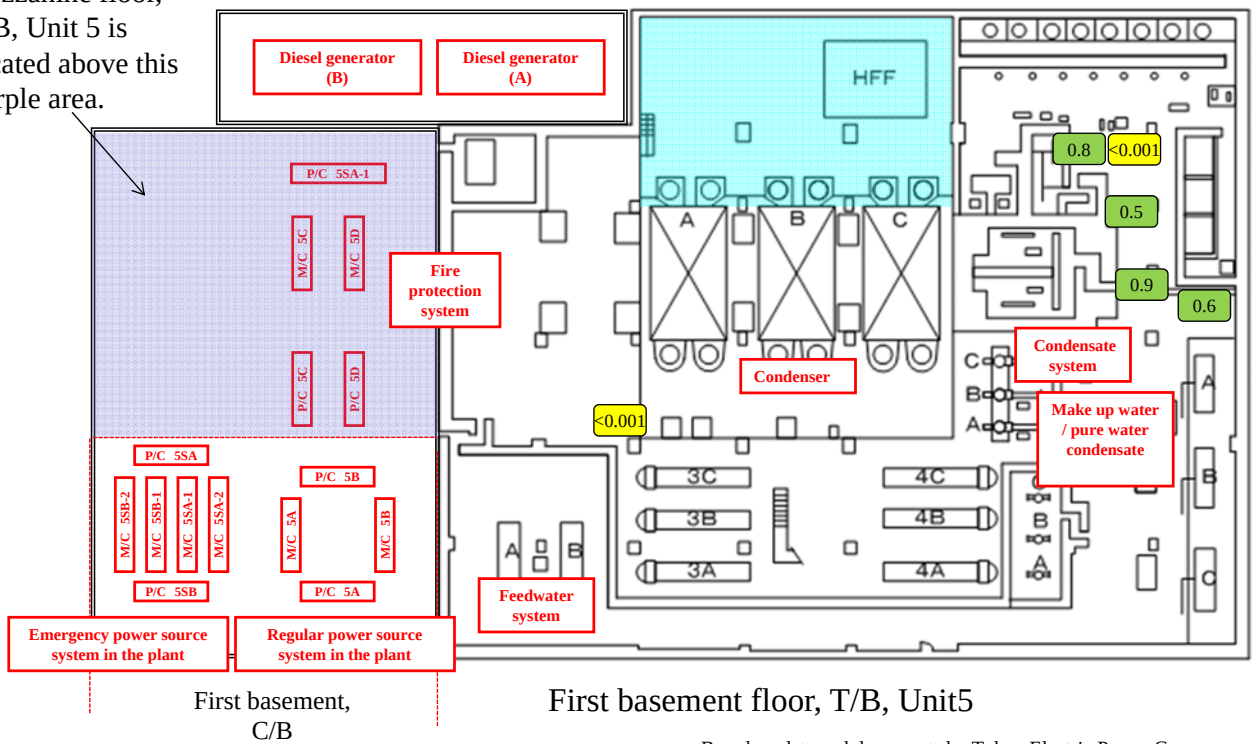


First floor, T/B, Unit 5

July 22, 2011

September 21, 2011

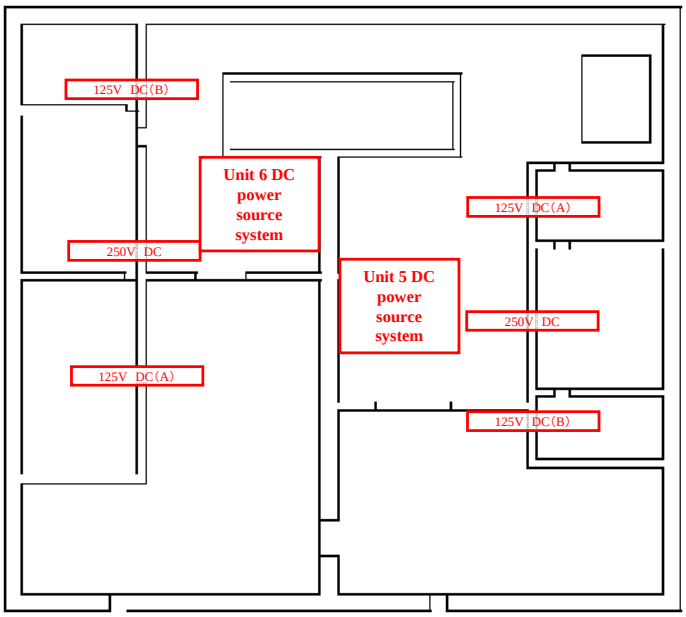
The basement mezzanine floor, T/B, Unit 5 is located above this purple area.



First basement, C/B

First basement floor, T/B, Unit5

Based on data and documents by Tokyo Electric Power Company



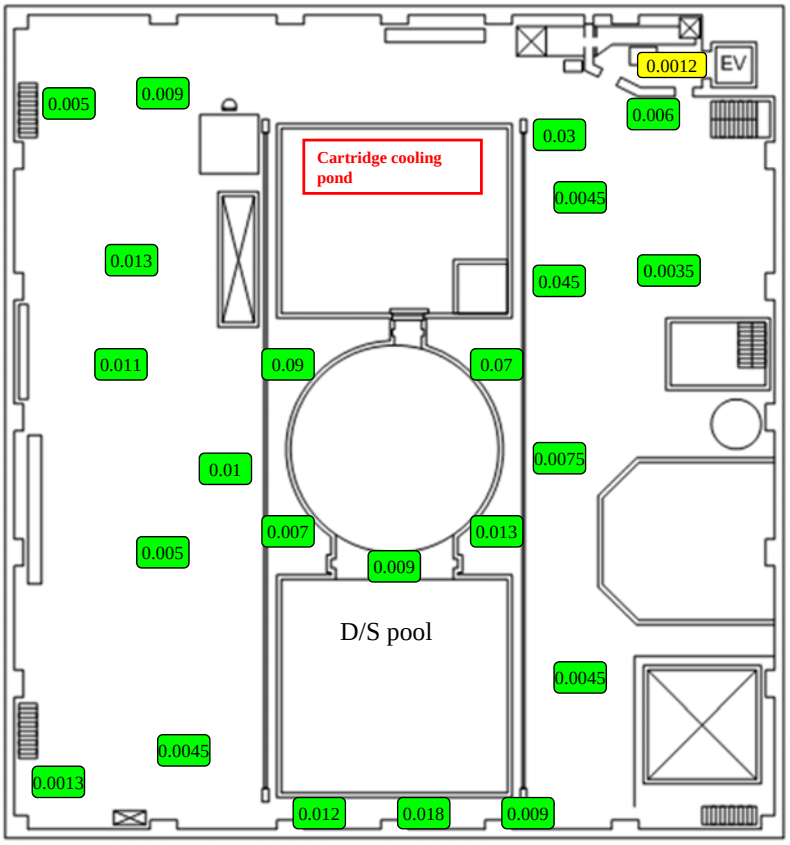
Basement mezzanine floor, T/B, Unit 5

- This basement mezzanine floor is located above the purple area on the first basement floor, T/B, Unit 5.
- The Unit 6 DC power source system is also installed on this floor.

Based on data and documents by Tokyo Electric Power Company

July 22, 2011

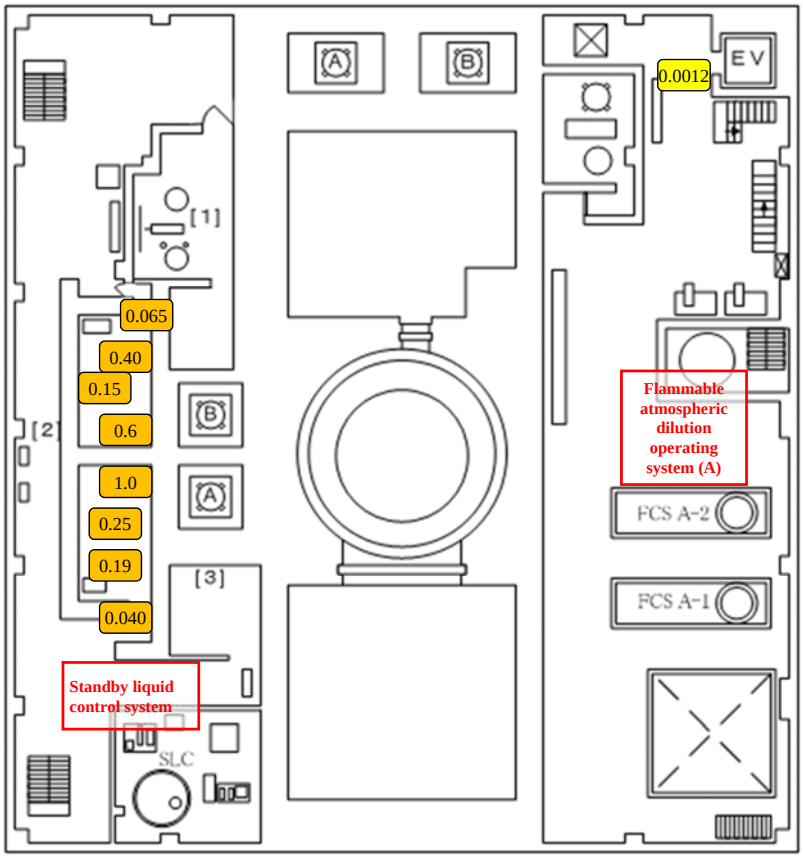
September 27, 2011



Sixth floor, R/B, Unit 6

July 22, 2011

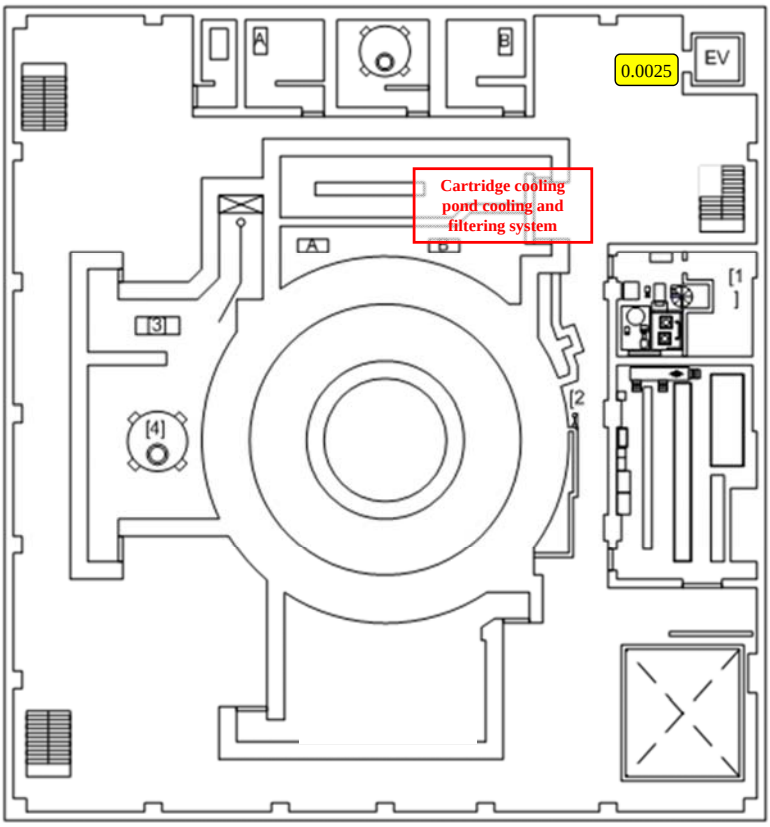
September 30, 2011



Fifth floor, R/B, Unit 6

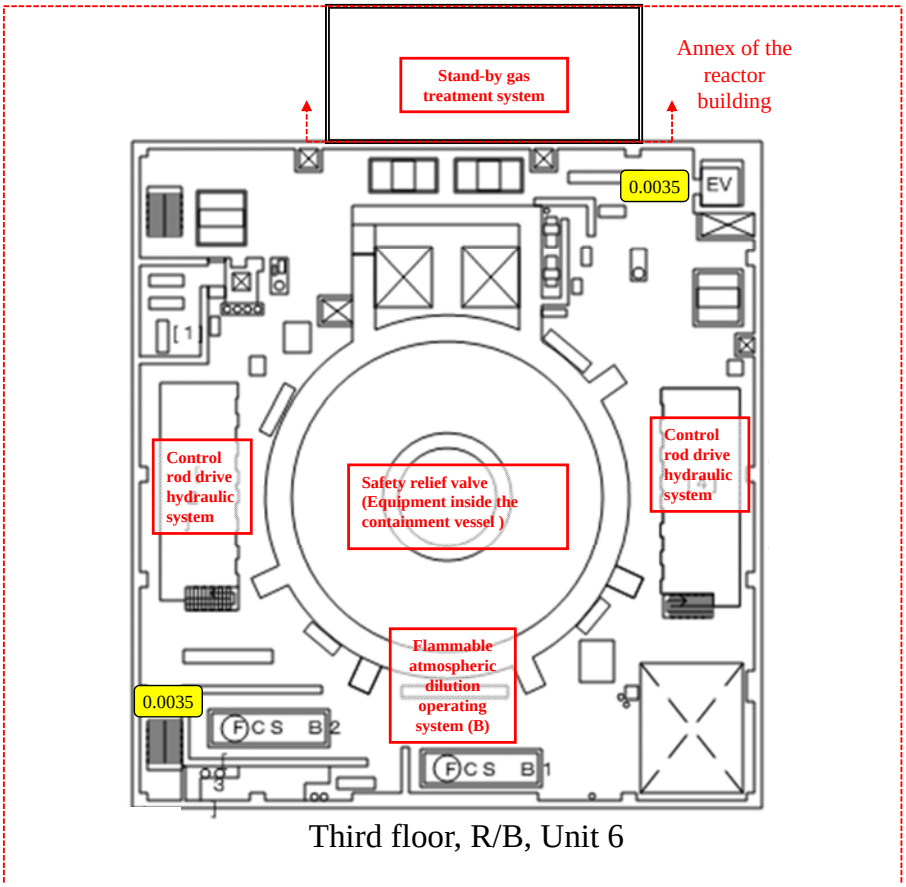
Based on data and documents by Tokyo Electric Power Company

July 22, 2011



Fourth floor, R/B, Unit 6

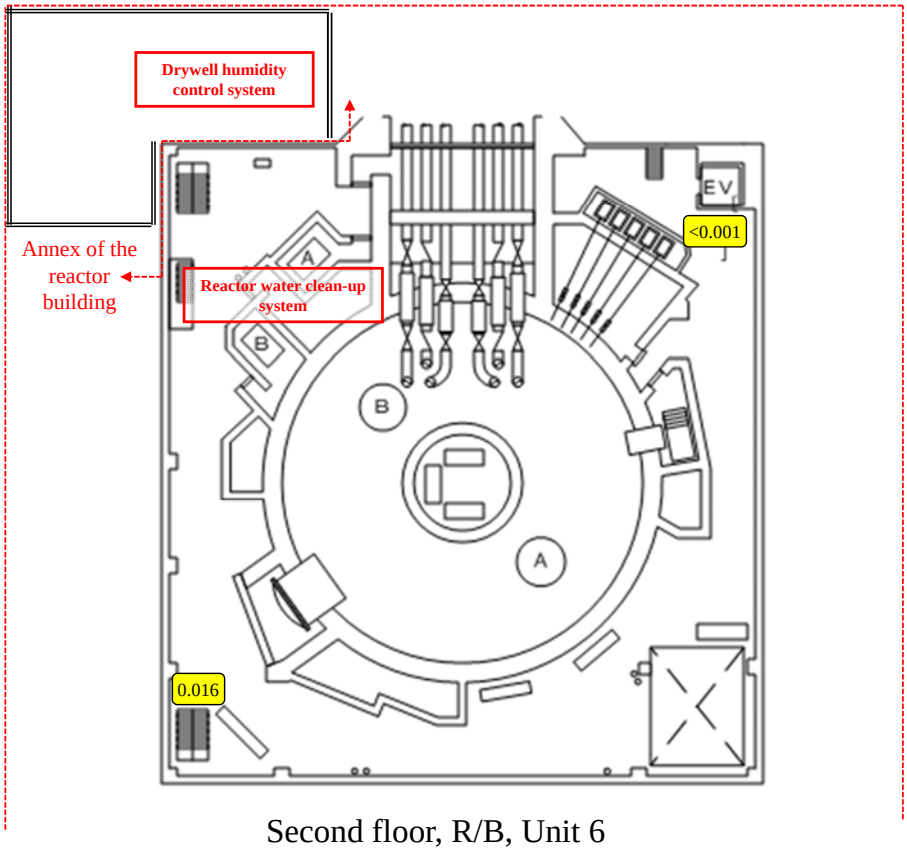
July 22, 2011



Third floor, R/B, Unit 6

Based on data and documents by Tokyo Electric Power Company

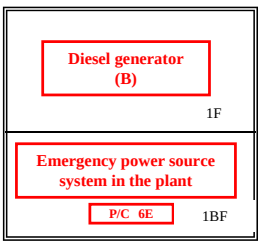
July 22, 2011



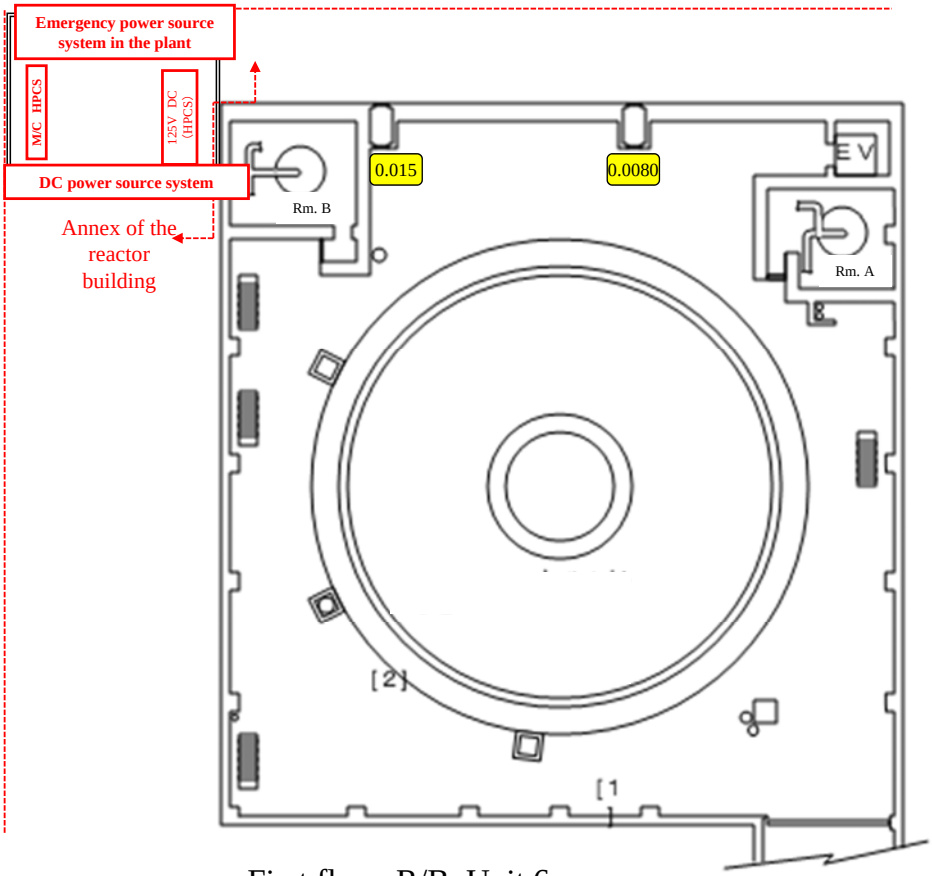
Second floor, R/B, Unit 6

July 22, 2011

Diesel generator building

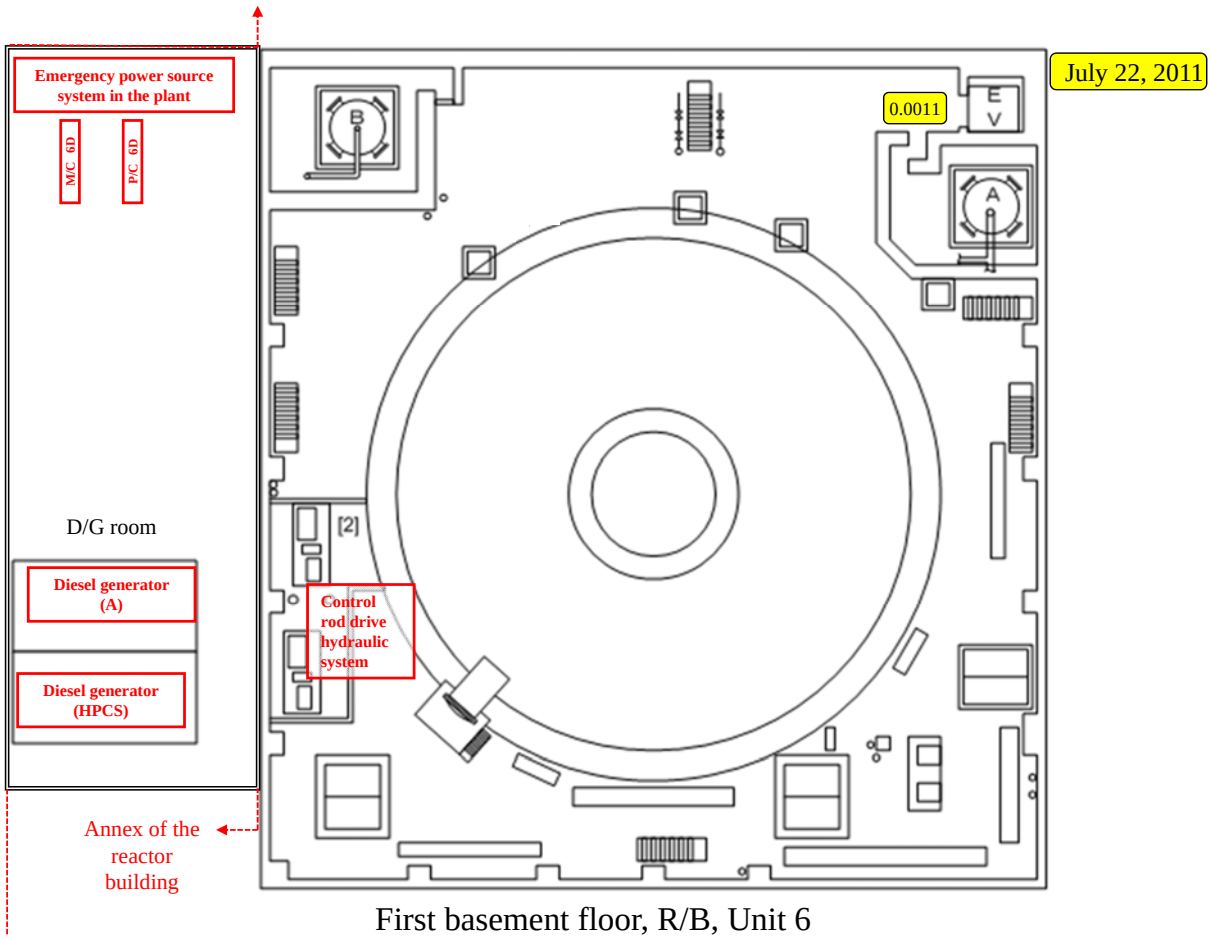


* Refer to Attachment II-4 for the location of the diesel generator building.

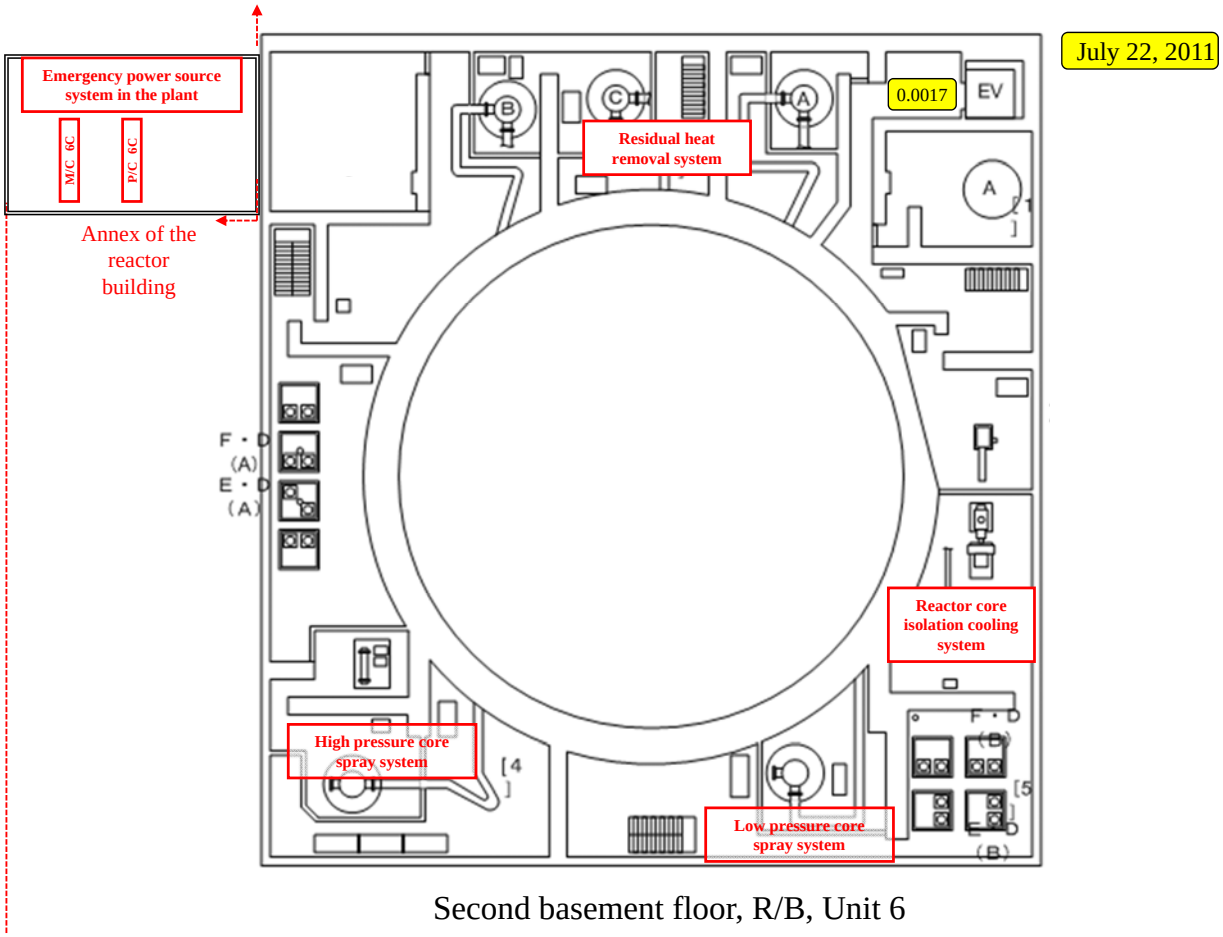


First floor, R/B, Unit 6

Based on data and documents by Tokyo Electric Power Company



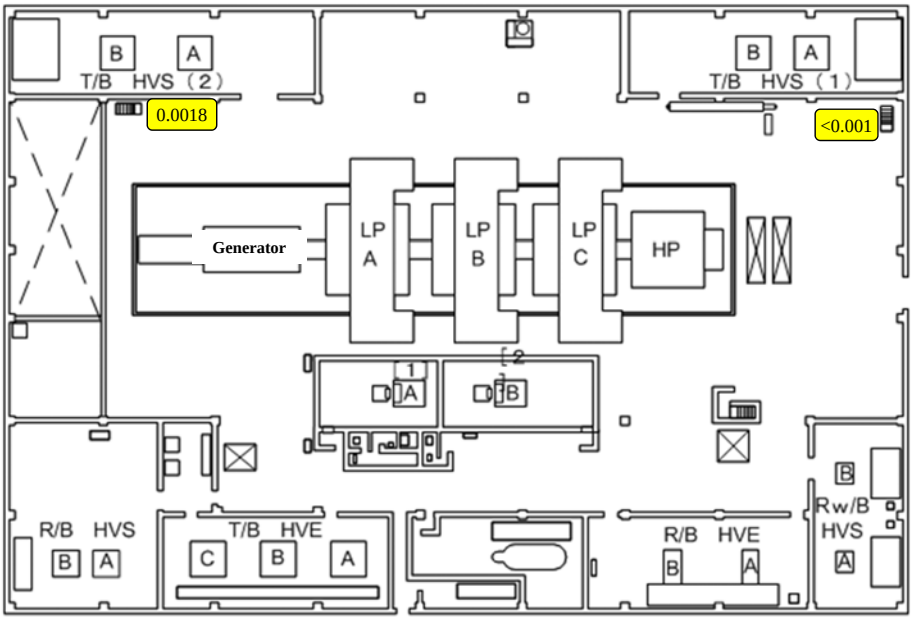
First basement floor, R/B, Unit 6



Second basement floor, R/B, Unit 6

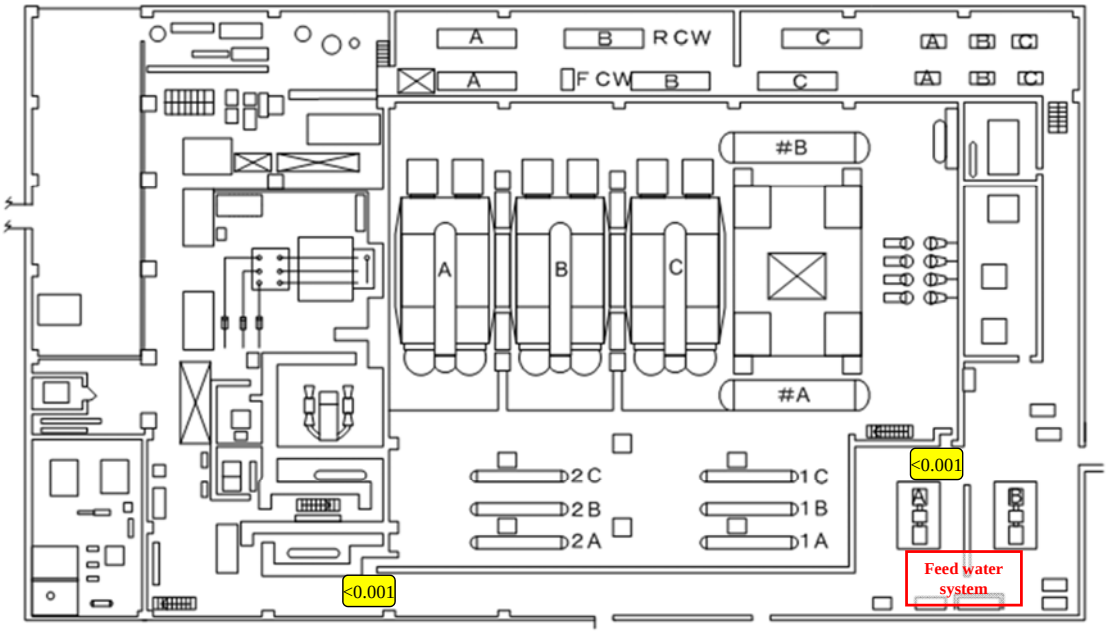
Based on data and documents by Tokyo Electric Power Company

July 22, 2011



Second floor, T/B, Unit 6

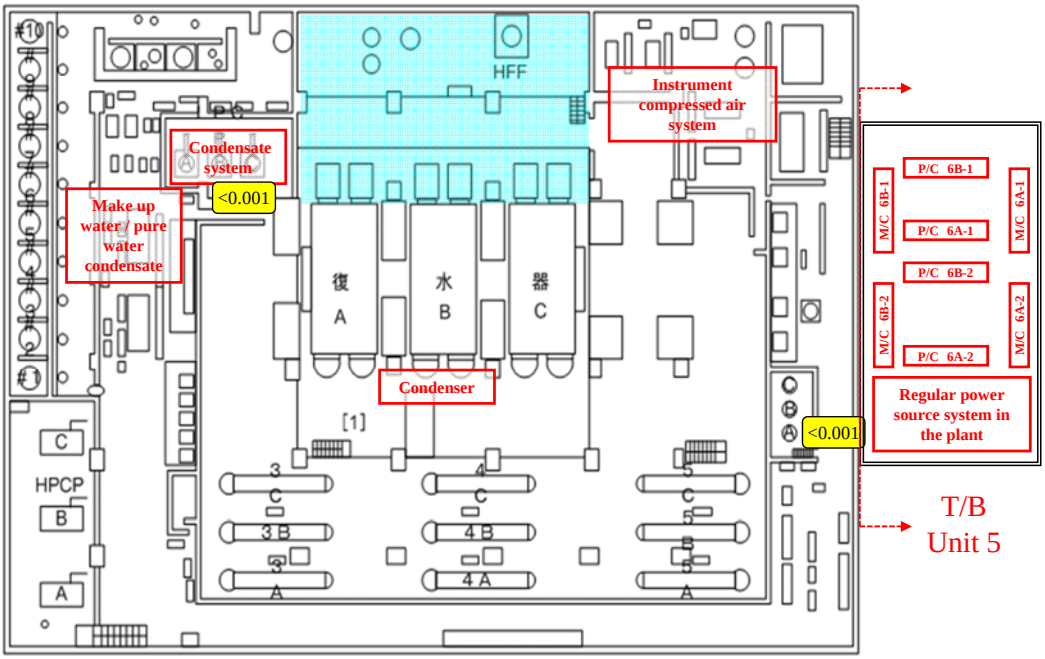
July 22, 2011



First floor, T/B, Unit 6

Based on data and documents by Tokyo Electric Power Company

July 22, 2011



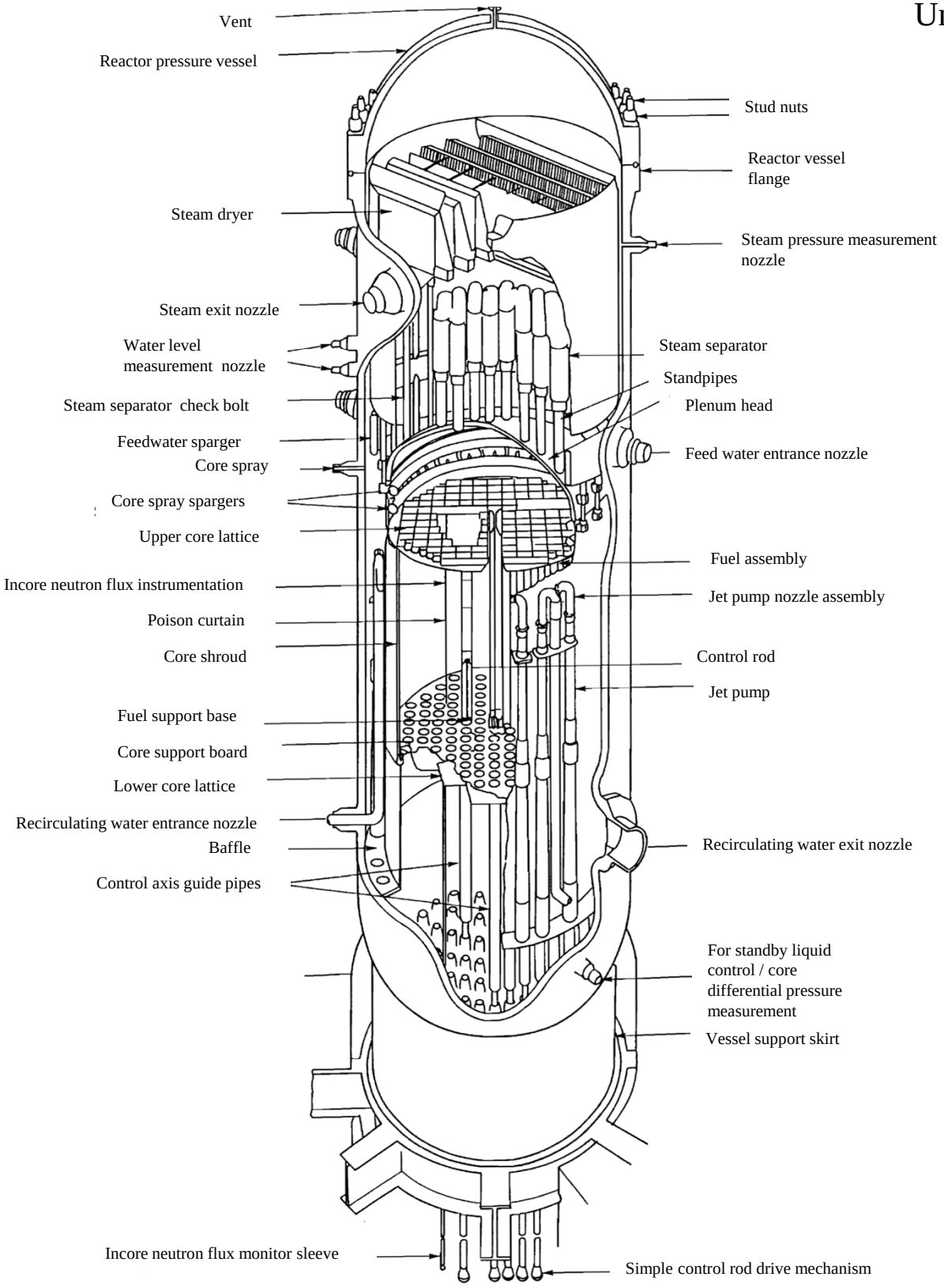
First basement floor, T/B, Unit 6

Based on data and documents by Tokyo Electric Power Company

Attachment II-13

Structures and components inside the reactor pressure vessel

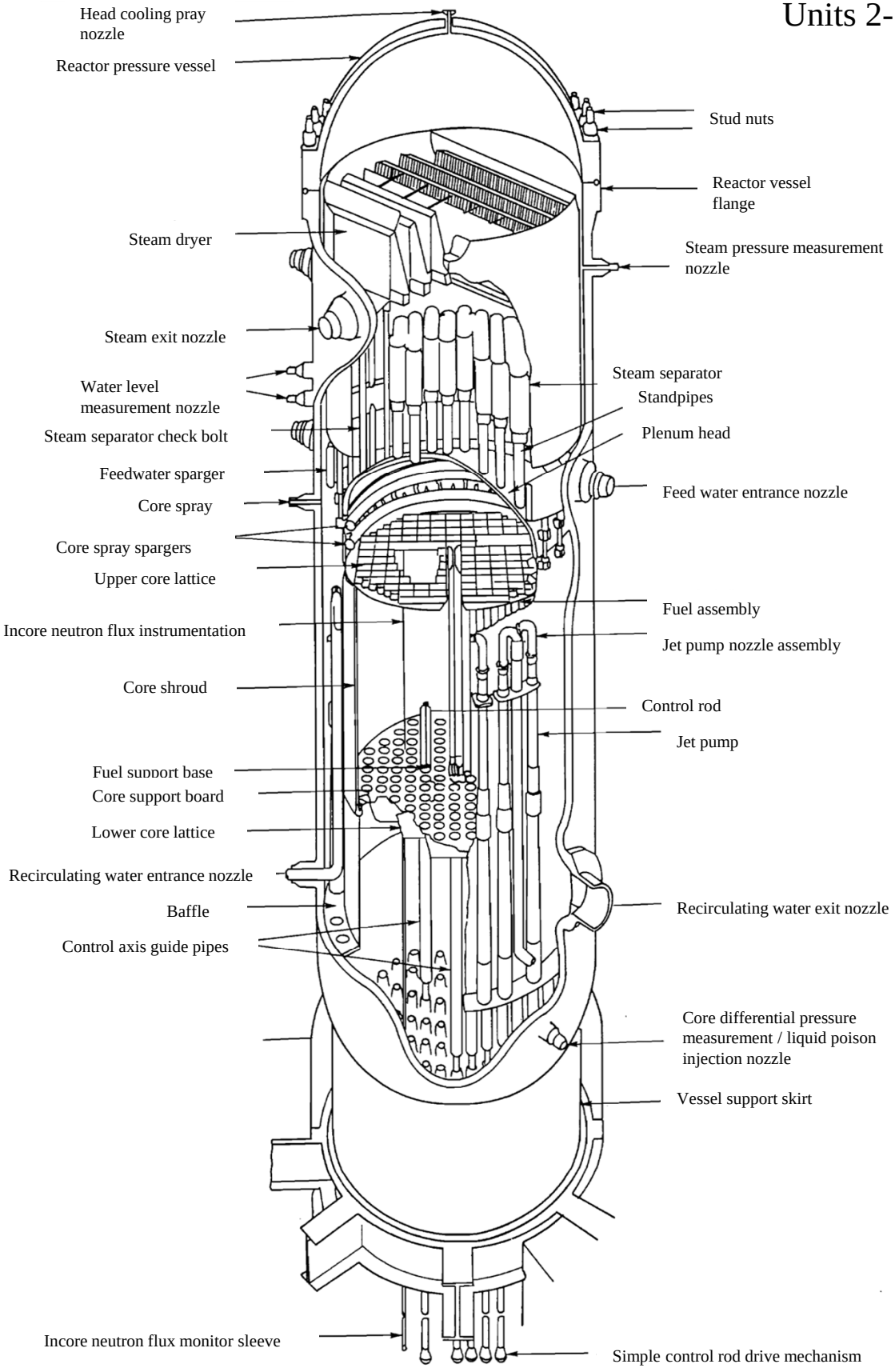
Unit 1



Source: Tokyo Electric Power Company, “Fukushima Dai-ichi NPS: Application for reactor establishment permit,” April 2002

Structures and components inside the reactor pressure vessel

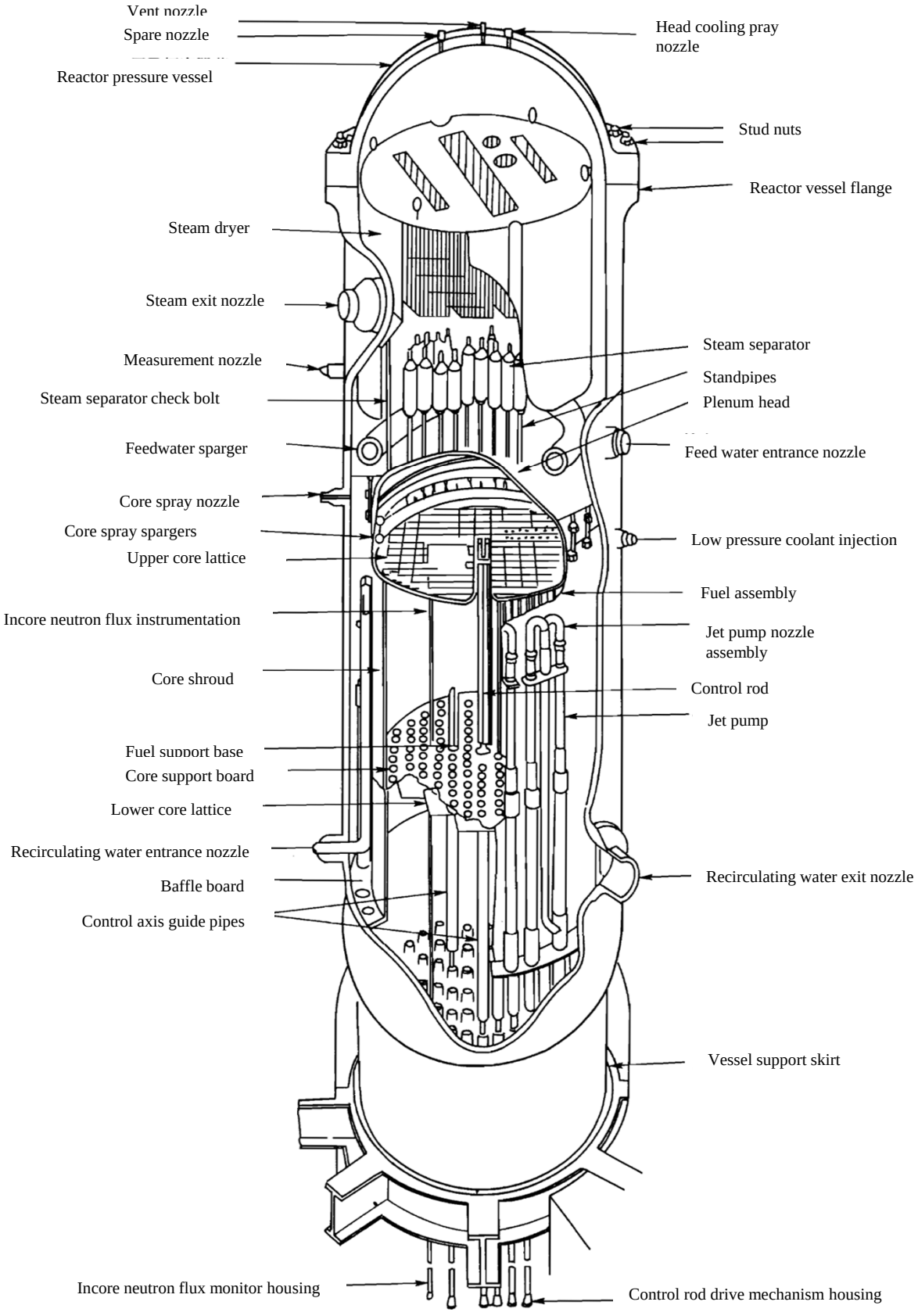
Units 2-5



Source: Tokyo Electric Power Company, “Fukushima Dai-ichi NPS: Application for permit for changes to reactor establishment” (as of June 2003)

Structures and components inside the reactor pressure vessel

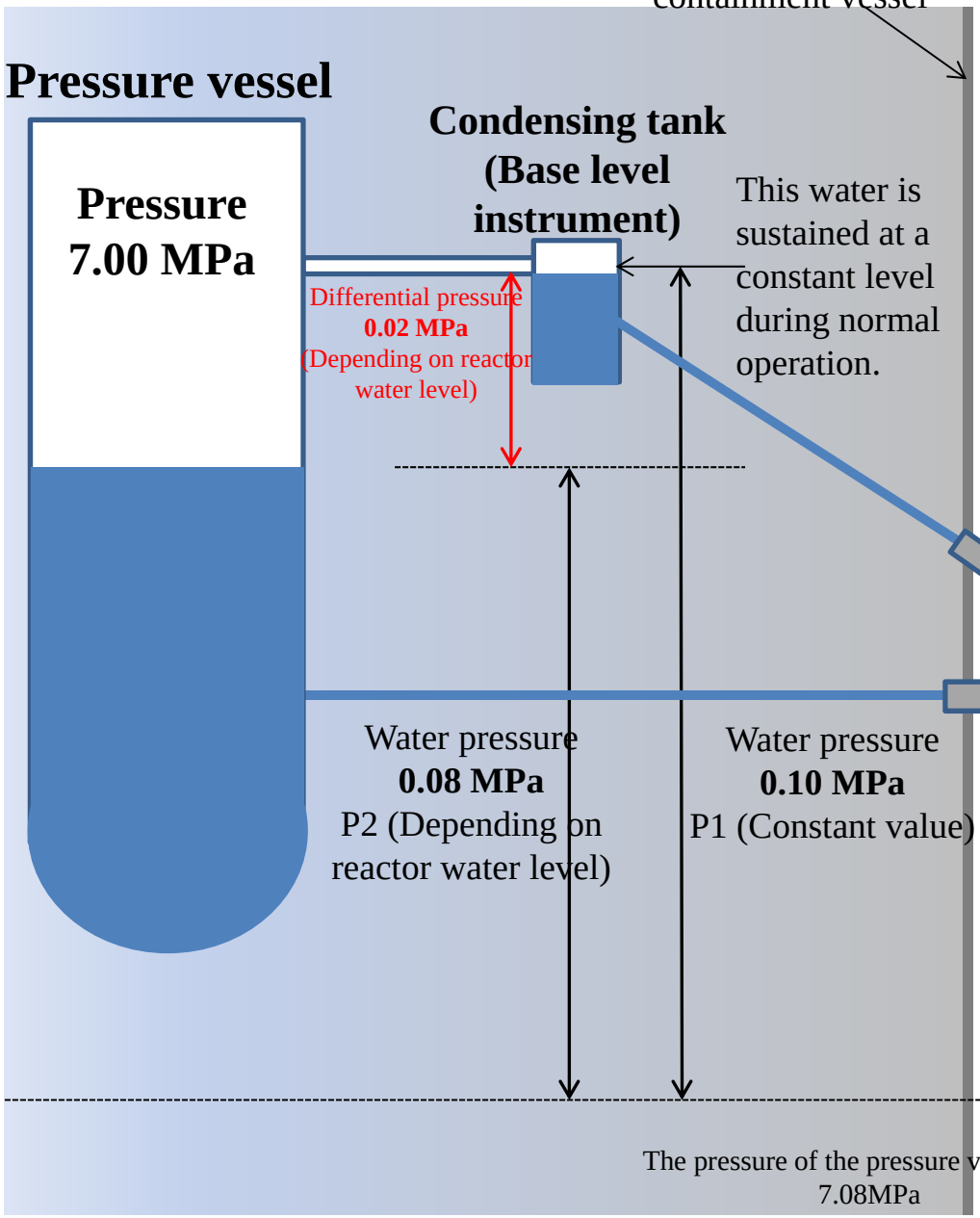
Unit 6



Source: Tokyo Electric Power Company, “Fukushima Dai-ichi NPS: Application for permit for changes to reactor establishment” (as of December 2010)

Principle of measurement by reactor water level and reactor pressure instrumentation systems

Based on data and documents by Tokyo Electric Power Company



<Reactor water gauge>

- The right side of the water gauge receives 7.10 MPa, the sum of the pressure inside the pressure vessel (7.00 MPa *1) and the pressure from the condensing tank level to the water gauge (P1 = 0.10 MPa *2).
- The left side of the water gauge receives 7.08 MPa, the sum of the pressure inside the pressure vessel (7.00 MPa) and the pressure from the pressure vessel level to the water gauge (P2 = 0.08 MPa *2).
- Therefore, the water gauge receives 7.10 MPa from the right and 7.08 MPa from the left. The pressure difference of 0.02 MPa is the force to push the diaphragm to the left.
- The mechanism is to detect the water level of the pressure vessel by electrically detecting the deflection amount of the diaphragm.

(The differential pressure increases as the water level of the reactor falls and decreases as the water level rises.)

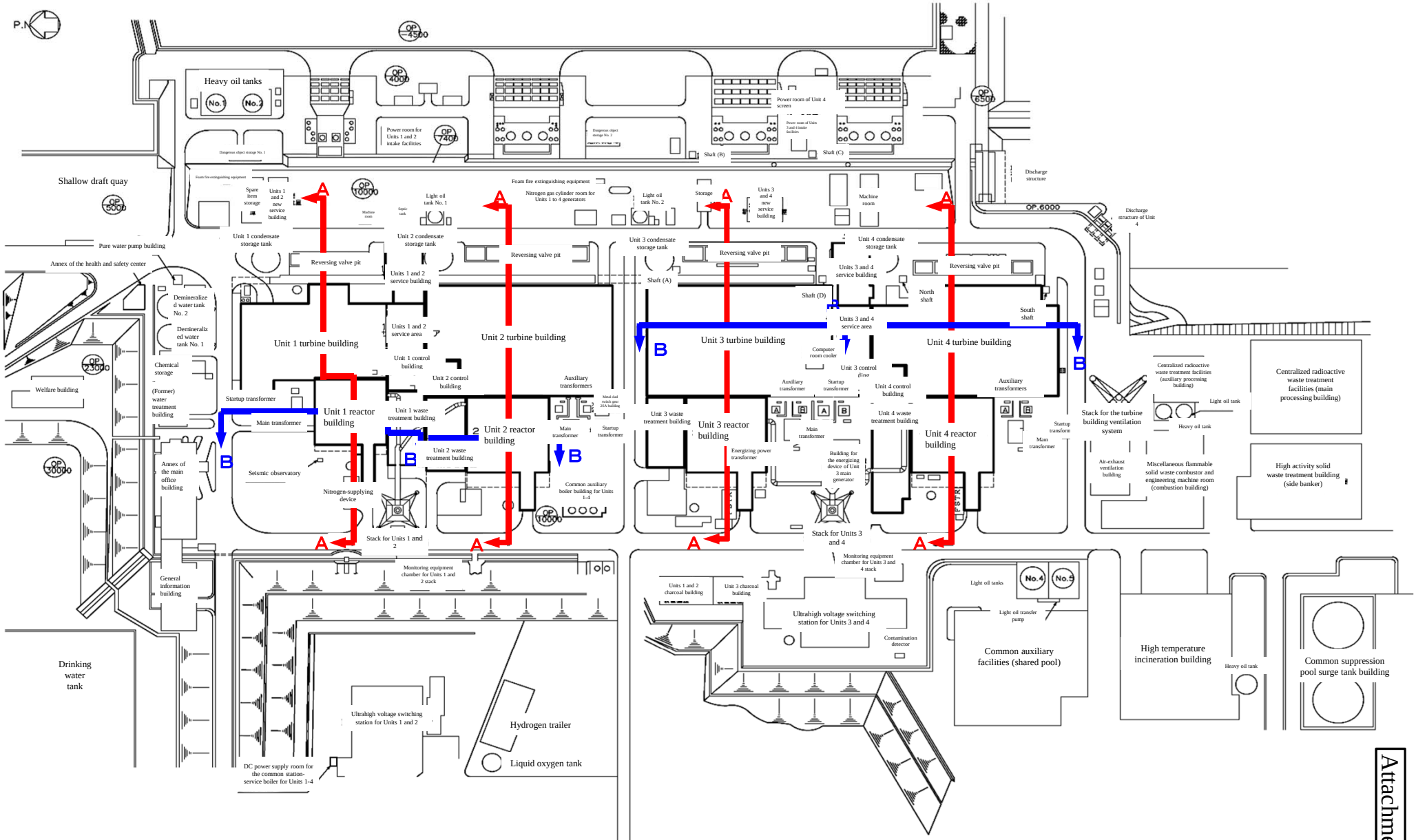
<Reactor pressure gauge>

- Like the water gauge, the reactor pressure gauge also calculates the pressure inside the pressure vessel by electrically detecting the deflection amount of the diaphragm.

*1: 7.00 MPa is assumed here because the pressure inside a BWR pressure vessel with Electric output comparable to 1,000,000 kW generally turns out to be 7 MPa (refer to Attachment II-2).

*2: P1 and P2 are the values used for explanatory convenience and differ from actual water pressures.

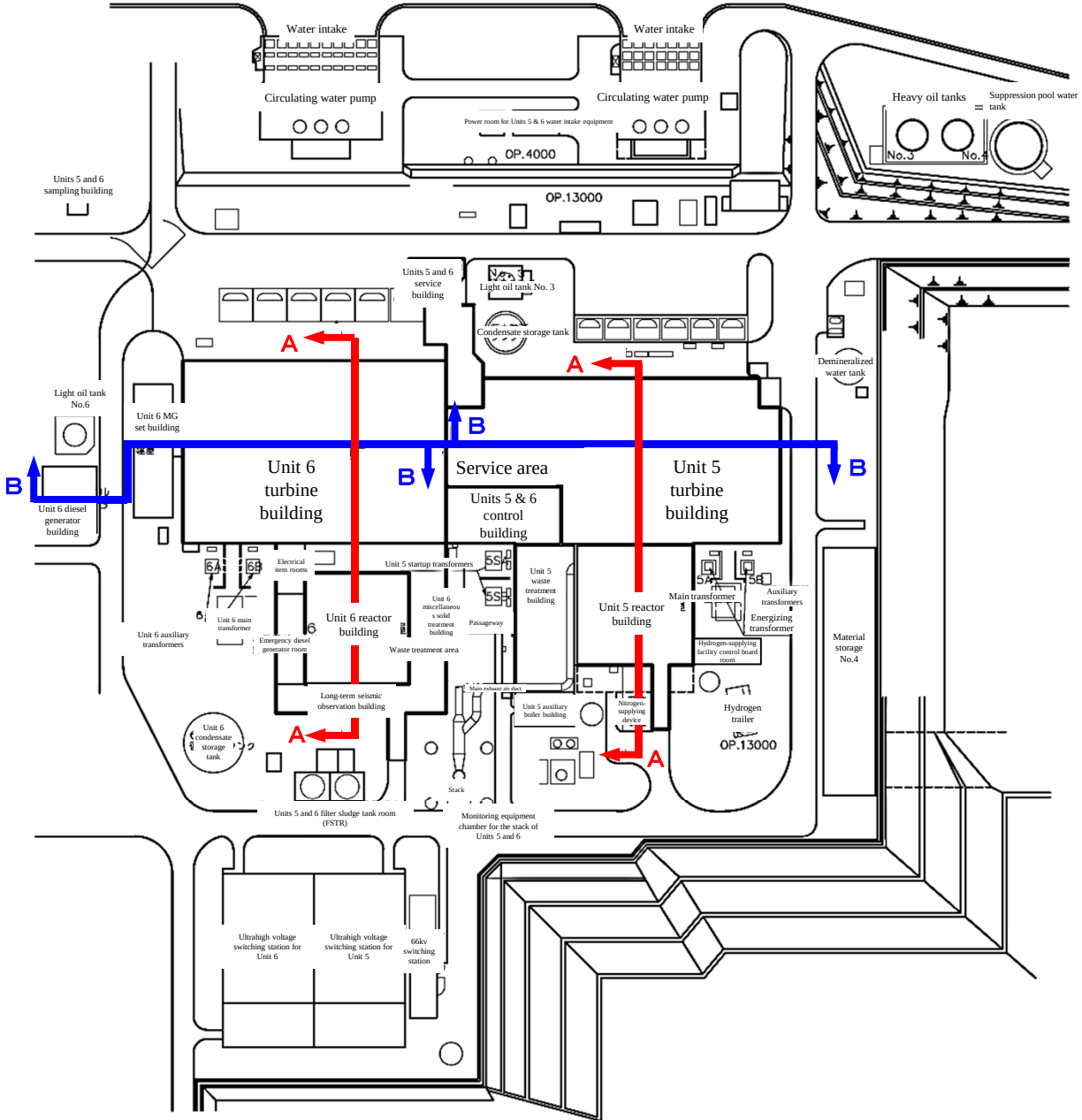
Attachment II-14



Sectional lines are referred to from the preparation of sectional views of the reactor building and other facilities at Units 1 to 4 of the Fukushima Dai-ichi NPS

Based on data and documents by Tokyo Electric Power Company

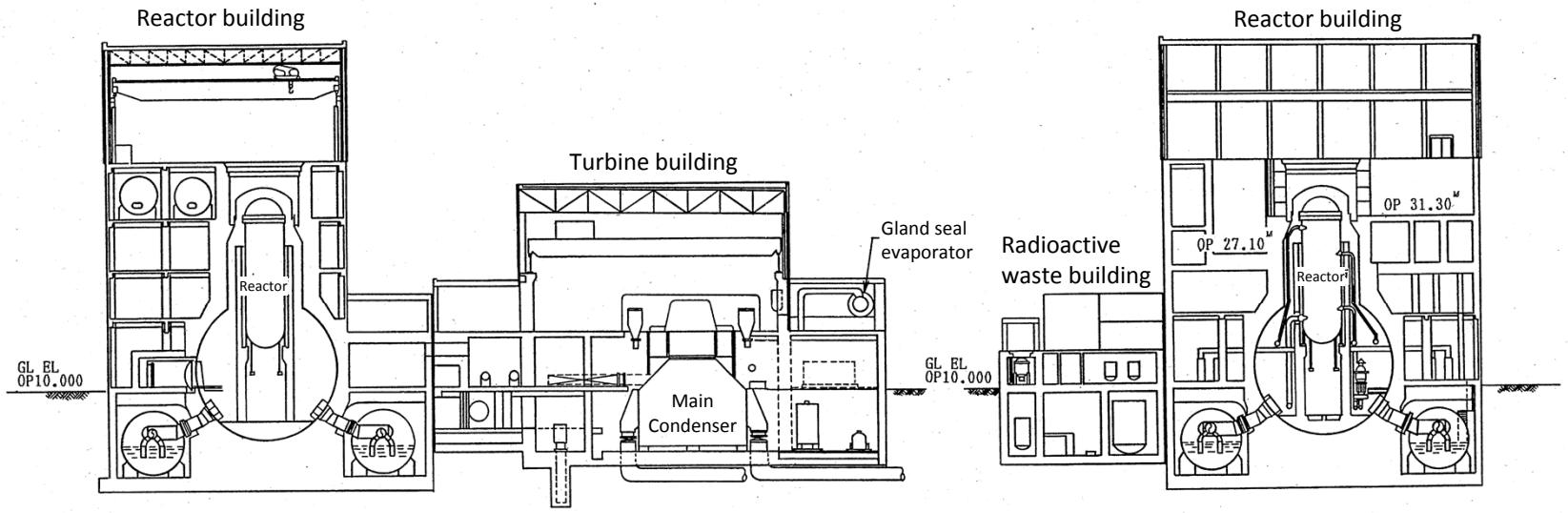
Attachment II-15



Sectional lines are referred to from the preparation of sectional views of the reactor building and other facilities at Units 5 and 6 of the Fukushima Dai-ichi NPS

Based on data and documents by Tokyo Electric Power Company

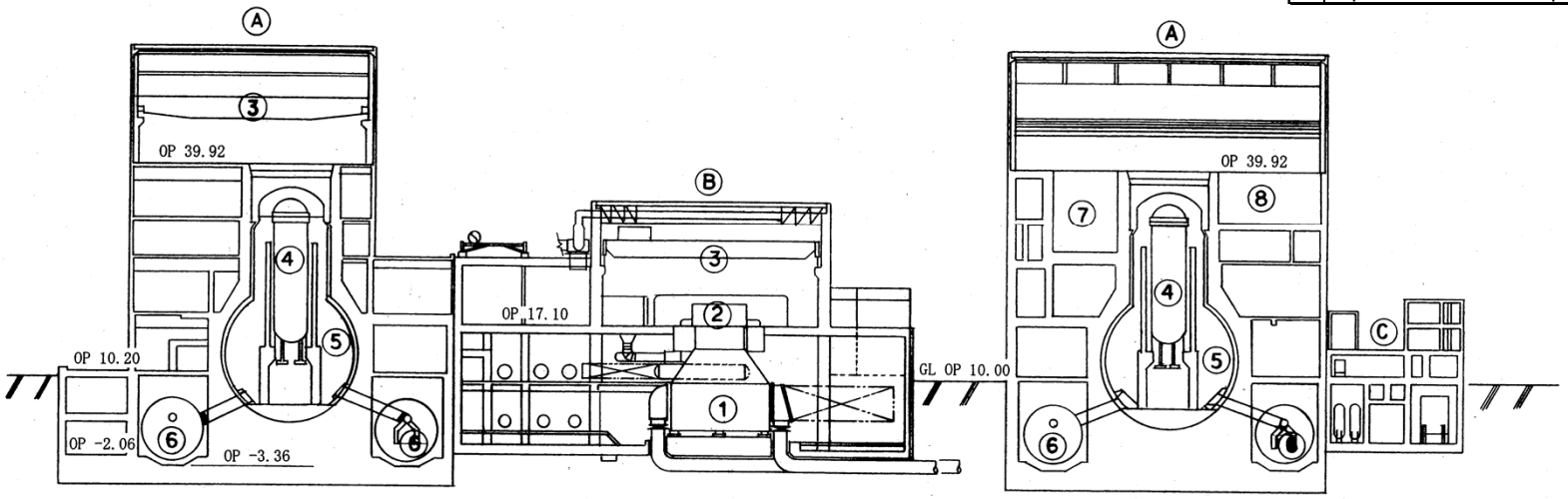
Sectional view of the reactor building and other facilities at Unit 1 of the Fukushima Dai-ichi NPS



Source: Tokyo Electric Power Company, “Fukushima Dai-ichi NPS: Application for reactor alternation license,” April 2002

Sectional view of the reactor building and other facilities at Unit 2 of the Fukushima Dai-ichi NPS

A	Reactor building	1	Condenser
B	Turbine building	2	Turbine generator
C	Radioactive waste building	3	Crane
		4	Reactor
		5	Drywell
		6	Suppression chamber
		7	Fuel storage pool
		8	Storage pool for the steam separator and other equipment

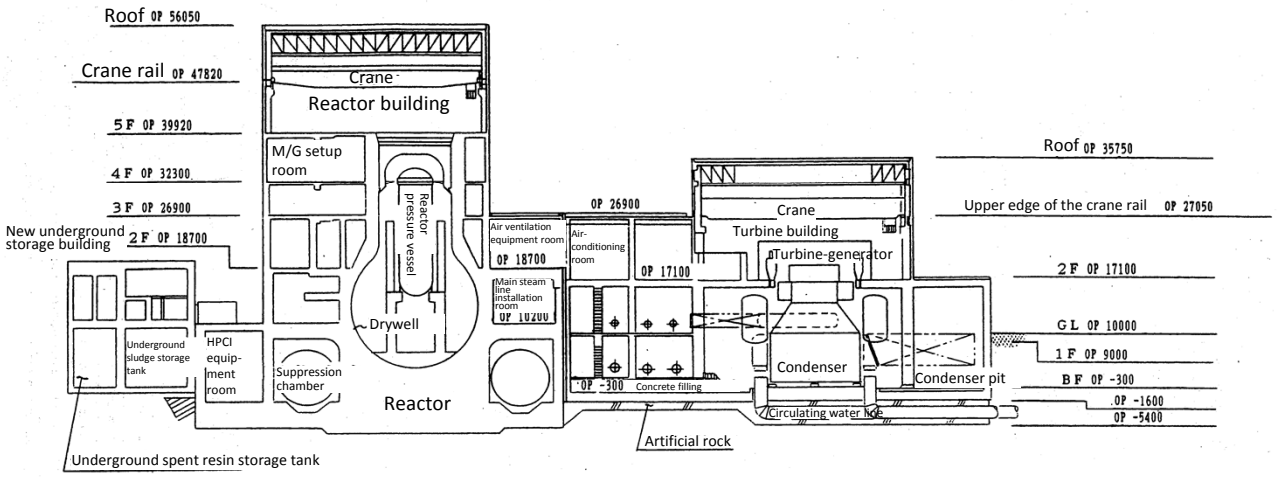


Section A-A

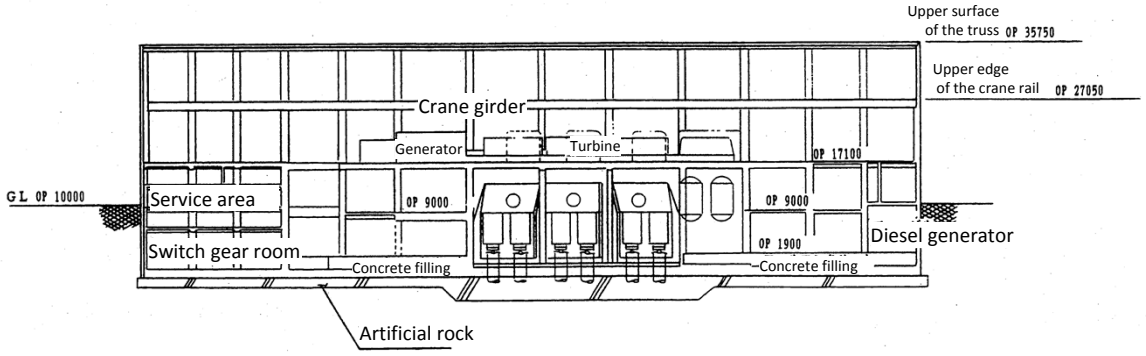
Section B-B

Source: Tokyo Electric Power Company, “Fukushima Dai-ichi NPS: Application for reactor alternation license,” April 2002

Sectional view of the reactor building and other facilities at Unit 3 of the Fukushima Dai-ichi NPS



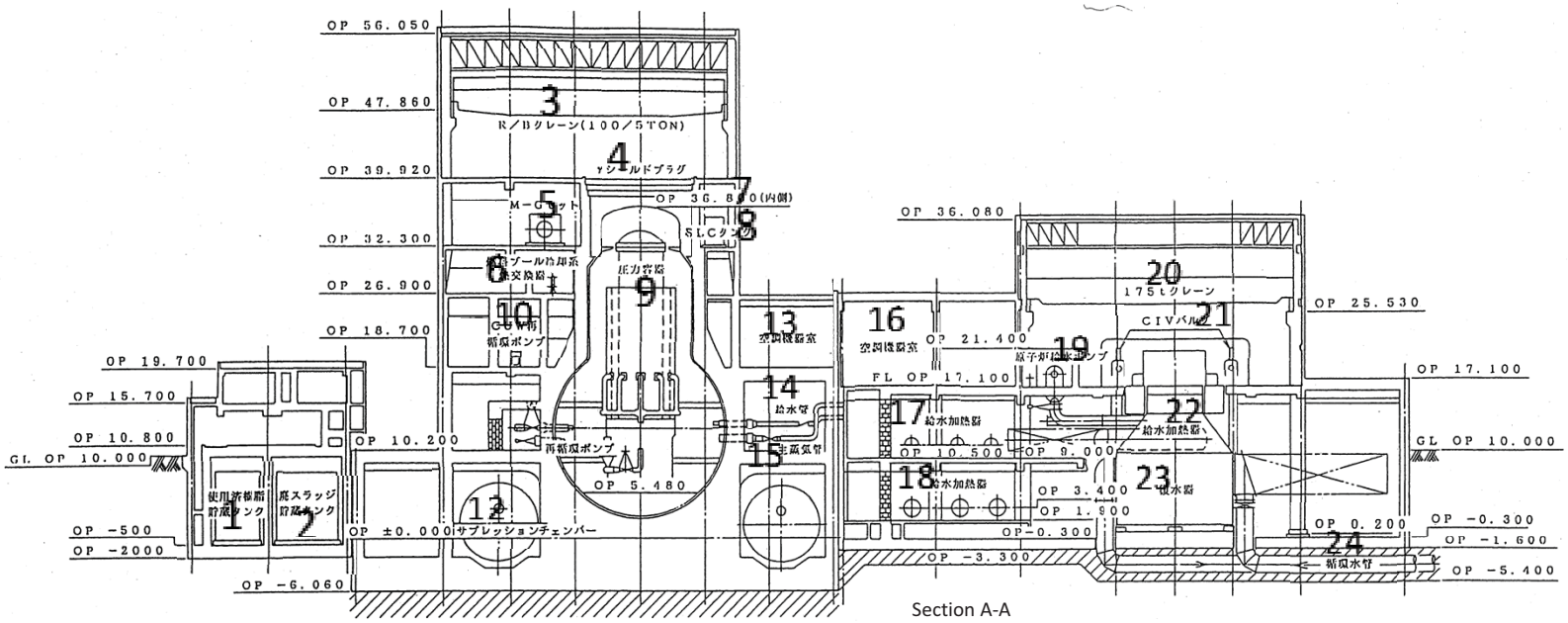
Section A-A



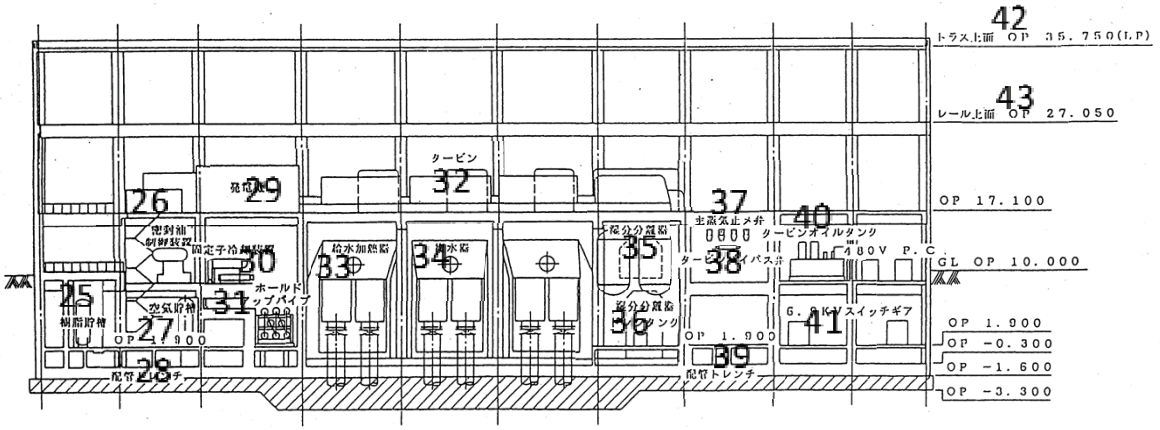
Section B-B

Based on “Fukushima Dai-ichi NPS: Application for reactor alternation license” (June 2003) by Tokyo Electric Power Company

Sectional view of the reactor building and other facilities at Unit 4 of the Fukushima Dai-ichi NPS



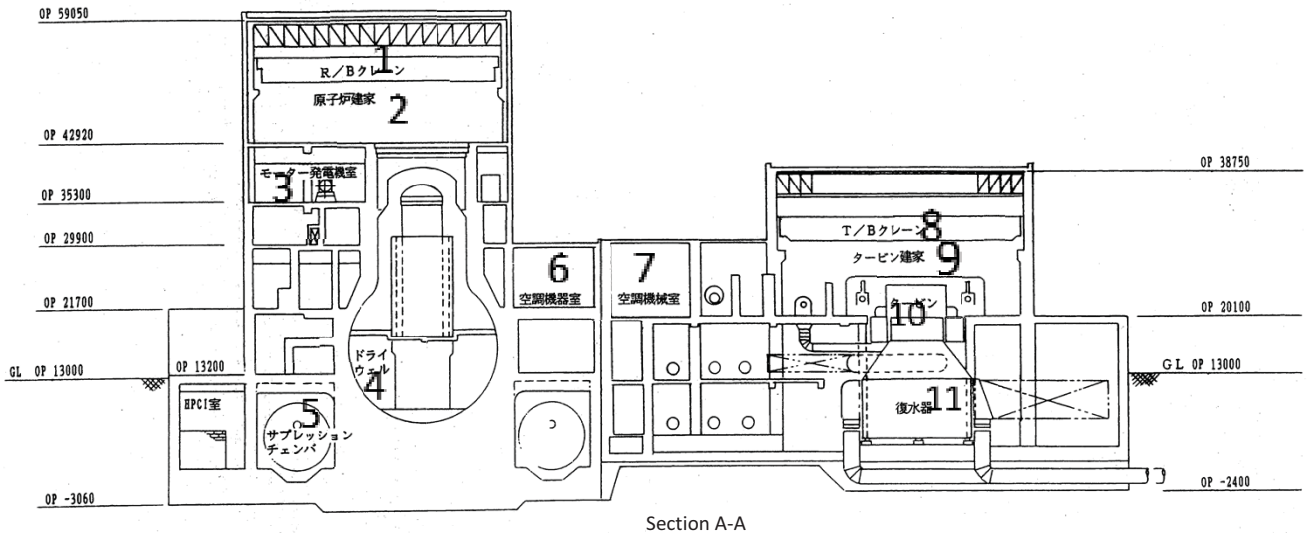
Section A-A



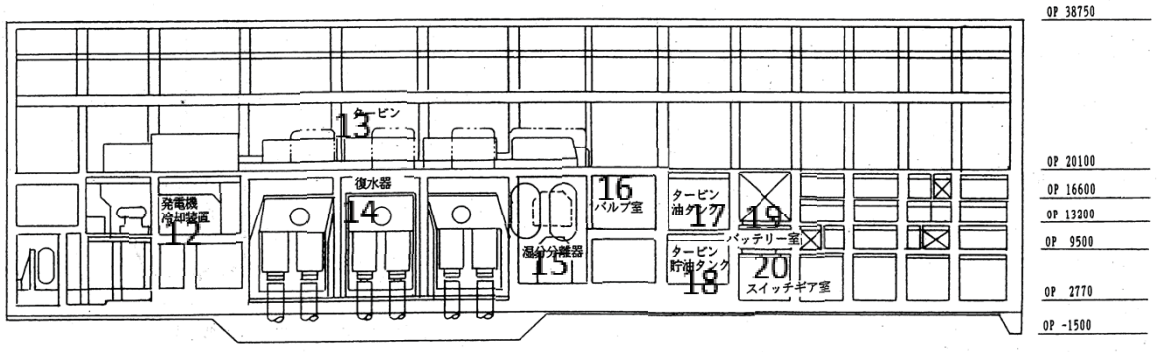
Section B-B

Based on “Fukushima Dai-ichi NPS: Application for reactor alternation license” (June 2003) by Tokyo Electric Power Company

Sectional view of the reactor building and other facilities at Unit 5 of the Fukushima Dai-ichi NPS



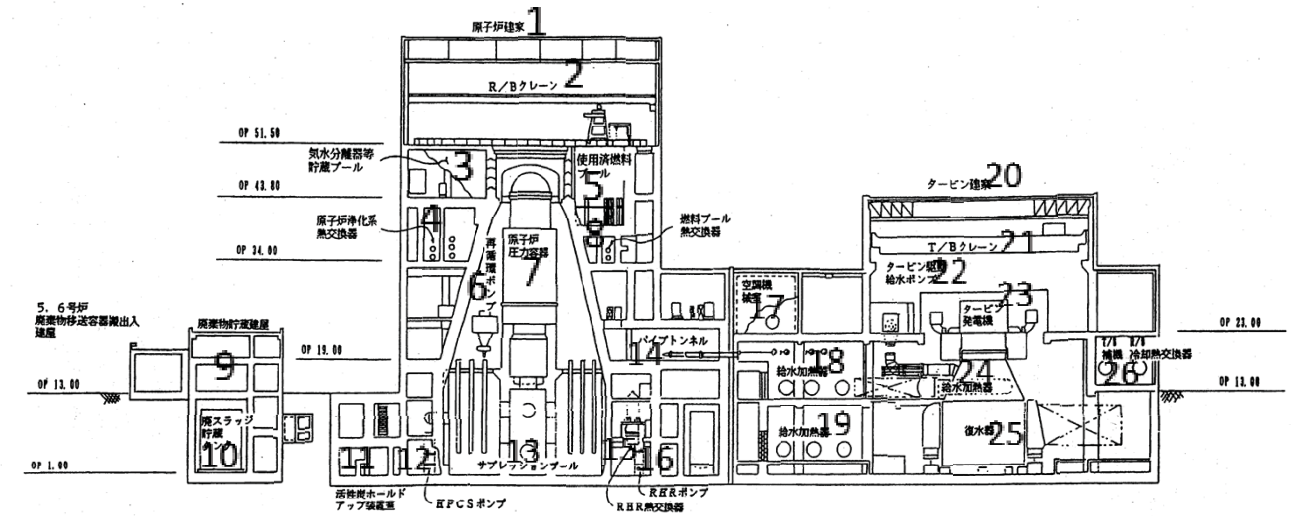
Section A-A



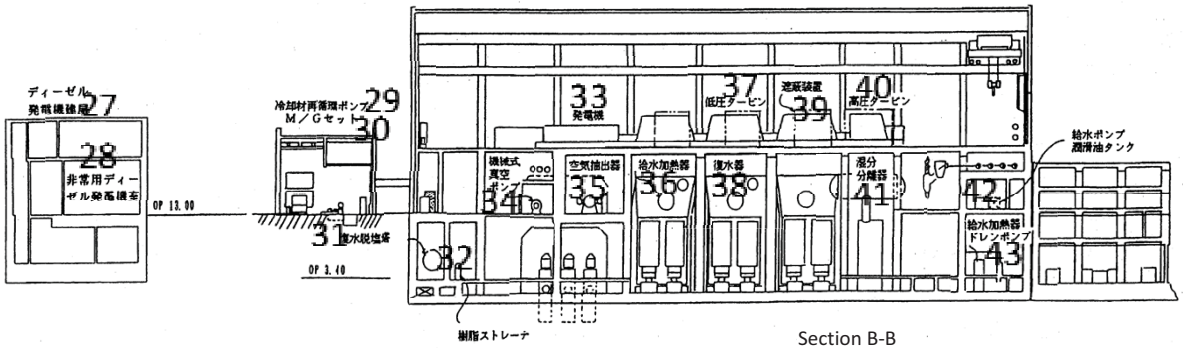
Section B-B

Based on “Fukushima Dai-ichi NPS: Application for reactor alternation license” (June 2003) by Tokyo Electric Power Company

Sectional view of the reactor building and other facilities at Unit 6 of the Fukushima Dai-ichi NPS



Section A-A



Section B-B

Source: Tokyo Electric Power Company, “Fukushima Dai-ichi NPS: Application for reactor alternation license,” December 2010

福島第一原子力発電所における 4 号機の原子炉建屋等の断面図:Sectional view of the reactor building and other facilities at Unit 4 of the Fukushima Dai-ichi NPS

上図　左　⇒　右

①使用済樹脂貯蔵タンク：Spent resin storage tank
②廃スラッジ貯蔵タンク：Waste sludge storage tank
③Ｒ／Ｂクレーン（１００／５ＴＯＮ）：R/B crane (100/5 ton)
④γシールドプラグ：Gamma shield plug
⑤Ｍ－Ｇセット：M/G set
⑥燃料プール冷却系熱交換器：Heat exchanger of the fuel pool cooling system
⑦ＯＰ　３６，８００(内側)：OP 36,800 (interior side)
⑧ＳＬＣタンク：SLC tank
⑨圧力容器：Pressure vessel
⑩ＣＵＷ再循環ポンプ：CUW recirculation pump
⑪再循環ポンプ：recirculation pump
⑫サプレッションチェンバ：Suppression chamber
⑬空調機器室：Air-conditioning equipment room
⑭給水管：Feedwater line
⑮主蒸気管：Main steam line
⑯空調機器室：Air-conditioning equipment room
⑰給水加熱器：Feedwater heater
⑱給水加熱器：Feedwater heater
⑲原子炉給水ポンプ：Reactor feed water pump
⑳１７５ｔクレーン：175-ton crane
㉑ＣＩＶバルブ：CIV valve
㉒給水加熱器：Feedwater heater
㉓復水器：Condenser
㉔循環水管：Circulating water line

下図　左　⇒　右

㉕樹脂貯槽：Resin reservoir
㉖密封油制御装置：Seal oil control system
㉗空気貯槽：Air reservoir
㉘配管トレンチ：Pipe trench
㉙発電機：Generator

㉚固定予冷却装置：Fixed pre-cooling unit
㉛ホールドアップパイプ：Holdup pipes
㉜タービン：Turbine
㉝給水加熱器：Feedwater heater
㉞復水器：Condenser
㉟湿分分離器：Moisture separator
㊱湿分分離器ドレンタンク：Moisture separator drain tank
㊲主蒸気止メ弁：Main steam stop valve
㊳タービンバイパス弁：Turbine bypass valve
㊴配管トレンチ：Pipe trench
㊵タービンオイルタンク：Turbine oil tank
㊶６．９ｋｖスイッチギア：6.9 kV switch gear
㊷トラス上面：Upper surface of the truss
㊸レール上面：Upper surface of the rail

福島第一原子力発電所における 5 号機の原子炉建屋等の断面図:Sectional view of the reactor building and other facilities at Unit 5 of the Fukushima Dai-ichi NPS

上図　左　⇒　右
①Ｒ／Ｂクレーン：R/B crane
②原子炉建屋：Reactor building
③モーター発電機室：Motor-driven generator room
④ドライウェル：Drywell
⑤サプレッションチェンバ：Suppression chamber
⑥空調機器室：Air-conditioning equipment room
⑦空調機器室：Air-conditioning equipment room
⑧Ｔ／Ｂクレーン：T/B crane
⑨タービン建屋：Turbine building
⑩タービン：Turbine
⑪復水器：Condenser

下図　左　⇒　右
⑫発電機冷却装置：Generator cooling unit

⑬タービン：Turbine
⑭復水器：Condenser
⑮湿分分離器：Moisture separator
⑯バルブ室：Valve room
⑰タービン油タンク：Turbine oil tank
⑱タービン貯油タンク：Turbine oil storage tank
⑲バッテリー室：Battery room
⑳スイッチギア室：Switch gear room

福島第一原子力発電所における６号機の原子炉建屋等の断面図：Sectional view of the reactor building and other facilities at Unit 6 of the Fukushima Dai-ichi NPS

上図　左　⇒　右
①原子炉建屋：Reactor building
②Ｒ／Ｂクレーン：R/B crane
③気水分離器等貯蔵プール：Storage pool for the steam separator and other devices
④原子炉浄化系熱交換器：Heat exchanger of the reactor cleanup system
⑤使用済燃料プール：Cartridge cooling pond
⑥再循環ポンプ：Recirculation pump
⑦原子炉圧力容器：Reactor pressure vessel
⑧燃料プール熱交換器：Fuel pool heat exchanger
⑨廃棄物貯蔵建屋：Waste storage building
⑩廃スラッジ貯蔵タンク：Waste sludge storage tank
⑪活性炭ホールドアップ装置室：Charcoal equipment room
⑫ＨＰＣＳポンプ：HPCS pump
⑬サプレッションプール：Suppression pool
⑭パイプトンネル：Pipe tunnel
⑮ＲＨＲ熱交換器：RHR heat exchanger
⑯ＲＨＲポンプ：RHR pump
⑰空調機械室：Air-conditioning machine room
⑱給水加熱器：Feedwater heater
⑲給水加熱器：Feedwater heater
⑳タービン建屋：Turbine building
㉑Ｔ／Ｂクレーン：T/B crane

㉒タービン駆動給水ポンプ：Turbine-driven feedwater pump
㉓タービン発電機：Turbine-generator
㉔給水加熱器：Feedwater heater
㉕復水器：Condenser
㉖補機冷却熱交換器：Component cooling heat exchanger

下図　左　⇒　右

㉗ディーゼル発電機建屋：Diesel generator building
㉘非常用ディーゼル発電機室：Emergency diesel generator room
㉙冷却材再循環ポンプ：Recirculation internal pump
㉚M／Gセット：M/G set
㉛復水脱塩搭：Condensate demineralization tower
㉜樹脂ストレーナ：Resin strainer
㉝発電機：Generator
㉞機械式真空ポンプ：Mechanical vacuum pump
㉟空気抽出器：Air ejector
㊱給水加熱器：Feedwater heater
㊲低圧タービン：Low-pressure turbine
㊳復水器：Condenser
㊴遮蔽装置：Shielding device
㊵高圧タービン：High-pressure turbine
㊶湿分分離器：Moisture separator
㊷給水ポンプ潤滑油タンク：Lubricant oil tank of the feedwater pump
㊸給水加熱器ドレンポンプ：Heater drain pump

Attachment II-16

Photographs showing damage to the Unit 1 reactor building

East wall

March 24, 2011
Photographed by Tokyo Electric Power Company

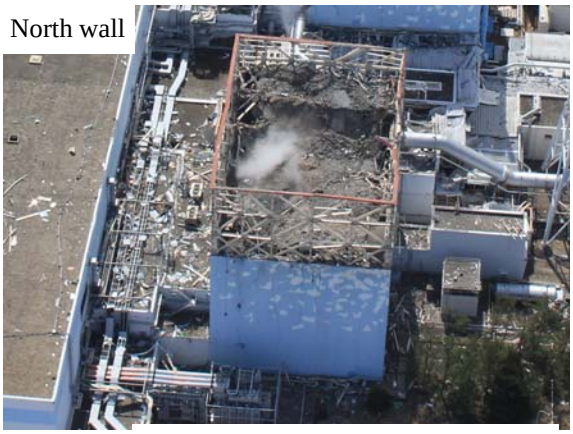
West wall

March 24, 2011
Photographed by Tokyo Electric Power Company

South wall

March 24, 2011
Photographed by Tokyo Electric Power Company

North wall



March 24, 2011
Photographed by Tokyo Electric Power Company

Photographs showing damage to the Unit 1 reactor building

March 12, 2011
Photographed by Tokyo Electric Power Company

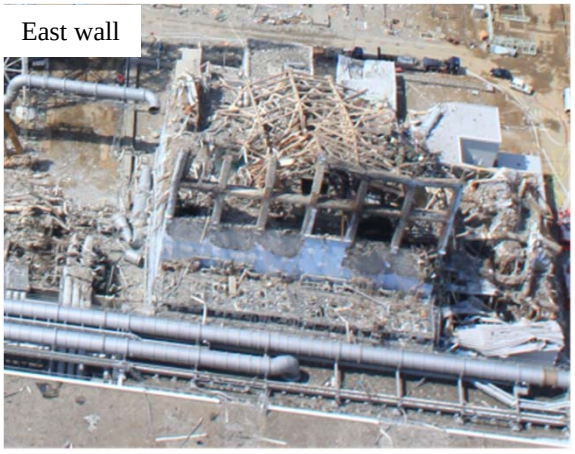
May 22, 2011
Photographed by Tokyo Electric Power Company

April 14, 2011
Photographed by Tokyo Electric Power Company

April 15, 2011
Photographed by Tokyo Electric Power Company

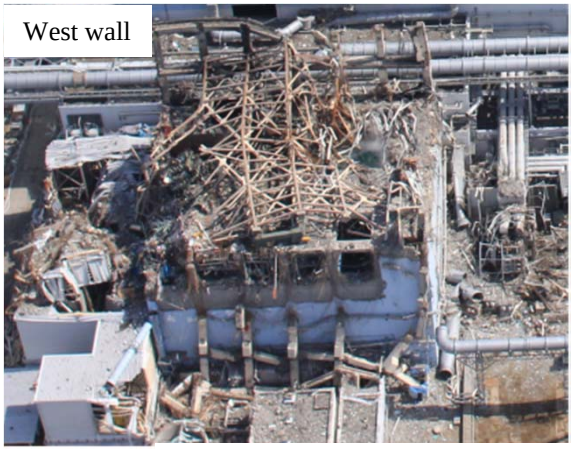
Photographs showing damage to the Unit 3 reactor building

East wall



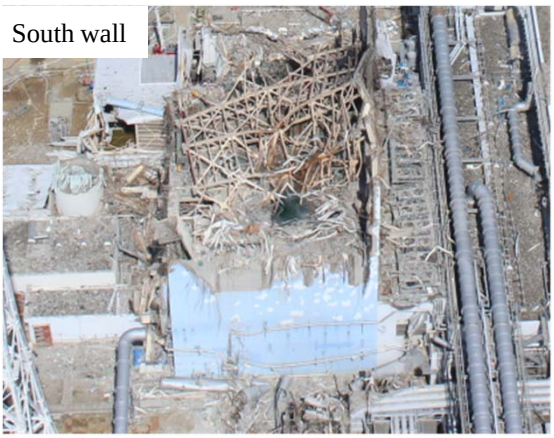
March 24, 2011
Photographed by Tokyo Electric Power Company

West wall



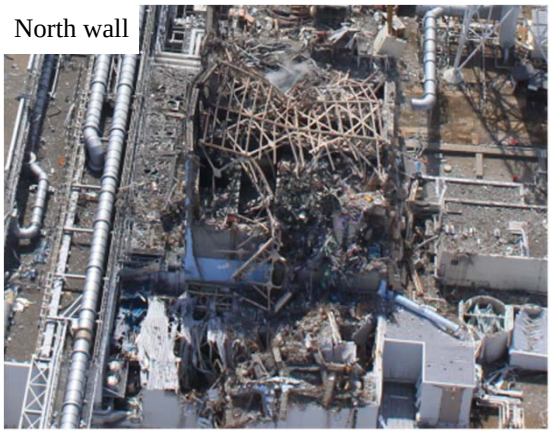
March 24, 2011
Photographed by Tokyo Electric Power Company

South wall



March 24, 2011
Photographed by Tokyo Electric Power Company

North wall



March 24, 2011
Photographed by Tokyo Electric Power Company

Photographs showing damage to the Unit 4 reactor building

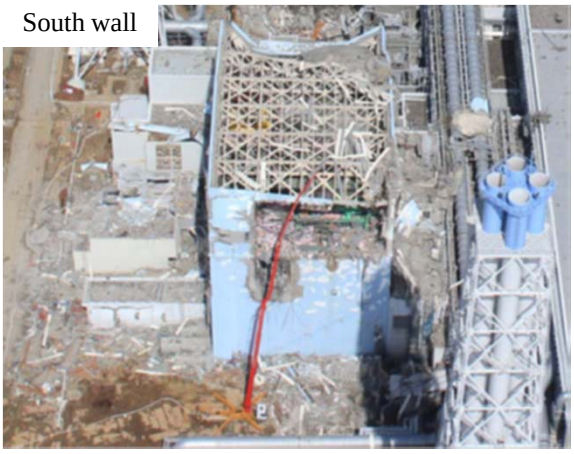
East wall

March 24, 2011
Photographed by Tokyo Electric Power Company

West wall

March 24, 2011
Photographed by Tokyo Electric Power Company

South wall



March 24, 2011
Photographed by Tokyo Electric Power Company

North wall

March 24, 2011
Photographed by Tokyo Electric Power Company

Photographs showing damage to the Unit 4 reactor building

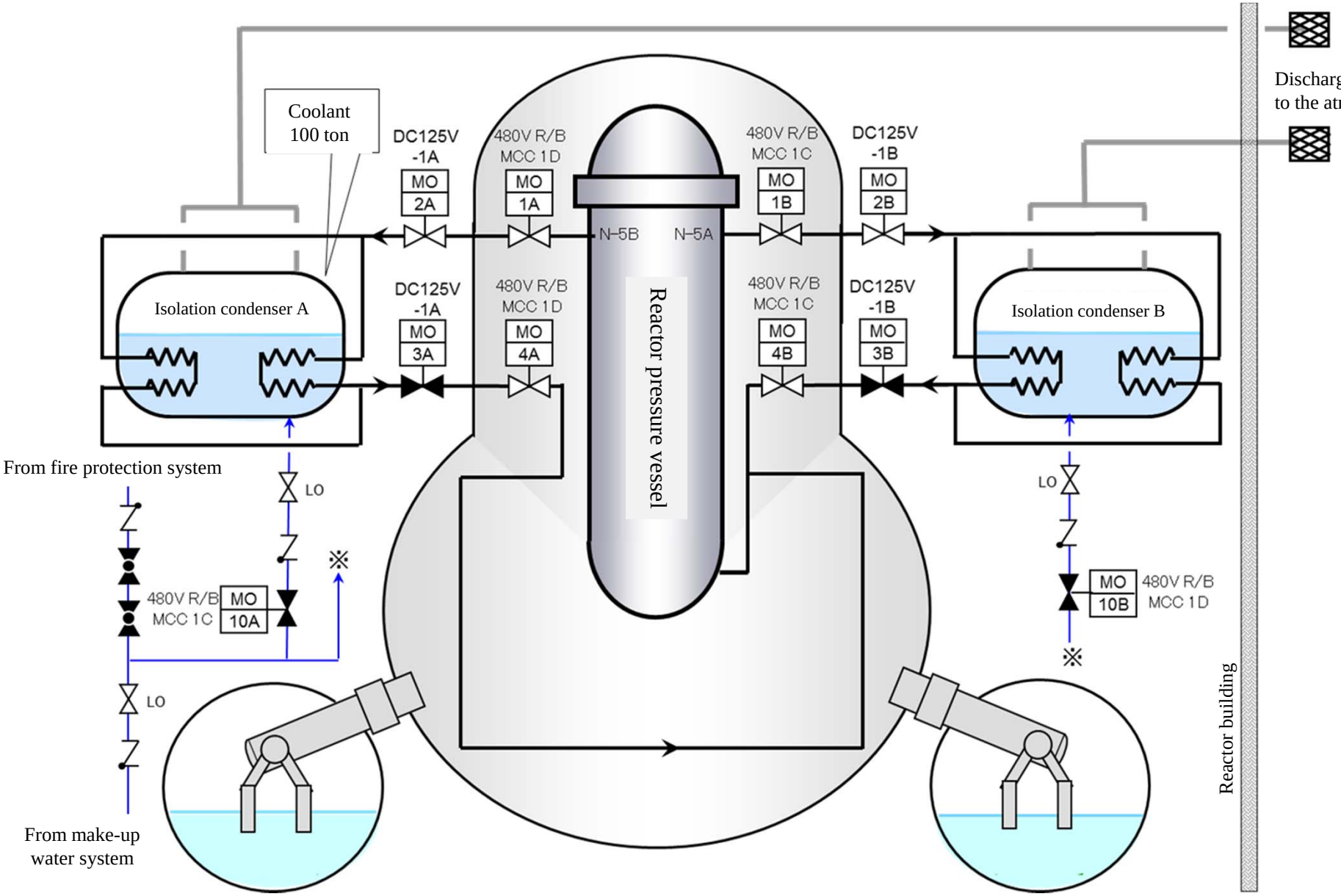
March 24, 2011
Photographed by Tokyo Electric Power Company

March 24, 2011
Photographed by Tokyo Electric Power Company

March 24, 2011
Photographed by Tokyo Electric Power Company

March 24, 2011
Photographed by Tokyo Electric Power Company

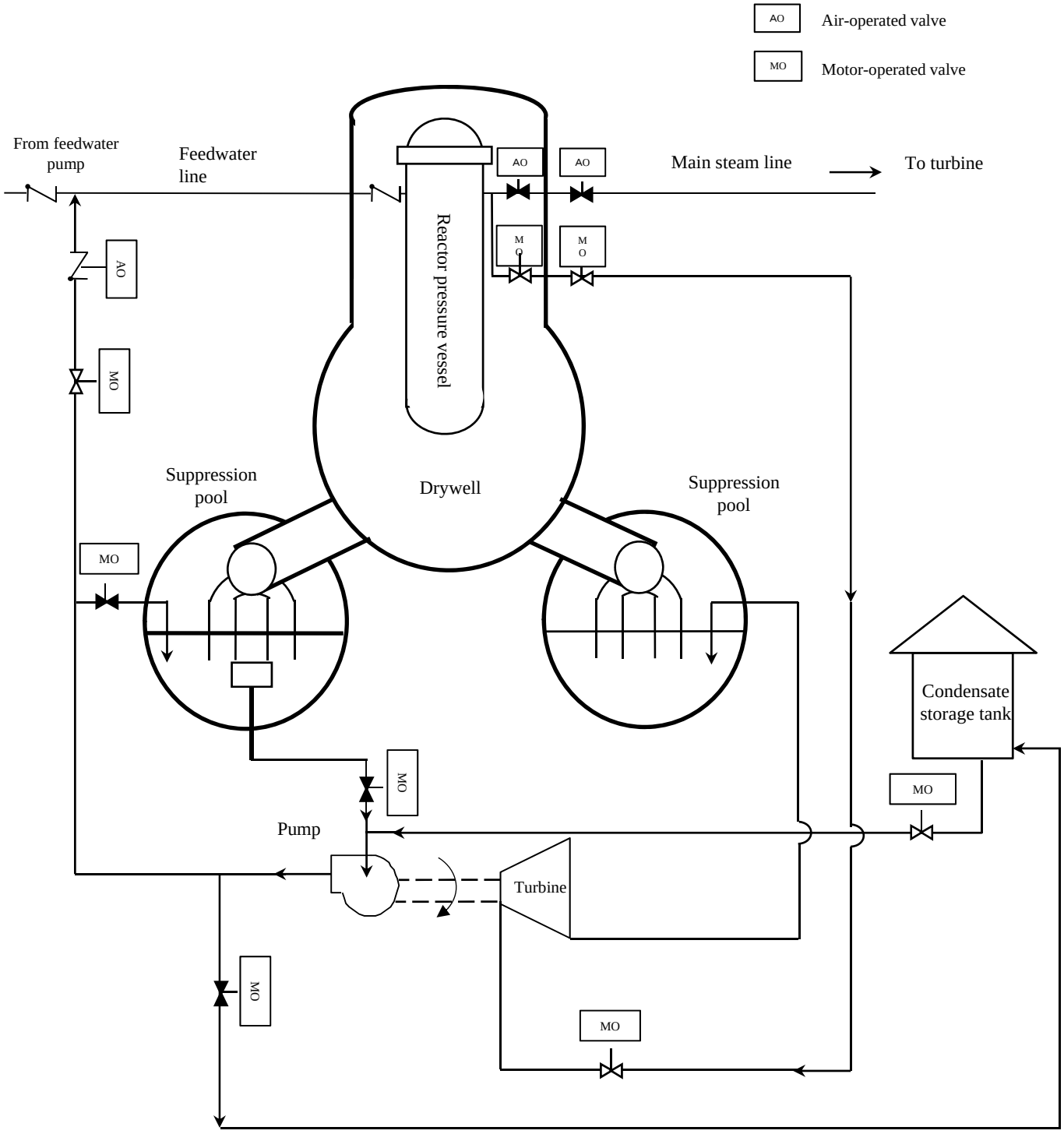
Isolation Condenser (IC)



Created by Tokyo Electric Power Company

Attachment II-17

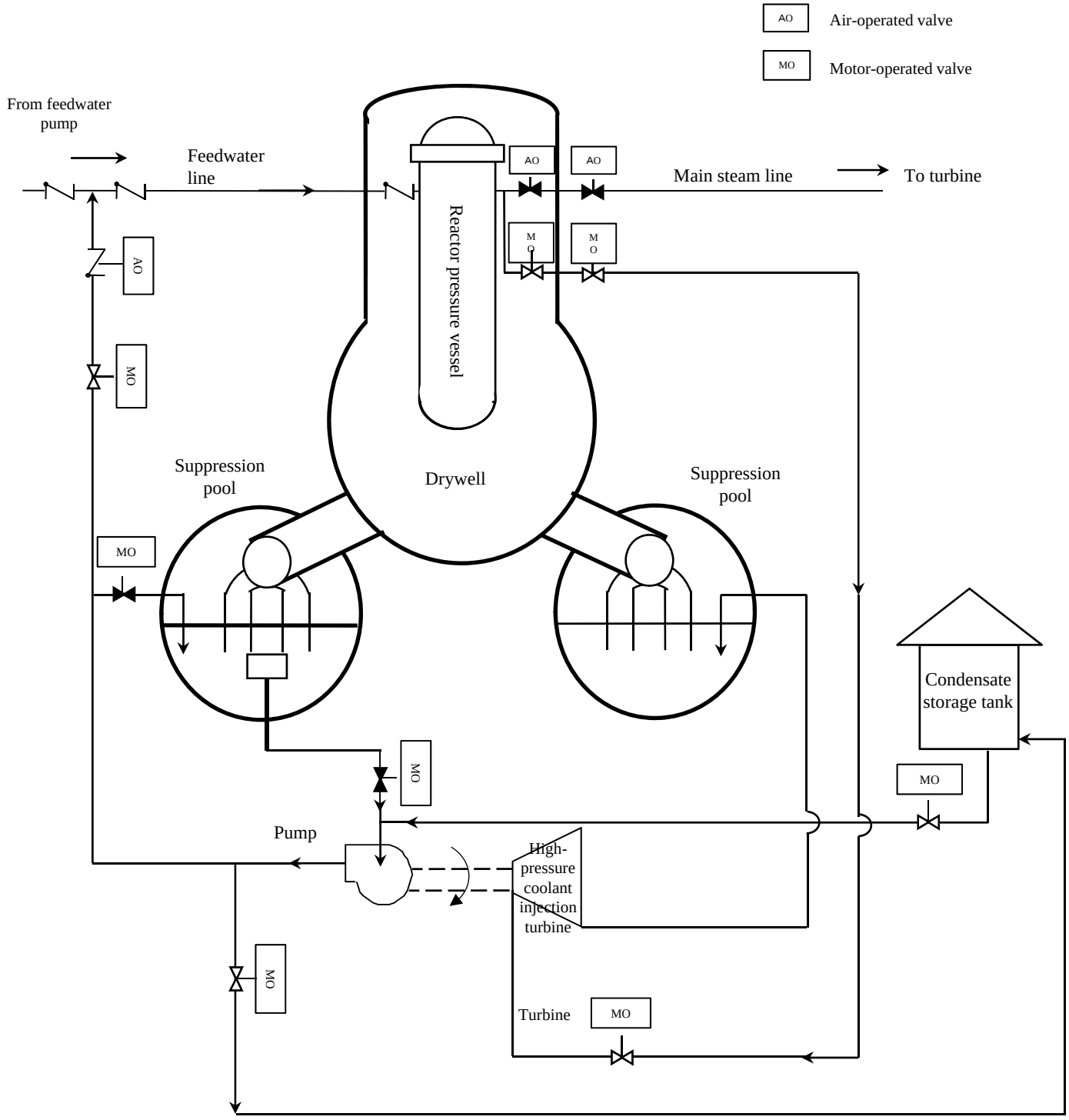
Attachment II-18



Reactor core isolation cooling (RCIC) system

Based on “Fukushima Dai-ichi NPS: Application for permit for changes to reactor establishment” (June 2003) by Tokyo Electric Power Company

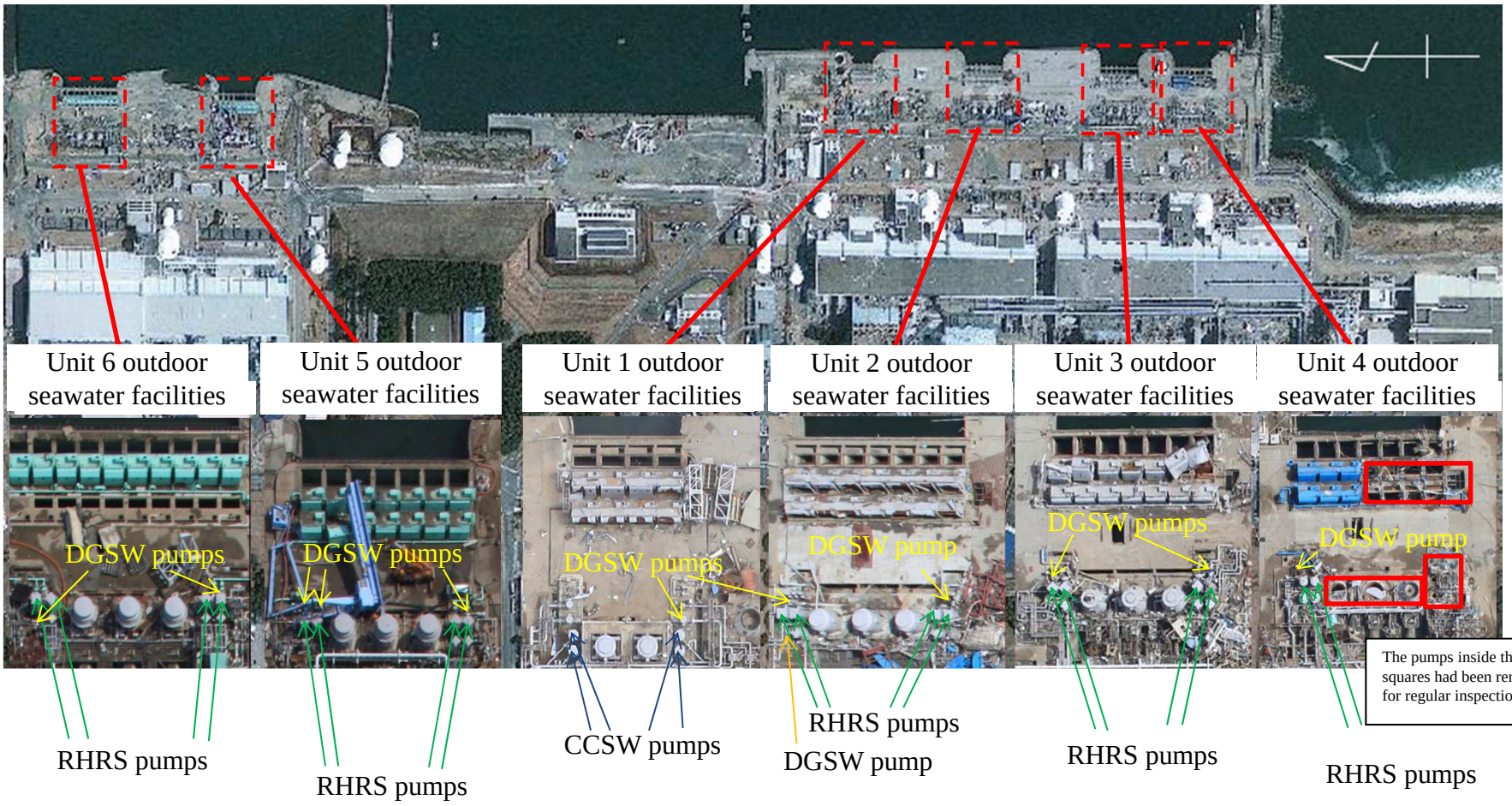
Attachment II-19



High pressure coolant injection (HPCI) system

Based on “Fukushima Dai-ichi NPS: Application for permit for changes to reactor establishment” (June 2003) by Tokyo Electric Power Company

Photograph showing an overview of the seaside area and outdoor seawater facilities at the Fukushima Dai-ichi NPS



RHRS: Residual heat removal sea water system
CCSW: Containment cooling sea water system
DGSW: Diesel generator sea water system

The aerial pictures are created from photographs on GeoEye.
The six pictures in the bottom row are created from photographs taken by Tokyo Electric Power Company on March 29, 2011.

Attachment II-20

Damage to the emergency diesel generators (DGs), metal clad switchgear (M/C) and power centers (P/Cs)

Table 1. Damage to the emergency diesel generators (DGs) after the arrival of the tsunami

	Equipment	Installation location	Remarks	Equipment	Installation location	Remarks	Equipment	Installation location	Remarks	Equipment	Installation location	Remarks	Equipment	Installation location	Remarks	Equipment	Installation location	Remarks
	Unit 1			Unit 2			Unit 3			Unit 4			Unit 5			Unit 6		
DG	1A	1st basement floor, T/B	-	2A	1st basement floor, T/B	-	3A	1st basement floor, T/B	-	4A	1st basement floor, T/B	-	5A	1st basement floor, T/B	Exciters exposed to water	6A	1st basement floor, R/B	Seawater pumps exposed to water
	1B	1st basement floor, T/B	-	2B	1st floor, shared pool	M/C (2E), submerged	3B	1st basement floor, T/B	-	4B	1st floor, shared pool	M/C (4E), exposure to water	5B	1st basement floor, T/B	Exciters exposed to water	6B	1st floor, DG bldg.	-
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	for HPCS	1st basement floor, R/B	Seawater pumps exposed to water

Table 2. Damage to the metal clad switchgear (M/C) after the arrival of the tsunami

		Equipment	Installation location	Equipment	Installation location	Equipment	Installation location	Equipment	Installation location	Equipment	Installation location	Equipment	Installation location
		Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6	
Emergency M/C		1C	1st floor, T/B	2C	1st basement floor, T/B	3C	1st basement floor, T/B	4C	1st basement floor, T/B	5C	1st basement floor, T/B	6C	2nd basement floor, R/B
		1D	1st floor, T/B	2D	1st basement floor, T/B	3D	1st basement floor,T/B	4D	1st basement floor, T/B	5D	1st basement floor, T/B	6D	1st basement floor, R/B
		-	-	2E	1st basement floor, shared pool	-	-	4E	1st basement floor, shared pool	-	-	for HPCS	1st floor, R/B
Regular M/C	Regular	1A	1st floor, T/B	2A	1st basement floor, T/B	3A	1st basement floor, T/B	4A	1st basement floor, T/B	5A	1st basement floor, C/B	6A-1	1st basement floor, T/B
		1B	1st floor, T/B	2B	1st basement floor, T/B	3B	1st basement floor, T/B	4B	1st basement floor, T/B	5B	1st basement floor, C/B	6A-2	1st basement floor, T/B
		-	-	-	-	-	-	-	-	-	-	6B-1	1st basement floor, T/B
		-	-	-	-	-	-	-	-	-	-	6B-2	1st basement floor, T/B
	Common	1S	1st floor, T/B	2SA	1st floor, 2SA bldg.	3SA	1st basement floor, C/B	-	-	5SA-1	1st basement floor, C/B	-	-
		-	-	2SB	1st basement floor, T/B	3SB	1st basement floor, C/B	-	-	5SA-2	1st basement floor, C/B	-	-
		-	-	-	-	-	-	-	-	5SB-1	1st basement floor, C/B	-	-
		-	-	-	-	-	-	-	-	5SB-2	1st basement floor, C/B	-	-

Table 3. Damage to the power centers (P/Cs) after the arrival of the tsunami

		Equipment	Installation location	Equipment	Installation location	Equipment	Installation location	Equipment	Installation location	Equipment	Installation location	Equipment	Installation location
		Unit 1		Unit 2		Unit 3		Unit 4		Unit 5		Unit 6	
Emergency P/C		1C	1st basement floor, C/B	2C	1st floor, T/B	3C	1st basement floor, T/B	4C	1st floor, T/B	5C	1st basement floor, T/B	6C	2nd basement floor, R/B
		1D	1st basement floor, C/B	2D	1st floor, T/B	3D	1st basement floor,T/B	4D	1st floor, T/B	5D	1st basement floor, T/B	6D	1st basement floor, R/B
		-	-	2E	1st basement floor, shared pool	-	-	4E	1st basement floor, shared pool	-	-	6E	1st basement floor, DG bldg.
Regular P/C	Regular	1A	1st floor, T/B	2A	1st floor, T/B	3A	1st basement floor, T/B	4A	1st floor, T/B	5A	1st basement floor, C/B	6A-1	1st basement floor, T/B
		1B	1st floor, T/B	2A-1	1st basement floor, T/B	3B	1st basement floor, T/B	4B	1st floor, T/B	5A-1	2nd floor, T/B	6A-2	1st basement floor, T/B
		-	-	2B	1st floor, T/B	-	-	-	-	5B	1st basement floor, C/B	6B-1	1st basement floor, T/B
		-	-	-	-	-	-	-	-	5B-1	2nd floor, T/B	6B-2	1st basement floor, T/B
	Common	1S	1st floor, T/B	2SB	1st basement floor, T/B	3SA	1st basement floor, C/B	-	-	5SA	1st basement floor, C/B	-	-
		-	-	-	-	3SB	1st basement floor, C/B	-	-	5SA-1	1st basement floor, T/B	-	-
		-	-	-	-	-	-	-	-	5SB	1st basement floor, C/B	-	-

Explanatory note: The colors inside cells indicate the following:

Pink: Equipment itself was exposed to water.

Blue: Equipment was not exposed to water.

Green: Equipment itself was not exposed to water, but lost function due to water exposure of related equipment.

Gray: Under construction.

* Refer to Attachment II-3 for the location of each building, and to Attachment II-12 for the installation locations of the respective facilities inside the buildings.
* Refer to “Photographs showing damage to M/Cs and P/Cs” for the conditions of M/Cs and P/Cs of Unit 1, which were exposed to water.

Based on “The impact of Tohoku-Chihou Taiheiyo-Oki Earthquake to Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station” (September 2011) by Tokyo Electric Power Company

Photographs showing damage to M/Cs and P/Cs

August 25, 2011 Photographed by Tokyo Electric Power Company

Picture (i): M/C on the north of the first floor, Unit 1 turbine building.
(Traces of the tsunami remain at shoulder height.)

August 25, 2011 Photographed by Tokyo Electric Power Company

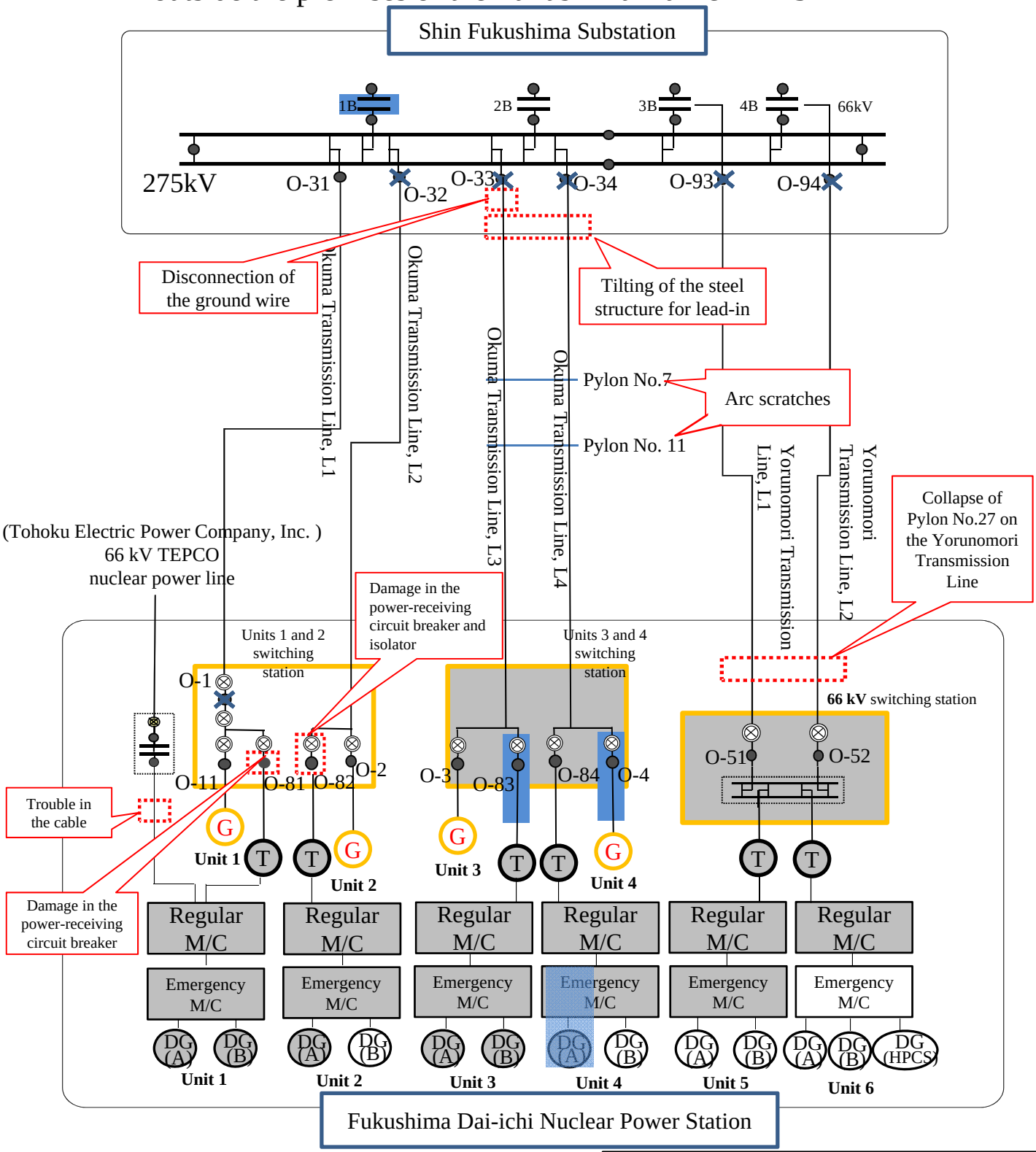
Picture (ii): M/C on the north of the first floor, Unit 1 turbine building.
(The device in the back is a breaker drawn out of the box.)

August 25, 2011 Photographed by Tokyo Electric Power Company

Picture (iii): P/C-1S on the first floor, Unit 1 turbine building.

Attachment II-22

Illustration of damage to electrical installations inside and outside the premises of the Fukushima Dai-ichi NPS



* The figure does not include L1 and L2 of the Futaba Transmission Line, the power transmission lines from Units 5 and 6, and the ultrahigh voltage switching station for Units 5 and 6 because they only serve for power transmission.

Based on "Regarding Collection of Reports Pursuant to the Provisions of Article 106, Paragraph 3 of the Electricity Business Act" (May 16, 2011) by Tokyo Electric Power Company

Explanatory note

- Isolator
- Breaker
- Startup transformer
- Power generator
- Exposed to water due to the tsunami
- Under inspection/construction
- Transformer
- Cutting point in power supply

Attachment II-23

Photographs showing damage to facilities required for the supply of external power

March 23, 2011 Photographed by Tokyo Electric Power Company

Picture (i): Breaker (O-81) having fallen inside the switching station for Units 1 and 2.

March 23, 2011 Photographed by Tokyo Electric Power Company

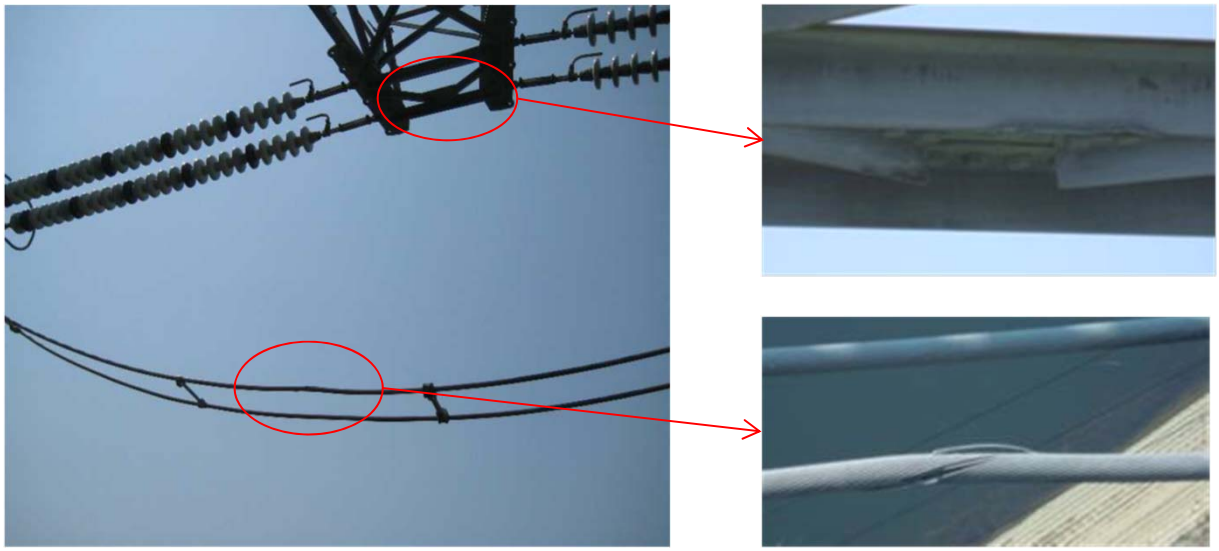
Picture (ii): Breaker (O-82) having fallen inside the switching station for Units 1 and 2.

March 23, 2011 Photographed by Tokyo Electric Power Company

Picture (iii): Disconnection switch having fallen inside the switching station for Units 1 and 2.

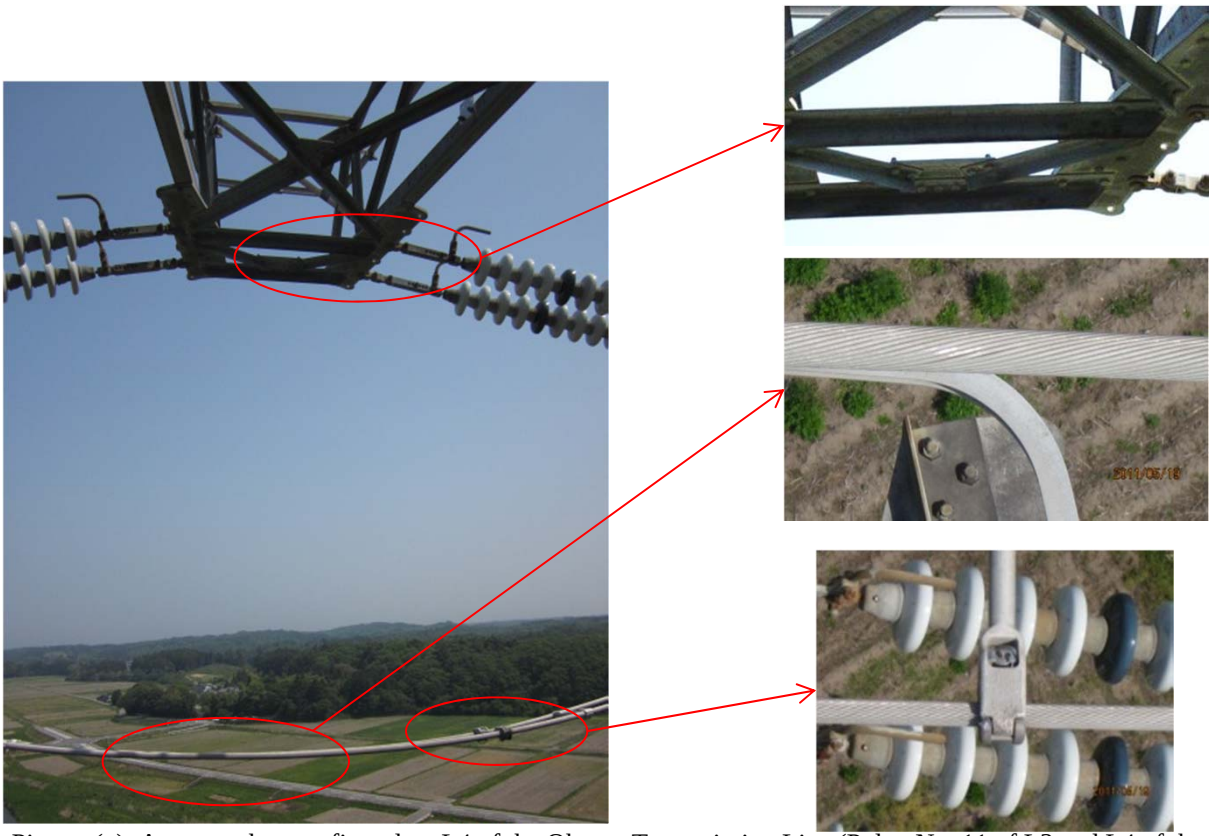
- The respective numbers for the breakers (O-81 and O-82) correspond to those in Attachment II-22.

Photographs showing damage to facilities required for the supply of external power



Picture (iv): Arc scratches confirmed on L3 of the Okuma Transmission Line (Pylon No.7 of L3 and L4 of the Okuma Transmission Line).

(May 19, 2011 Photographed by Tokyo Electric Power Company)



Picture (v): Arc scratches confirmed on L4 of the Okuma Transmission Line (Pylon No. 11 of L3 and L4 of the Okuma Transmission Line.)

(May 19, 2011 Photographed by Tokyo Electric Power Company)

*The locations of Pylons No. 7 and 11 are as indicated in L3 and L4 of the Okuma Transmission Line in Attachment II-22.

Photographs showing damage to facilities required for the supply of external power

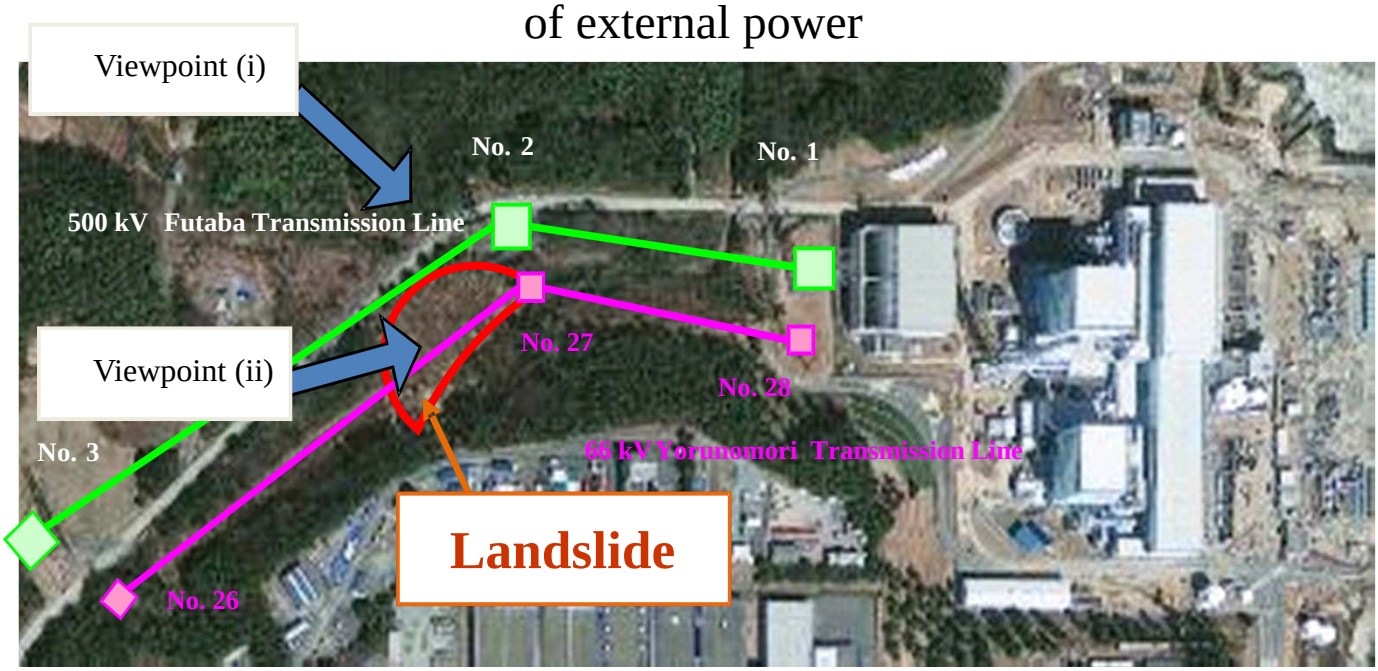
March 12, 2011 Photographed by Tokyo Electric Power Company

Picture (vi): Disconnected ground wire inside the Shin Fukushima Substation (Okuma Transmission Line, L3).

March 11, 2011 Photographed by Tokyo Electric Power Company

Picture (vii): Tilted steel structure for lead-in, Okuma Transmission Line, L3 and L4.

Photographs showing damage to facilities required for the supply of external power

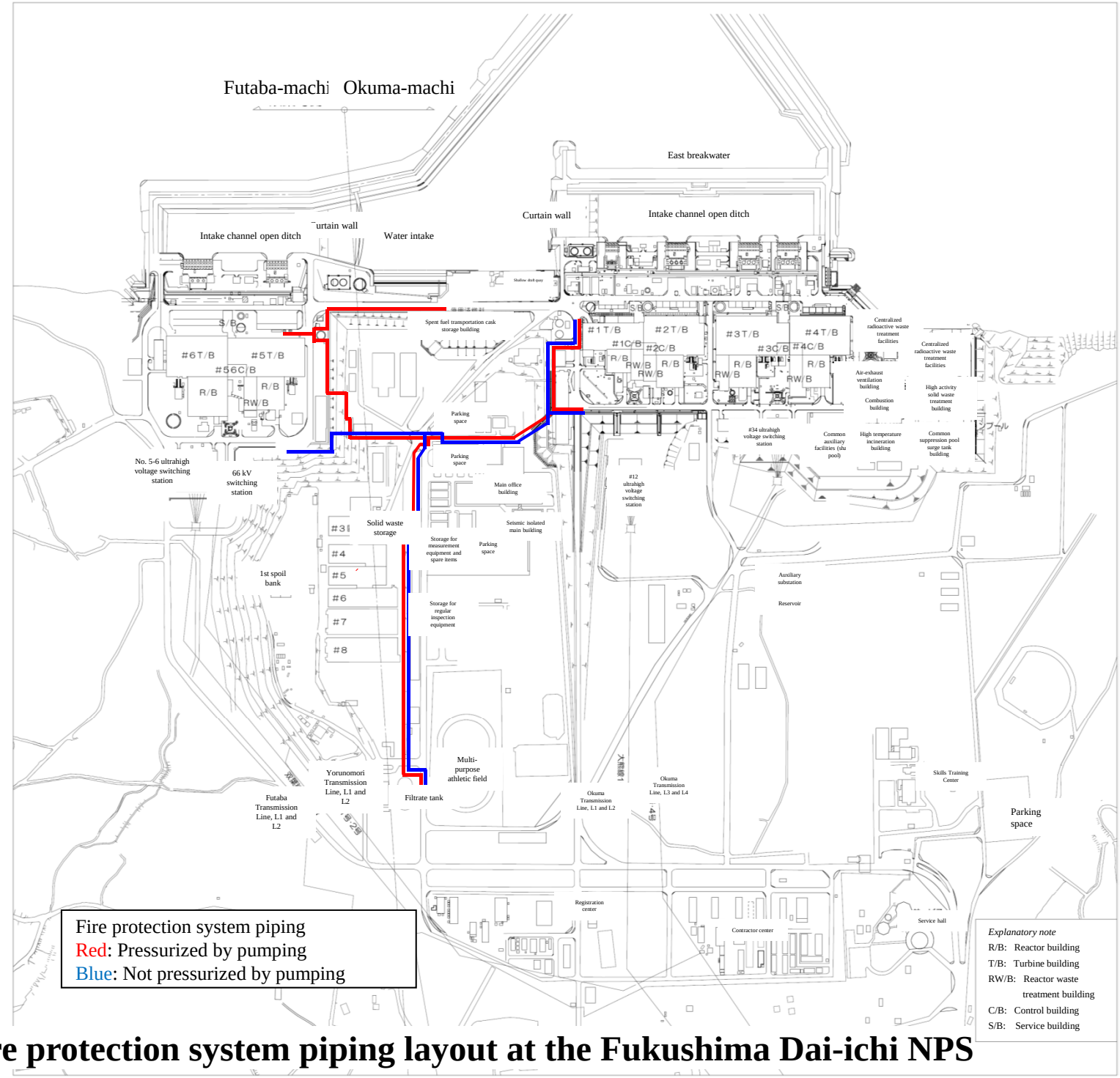


Landside on the slope (Viewpoint (i))

Collapse of the pylon (Viewpoint (ii))

- Top picture showing the landslide: Photographed by ©Geo Eye on March 19, 2011.
- Pictures from Viewpoints (i) and (ii): Photographed by Tokyo Electric Power Company on March 18, 2011.

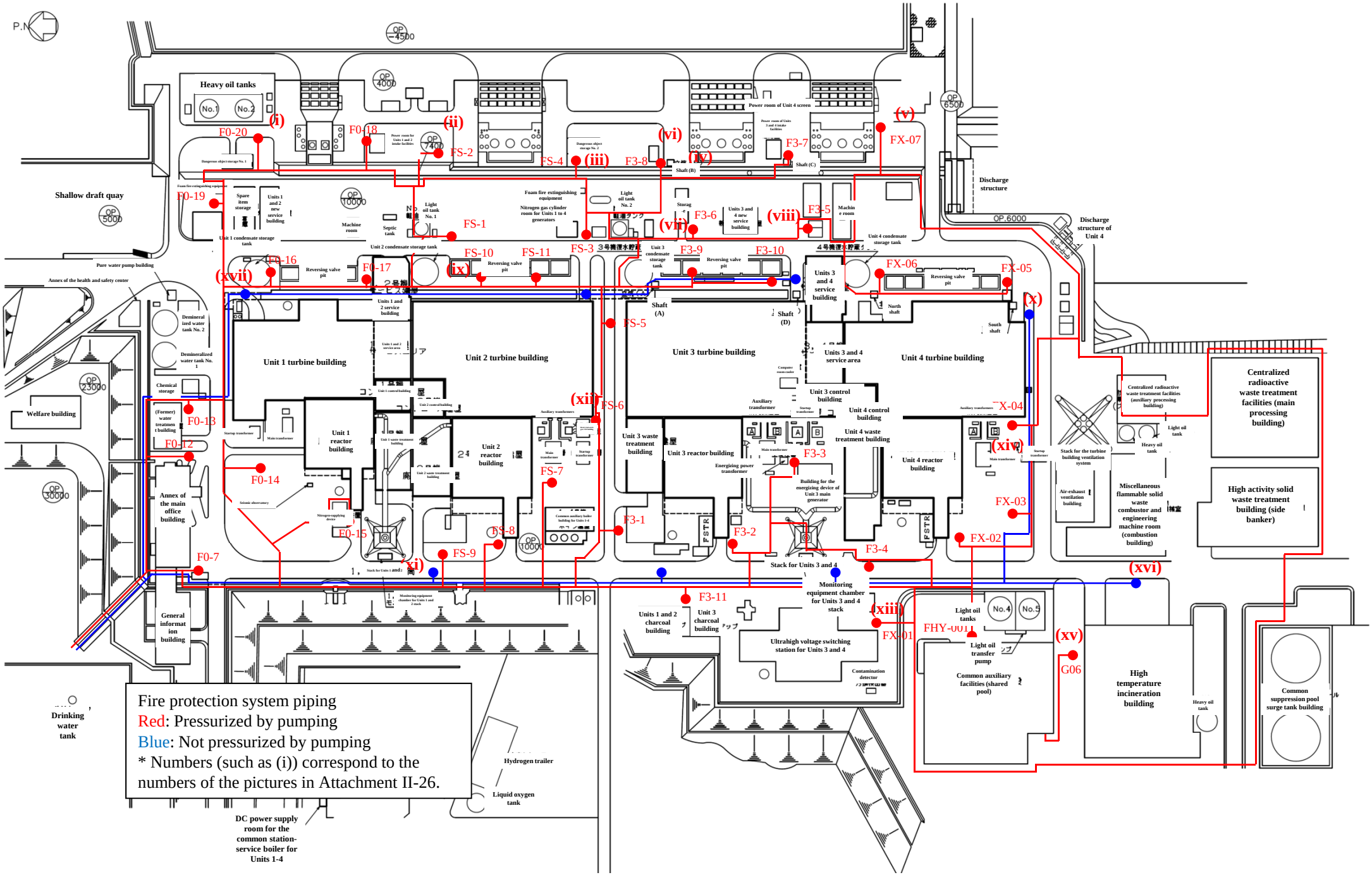
Picture (viii): Collapsed Pylon No. 27 of the Yorunomori Transmission Line, L1 and L2.



Fire protection system piping layout at the Fukushima Dai-ichi NPS

Based on data and documents by Tokyo Electric Power Company.

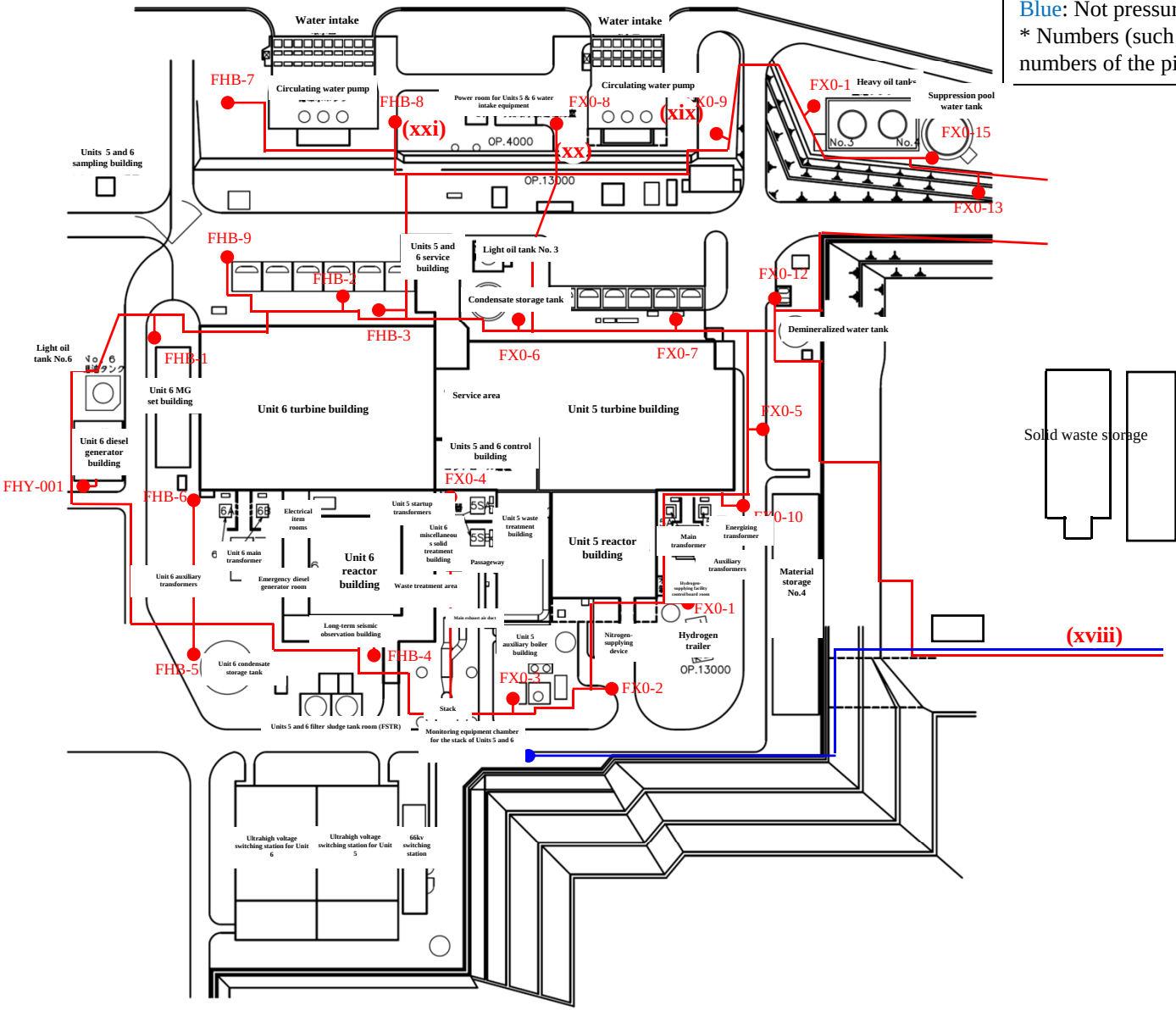
Attachment II-24



Fire protection system piping layout at the Fukushima Dai-ichi NPS (Units 1 to 4)

Based on data and documents by Tokyo

Fire protection system piping
Red: Pressurized by pumping
Blue: Not pressurized by pumping
* Numbers (such as (i)) correspond to the numbers of the pictures in Attachment II-26.



Based on data and documents by Tokyo Electric Power Company

Fire protection system piping layout at the Fukushima Dai-ichi NPS (Units 5 and 6)

Location of the T/B water delivery ports at Units 1 to 4 of the Fukushima Dai-ichi NPS

＊ Construction completed in June 2010.

Photographed by Tokyo Electric Power Company on August 1, 2011.

＊ Construction completed in June 2010.
Used for reactor coolant injection.

Photographed by Tokyo Electric Power Company on August 1, 2011.

＊ Construction completed in June 2010.
Used for reactor coolant injection.

Photographed by Tokyo Electric Power Company on July 29, 2011.

＊ Construction completed in June 2010.
Used for reactor coolant injection.

Photographed by Tokyo Electric Power Company on September 26, 2011.

＊ Construction completed in June 2010.

Photographed by Tokyo Electric Power Company on September 26, 2011.

Photograph taken from the depth of the photograph below facing toward the wall.

Photographed by Tokyo Electric Power Company on July 29, 2011.

Attachment II-25

Explanatory note

- Installed on the side of the building. Construction completed in June 2010.
- Installed on the fire protection system piping. Construction completed in June 2010.
- Installed on the fire protection system piping. (Renovated in June 2010.)

Based on data and documents by Tokyo Electric Power Company

福島第一原子力発電所１号機から４号機　Ｔ／Ｂ送水口設置個所：Location of the T/B water delivery ports at Units 1 to 4 of the Fukushima Dai-ichi NPS

図上部　左⇒右

①機械室：Machine room
②放水口：Discharge structure
③４号機放水口：Discharge structure of Unit 4

図中央部　左⇒右

④事務本館別館：Annex of the main office building
⑤総合情報棟：General information building
⑥１号機復水貯蔵タンク：Unit 1 condensate storage tank
⑦逆洗弁ピット：Reversing valve pit
⑧２号機復水貯蔵タンク：Unit 2 condensate storage tank
⑨逆洗弁ピット：Reversing valve pit
⑩３号機復水貯蔵タンク：Unit 3 condensate storage tank
⑪立杭（A）：Shaft (A)
⑫逆洗弁ピット：Reversing valve pit
⑬立杭（Ｄ）：Shaft (D)
⑭北側立杭：North shaft
⑮逆洗弁ピット：Reversing valve pit
⑯南側立杭：South shaft
⑰１号機タービン建屋：Unit 1 turbine building
⑱１号機原子炉建屋：Unit 1 reactor building
⑲１，２号機サービス建屋：Units 1 and 2 service building
⑳１，２号機サービスエリア：Units 1 and 2 service area
㉑１号機コントロール建屋：Unit 1 control building
㉒２号機コントロール建屋：Unit 2 control building
㉓１号機廃棄物処理建屋：Unit 1 waste treatment building
㉔２号機廃棄物処理建屋：Unit 2 waste treatment building
㉕２号機タービン建屋：Unit 2 turbine building
㉖２号機原子炉建屋：Unit 2 reactor building
㉗起動変圧器：Startup transformer
㉘主変圧器：Main transformer
㉙地震観測小屋：Seismic observatory

㉚チッ素供給装置：Nitrogen-supplying device
㉛１，２号機排気筒：Stack for Units 1 and 2
㉜１，２号機排気筒モニタ収納小屋：Monitoring equipment chamber for Units 1 and 2 stack
㉝所内変圧器：Auxiliary transformers
㉞メタクラ２SA 建屋：Metal clad switch gear 2SA building
㉟主変圧器：Main transformer
㊱起動変圧器：Startup transformer
㊲１～４号機共用所内ボイラ建屋：Common auxiliary boiler building for Units 1-4
㊳３号機タービン建屋：Unit 3 turbine building
㊴計算機室冷凍機：Computer room cooler
㊵３号機廃棄物処理建屋：Unit 3 waste treatment building
㊶３号機原子炉建屋：Unit 3 reactor building
㊷所内変圧器：Auxiliary transformers
㊸起動変圧器：Startup transformer
㊹励磁電源変圧器：Energizing power transformer
㊺主変圧器：Main transformer
㊻３号機主発電機励磁装置盤建屋：Building for the energizing device of Unit 3 main generator
㊼３，４号機排気筒：Stack for Units 3 and 4
㊽３，４号機排気筒モニタ収納小屋：Monitoring equipment chamber for Units 3 and 4 stack
㊾３，４号機サービス建屋：Units 3 and 4 service building
㊿３，４号機サービスエリア：Units 3 and 4 service area
(51)３号機コントロール建屋：Unit 3 control building
(52)４号機コントロール建屋：Unit 4 control building
(53)４号機廃棄物処理建屋：Unit 4 waste treatment building
(54)４号機タービン建屋：Unit 4 turbine building
(55)４号機原子炉建屋：Unit 4 reactor building
(56)所内変圧器：Auxiliary transformer
(57)主変圧器：Main transformer
(58)励磁電源変圧器：Energizing power transformer
(59)タービン建屋換気系排気筒：Stack for the turbine building ventilation system
(60)排風気建屋：Air-exhaust ventilation building
(61)放射性廃棄物集中処理施設(プロセス補助建屋)：Centralized radioactive waste treatment facilities (auxiliary processing building)
(62)重油タンク：Heavy oil tank
(63)軽油タンク：Light oil tank

㊹可燃性雑固体廃棄物焼却施設および工作機械室（焼工建屋）：Miscellaneous flammable solid waste combustor and engineering machine room (combustion building)
㊺放射性廃棄物集中処理施設（プロセス主建屋）：Centralized radioactive waste treatment facilities (main processing building)
㊻高放射性固体廃棄物処理建屋（サイトバンカー）：High activity solid waste treatment building (side banker)

図下部　左⇒右

㊼飲料水タンク：Drinking water tank
㊽１，２号機超高圧開閉所：Ultrahigh voltage switching station for Units 1 and 2
㊾１～４号機共用所内ボイラ直流電源室：DC power supply room for the common station-service boiler for Units 1-4
㊿水素トレーラー：Hydrogen trailer
(71)液体酸素タンク：Liquid oxygen tank
(72)１、２号機活性炭ホールドアップ装置建屋：Units 1 and 2 charcoal building
(73)３号機活性炭ホールドアップ装置建屋：Unit 3 charcoal building
(74)３，４号機超高圧開閉所：Ultrahigh voltage switching station for Units 3 and 4
(75)汚損検出器：Contamination detector
(76)軽油タンク：Light oil tanks
(77)軽油移送ポンプ：Light oil transfer pump
(78)運用補助共用施設（共用プール）：Common auxiliary facilities (shared pool)
(79)高温焼却建屋：High temperature incineration building
(80)重油タンク：Heavy oil tank
(81)共用サプレッションプールサージタンク建屋：Common suppression pool surge tank building

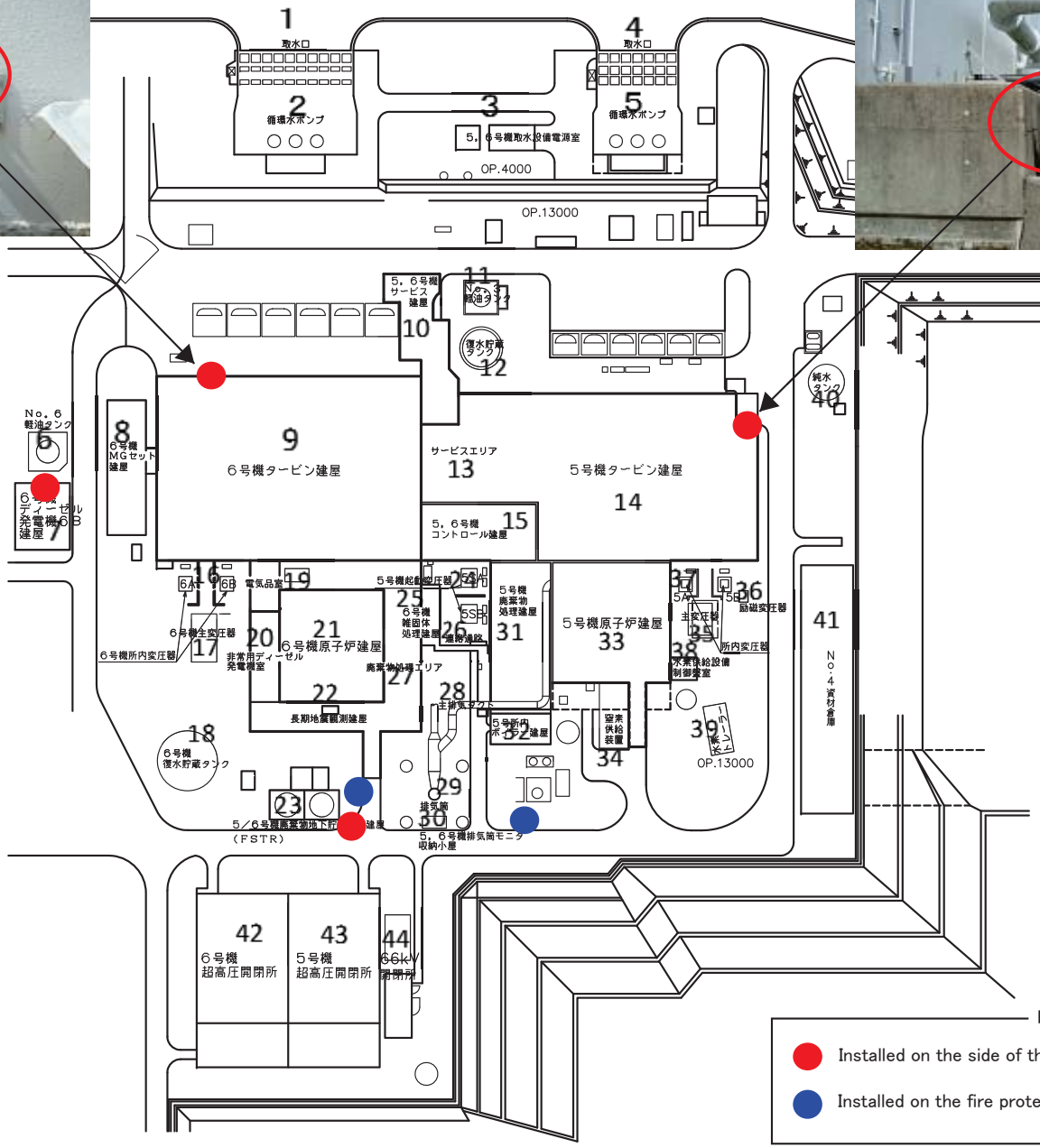
Location of the T/B water delivery ports at Units 5 and 6 of the Fukushima Dai-ichi NPS

＊ Construction completed in June 2010.

Photographed by Tokyo Electric Power Company on September 26, 2011.

＊ Construction completed in June 2010.

Photographed by Tokyo Electric Power Company on September 26, 2011.



Explanatory note

- Installed on the side of the building. Construction completed in June 2010.
- Installed on the fire protection system piping. (Renovated in June 2010.)

Based on data and documents by Tokyo Electric Power Company

福島第一原子力発電所５号機及び６号機　Ｔ／Ｂ送水口設置個所：Location of the T/B water delivery ports at Units 5 and 6 of the Fukushima Dai-ichi NPS

Location of the T/B water delivery ports at Units 1 to 4 of the Fukushima Dai-ichi NPS

図上部　左⇒右）

①取水口：Water intake
②循環水ポンプ：Circulating water pump
③５，６号機取水設備電源室：Power room for Units 5 and 6 intake facilities
④取水口：Water intake
⑤循環水ポンプ：Circulating water pump

図中央部　左⇒右

⑥Ｎｏ．６軽油タンク：Light oil tank No. 6
⑦６号機ディーゼル発電機建屋：Unit 6 diesel generator building
⑧６号機ＭＧセット建屋：Unit 6 MG set building
⑨６号機タービン建屋：Unit 6 turbine building
⑩５，６号機サービス建屋　：Units 5 and 6 service building
⑪Ｎｏ．３軽油タンク：Light oil tank No. 3
⑫復水貯蔵タンク：Condensate storage tank
⑬サービスエリア：Service area
⑭５号機タービン建屋：　Unit 5 turbine building
⑮５，６号機コントロール建屋：Units 5 and 6 control building
⑯６号機所内変圧器：Unit 6 auxiliary transformers
⑰６号機主変圧器：Unit 6 main transformer
⑱６号機復水貯蔵タンク：Unit 6 condensate storage tank
⑲電気品室：Electrical item room
⑳非常用ディーゼル発電機室：Emergency diesel generator room
㉑６号機原子炉建屋：Unit 6 reactor building
㉒長期地震観測建屋：Long-term seismic observation building
㉓５／６号機廃棄物地下貯蔵設備建屋：Units 5 and 6 filter sludge tank room
㉔５号機起動変圧器：Unit 5 startup transformers
㉕６号機雑固体処理建屋：Unit 6 miscellaneous solid treatment building
㉖連絡通路：Passageway
㉗廃棄物処理エリア：Waste treatment area
㉘主排気ダクト：Main exhaust air duct

㉙排気筒：Stack

㉚５，６号機排気筒モニタ収納小屋：Monitoring equipment chamber for the stack of Units 5 and 6

㉛５号機廃棄物処理建屋：Unit 5 waste treatment building

㉜５号所内ボイラー建屋：Unit 5 auxiliary boiler building

㉝５号機原子炉建屋：Unit 5 reactor building

㉞窒素供給装置：Nitrogen-supplying device

㉟主変圧器：Main transformer

㊱励磁変圧器：Energizing transformer

㊲所内変圧器：Auxiliary transformers

㊳水素供給設備制御盤室：Hydrogen-supplying facility control board room

㊴水素トレーラー：Hydrogen trailer

㊵純水タンク：Demineralized water tank

㊶Ｎｏ．４資材倉庫：Material storage No.4

図下部　左⇒右

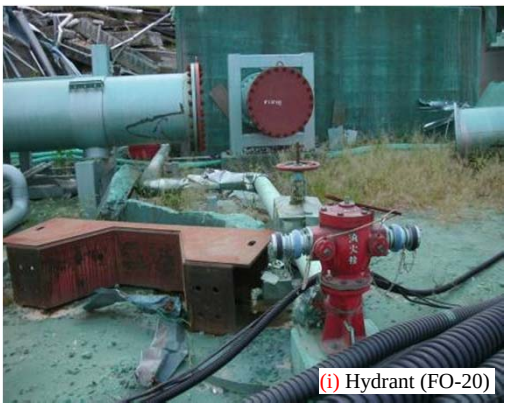
㊷６号機超高圧開閉所：Ultrahigh voltage switching station for Unit 6

㊸５号機超高圧開閉所：Ultrahigh voltage switching station for Unit 5

㊹６６ＫＶ開閉所：66 kV switchyard

Attachment II-26

Photographs showing the installation of outdoor fire protection system facilities at the Fukushima Dai-ichi NPS


(i) Hydrant (FO-20)

August 24, 2011 Photographed by Tokyo Electric Power Company


(ii) Hydrant (FS-2)

August 24, 2011 Photographed by Tokyo Electric Power Company


(iii) Hydrant (FS-4)

August 24, 2011 Photographed by Tokyo Electric Power Company


(iv) Intake of the domestic water system

August 24, 2011 Photographed by Tokyo Electric Power Company


(v) Hydrant (FX-07)

August 24, 2011 Photographed by Tokyo Electric Power Company


(vi) Hydrant (F3-8)

August 24, 2011 Photographed by Tokyo Electric Power Company

* Of the entire outdoor fire extinguishing system, the pictures above show only examples of damage to facilities installed above ground.
(The condition of underground piping is yet to be confirmed.)

Photographs showing the installation of outdoor fire protection system facilities at the Fukushima Dai-ichi NPS


(vii) Hydrant (F3-6)

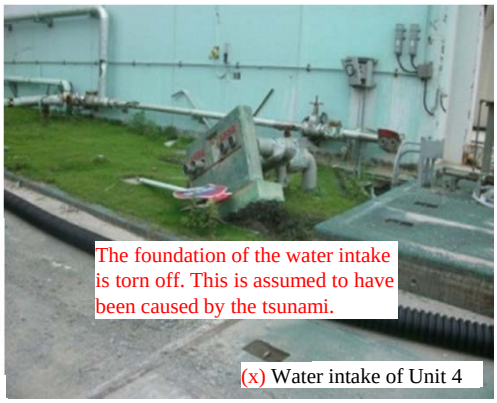
August 24, 2011 Photographed by Tokyo Electric Power Company


(viii) Hydrant (F3-5)

August 24, 2011 Photographed by Tokyo Electric Power Company


(ix) Hydrant (FS-10)

August 24, 2011 Photographed by Tokyo Electric Power Company



(x) Water intake of Unit 4

August 24, 2011 Photographed by Tokyo Electric Power Company


(xi) Water intake of Units 1 and 2

August 25, 2011 Photographed by Tokyo Electric Power Company


(xii) Hydrant (FS-6)

August 25, 2011 Photographed by Tokyo Electric Power Company

* Of the entire outdoor fire extinguishing system, the pictures above show only examples of damage to facilities installed above ground.
(The condition of underground piping is yet to be confirmed.)

Photographs showing the installation of outdoor fire protection system facilities at the Fukushima Dai-ichi NPS


(xiii) Hydrant (FX-01)

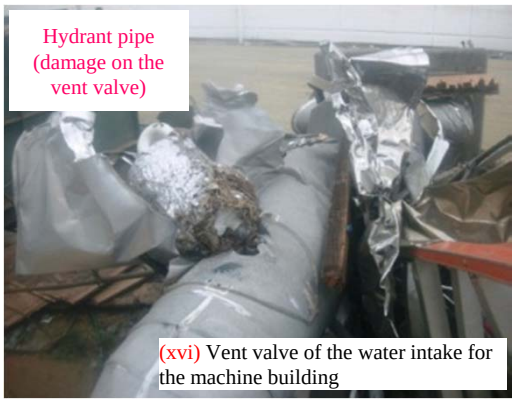
August 25, 2011 Photographed by Tokyo Electric Power Company


(xiv) Hydrant and other equipment (FX-04, FP-407)

August 25, 2011 Photographed by Tokyo Electric Power Company


(xv) Hydrant (G06)

August 25, 2011 Photographed by Tokyo Electric Power Company



(xvi) Vent valve of the water intake for the machine building

March 24, 2011 Photographed by Tokyo Electric Power Company

(xvii) Water intake for Unit 1

July 4, 2011 Photographed by Tokyo Electric Power Company


(xviii) Leaking point on the side pipeline stretching toward Units 5 and 6

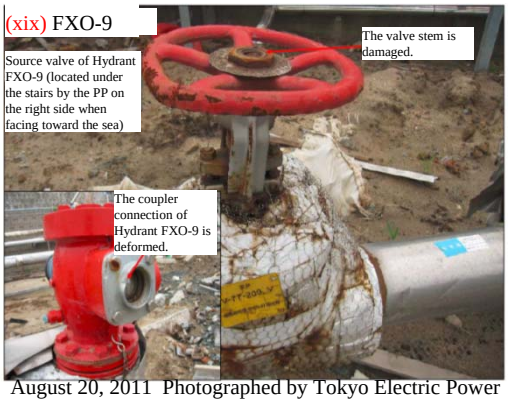
August 15, 2011 Photographed by Tokyo Electric Power Company

* Of the entire outdoor fire extinguishing system, the pictures above show only examples of damage to facilities installed above ground.
(The condition of underground piping is yet to be confirmed.)

Photographs showing the installation of outdoor fire protection system facilities at the Fukushima Dai-ichi NPS

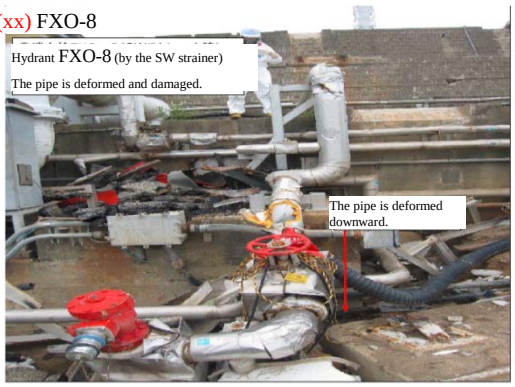
August 15, 2011 Photographed by Tokyo Electric Power Company

(xix) FXO-9



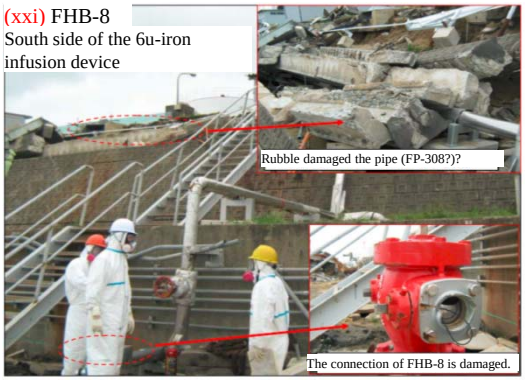
August 20, 2011 Photographed by Tokyo Electric Power Company

(xx) FXO-8



August 20, 2011 Photographed by Tokyo Electric Power Company

(xxi) FHB-8



March 20, 2011 Photographed by Tokyo Electric Power Company

* Of the entire outdoor fire extinguishing system, the pictures above show only examples of damage to facilities installed above ground.
(The condition of underground piping is yet to be confirmed.)

Attachment II-27

Photographs showing the installation of fire hydrants in the T/Bs of Units 1 to 3

Unit 1 turbine building

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (HB-9) on the first floor

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (HB-11) on the first floor

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (HB-18) on the second floor

Photographs showing the installation of fire hydrants in the T/Bs of Units 1 to 3

Unit 2 turbine building

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (FH-17) on the second floor

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (FH-18) on the second floor

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (FH-20) on the second floor

Photographs showing the installation of fire hydrants in the T/Bs of Units 1 to 3

Unit 3 turbine building

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (T-14) on the first floor

August 25, 2011 Photographed by Tokyo Electric Power Company

Hydrant (T-19) on the second floor

Attachment II-28

Photographs showing damage to the main office building

March 29, 2011 Photographed by Tokyo Electric Power Company

Picture (i): Inside the office of the Public Relations Department on the first floor.

March 29, 2011 Photographed by Tokyo Electric Power Company

Picture (ii): Hallway near the entrance on the first floor.

Photographs showing damage to the main office building

May 6, 2011 Photographed by Tokyo Electric Power Company

Picture (iii): Inside the office of the General Affairs Department on the second floor.

March 29, 2011 Photographed by Tokyo Electric Power Company

Picture (iv): Inside the office of the General Engineering Department on the second floor.

Photographs showing damage to the main office building

May 6, 2011 Photographed by Tokyo Electric Power Company

Picture (v): Exterior of the main building.

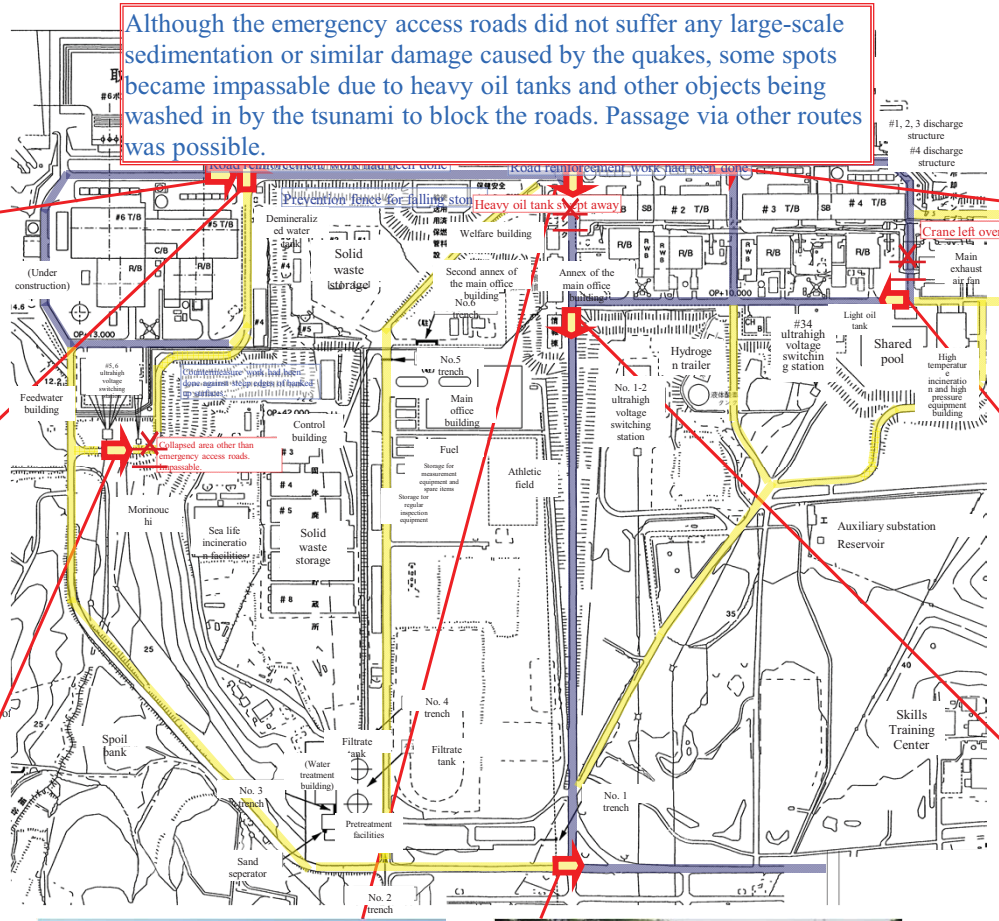
Photographs showing damage to emergency access roads to the Fukushima Daiichi NPS

Although the emergency access roads did not suffer any large-scale sedimentation or similar damage caused by the quakes, some spots became impassable due to heavy oil tanks and other objects being washed in by the tsunami to block the roads. Passage via other routes was possible.

The lane on the sea side cracked parallel to the road and created a gap. The west side was passable. Photographed by TEPCO on March 17, 2

Although this area had had reinforcement work, cracks and gaps occurred on the sides of road which had not been reinforced. Photographed by TEPCO on March 17, 2011

Although this is not an emergency access road, the slopes collapsed and blocked the road, leaving it impassable. Photographed by TEPCO on March 20, 2011

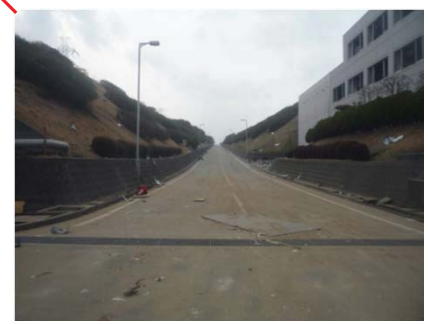


Although there was no major damage to the road, a heavy oil tank washed in by the tsunami b road, leaving it impassable. Photographed by TEPCO on March 17, 2011

No particular problem was observed on the straight road stretching from the main gate. Photographed by TEPCO on August 26, 2011

Although no particular problem was observed with the road, rubble scattered around due to the tsunami and explosion Photographed by TEPCO on March 16, 2011

No particular problem was observed on the west sides of Units 1 to 4. When Units 1, 3 and 4 were damaged, rubble scattered around. Photographed by TEPCO on Match 20, 2011



Despite the scattering of some rubble, no particular problem was observed on the road. Photographed by TEPCO on March 20, 2011

Emergency access road

Major route other than emergency access roads

Impassable

Photograph spot & direction

Based on data and documents by Tokyo Electric Power

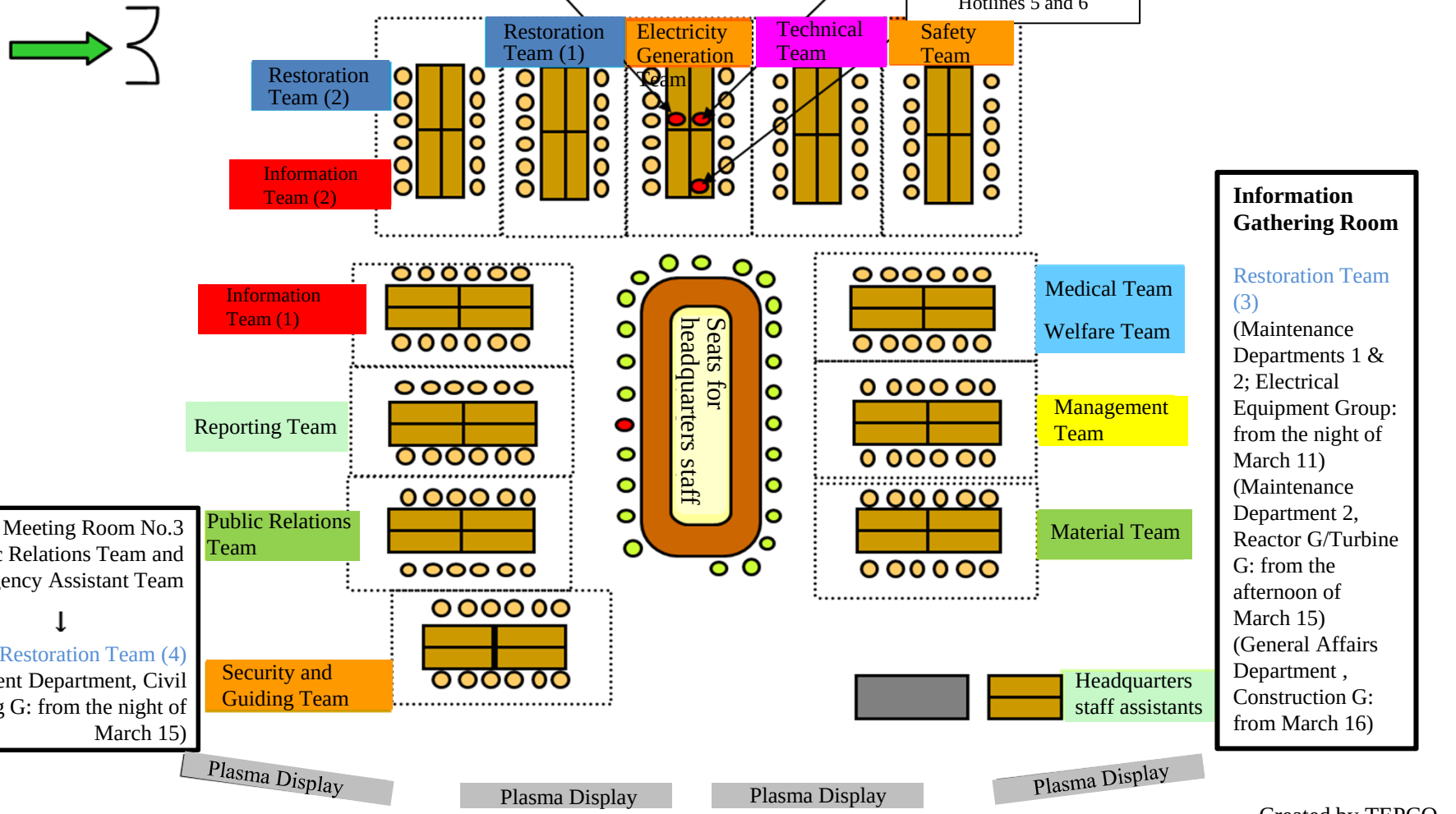
Attachment II-29

Layout of the Emergency Response Office

Layout of the Emergency Response Office
(At the establishment of the Emergency Response Headquarters on March 11, 2011)

Meeting Rooms No.1 and No.2
The Restoration Team, Operation Team, Engineering Team and Health Physics Team (For Emergency Purpose)

* Actual layout may vary slightly depending on the situation



Information Gathering Room

Restoration Team (3)
(Maintenance Departments 1 & 2; Electrical Equipment Group: from the night of March 11)
(Maintenance Department 2, Reactor G/Turbine G: from the afternoon of March 15)
(General Affairs Department , Construction G: from March 16)

Meeting Room No.3
For Public Relations Team and Emergency Assistant Team

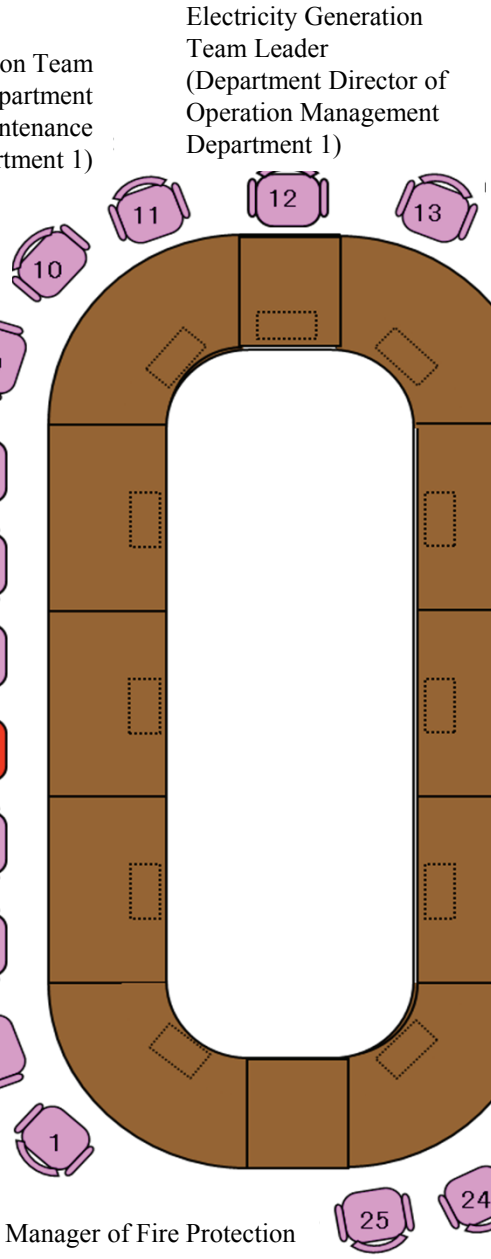
↓

Restoration Team (4)
(Management Department, Civil Engineering G: from the night of March 15)

Created by TEPCO

Attachment IV-1

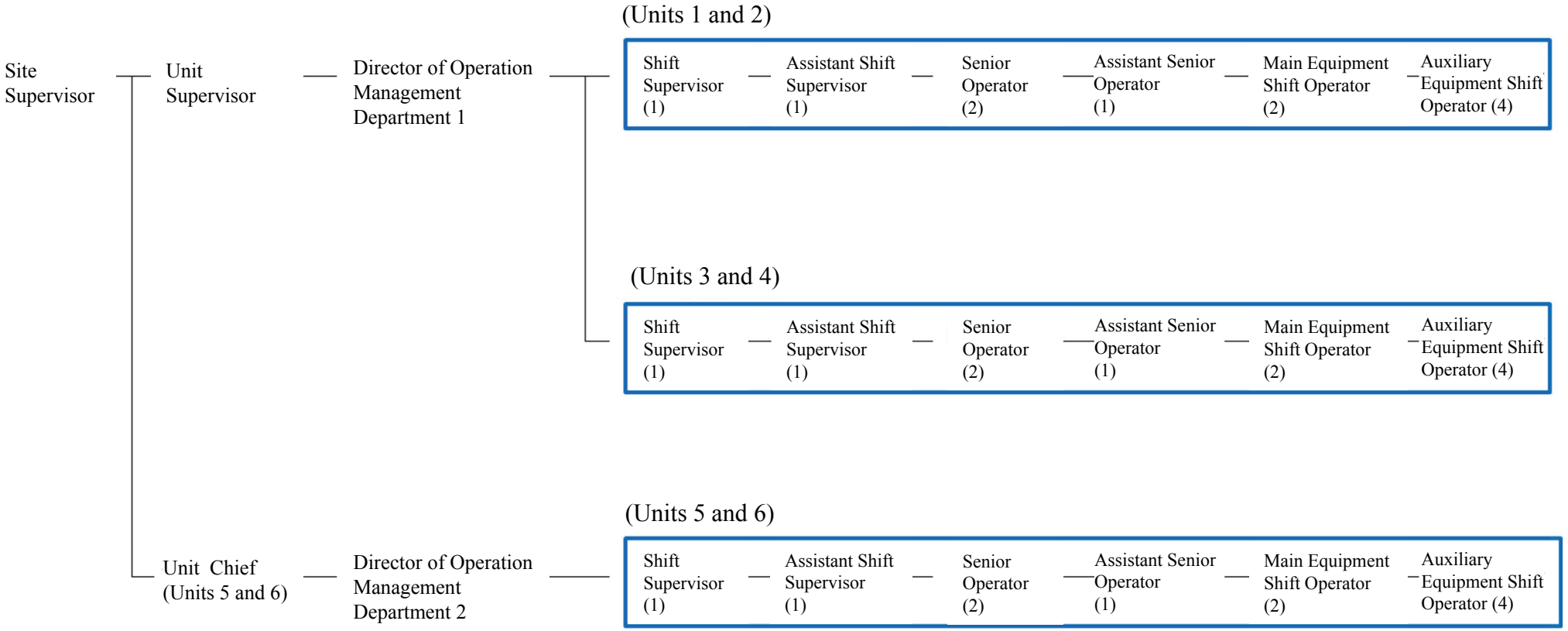
Personnel Positioning of Seats for Headquarters
(At the establishment of the Emergency Response Headquarters on March 11, 2011)



* Actual layout may vary slightly depending on the situation

Created by TEPCO

Shift arrangements at the Fukushima Dai-ichi NPS

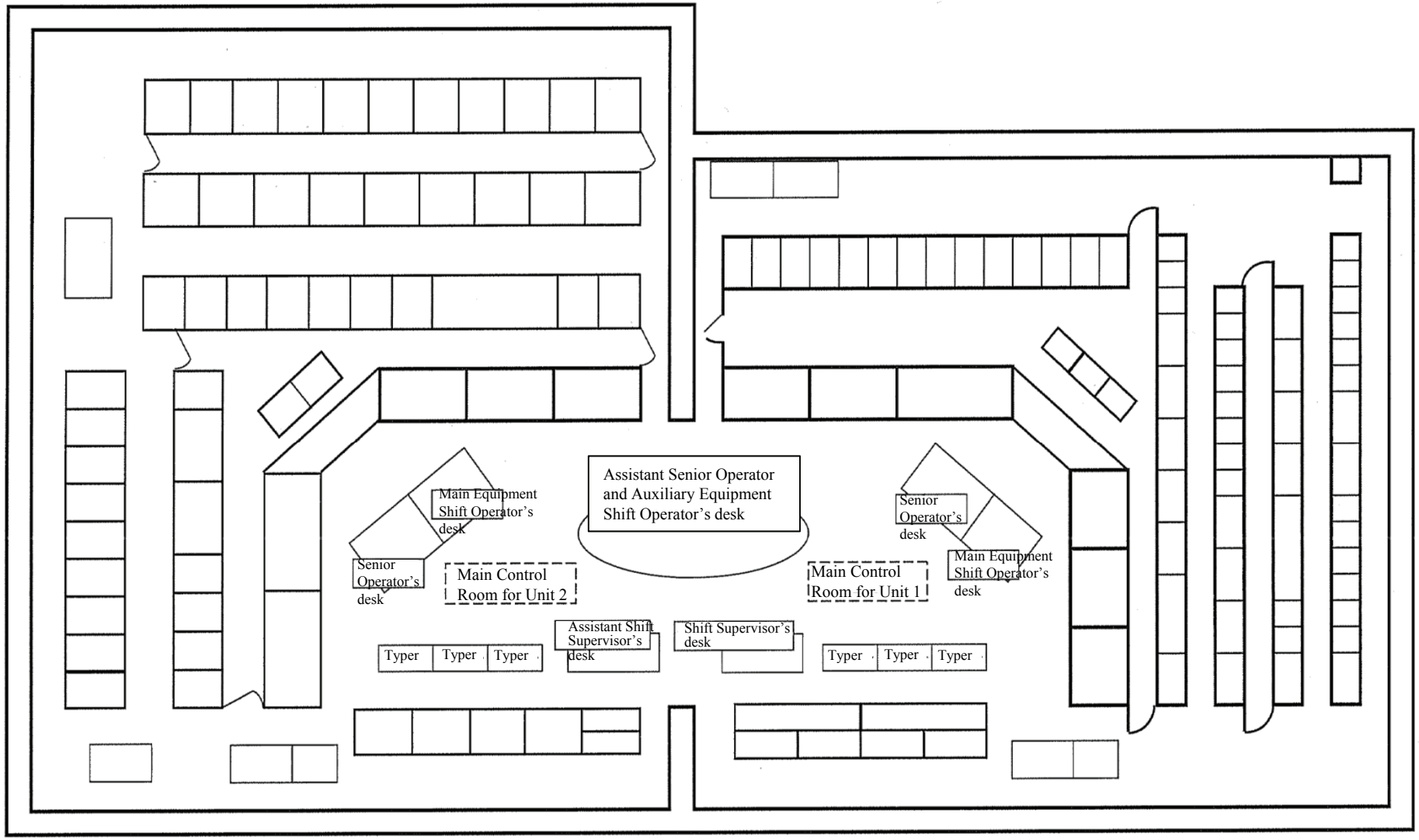


*1 A Senior Operator and a main-equipment shift operator work full time for each Unit.
*2 The number of shift members can vary depending on the situation at the Plant.

Attachment IV-2

Compiled from "Report on the Fukushima Dai-ichi Nuclear Power Station Unit 1 Periodic Safety Review (Number 3)" (November, 2010) by TEPCO

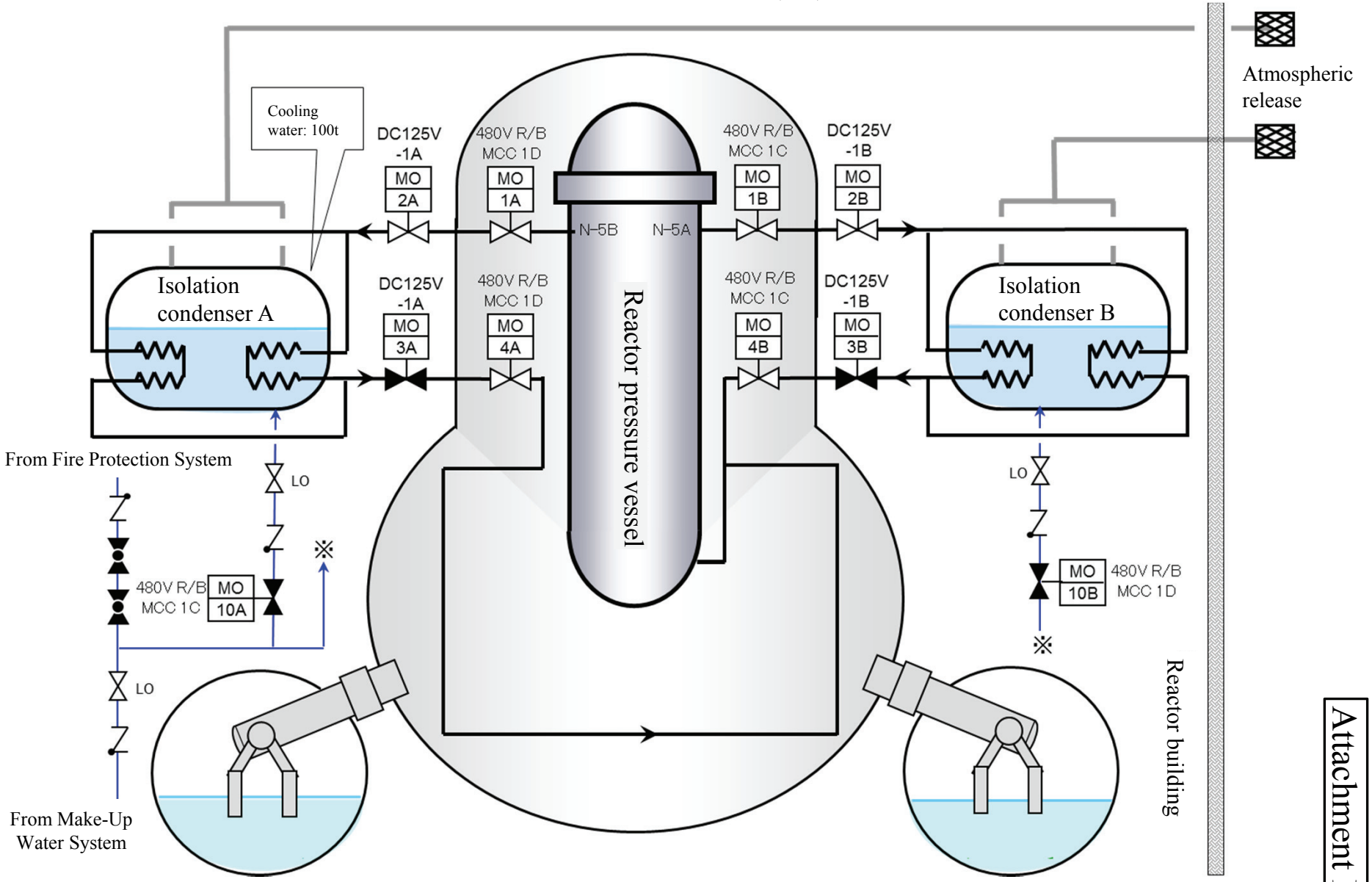
Layout of the main control room for Units 1 and 2



Created by TEPCO

Attachment IV-3

Isolation condenser (IC)

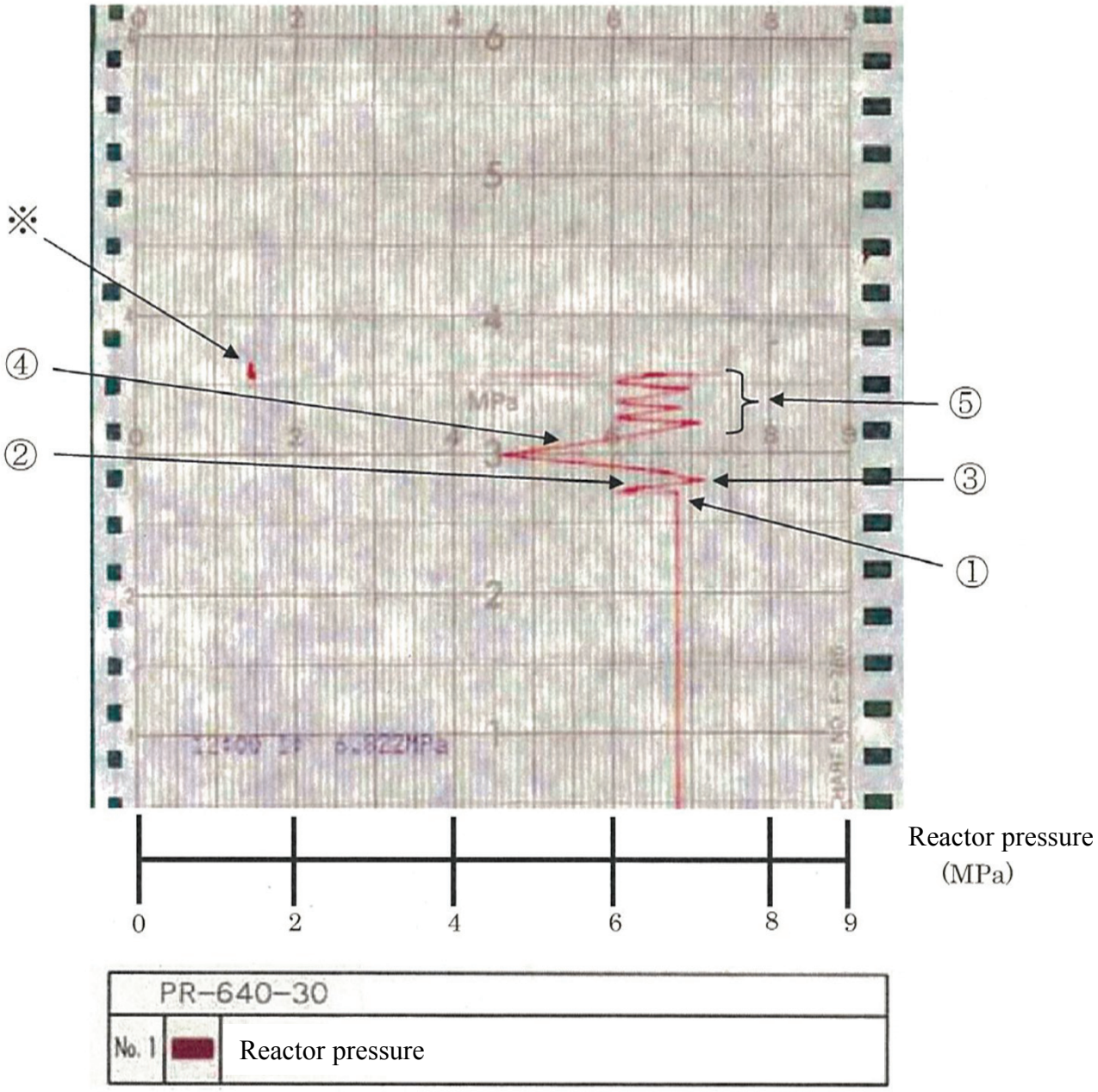


Created by TEPCO

Attachment IV-4

Attachment IV-5

Unit 1 reactor pressure



① Scram by the earthquake at 14:46

② Pressure increase associated with the closing of the main steam isolation valve

③ Actuation of isolation condenser and associated pressure decrease at 14:52

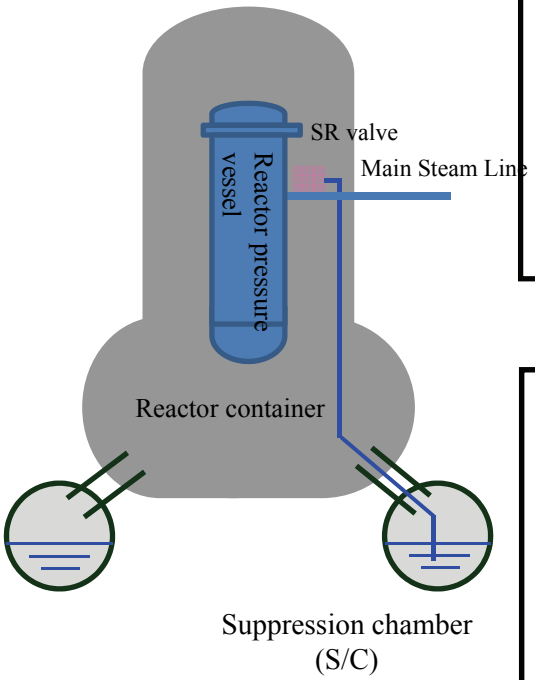
④ Pressure increase associated with stoppage of the isolation condenser

⑤ Pressure fluctuation probably caused by the isolation condenser

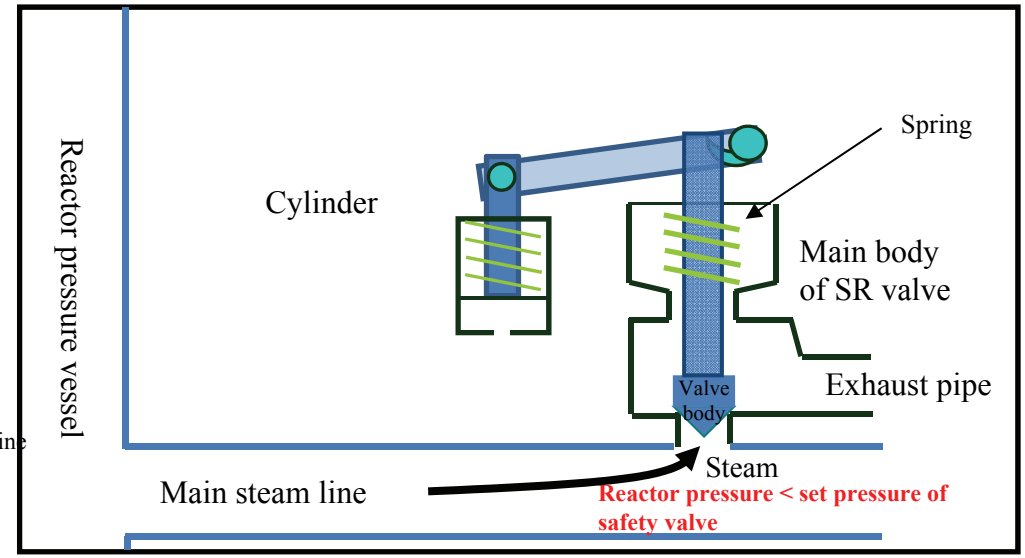
※ It is estimated that the tsunami hit after 15:30. Recording probably stopped due to the impact of the tsunami.

Adopted from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO.

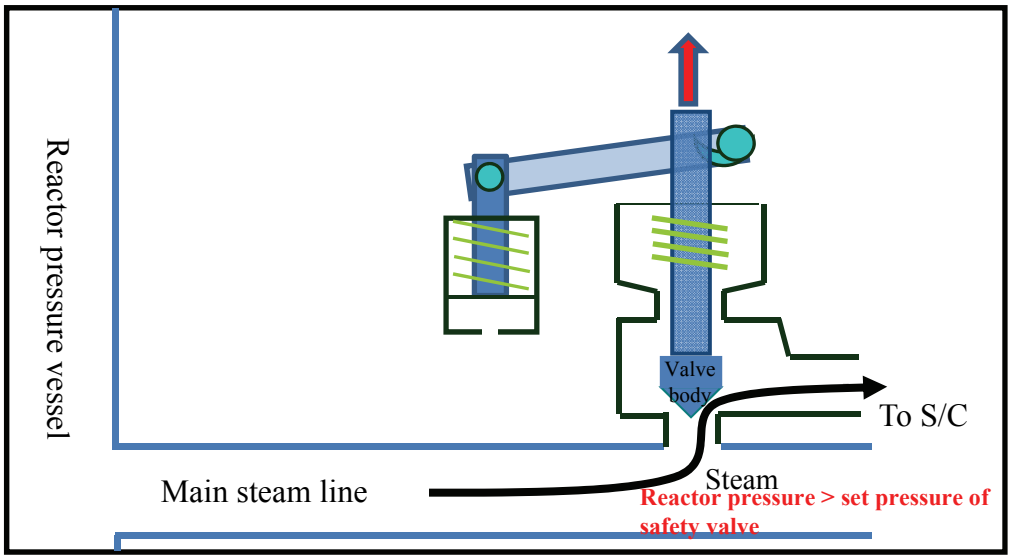
Illustrated overview of the safety relief valve (SRV) operating principle (safety valve function)



In times of normal operation



In the case of abnormal pressure increase



Explanation of the operating principle

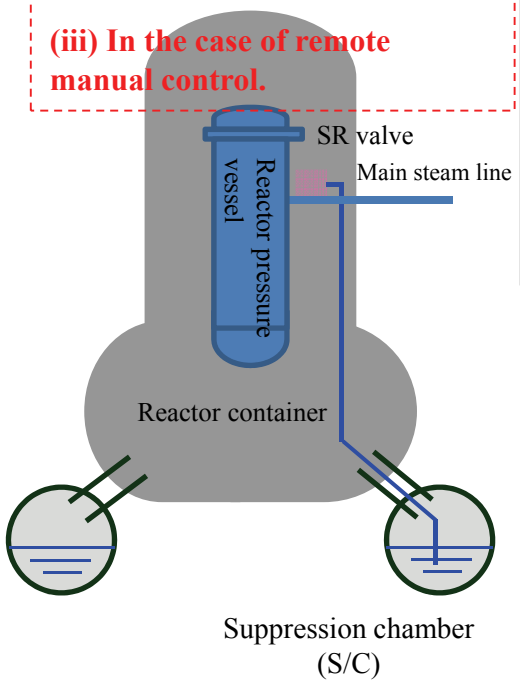
(i) The reactor pressure increases with the closing of the main steam isolation valve, etc.
(ii) When the reactor pressure exceeds the set pressure of the safety valve (spring force), steam pushes the valve body of the SR valve up.
(iii) A steam flow channel is formed after the valve body has been pushed up and the steam is released into the S/C through the exhaust pipe.

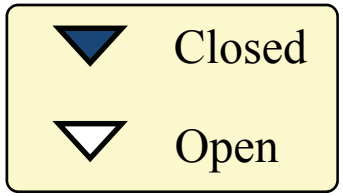
Compiled from documents by TEPCO

Attachment IV-6

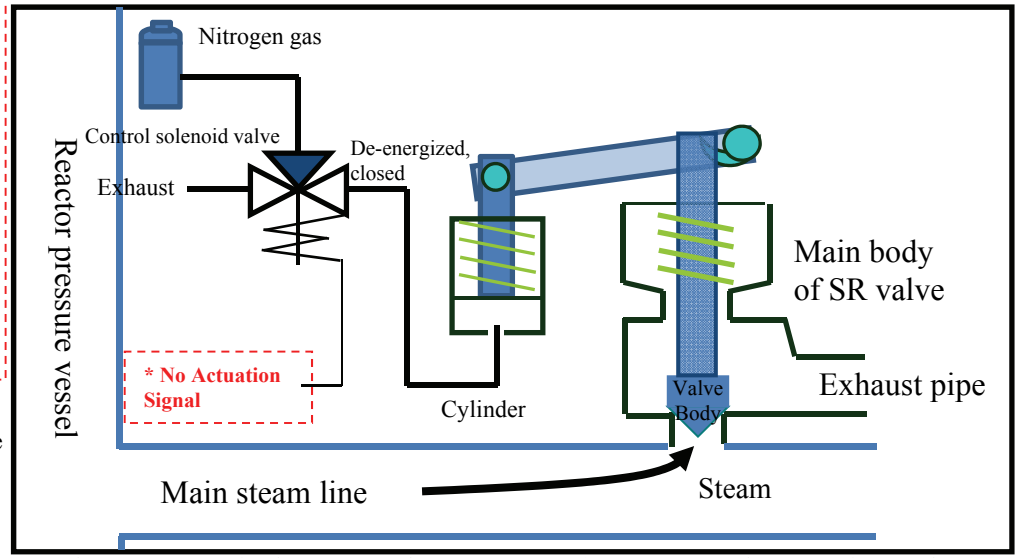
Illustrated overview of the safety relief valve (SRV) operating principle (in the case of relief valve actuation, ADS actuation or remote manual operation)

***SR valve actuation signal is given:**
(i) When the pressure reaches the relief valve setting pressure;
(ii) When the Automatic Depressurization System (ADS) is actuated; and
(iii) In the case of remote manual control.

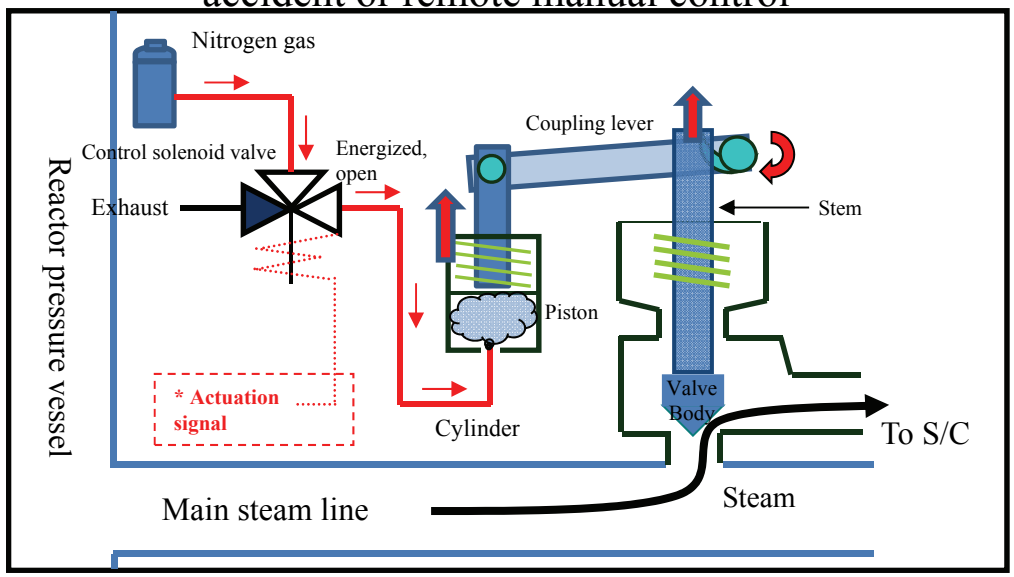




In times of normal operation



In the case of abnormal pressure increase, loss of coolant accident or remote manual control



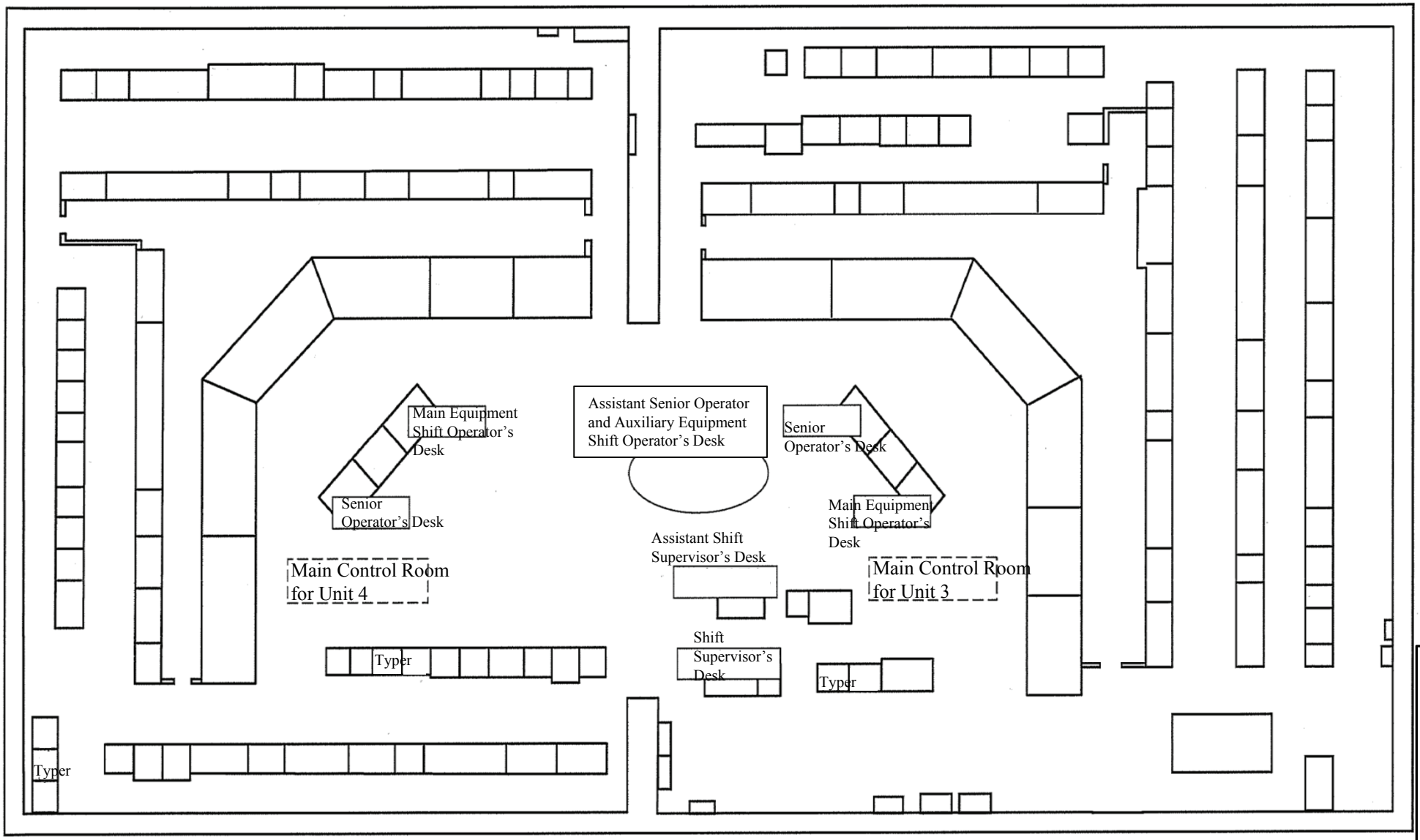
Explanation of the operating principle

The relief valve:
(i) The reactor pressure increases with the closing of the main steam isolation valve, etc.
(ii) When the reactor pressure reaches the set pressure of the relief valve, a signal is sent to the control solenoid valve in the nitrogen supply line.
(iii) The flow channel is altered with the opening and closing of the control solenoid valve and nitrogen gas is fed into the SR valve cylinder.
(iv) When nitrogen gas is fed into the cylinder, the piston and the stem are pushed up by the coupling lever.
(v) The valve body is then in a free state after the stem has been pushed up. When the valve body is pushed up by the steam pressure in this state, a steam flow channel is formed and steam is released into the S/C through the exhaust pipe.

*In the case of ADS, an actuation signal is sent when there is a loss of coolant accident (LOCA) instead of procedures (i) and (ii), but the following procedures, (iii) to (v), are the same.
* In the case of remote manual control, an actuation signal is sent according to manual control from the main control room instead of procedures (i) and (ii), but the following procedures, (iii) to (v), are the same.

Compiled from documents by TEPCO

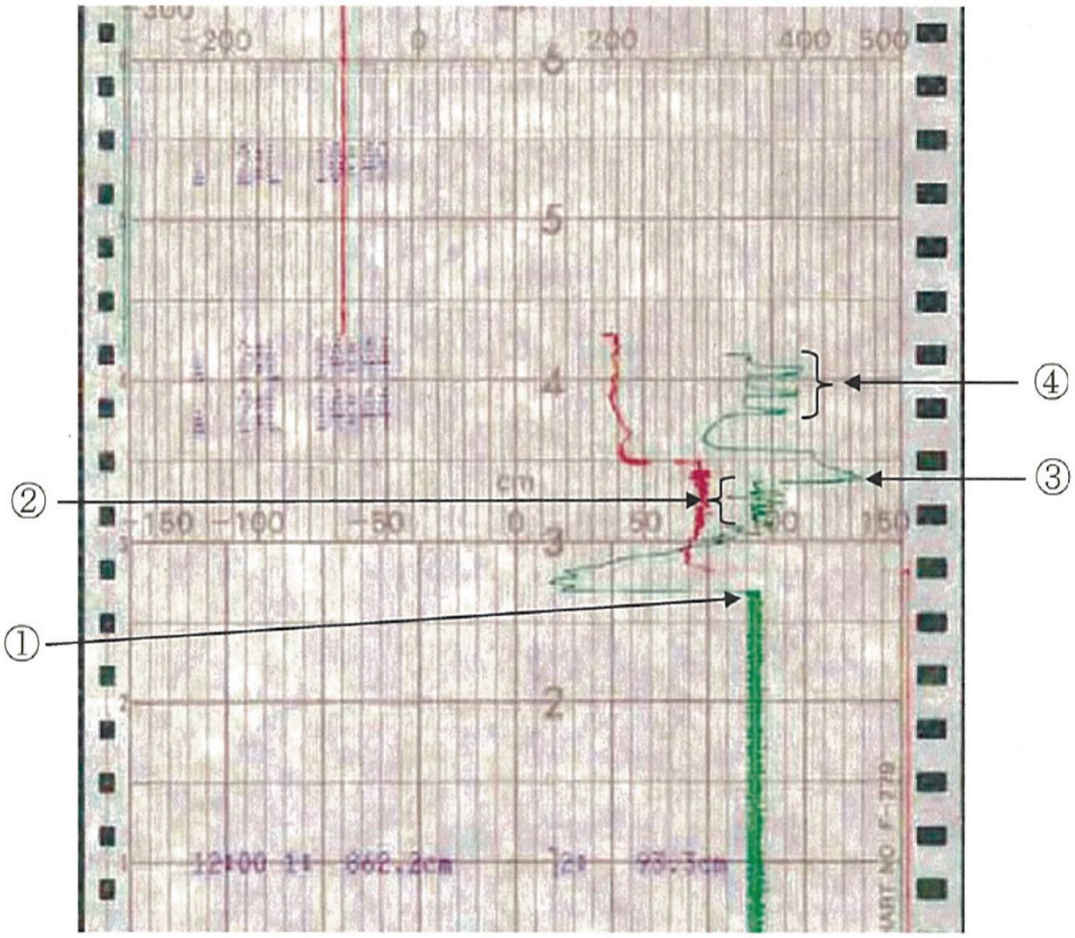
Layout of the Main Control Room for Units 3 and 4



Attachment IV-7

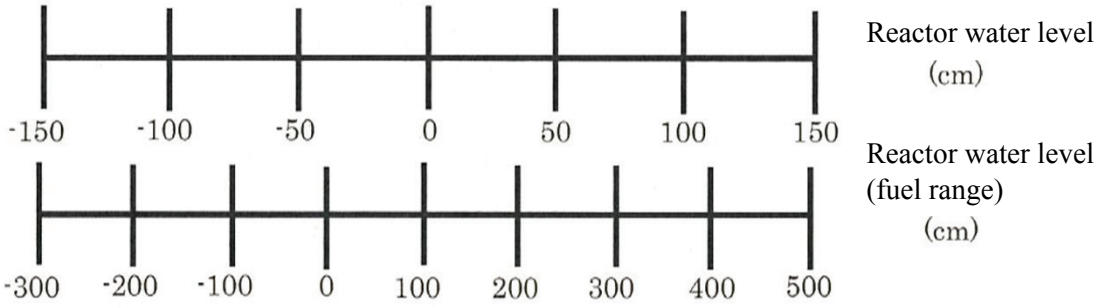
Prepared by TEPCO

Unit 1 reactor water level



Green = reactor water level

Red = reactor water level (fuel range)



① Scram due to the earthquake at 14:46 (Fast-forwarding of chart: 60 times faster, a minute for an hour)

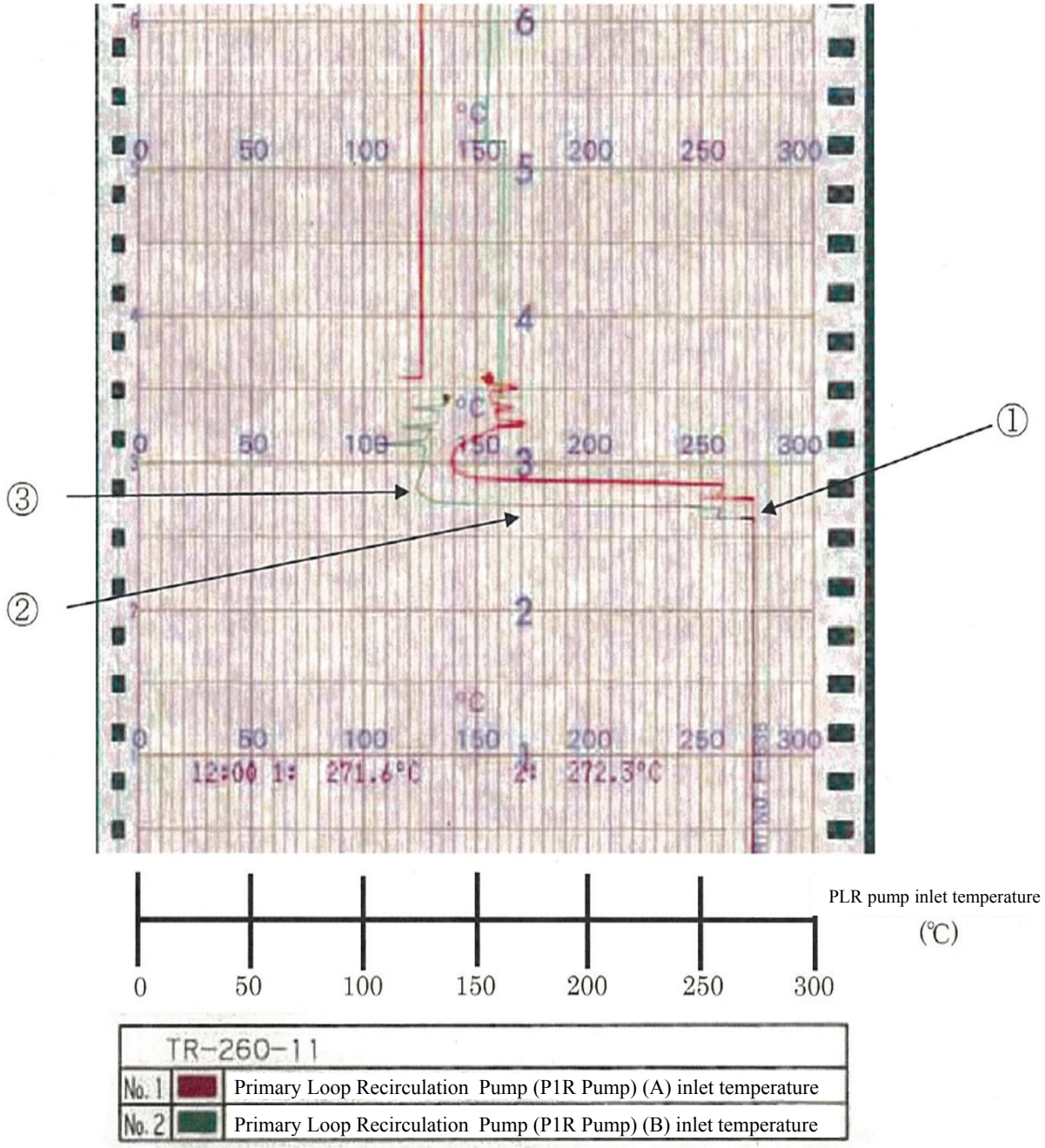
② Loss of power and closing of the main steam isolation valve around this time (Fast-forwarding of chart reset by the loss of power)

③ Automatic startup of the isolation condenser

④ Possible fluctuation of water level due to the operation of the isolation condenser

Extracted from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO

Unit 1 reactor recirculation pump inlet temperature



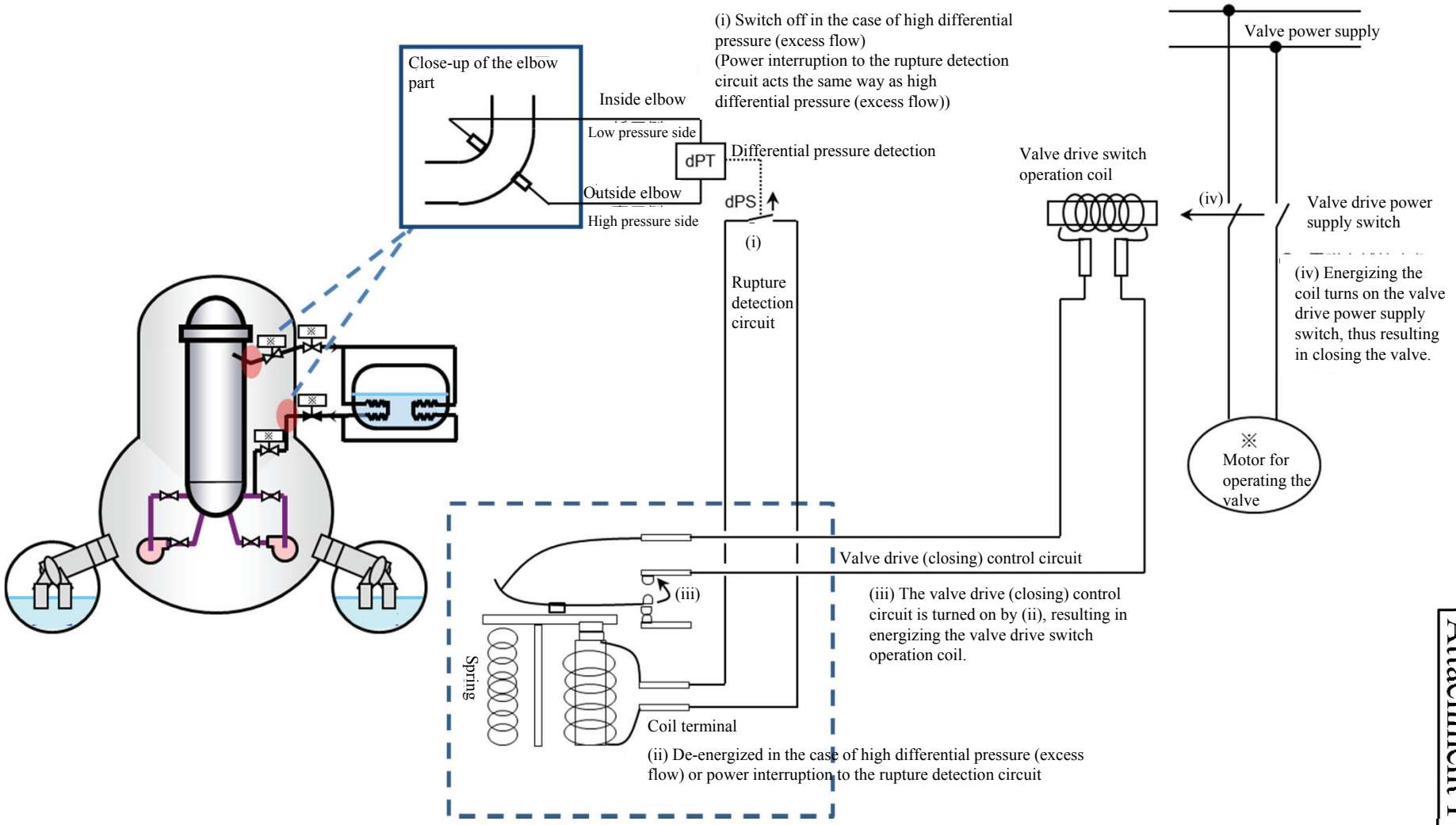
① Scram due to the earthquake at 14:46

② Decrease in power due to the scram, pressure decrease due to the operation of the isolation condenser and decrease in temperature due to the injection of low-temperature

③ Shutdown of the isolation condenser that automatically started

Extracted from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO

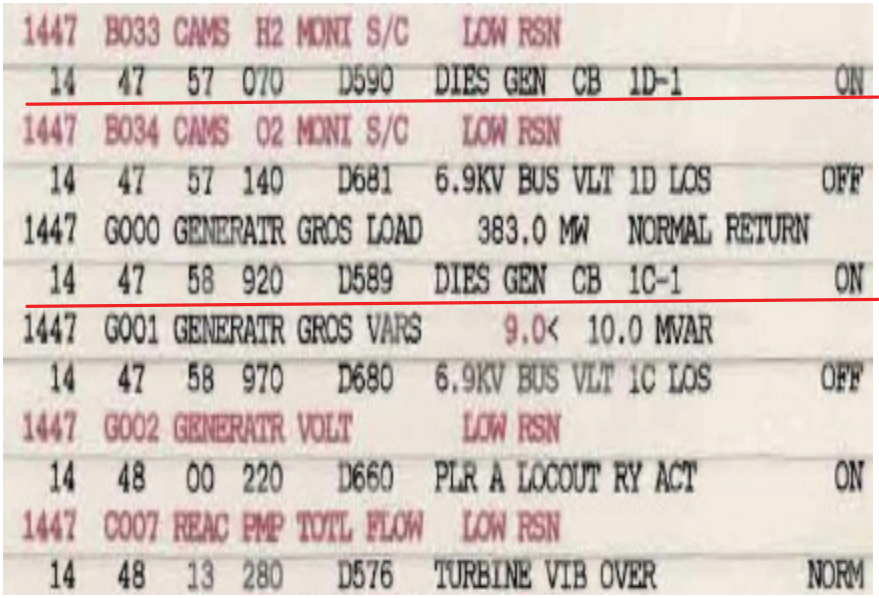
Illustrated overview of reactor core isolation by the IC system (closing of the isolation valve)



Created by TEPCO

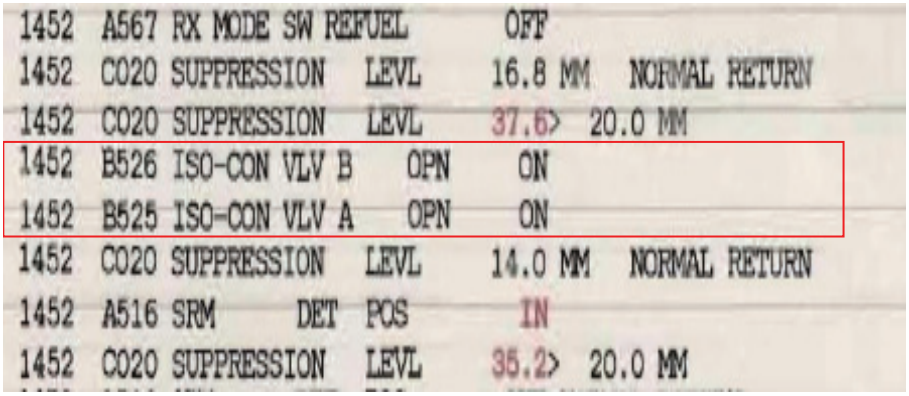
Attachment IV-10

The DG Breaker ON/OFF status and IC operation status
as recorded on the Unit 1 alarm typewriter



D/G 1B breaker on

D/G 1A breaker on

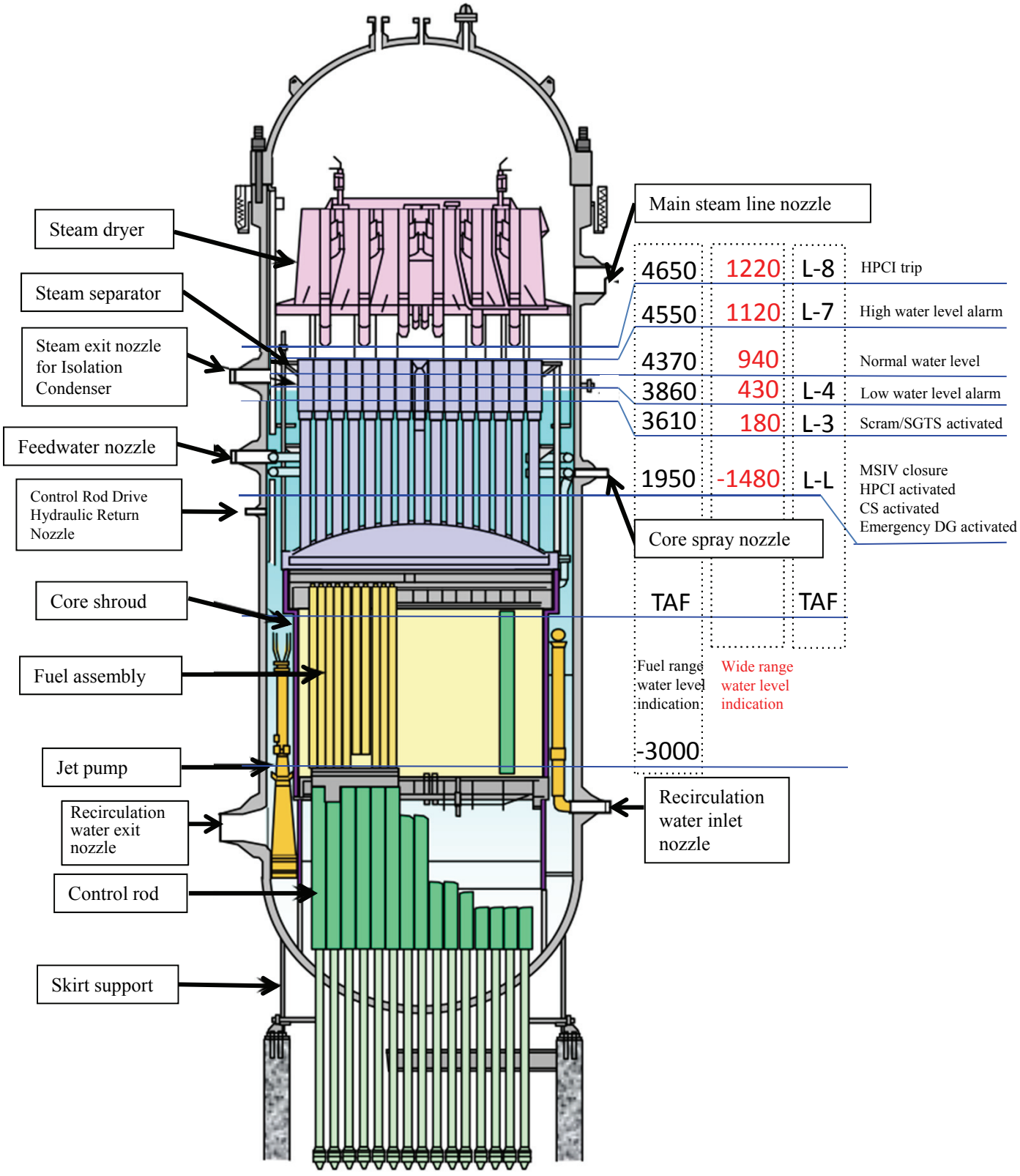


IC operation

Adopted from “The Impact of the Tohoku District – of the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO.

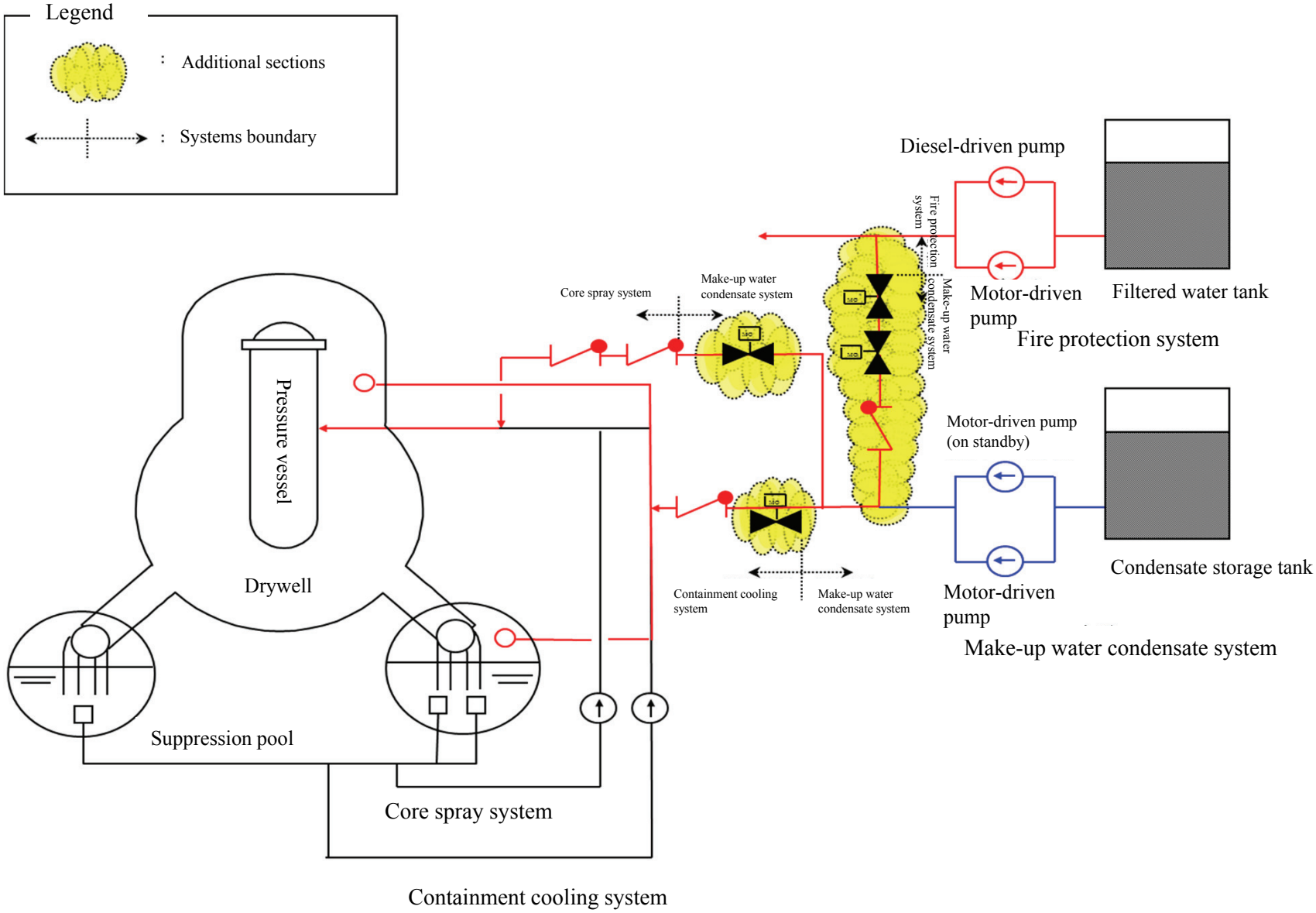
Attachment IV-12

Illustrated overview of reactor water levels



Created by TEPCO

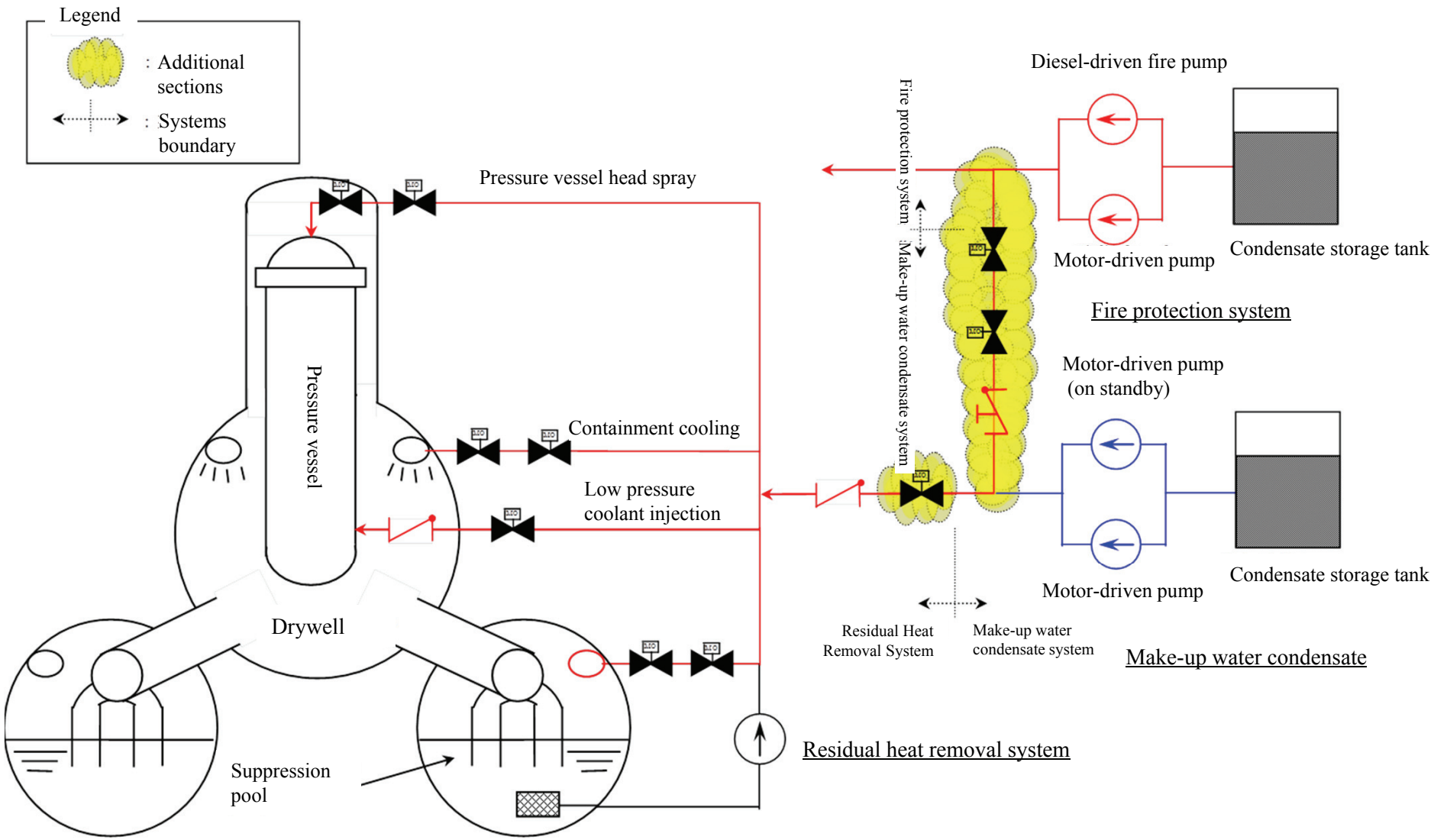
Conceptual diagram of alternative water injection facilities (Unit 1)



Compiled from the "Report on Preparation for Accident Management" (May, 2002) by TEPCO

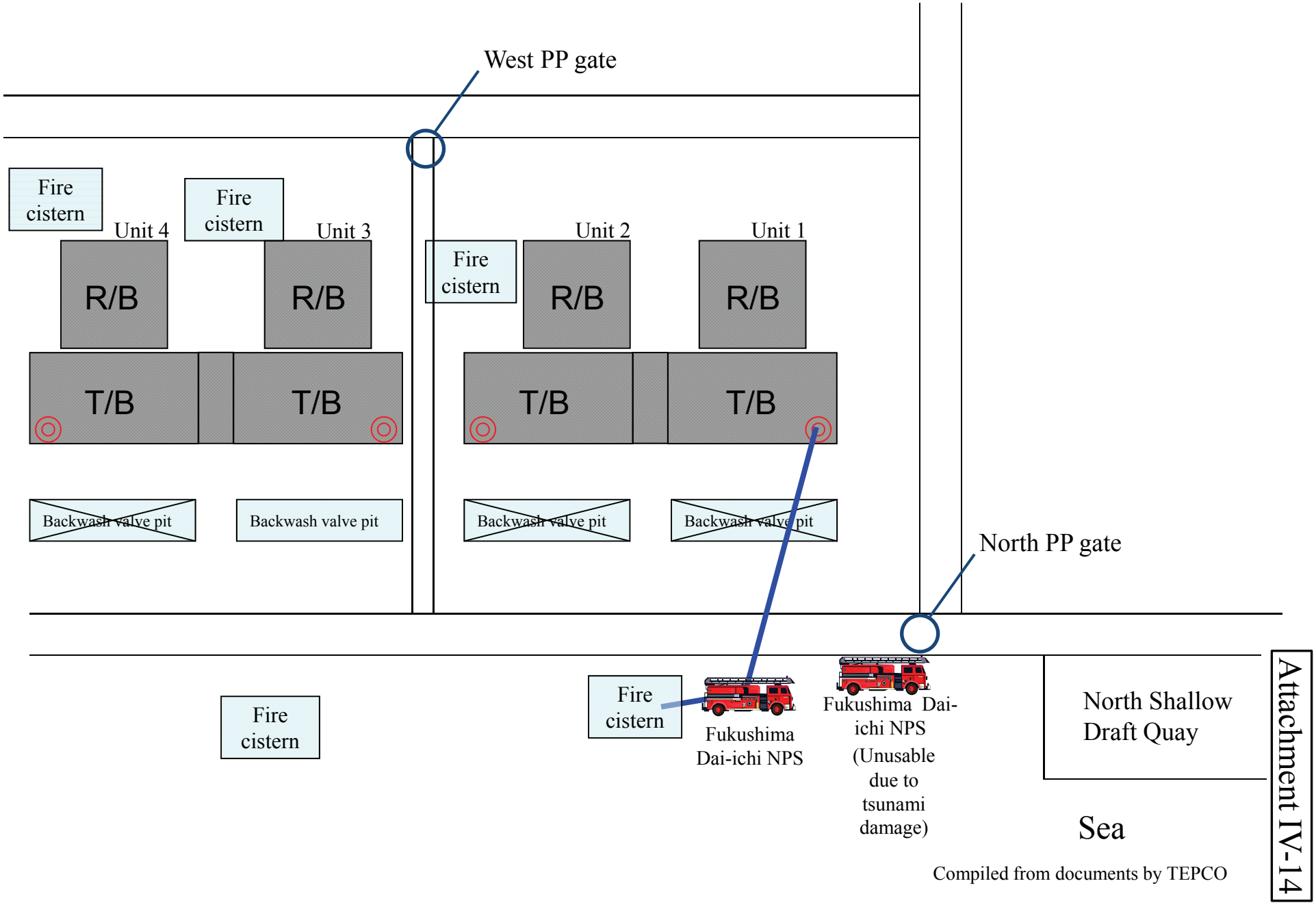
Attachment IV-13

Conceptual diagram of alternative water injection facilities (Units 2 to 5)



Compiled from the "Report on Preparation for Accident Management" (May, 2002) by TEPCO

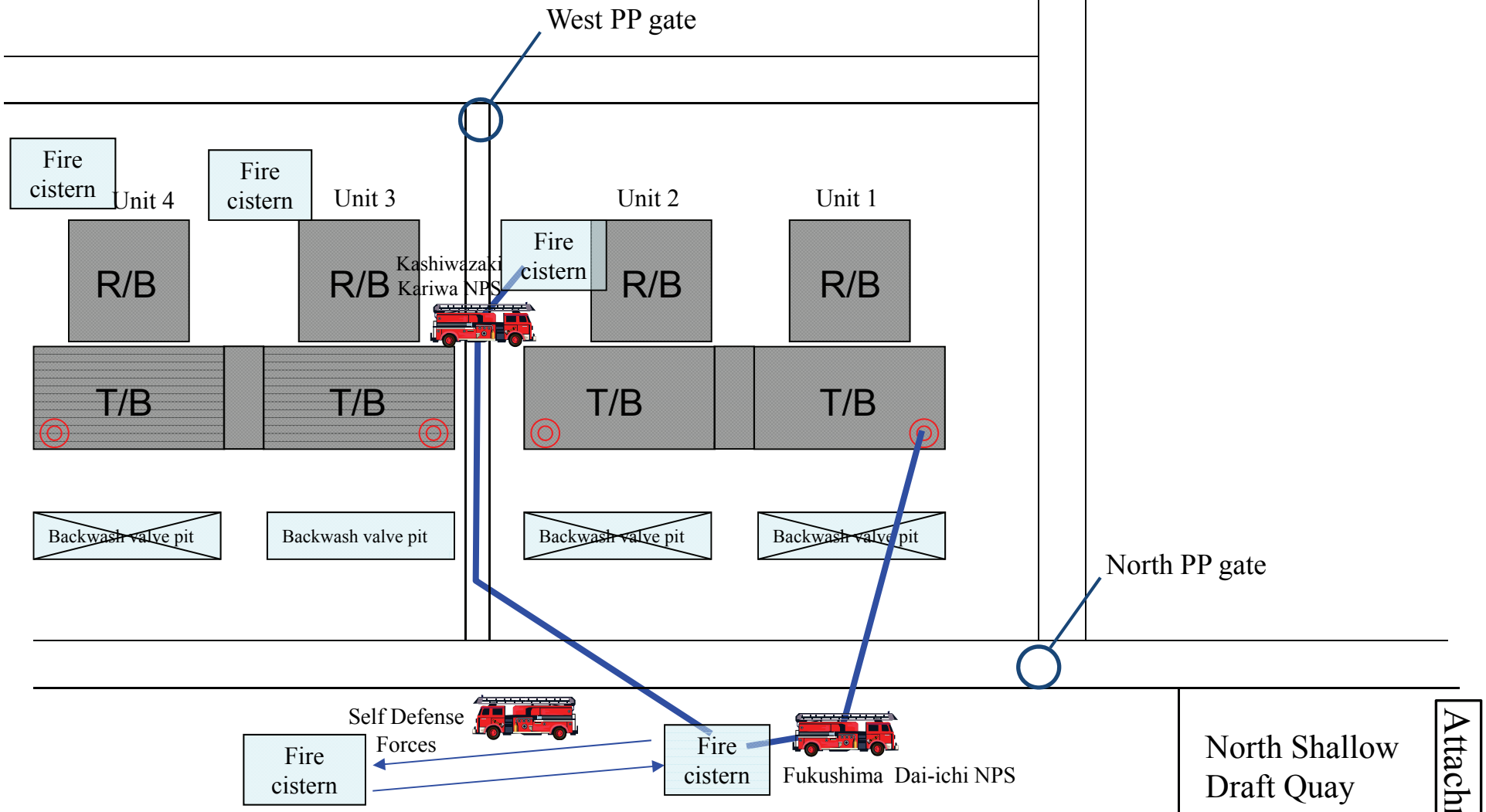
Overview of water injection by fire engines (at around 05:46 on March 12)



Compiled from documents by TEPCO

Attachment IV-14

Overview of water injection by fire engines (after around 10:52 on March 12)



Compiled from documents by TEPCO

Attachment IV-15

Attachment IV-16

Examples of protective outfits and gears used

General work uniform
Level B gloves,
Level B shoes,
Level B helmet

Level B clothing
Level B gloves,
Level B shoes,
Level B helmet

Level B clothing
Level B gloves,
thin latex gloves,
Level B2 shoes,
Level B helmet

Level C clothing
thin latex gloves,
Level C headwear,
Level C socks

Level C clothing
thin latex gloves,
Level C headwear,
Level C socks,
Level C shoes,
Level C helmet
(Level C gloves, if necessary)

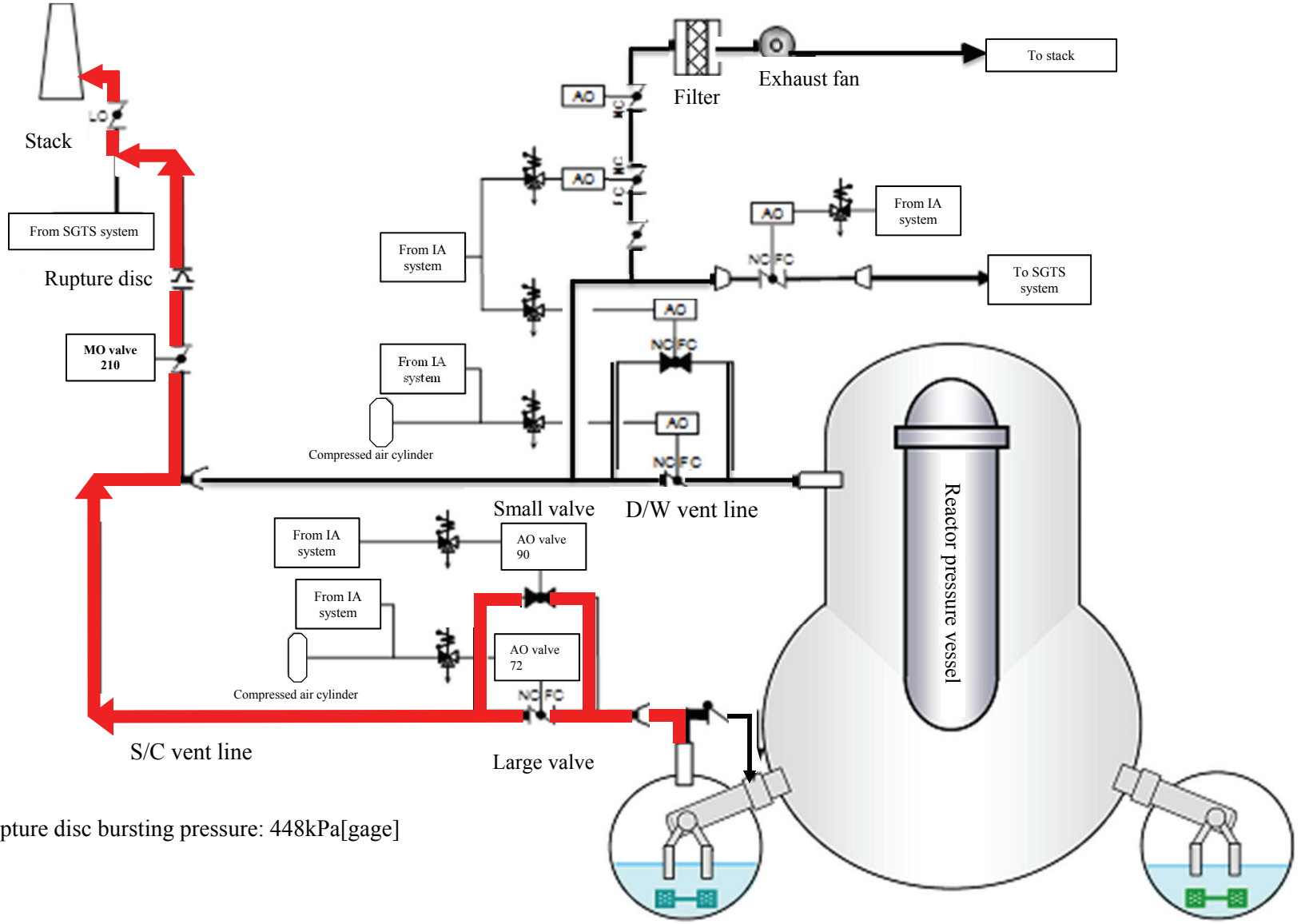
Two-piece anorak

Full face mask

Hood mask

Adopted from “The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO.

Unit 1 vent line



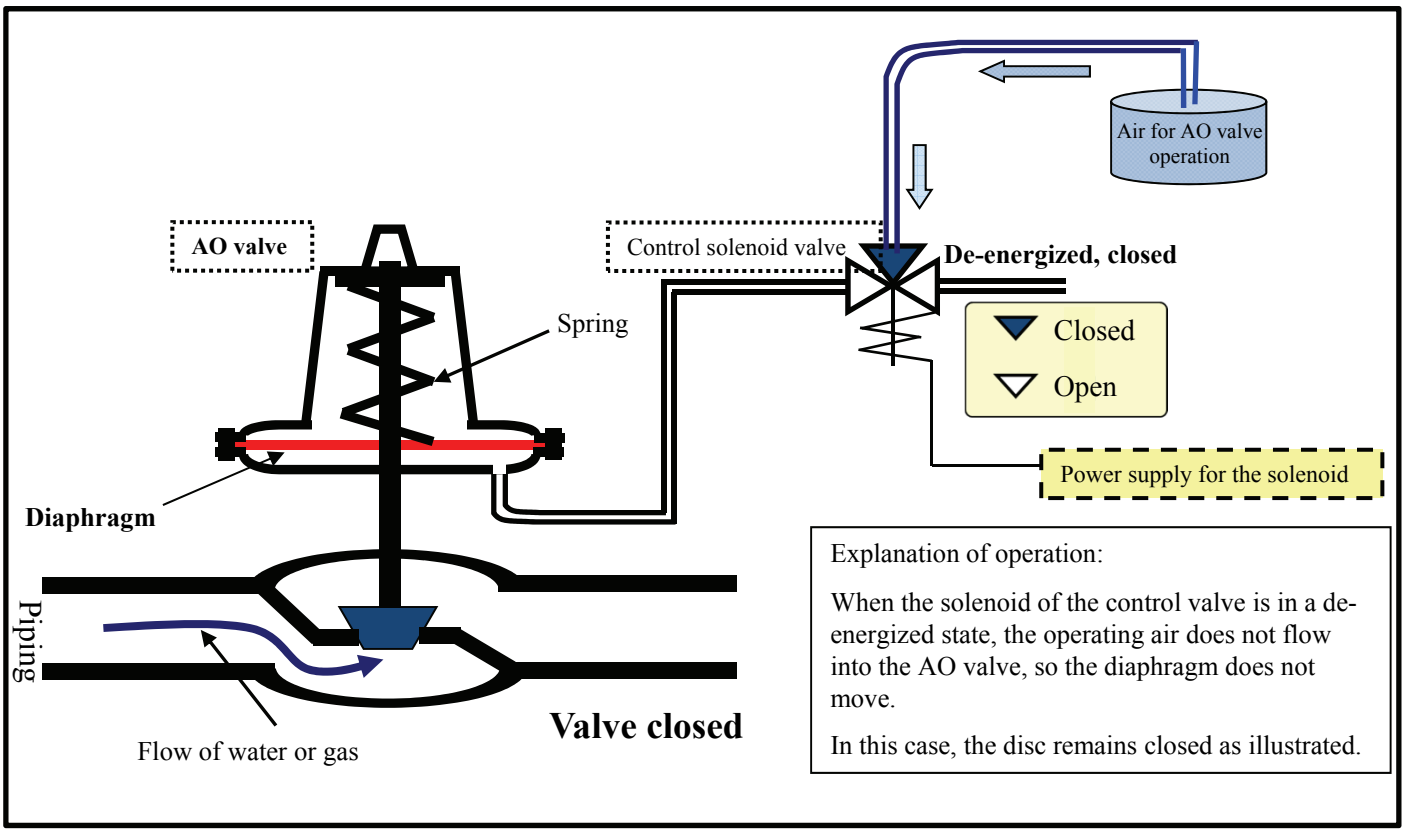
Rupture disc bursting pressure: 448kPa[gage]

Attachment IV-17

Compiled from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO

Attachment IV-18

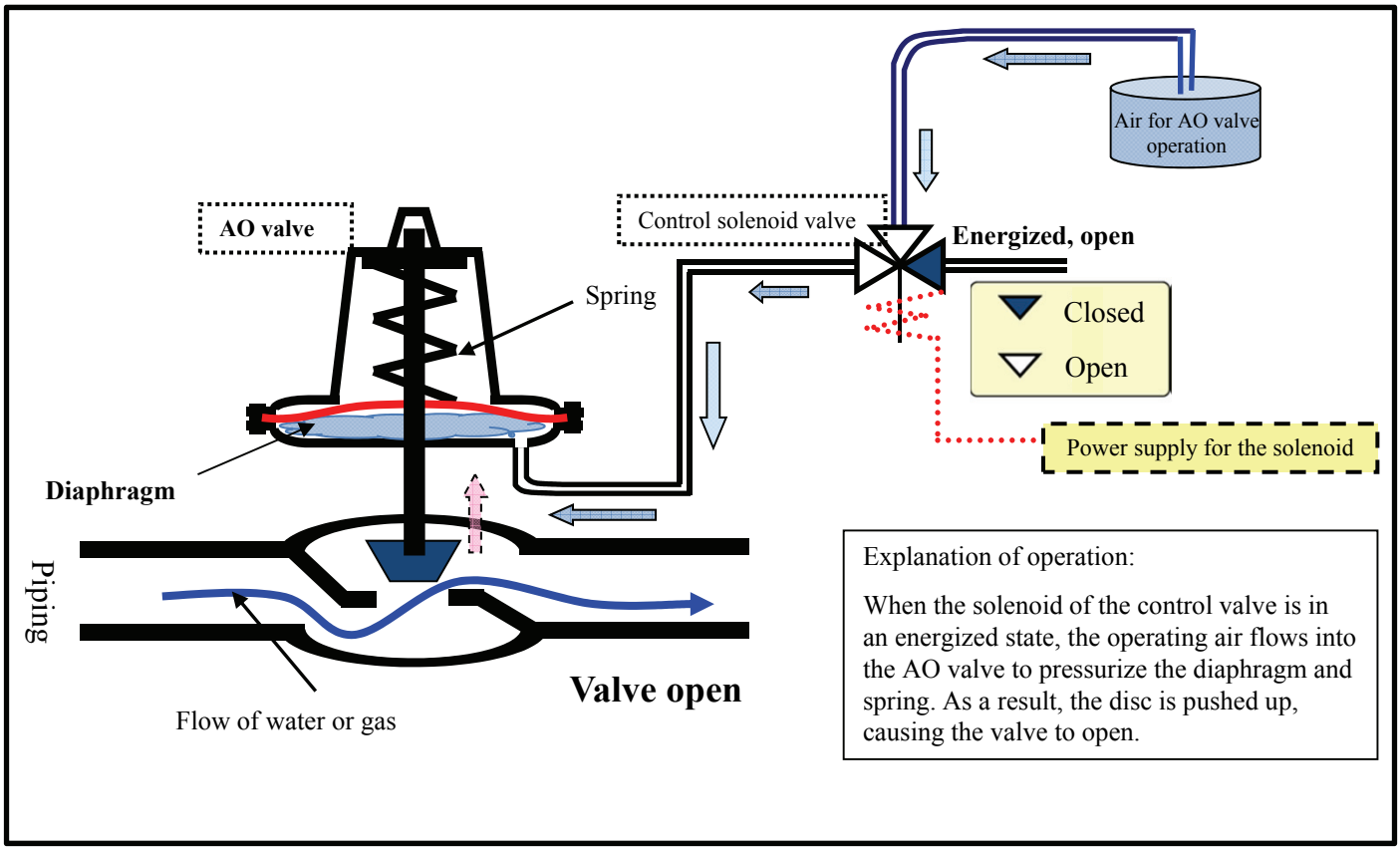
Illustrated overview of the operating principle of air-operated (AO) valves



Explanation of operation:

When the solenoid of the control valve is in a de-energized state, the operating air does not flow into the AO valve, so the diaphragm does not move.

In this case, the disc remains closed as illustrated.

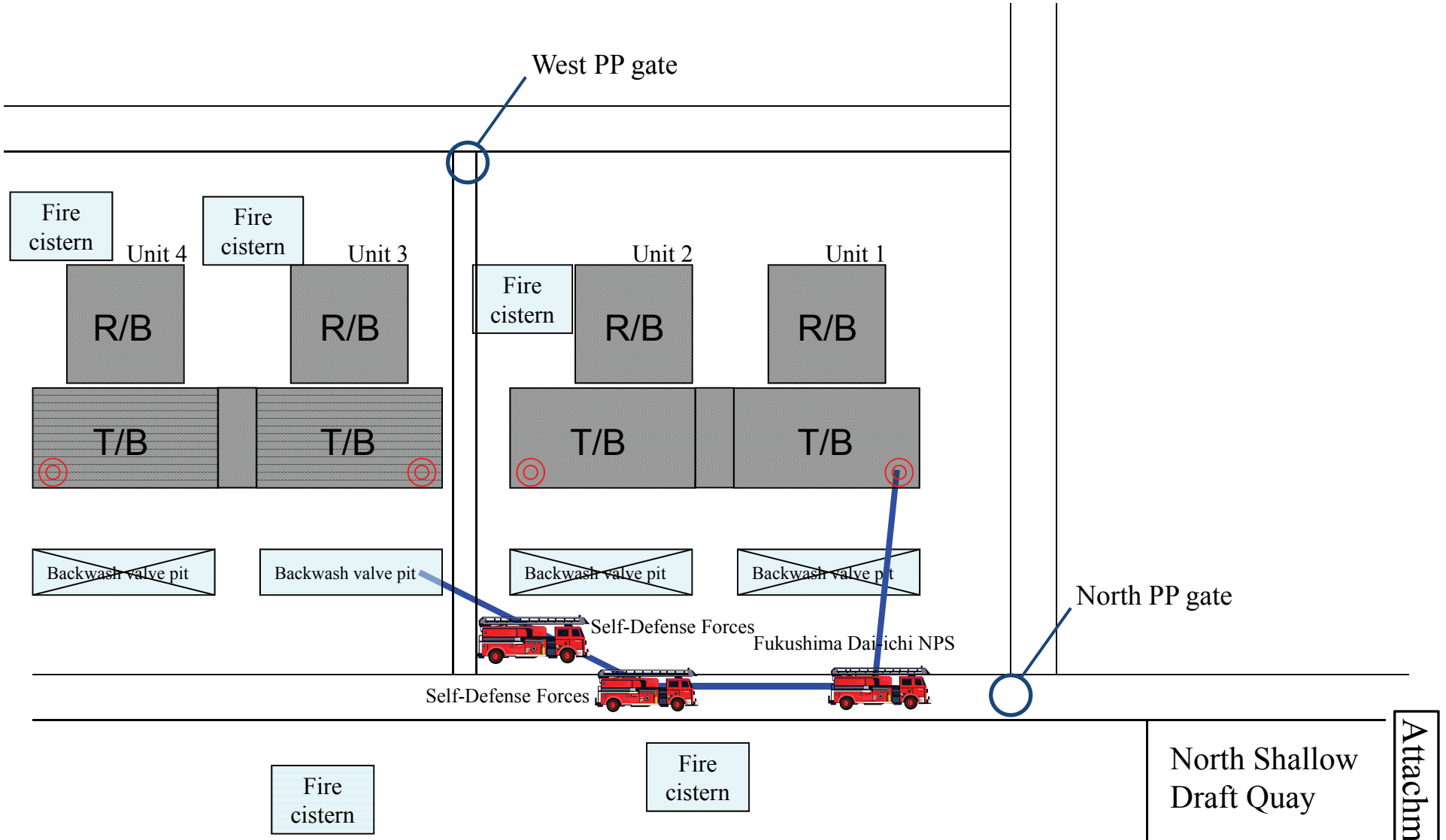


Explanation of operation:

When the solenoid of the control valve is in an energized state, the operating air flows into the AO valve to pressurize the diaphragm and spring. As a result, the disc is pushed up, causing the valve to open.

Compiled from documents by TEPCO

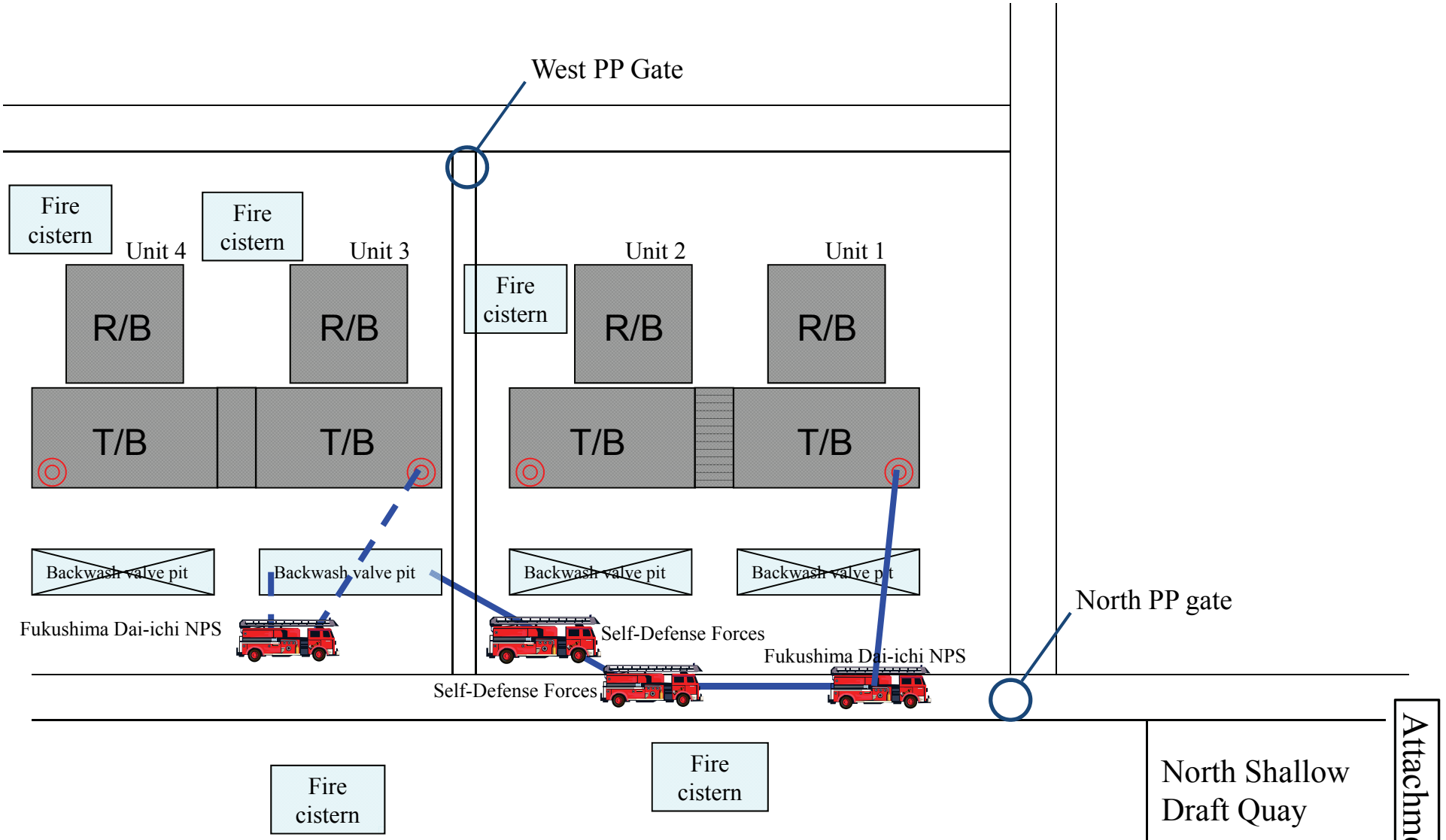
Overview of water injection by fire engines (at around 19:04 on March 12)



Compiled from documents by TEPCO

Attachment IV-19

Overview of water injection by fire engines (at around 07:00 on March 13)

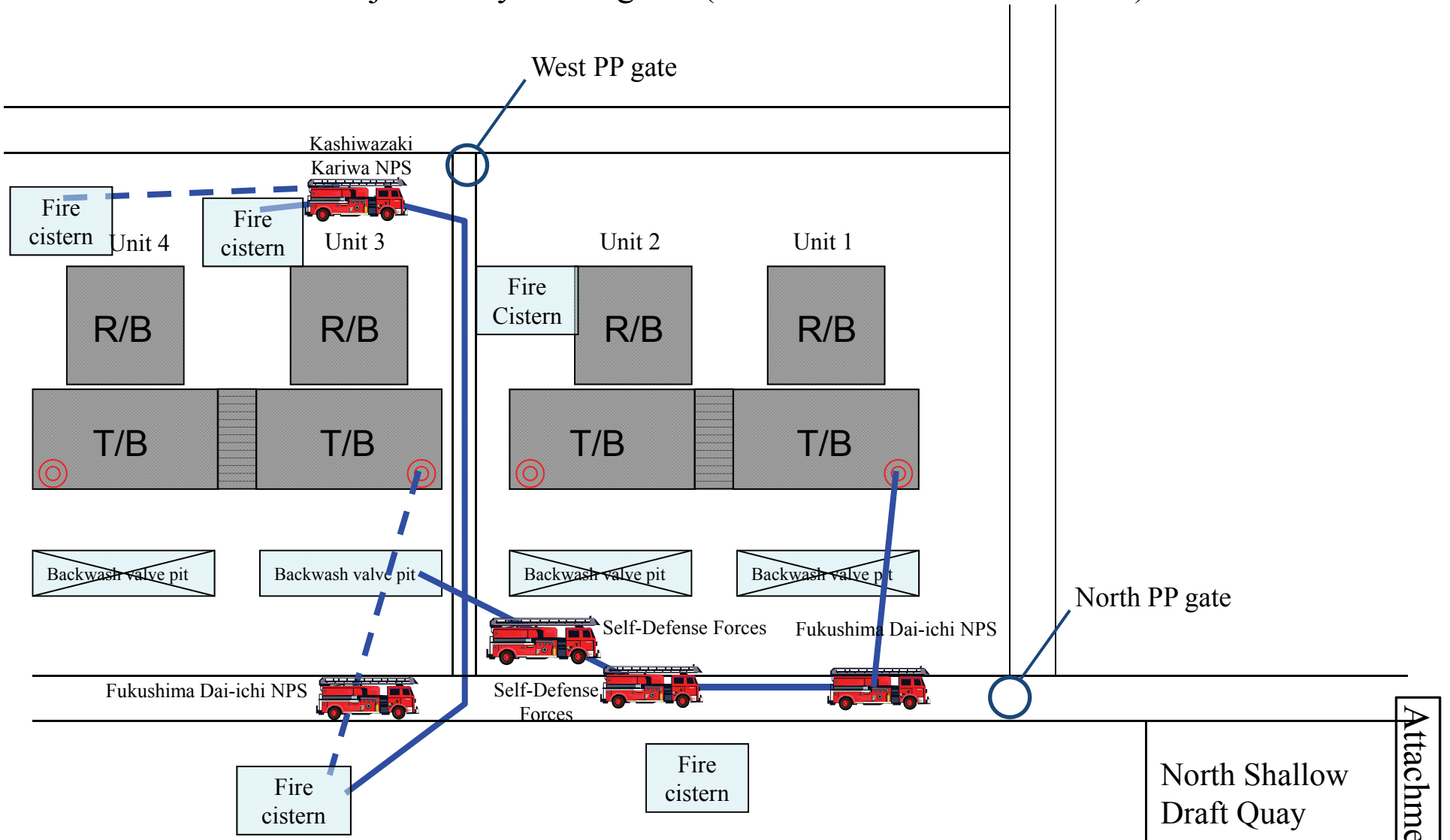


*The blue dotted lines show that water injection had not started by around 07:00 on March 13.

Compiled from documents by TEPCO

Attachment IV-20

Overview of water injection by fire engines (at around 09:00 on March 13)

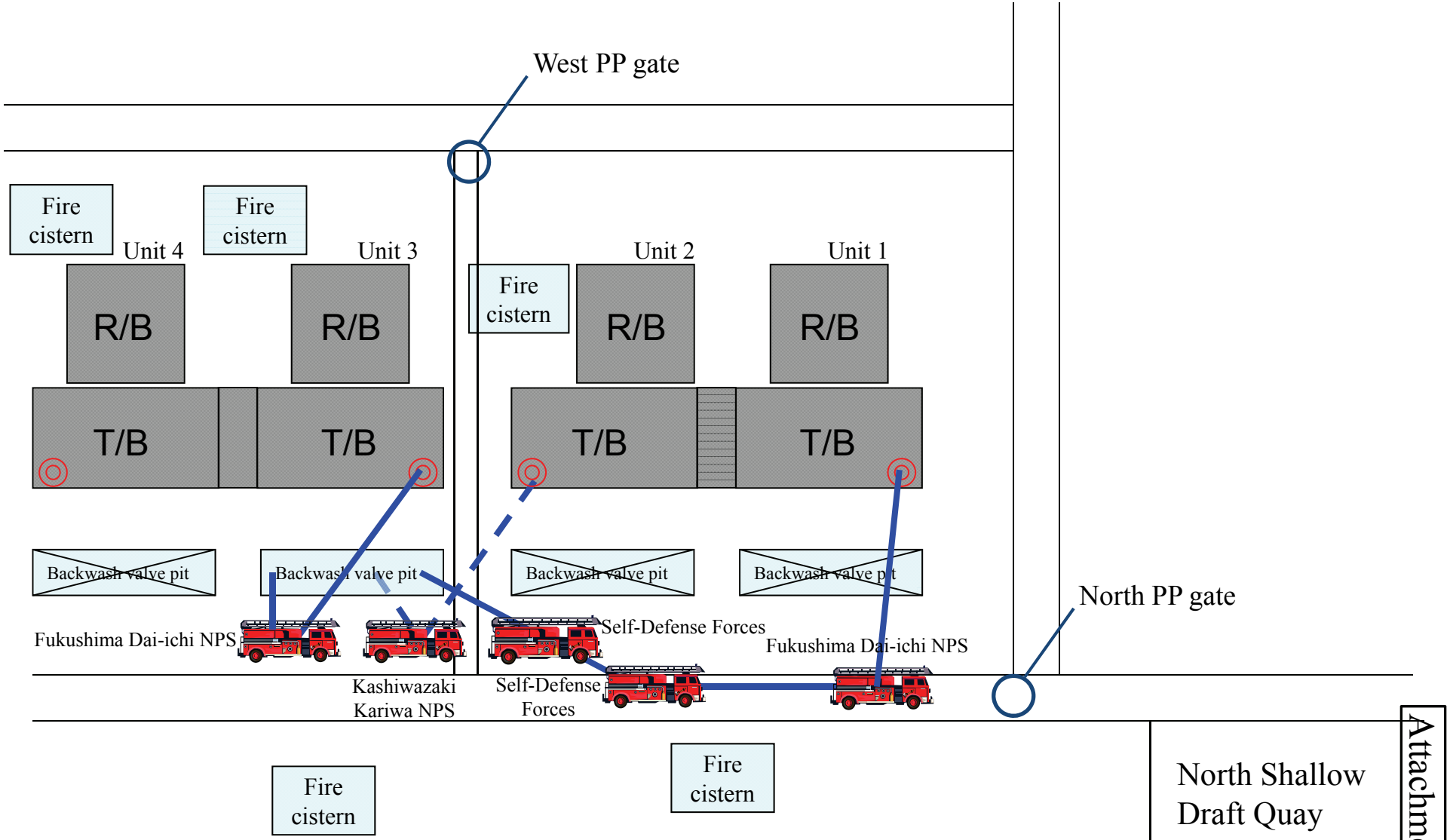


*The blue dotted lines show that water injection had not started by around 09:00 on March 13.

Compiled from documents by TEPCO

Attachment IV-21

Overview of water injection by fire engines (the early evening of March 13)

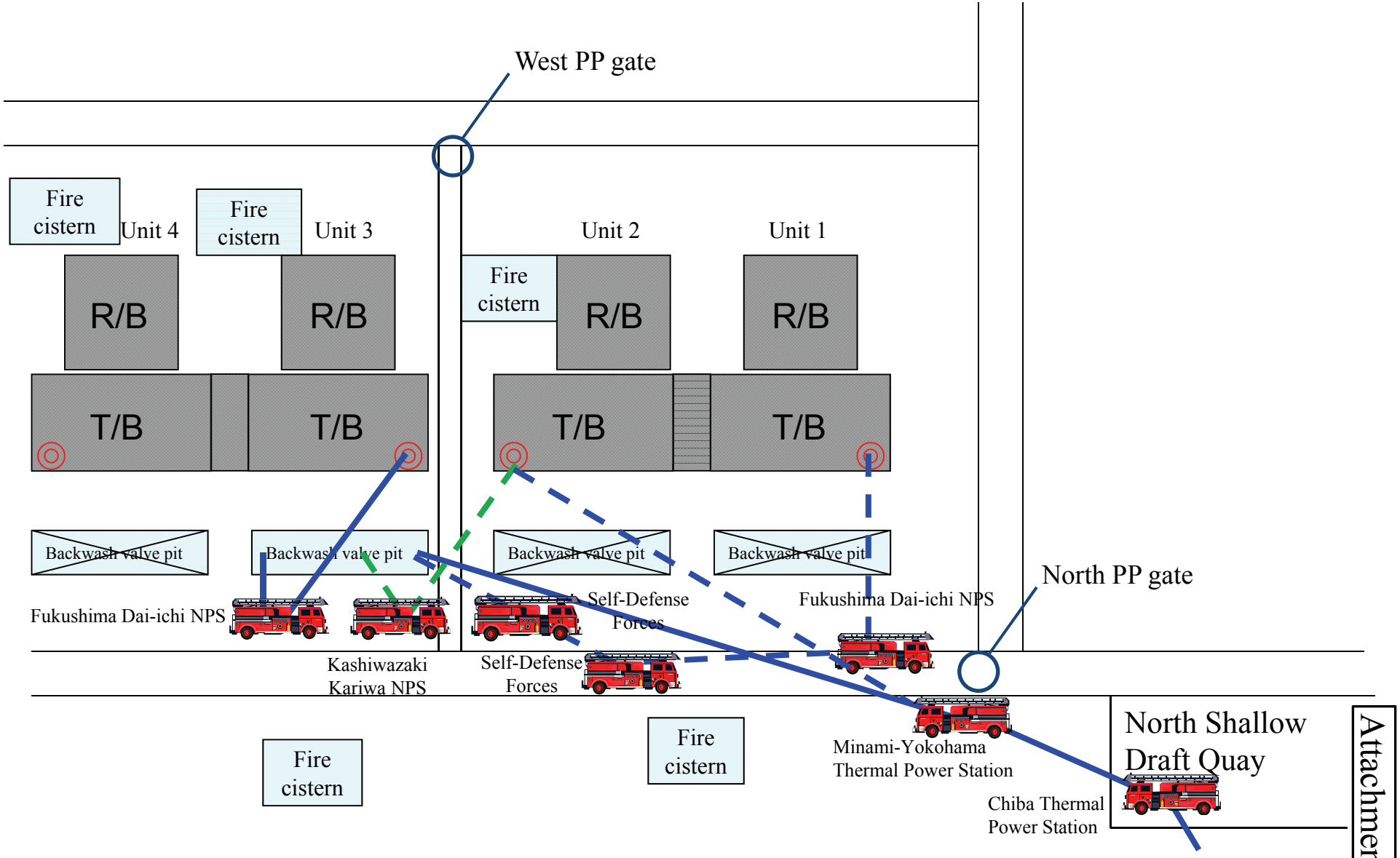


*The blue dotted lines show that water injection had not started by the early evening of March 13.

Compiled from documents by TEPCO

Attachment IV-22

Overview of water injection by fire engines (until around 11:01 on March 14)

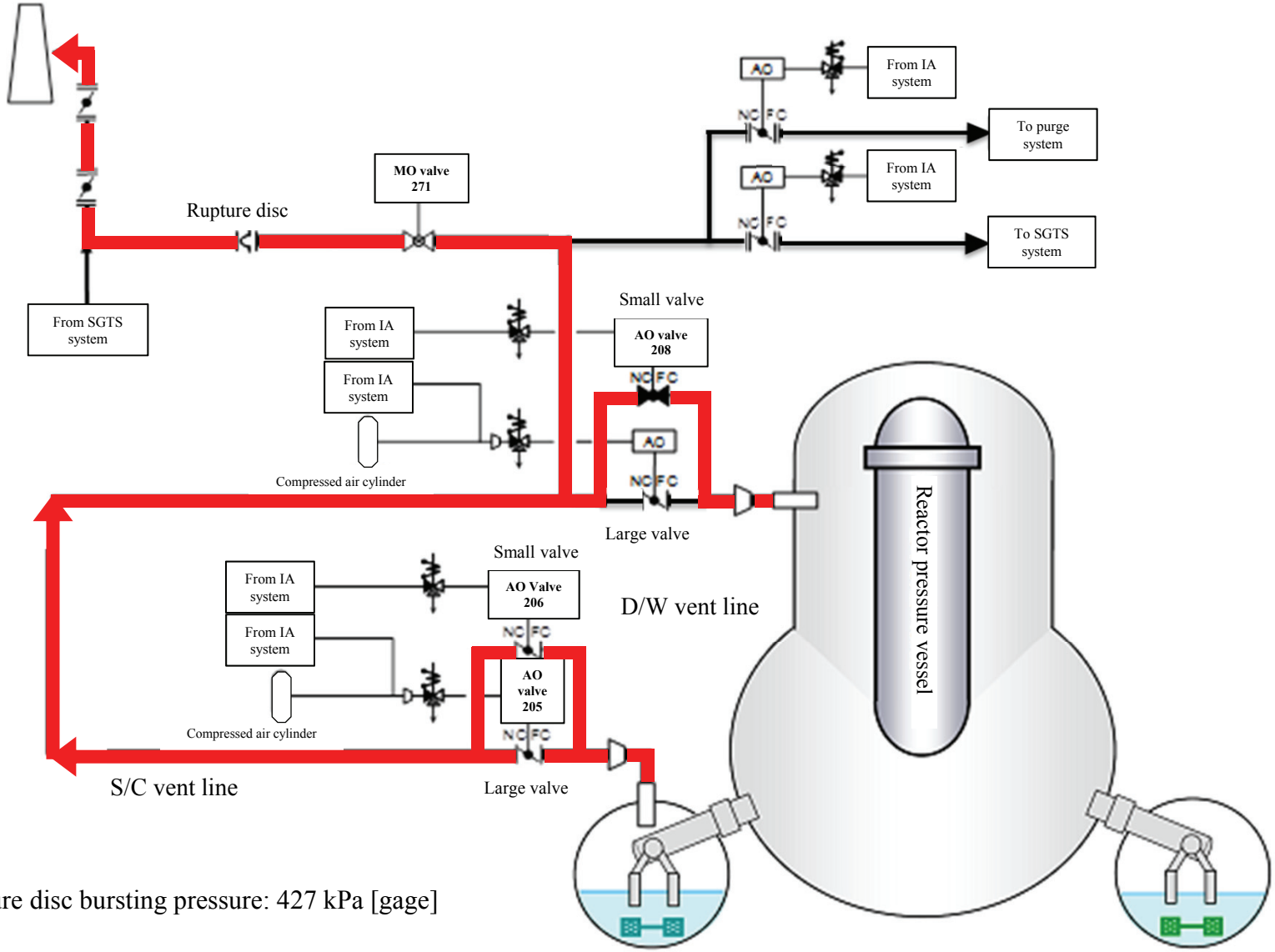


*The water injection lines to Unit 2 were changed from blue dotted lines to green before the explosion at Unit 3, but water injection had not started yet.

Compiled from documents by TEPCO

Attachment IV-23

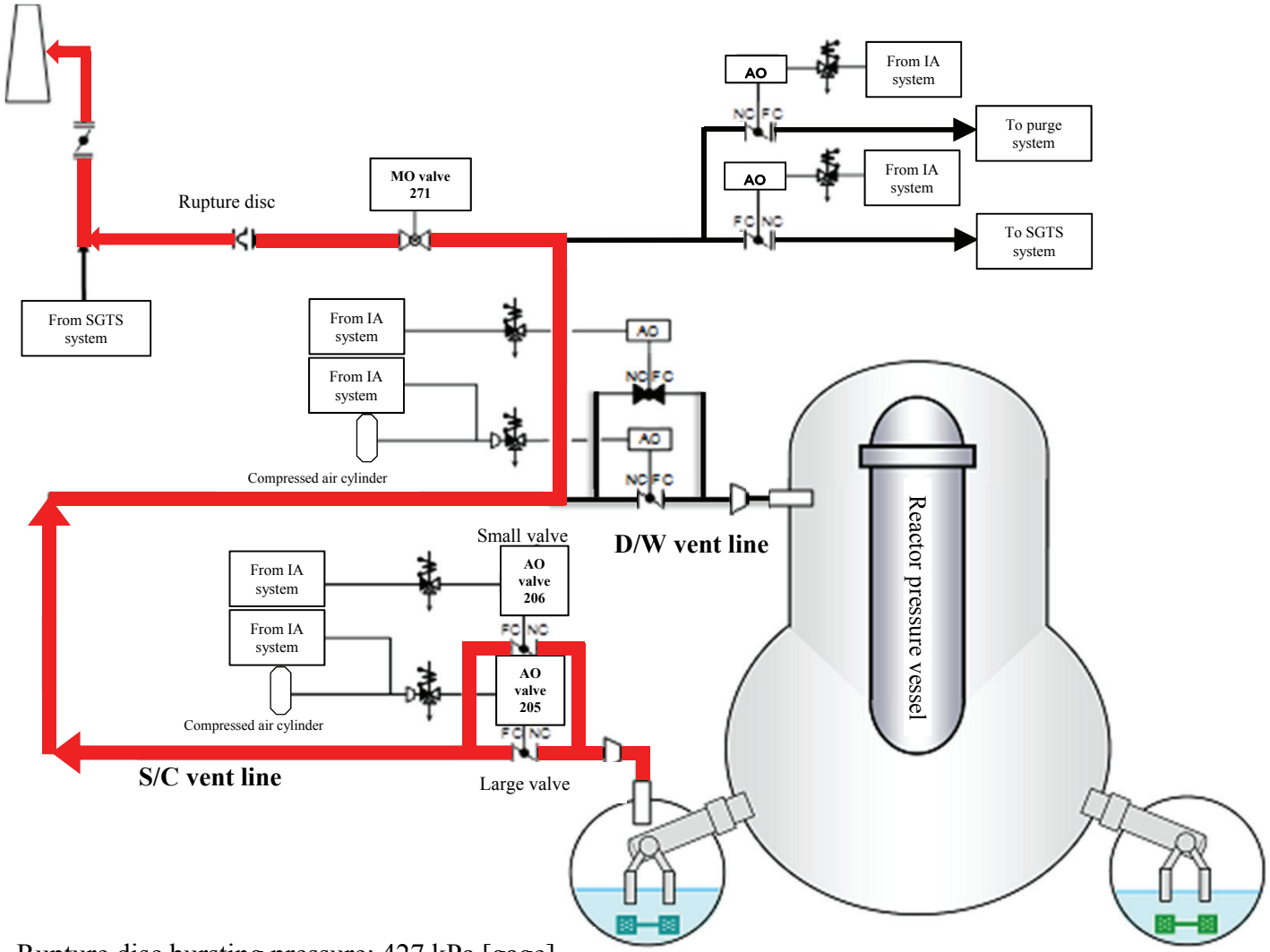
Unit 2 vent line



Rupture disc bursting pressure: 427 kPa [gage]

Attachment IV-24

Unit 3 vent line

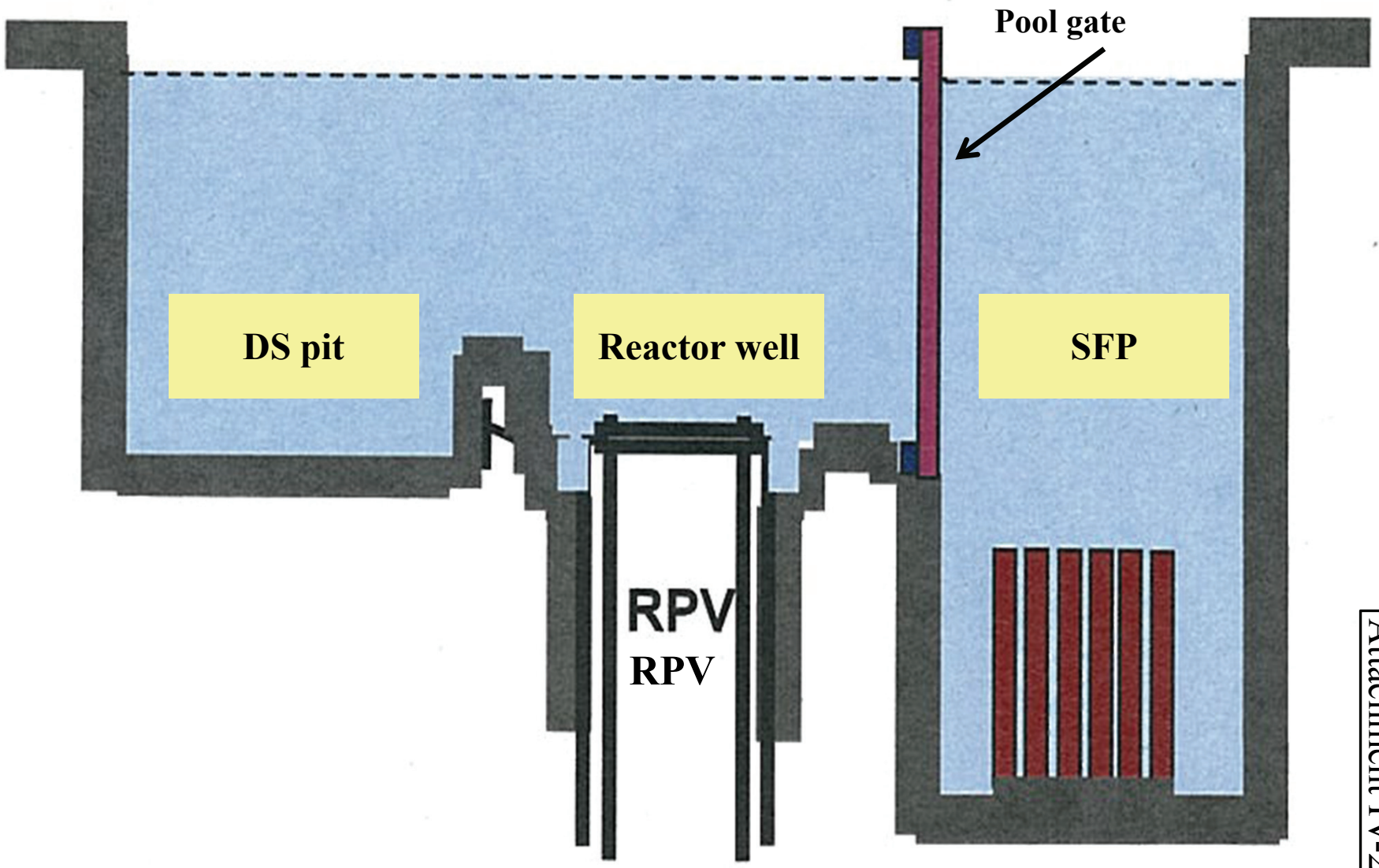


Rupture disc bursting pressure: 427 kPa [gage]

Attachment IV-25

Compiled from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO

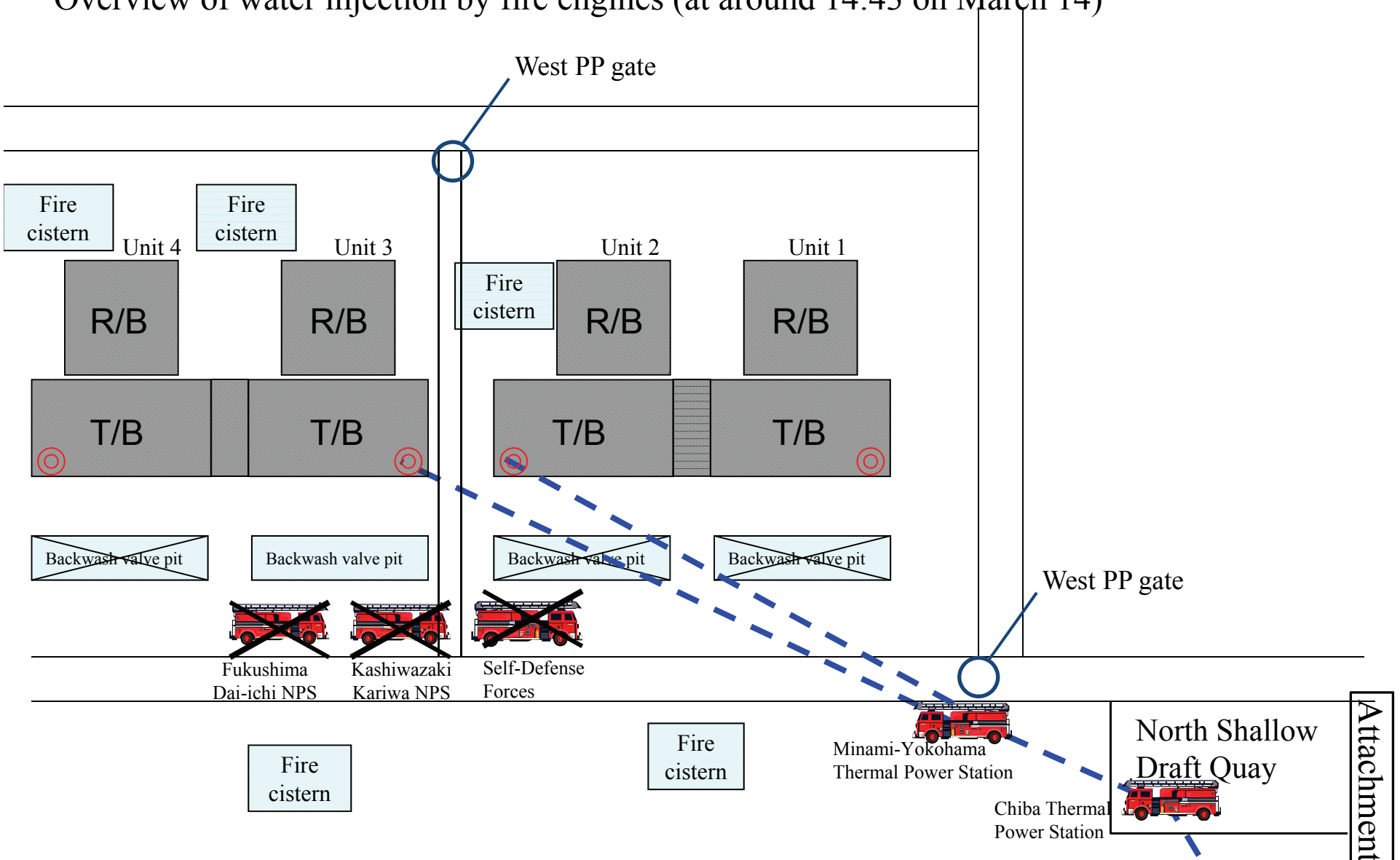
Sectional view of the Unit 4 spent fuel pool and nearby facilities



Attachment IV-26

Compiled from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO.

Overview of water injection by fire engines (at around 14:43 on March 14)

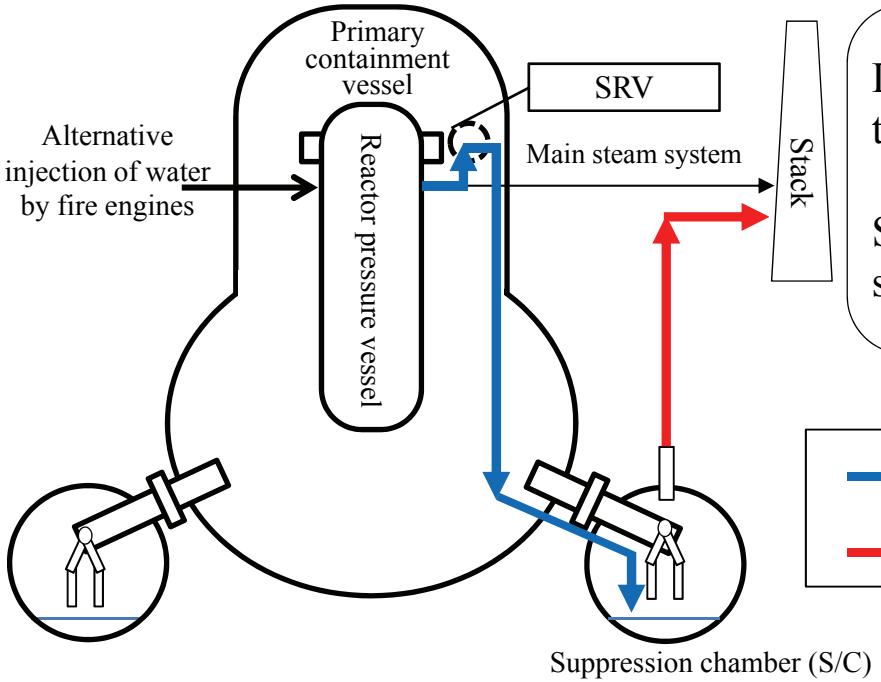


*The blue dotted lines show that water injection had not started by around 14:43 on March 13.

Compiled from documents by TEPCO

Attachment IV-27

Comparative review of the chosen methods for depressurization and alternative water injection of Unit 2



Depressurization of the reactor pressure vessel (RPV) through the safety relief valve (SRV) (original function)

Steam released from the RPV is cooled by water in the suppression chamber (S/C)

Flow of steam through the SRV

S/C vent line

Opinion of Site Superintendent, Mr. Yoshida

Concern:
Because of high pool temperature and pressure in the Unit 2 S/C uncondensed, steam through the SRV might lead to not only insufficient depressurization of the reactor but also damage of the S/C.
Proposal:
Water should be injected, depressurizing the RPV, after configuring an S/C vent line to secure an escape route for S/C pressure.

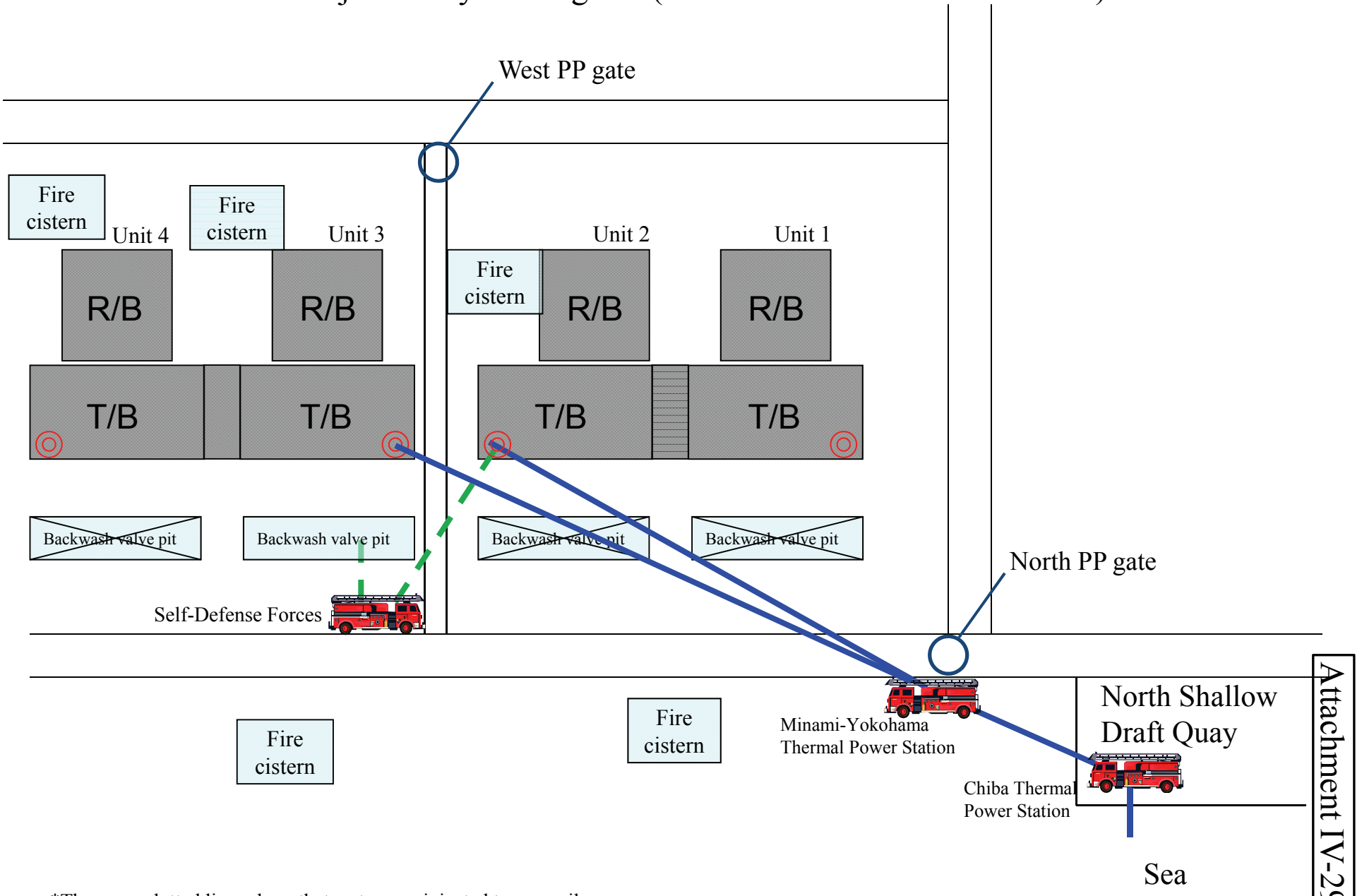
Opinion of Chairman, Madarame

Concern:
Because of no water injection into Unit 2 for a long time, there is a possibility that the RPV would be damaged due to possible fuel damage.

Proposal:
Water injection should come first, depressurizing the RPV without waiting for the completion of an S/C vent line.

Attachment IV-28

Overview of water injection by fire engines (after around 19:57 on March 14)

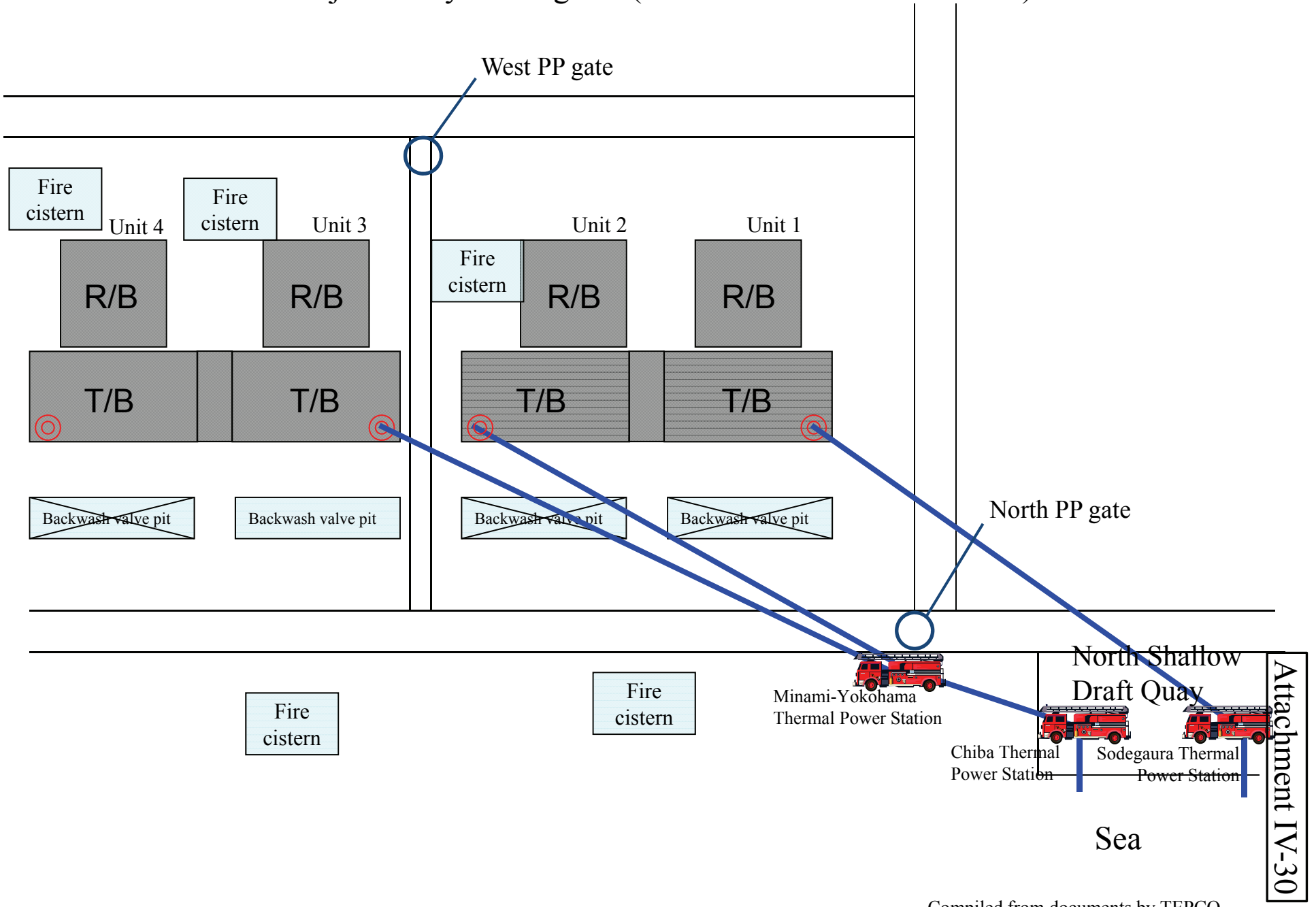


*The green dotted lines show that water was injected temporarily.

Compiled from documents by TEPCO

Attachment IV-29

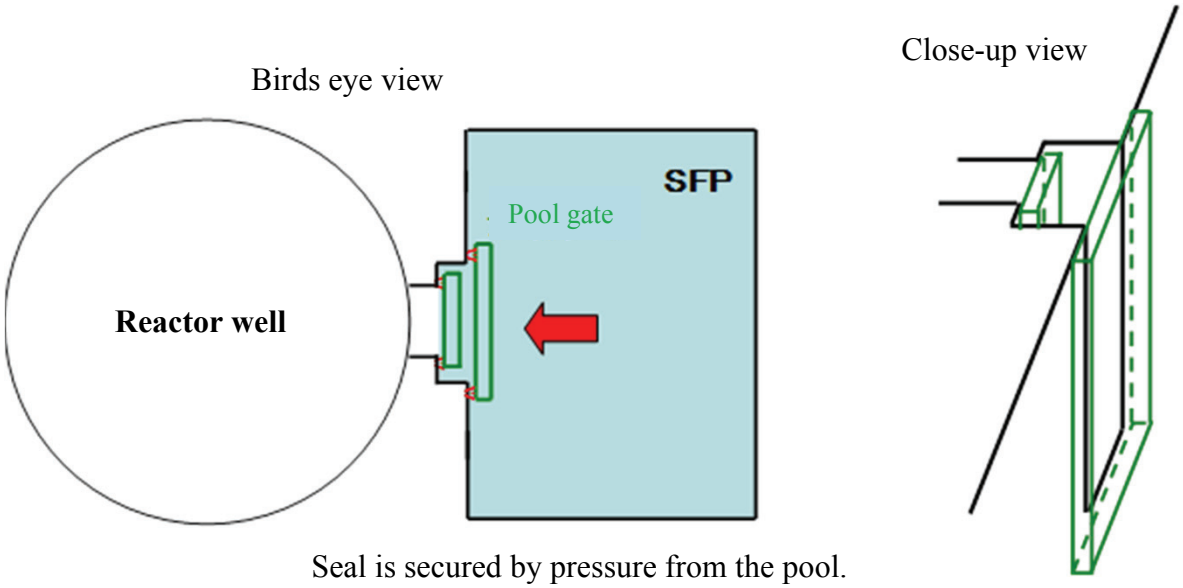
Overview of water injection by fire engines (at around 20:30 on March 14)



Compiled from documents by TEPCO

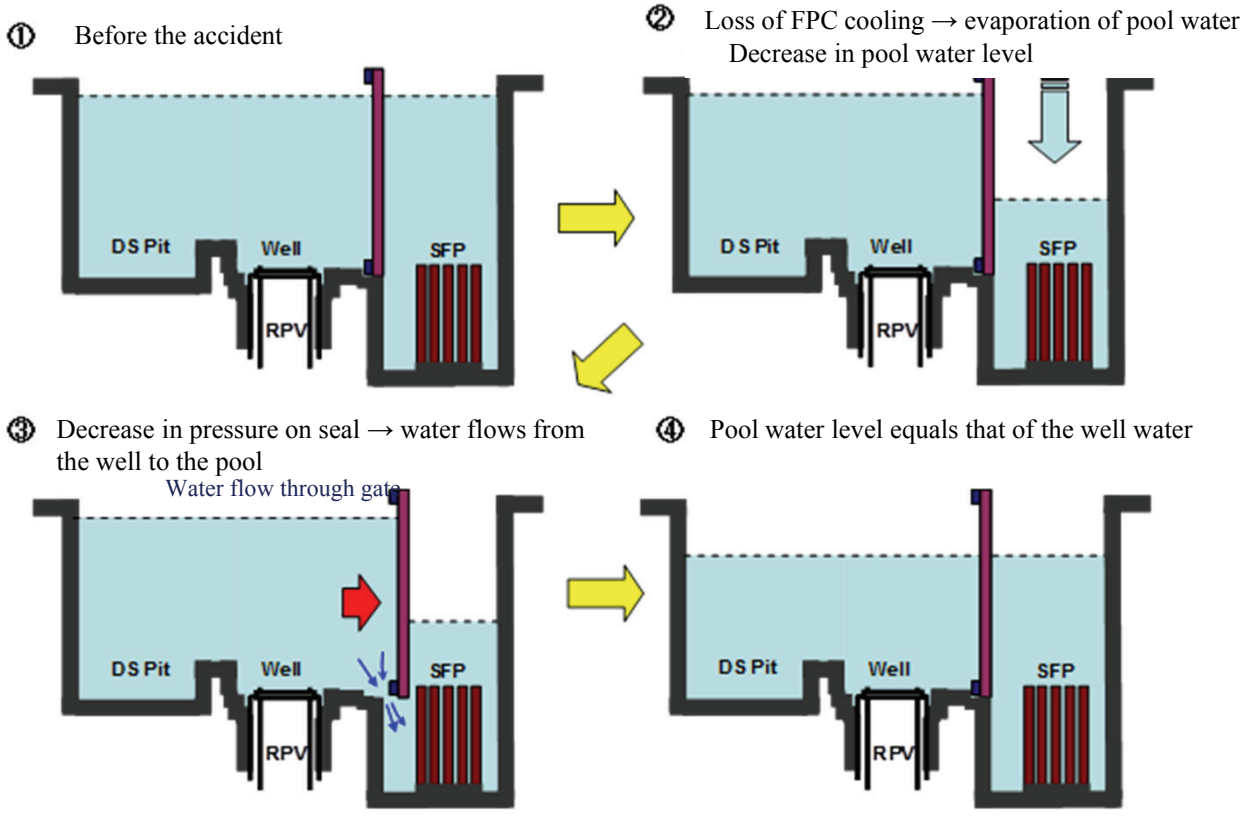
Attachment IV-31

Pool gate configuration



Seal is secured by pressure from the pool.

Water level changes of the spent fuel pool after the accident (before water injection started)



Compiled from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO.

Attachment IV-32

Progress in the cooling of spent fuel pools

Blue: Water spray by helicopters, water cannon trucks, fire engines and concrete pumping trucks
Green: Water injection from the fuel pool cooling & clean-up system (FPC)
Purple: Water injection by temporary water injection systems
Red: Cooling by alternative cooling systems

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
Mar/17			9:48 - 10:01 Water sprinkle by the Self-Defense Force (Helicopters) [Approximately 30t / Seawater] 19:05 - 19:13 Water spray by the Tokyo Police Department (Water cannon trucks) [Approximately 44t / Seawater] 19:35 - 20:09 Water spray by the Self-Defense Forces (Fire Engines) [Approximately 30t / Fresh Water]			
Mar/18			14:00 - 14:38 Water spray by the Self-Defense Force (Fire Engines) [Approximately 40t / Fresh Water] 14:42 - 14:45 Water spray by TEPCO (High Pressure Water cannon truck of US forces) [approximately 2t / Fresh Water]			
Mar/19			0:30 - 1:10 Water spray by the Tokyo Fire Department (Fire Engines) [Approximately 60t / Seawater] 14:10 - 3/20 3:40 Water spray by the Tokyo fire Department ((Fire Engines) [Approximately 2430t / Seawater]		1:55 Startup of Temporary Residual Heat Removal Service Water System (RHRS) 5:00 Start of Cooling in the Fuel Pool Cooling mode of the Residual Heat Removal System (RHR)	21:16 Startup of Temporary Residual Heat Removal Service Water System (RHRS) 22:14 Start of Cooling in the Fuel Pool Cooling mode of the Residual Heat Removal System (RHR)
Mar/20		15:05 - 19:45 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 40t / Seawater]	21:36 - 3/21 3:58 Water spray by the Tokyo Fire Department (Fire Engines) [Approximately 1137t / Seawater]	8:21 - 9:40 Water spray by the Self-Defense Force (Fire Engines) [Approximately 80t / Fresh Water] 18:30 - 19:46 Water spray by the Self-Defense Force (Fire Engines) [Approximately 80t / Fresh Water]	Cooling by Temporar	Cooling by Temporary

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
Mar/21				6:37 - 8:41 Water spray by the Self-Defense Force (Fire Engines, High Pressure Water cannon truck of US forces) [Approximately 92t / Fresh Water]	Cooling by Residual Heat Removal System (RHR)	Cooling by Residual Heat Removal System (RHR)
Mar/22		16:07 - 17:01 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 18 t / Seawater]	15:10 - 15:59 Water spray by Tokyo Fire Department and Osaka-City Fire Department (Fire Engines) [Approximately 150t / Seawater]	17:17 - 20:32 Water spray by concrete pumping trucks [Approximately 150t / Seawater]		
Mar/23			11:03 - 13:20 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 35 t / Seawater]	10:00 - 13:02 Water spray by concrete pumping trucks [Approximately 125t / Seawater]		
Mar/24			5:35 - 16:05 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 120 t / Seawater]	14:36 - 17:30 Water spray by concrete pumping trucks [Approximately 150t / Seawater]		
Mar/25		10:30 - 12:19 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 30 t / Seawater]	13:28 - 16:00 Water spray by Kawasaki City Fire Department (Fire Engines) [Approximately 450 t / Seawater]	6:05 - 10:20 Water spray from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 21t / Seawater] 19:05 - 22:07 Water spray by concrete pumping trucks [Approximately 150t / Seawater]		
Mar/26						
Mar/27			12:34 - 14:36 Water spray by concrete pumping trucks [Approximately 100t / Seawater]	16:55 - 19:25 Water spray by concrete pumping trucks [Approximately 125t / Seawater]		
Mar/28						
Mar/29		16:30 - 18:25 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 15 - 30 t / Fresh Water]	14:17 - 18:18 Water spray by concrete pumping trucks [Approximately 100t / Fresh Water]			
Mar/30		19:05 - 23:50 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Less than 20 t / Fresh Water]		14:04 - 18:33 Water spray by concrete pumping trucks [Approximately 140t / Fresh Water]		
Mar/31	13:03 - 16:04 Water spray by concrete pumping trucks [Approximately 90 t / Fresh Water]		16:30 - 19:33 Water spray by concrete pumping trucks [Approximately 105t / Fresh Water]			
Apr/1		14:56 - 17:05 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 70 t / Fresh Water]		8:28 - 14:14 Water spray by concrete pumping trucks [Approximately 180t / Fresh Water]		
Apr/2			9:52 - 12:54 Water spray by concrete pumping trucks [Approximately 75 t / Fresh Water]			
Apr/3				17:14 - 22:16 Water spray by concrete pumping trucks [Approximately 180 t / Fresh Water]		

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
Apr/4		11:05 - 13:37 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 70 t / Fresh Water]	17:03 - 19:19 Water spray by concrete pumping trucks [Approximately 70 t / Fresh Water]		Cooling by Temporary Residual Heat Removal System (RHR)	Cooling by Temporary Residual Heat Removal System (RHR)
Apr/5				17:35 - 18:22 Water spray by concrete pumping trucks [Approximately 20 t / Fresh Water]		
Apr/6						
Apr/7		13:29 - 14:34 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 36 t / Fresh Water]	6:53 - 8:53 Water spray by concrete pumping trucks [Approximately 70 t / Fresh Water]	18:23 - 19:40 Water spray by concrete pumping trucks [Approximately 38 t / Fresh Water]		
Apr/8			17:06 - 20:00 Water spray by concrete pumping trucks [Approximately 75 t / Fresh Water]			
Apr/9				17:07 - 19:24 Water spray by concrete pumping trucks [Approximately 90 t / Fresh Water]		
Apr/10		10:37 - 12:38 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 60 t / Fresh Water]	17:15 - 19:15 Water spray by concrete pumping trucks [Approximately 80 t / Fresh Water]			
Apr/11						
Apr/12			16:26 - 17:16 Water spray by concrete pumping trucks [Approximately 35 t / Fresh Water]			
Apr/13		13:15 - 14:55 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 60 t / Fresh Water]		0:30 - 6:57 Water spray by concrete pumping trucks [Approximately 195 t / Fresh Water]		
Apr/14			15:56 - 16:32 Water spray by concrete pumping trucks [Approximately 25 t / Fresh Water]			
Apr/15				14:30 - 18:29 Water spray by concrete pumping trucks [Approximately 140 t / Fresh Water]		
Apr/16		10:13 - 11:54 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 45 t / Fresh Water]				
Apr/17				17:39 - 21:22 Water spray by concrete pumping trucks [Approximately 140 t / Fresh Water]		
Apr/18			14:17 - 15:02 Water spray by concrete pumping trucks [Approximately 30 t / Fresh Water]			
Apr/19		16:08 - 17:28 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 47 t / Fresh Water]		10:17 - 11:35 Water spray by concrete pumping trucks [Approximately 40 t / Fresh Water]		

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
Apr/20				17:08 - 20:31 Water spray by concrete pumping trucks [Approximately 100 t / Fresh Water]	Cooling by Temporary Residual Heat Removal System (RHR)	Cooling by Temporary Residual Heat Removal System (RHR)
Apr/21				17:14 - 21:20 Water spray by concrete pumping trucks [Approximately 140 t / Fresh Water]		
Apr/22		15:55 - 17:40 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 50 t / Fresh Water]	14:19 - 15:40 Water spray by concrete pumping trucks [Approximately 50 t / Fresh Water]	17:52 - 23:53 Water spray by concrete pumping trucks [Approximately 200 t / Fresh Water]		
Apr/23				12:30 - 16:44 Water spray by concrete pumping trucks [Approximately 140 t / Fresh Water]		
Apr/24				12:25 - 17:07 Water spray by concrete pumping trucks [Approximately 165 t / Fresh Water]		
Apr/25		10:12 - 11:18 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 38 t / Fresh Water]		18:15 - 4/26 0:26 Water spray by concrete pumping trucks [Approximately 210 t / Fresh Water]		
Apr/26			12:25 - 14:02 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 47.5 t / Fresh Water]	16:50 - 20:35 Water spray by concrete pumping trucks [Approximately 130 t / Fresh Water]		
Apr/27				12:18 - 15:15 Water spray by concrete pumping trucks [Approximately 85 t / Fresh Water]		
Apr/28		10:15 - 11:28 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 43 t / Fresh Water]				
Apr/29						
Apr/30						
May/1						
May/2		10:05 - 11:40 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 55 t / Fresh Water]				
May/3						
May/4						
May/5				12:19 - 20:46 Water spray by concrete pumping trucks [Approximately 270 t / Fresh Water]		
May/6		9:36 - 11:16 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 58 t / Fresh Water]		12:38 - 17:51 Water spray by concrete pumping trucks [Approximately 180 t / Fresh Water]		
May/7				14:05 - 17:30 Water spray by concrete pumping trucks [Approximately 120 t / Fresh Water]		

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
May/8			12:10 - 14:10 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 60 t / Fresh Water]		Cooling by Temporary Residual Heat Removal System (I	Cooling by Temporary Residual Heat Removal System (I
May/9			12:14 - 15:00 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 80 t / Fresh Water]	16:05 - 19:05 Water spray by concrete pumping trucks [Approximately 100 t / Fresh Water]		
May/10		13:09 - 14:45 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 56 t / Fresh Water]				
May/11				16:07 - 19:38 Water spray by concrete pumping trucks [Approximately 120 t / Fresh Water]		
May/12						
May/13				16:04 - 19:04 Water spray by concrete pumping trucks [Approximately 100 t / Fresh Water]		
May/14		13:00 - 14:37 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 56 t / Fresh Water]				
May/15				16:25 - 20:25 Water spray by concrete pumping trucks [Approximately 140 t / Fresh Water]		
May/16			15:00 - 18:32 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 106 t / Fresh Water]			
May/17				16:14 - 20:06 Water spray by concrete pumping trucks [Approximately 120 t / Fresh Water]		
May/18		13:10 - 14:40 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 53 t / Fresh Water]				
May/19				16:30 - 19:30 Water spray by concrete pumping trucks [Approximately 100 t / Fresh Water]		
May/20	15:06 - 16:15 Water spray by concrete pumping trucks [Approximately 60 t / Fresh Water]					
May/21				16:00 - 19:56 Water spray by concrete pumping trucks [Approximately 130 t / Fresh Water]		
May/22	15:33 - 17:09 Water spray by concrete pumping trucks [Approximately 90 t / Fresh Water]	13:02 - 14:40 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 56 t / Fresh Water]				

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
May/23				16:00 - 19:09 Water spray by concrete pumping trucks [Approximately 100 t / Fresh Water]		
May/24			10:15 - 13:35 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 100 t / Fresh Water]			
May/25				16:36 - 20:04 Water spray by concrete pumping trucks [Approximately 121 t / Fresh Water]		
May/26		10:06 - 11:36 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 53 t / Fresh Water]				
May/27				17:05 - 20:00 Water spray by concrete pumping trucks [Approximately 100 t / Fresh Water]		
May/28	16:47 - 17:00 Leak Test of the Fuel Pool Cooling & Clean-up System (FPC) Line [Approximately 5t / Fresh Water]		13:28 - 15:08 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 50 t / Fresh Water]	17:56 - 19:45 Water spray by concrete pumping trucks [Approximately 60 t / Fresh Water]	21:14 One of the pumps of the temporary Residual Heat Removal Service Water System (RHRS) stopped.	
May/29	11:10 - 15:35 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 168 t / Fresh Water]				12:31 The temporary Residual Heat Removal Service Water System (RHRS) Pump restored and Started up	
May/30		12:06 - 13:52 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 53 t / Fresh Water]				
May/31		17:21 - Start of Cooling by Alternative Cooling System				
Jun/1		5:06 - 7:06 Sirculation cooling system pump stopped 6:06 - 6:53 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 25t / Fresh Water] 7:06 - Resumed of Cooling by Alternative Cooling System	14:34 - 15:54 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 40t / Fresh Water]			
Jun/2						
Jun/3				14:35 - 21:15 Water spray by concrete pumping trucks [Approximately 210 t / Fresh Water]		
Jun/4				14:23 - 19:45 Water spray by concrete pumping trucks [Approximately 180 t / Fresh Water]		
Jun/5	10:16 - 10:48 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 15 t / Fresh Water]		13:08 - 15:14 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 60 t / Fresh Water]			

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
Jun/6				15:56 - 18:35 Water spray by concrete pumping trucks [Approximately 90 t / Fresh Water]		
Jun/7						
Jun/8				16:12 - 19:41 Water spray by concrete pumping trucks [Approximately 120 t / Fresh Water]		
Jun/9			13:42 - 15:31 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 55 t / Fresh Water]			
Jun/10						
Jun/11						
Jun/12						
Jun/13			10:09 - 11:48 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 42 t / Fresh Water]	16:36 - 21:00 Water spray by concrete pumping trucks [Approximately 150 t / Fresh Water]		
Jun/14				16:10 - 20:52 Water spray by concrete pumping trucks [Approximately 150 t / Fresh Water]		
Jun/15						
Jun/16				13:14 - 15:44 Water injection by temporary water injection system [Approximately 75t / Fresh Water]		
Jun/17			10:19 - 11:57 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 49 t / Fresh Water]			
Jun/18				16:05 - 19:23 Water injection by temporary water injection system [Approximately 99t / Fresh Water]		
Jun/19						
Jun/20						
Jun/21						
Jun/22				14:31 - 16:38 Water injection by temporary water injection system [Approximately 56t / Fresh Water]		
Jun/23						
Jun/24						
Jun/25						
Jun/26			9:56 - 11:23 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 45 t / Fresh Water]			
Jun/27			15:00 - 17:18 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 60 t / Fresh Water]			
Jun/28						

Cooling by Alternative Cooling System

Cooling by Temporary Residual Heat Removal System (RHR)

Cooling by Temporary Residual Heat Removal System (RHR)

Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
Jun/29			14:45 - 15:53 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 30 t / Fresh Water]	11:47 - 12:01 Water injection by temporary water injection system [Approximately 7t / Fresh Water]		
Jun/30			19:47 Start of Cooling by Alternative Cooling system	11:30 - 11:55 Water injection by temporary water injection system [Approximately 13t / Fresh Water]		
Jul/1						
Jul/2						
Jul/3						
Jul/4						
Jul/5	15:10 - 17:30 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 75 t / Fresh Water]					
Jul/6						
Jul/7						
Jul/8						
Jul/9						
Jul/10						
Jul/11						
Jul/12						
Jul/13						
Jul/14						
Jul/15						
Jul/16						
Jul/17						
Jul/18						
Jul/19						
Jul/20						
Jul/21						
Jul/22						
Jul/23						
Jul/24						
Jul/25						
Jul/26						
Jul/27						
Jul/28						
Jul/29						
Jul/30						
Jul/31				8:47 - 9:38 Water injection by temporary water injection system [Approximately 25t / Fresh Water] 12:44 Start of Cooling by Alternative Cooling System		
Aug/1						
Aug/2						
Aug/3						
Aug/4						

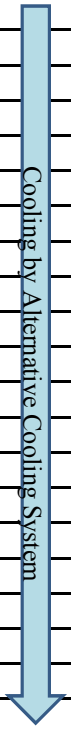
Cooling by Alternative Cooling System

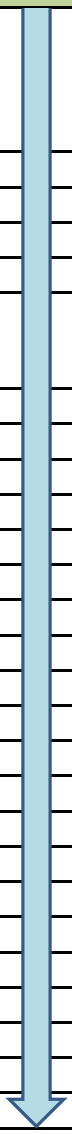
Cooling by Alternative Cooling System

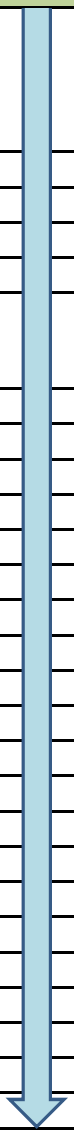
Cooling by Temporary Residual Heat Removal System (RHR)

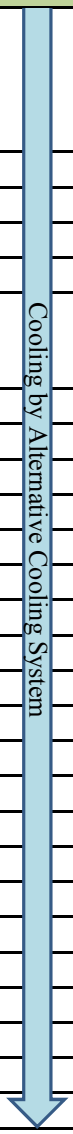
Cooling by Temporary Residual Heat Removal System (RHR)

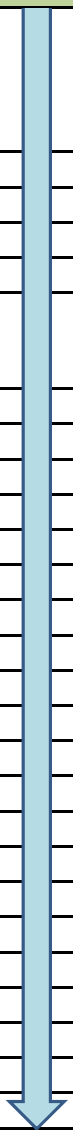
Date	Unit 1 Pool	Unit 2 Pool	Unit 3 Pool	Unit 4 Pool	Unit 5 Pool	Unit 6 Pool
Aug/5	15:20 - 17:51 Water injection from the Fuel Pool Cooling & Clean-up System (FPC) [Approximately 75 t / Fresh Water]					
Aug/6						
Aug/7						
Aug/8						
Aug/9						
Aug/10	11:22 Start of Cooling by Alternative Cooling System					
Aug/11						
Aug/12						
Aug/13						
Aug/14						
Aug/15						
Aug/16						
Aug/17						
Aug/18						
Aug/19						
Aug/20						
Aug/21						
Aug/22						
Aug/23						
Aug/24						
Aug/25						
Aug/26						
Aug/27						
Aug/28						
Aug/29						
Aug/30						
Aug/31						

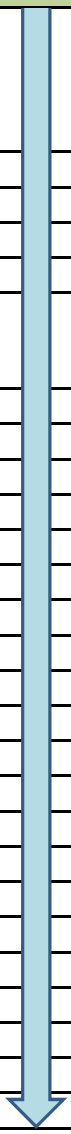




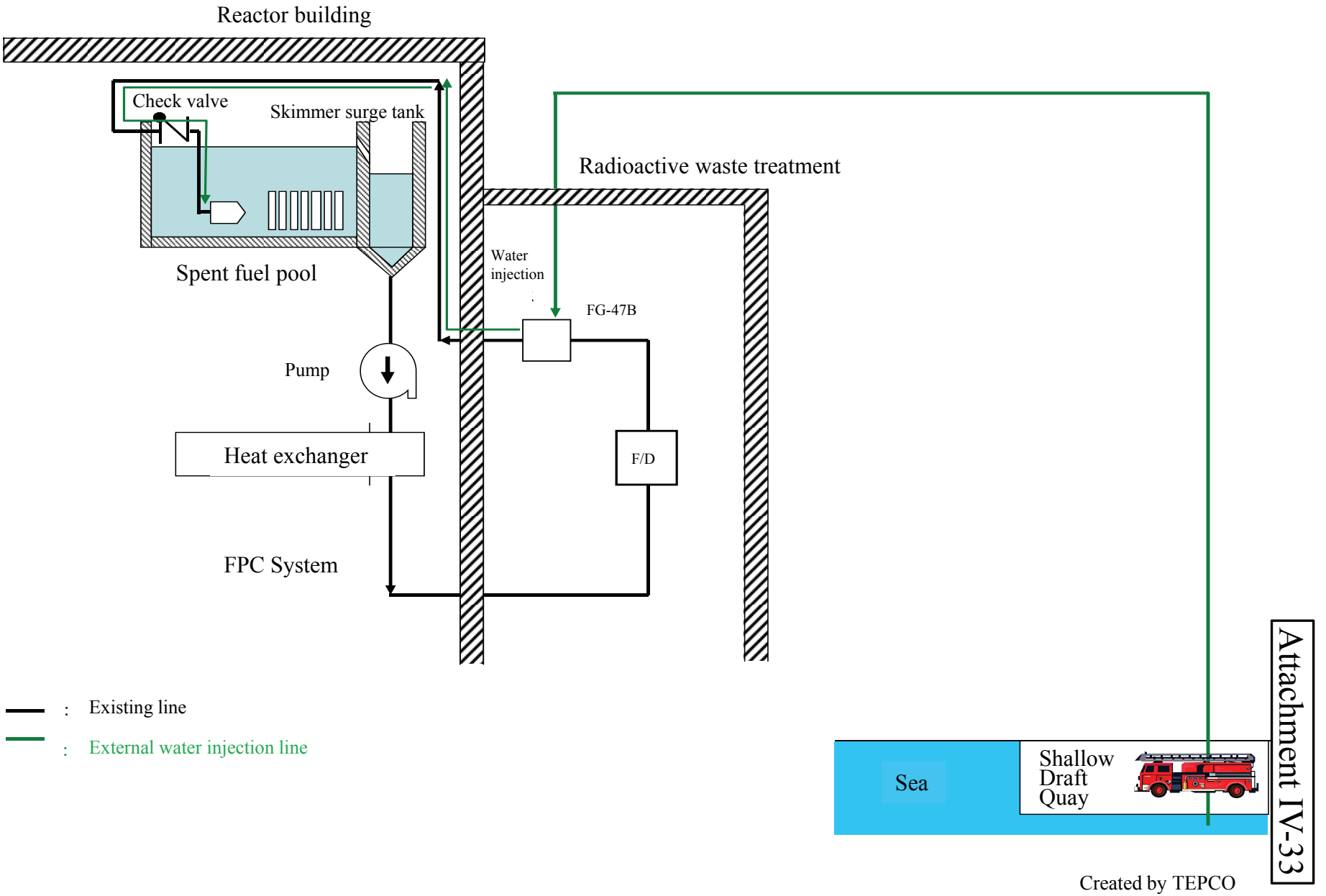








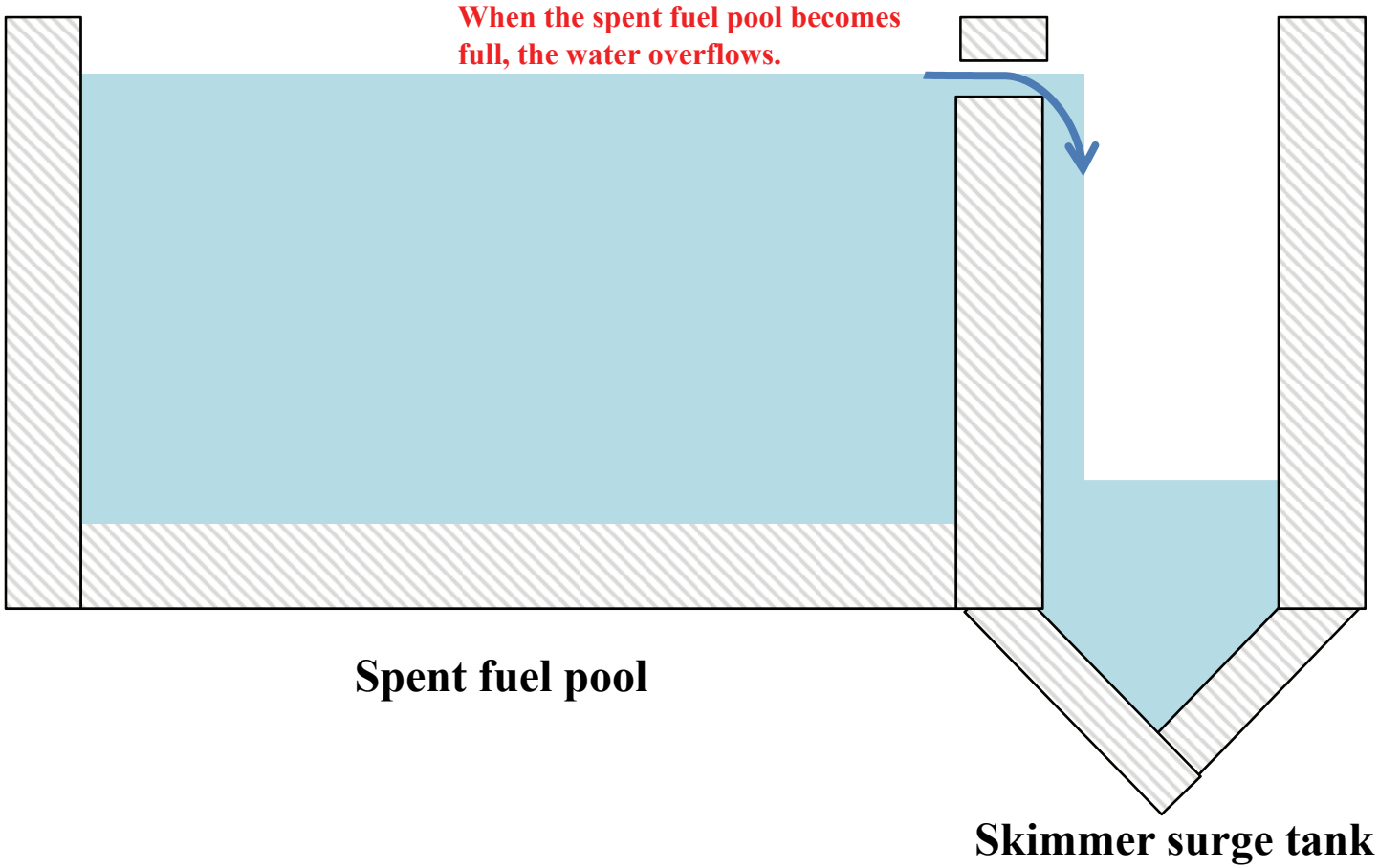
Water injection into the Unit 2 spent fuel pool using the FPC System



Attachment IV-33

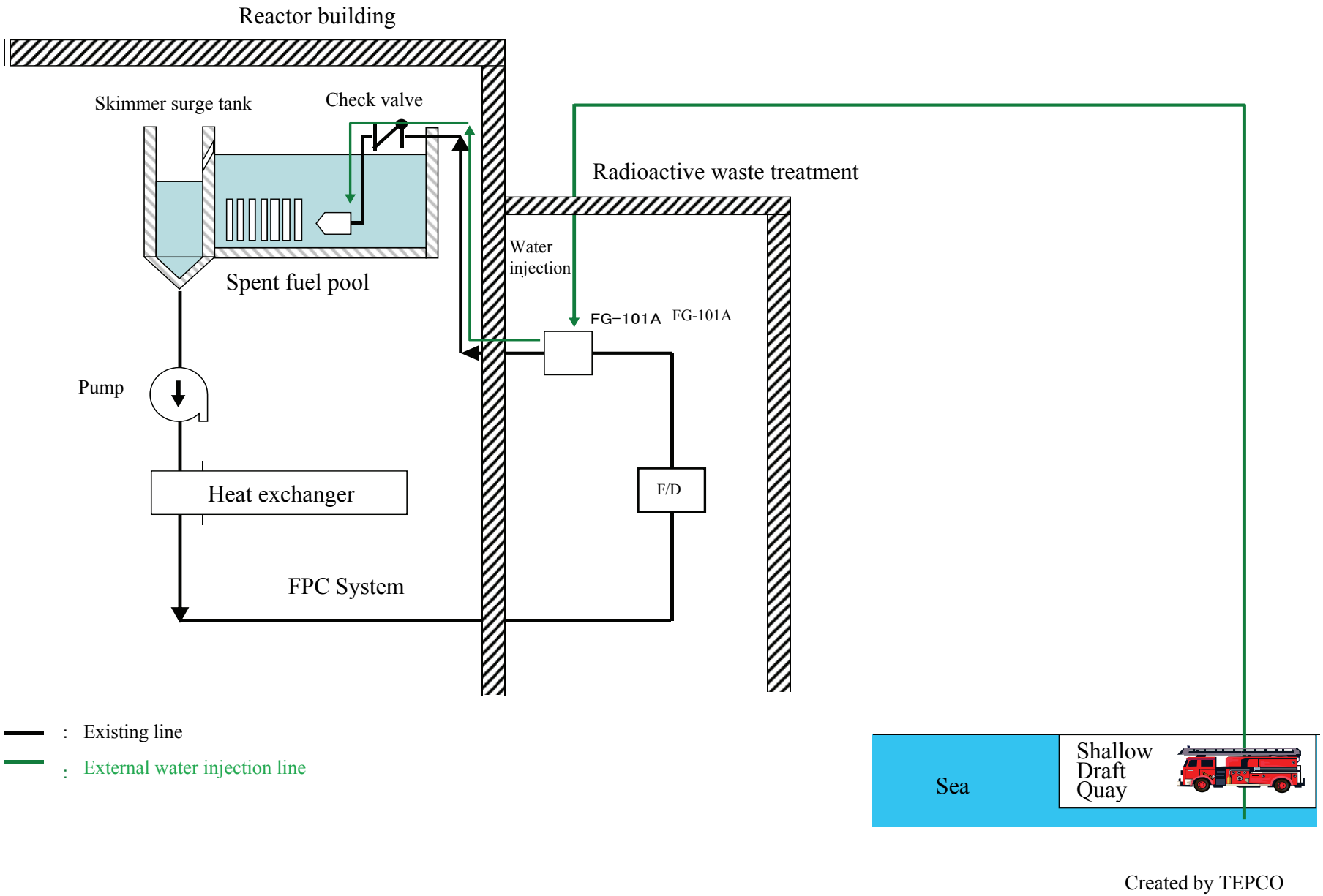
Created by TEPCO

Skimmer surge tank configuration



Attachment IV-34

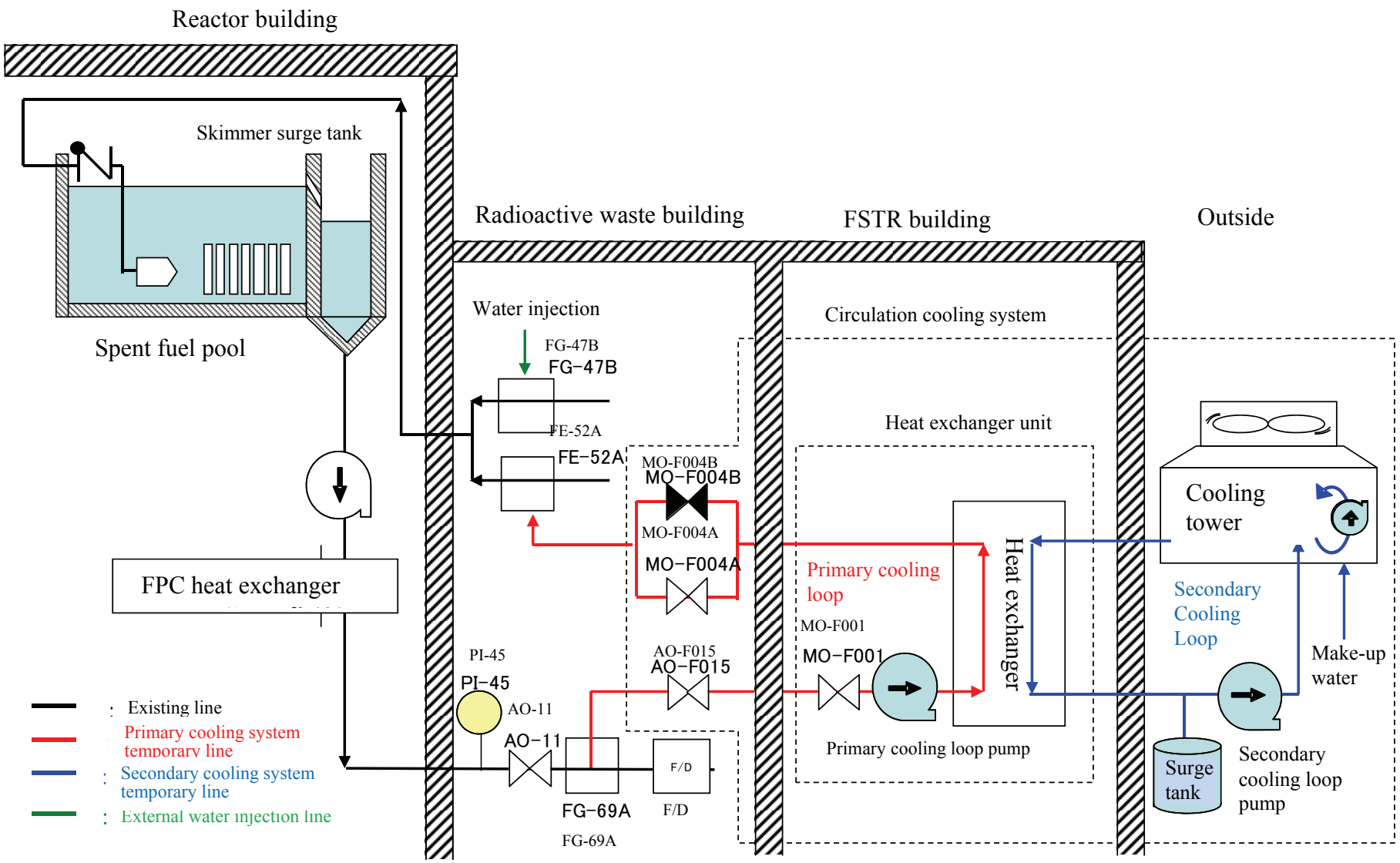
Water injection into the spent fuel pools of Units 3 and 4 using the FPC System



Attachment IV-35

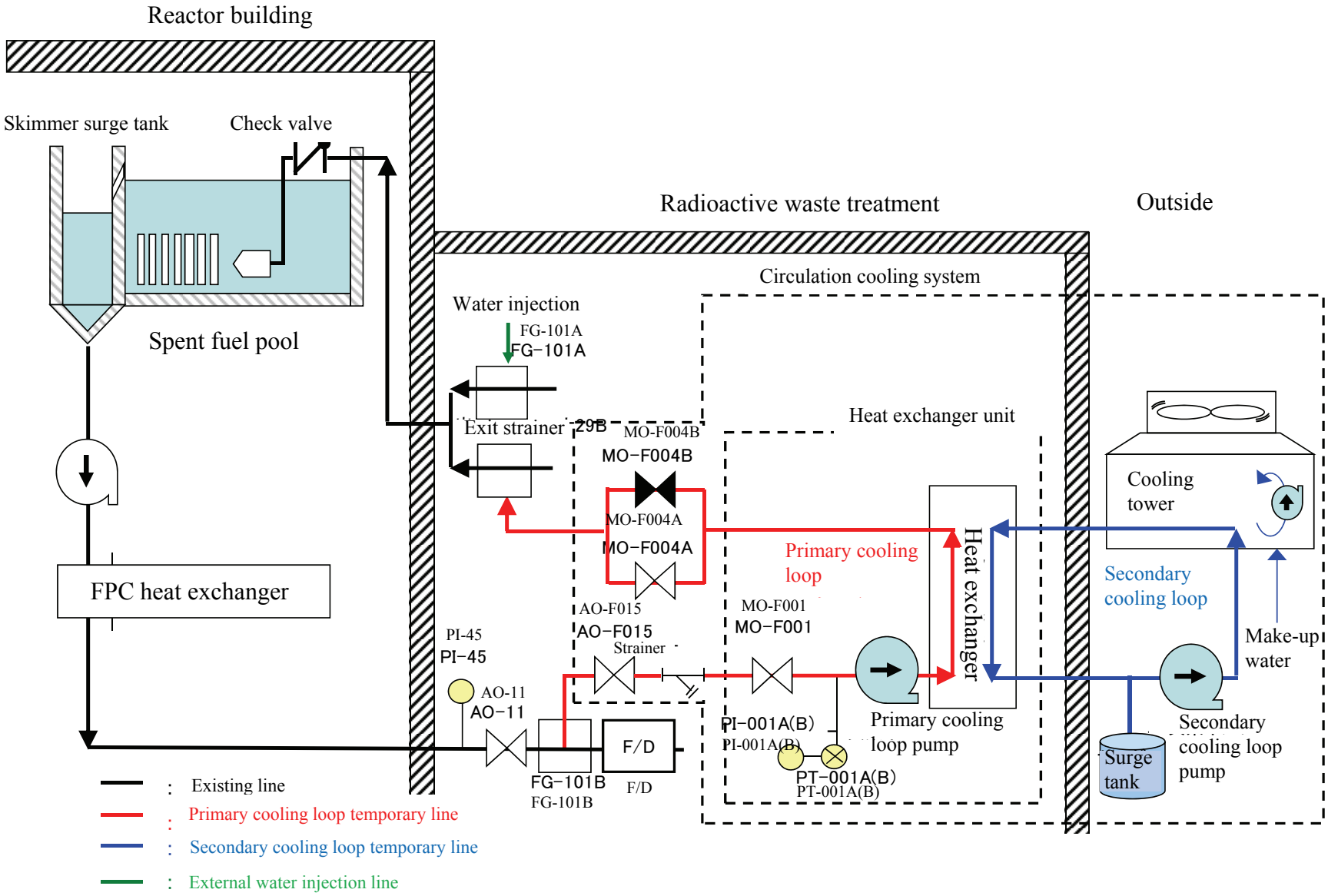
Created by TEPCO

Alternative cooling system for the Unit 2 spent fuel pool



Attachment IV-36

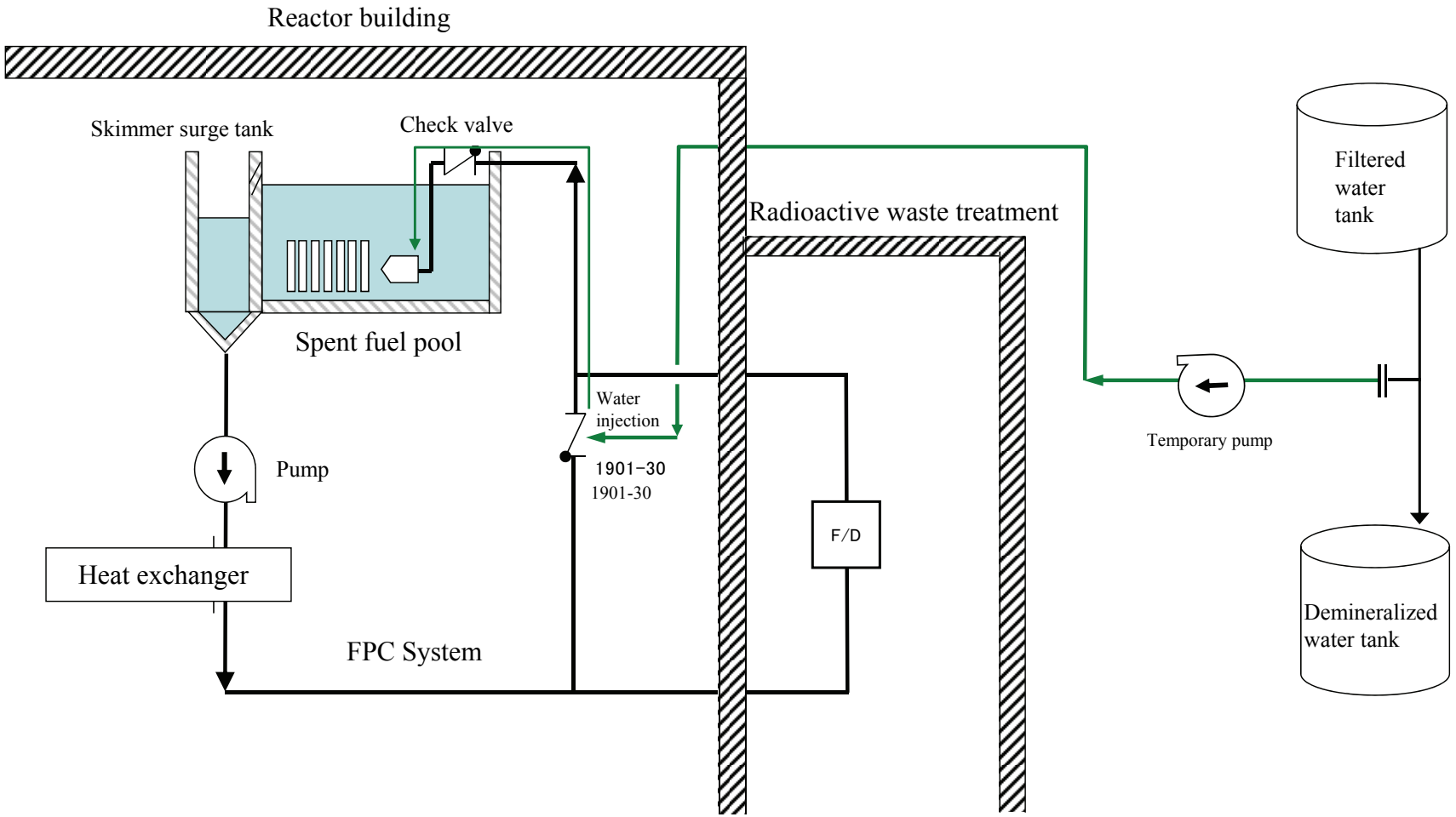
Alternative cooling system for the Unit 3 spent fuel pool



Created by TEPCO

Attachment IV-37

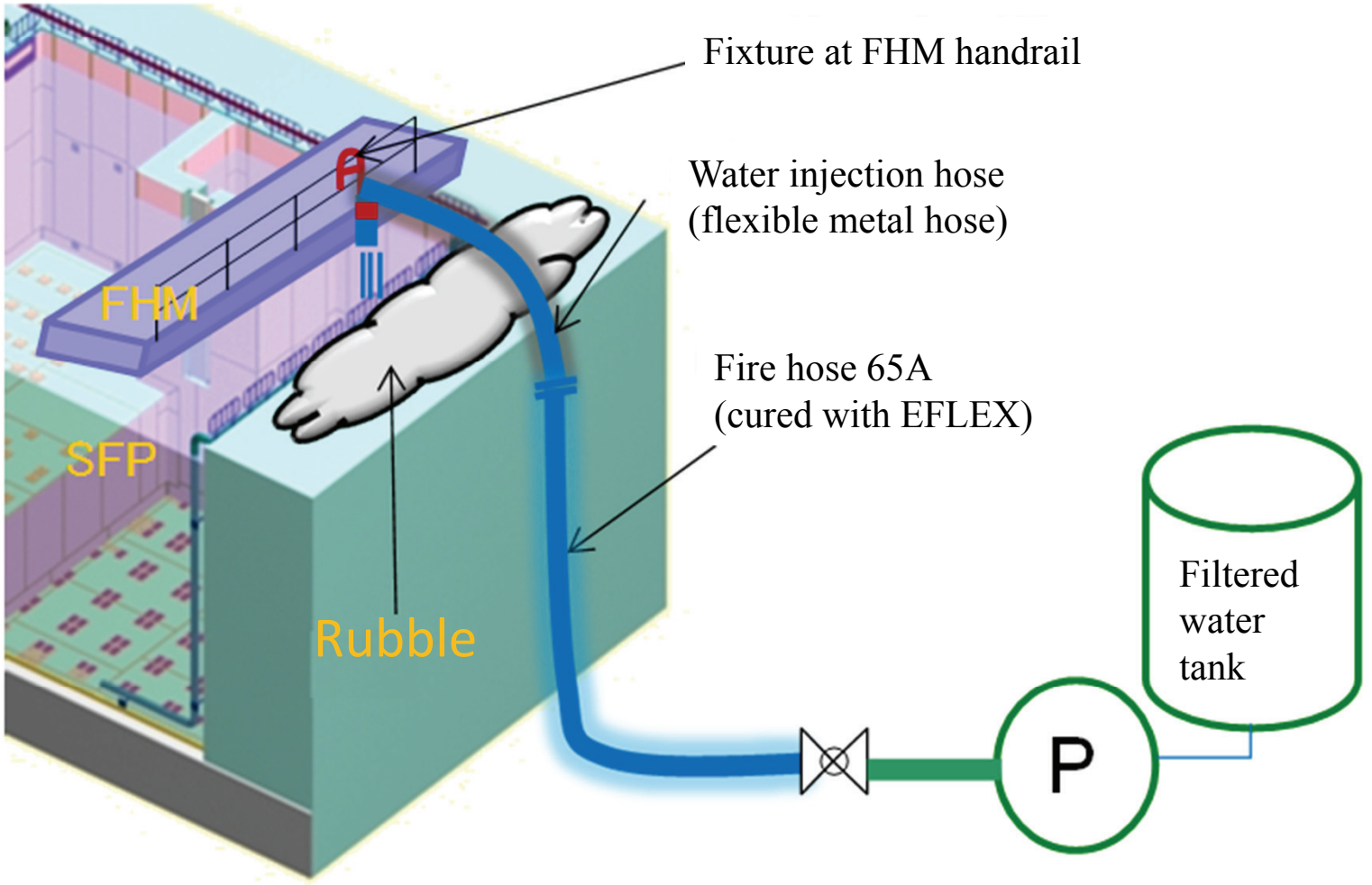
Water injection into the Unit 1 spent fuel pool using the FPC system



Created by TEPCO

Attachment IV-38

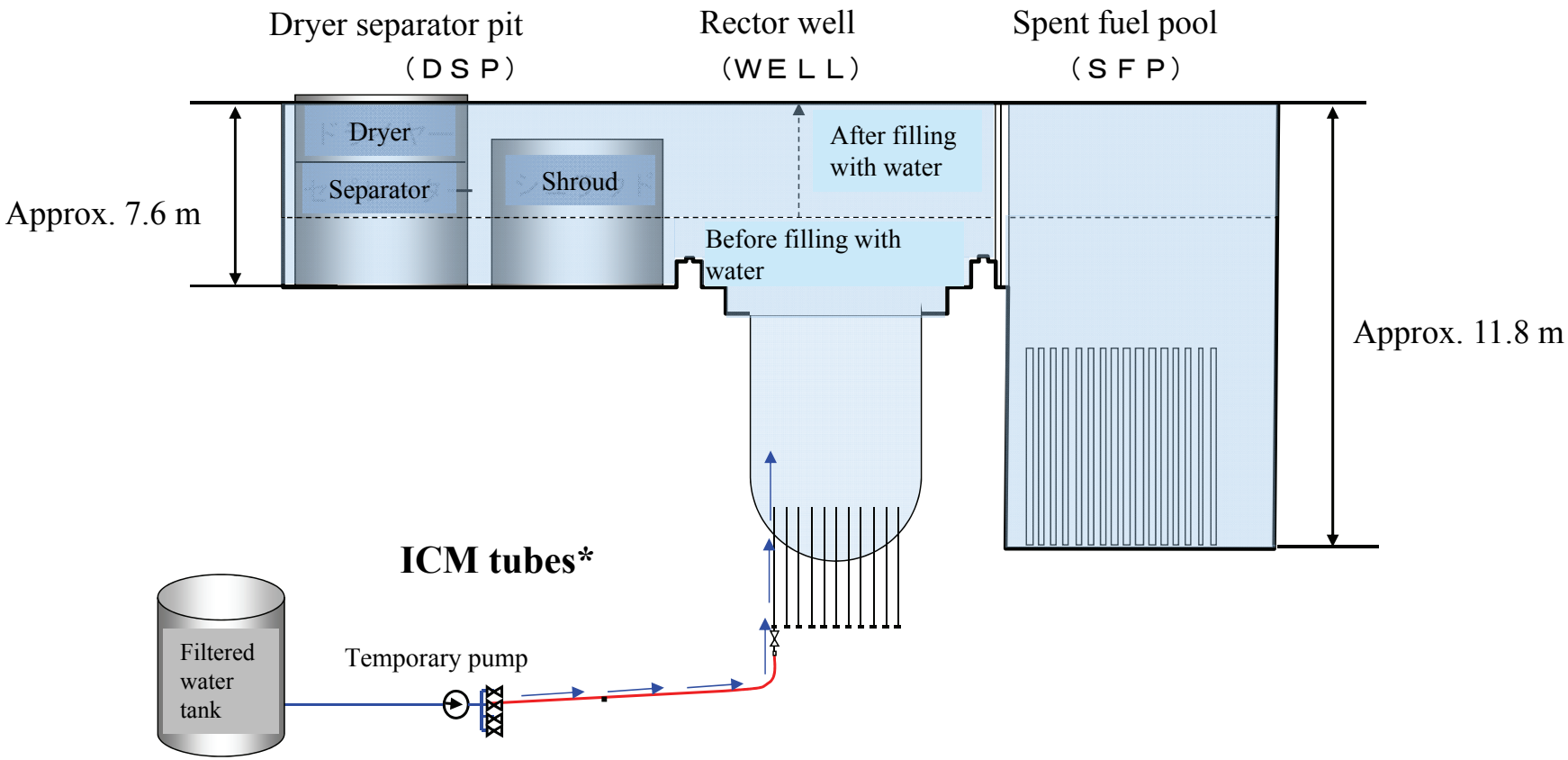
Temporary SFP water injection system ("Mizuha")



Adopted from "Progress Status of *Roadmap towards Restoration after the Accident at the Fukushima Daiichi Nuclear Power Station, TEPCO*" (September, 2009)

Attachment IV-39

Water injection into the Unit 4 spent fuel pool using the ICM tubes

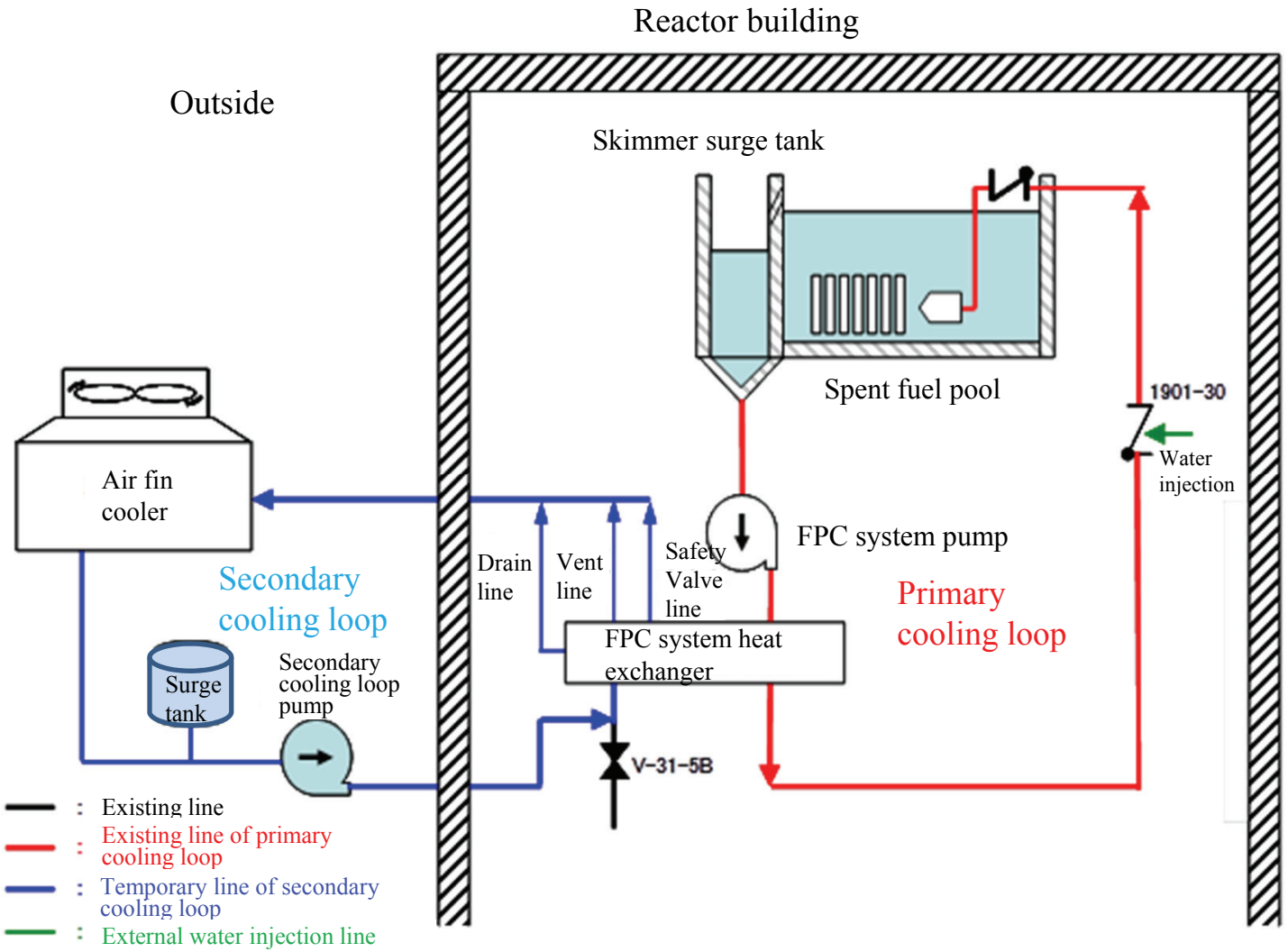


* The ICM tubes are stainless steel tubes housings installed within and welded to the reactor pressure vessel to protect the In-Core Monitors)ICMs) that measure neutron flux in the reactor.

Compiled from documents by TEPCO

Attachment IV-40

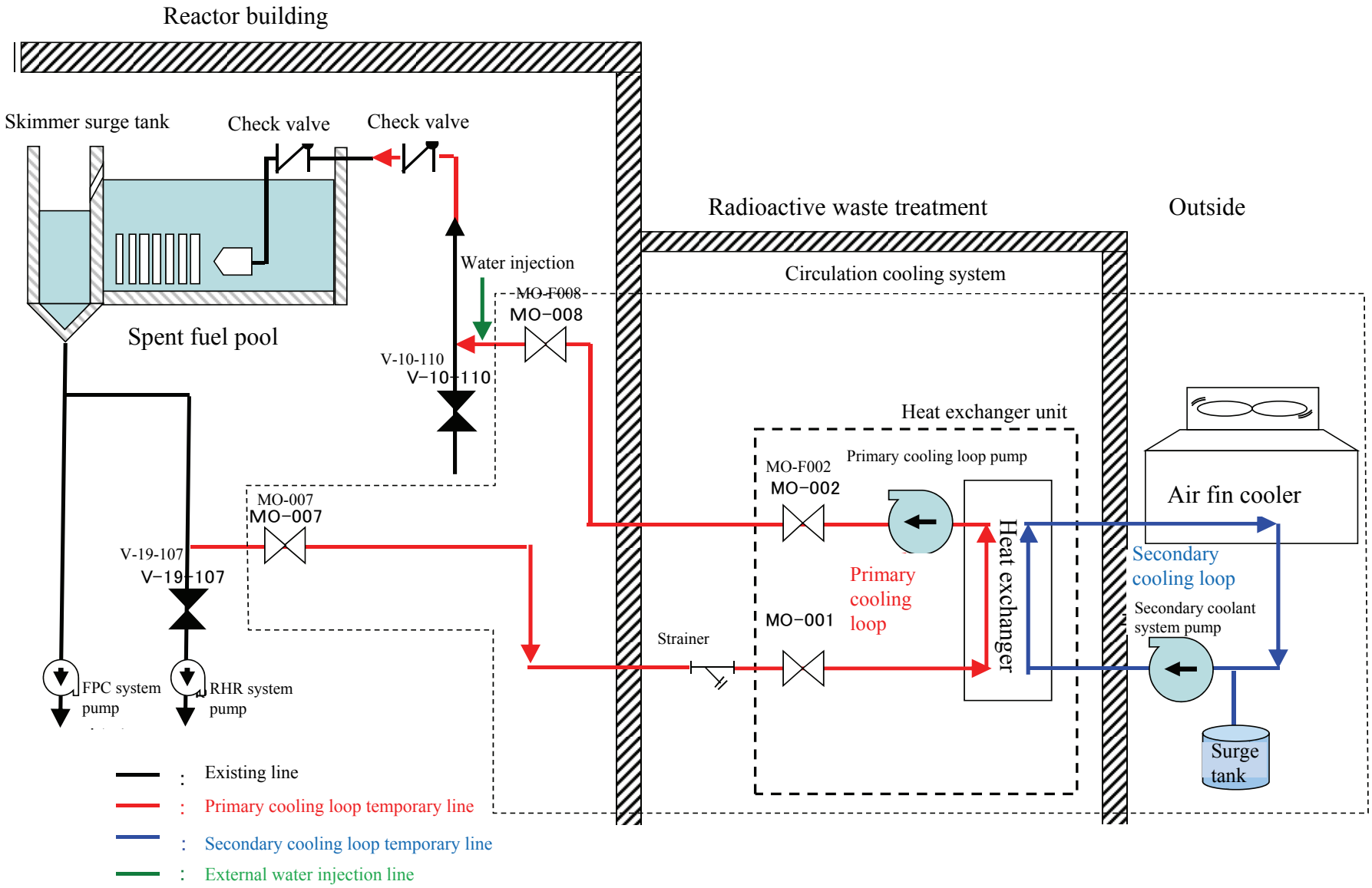
Alternative cooling system for the Unit 1 spent fuel pool



Adopted from "The Impact of the Tohoku District – off the Pacific Ocean Earthquake on Nuclear Reactor Facilities at the Fukushima Dai-ichi Nuclear Power Station" (September, 2011) by TEPCO

Attachment IV-41

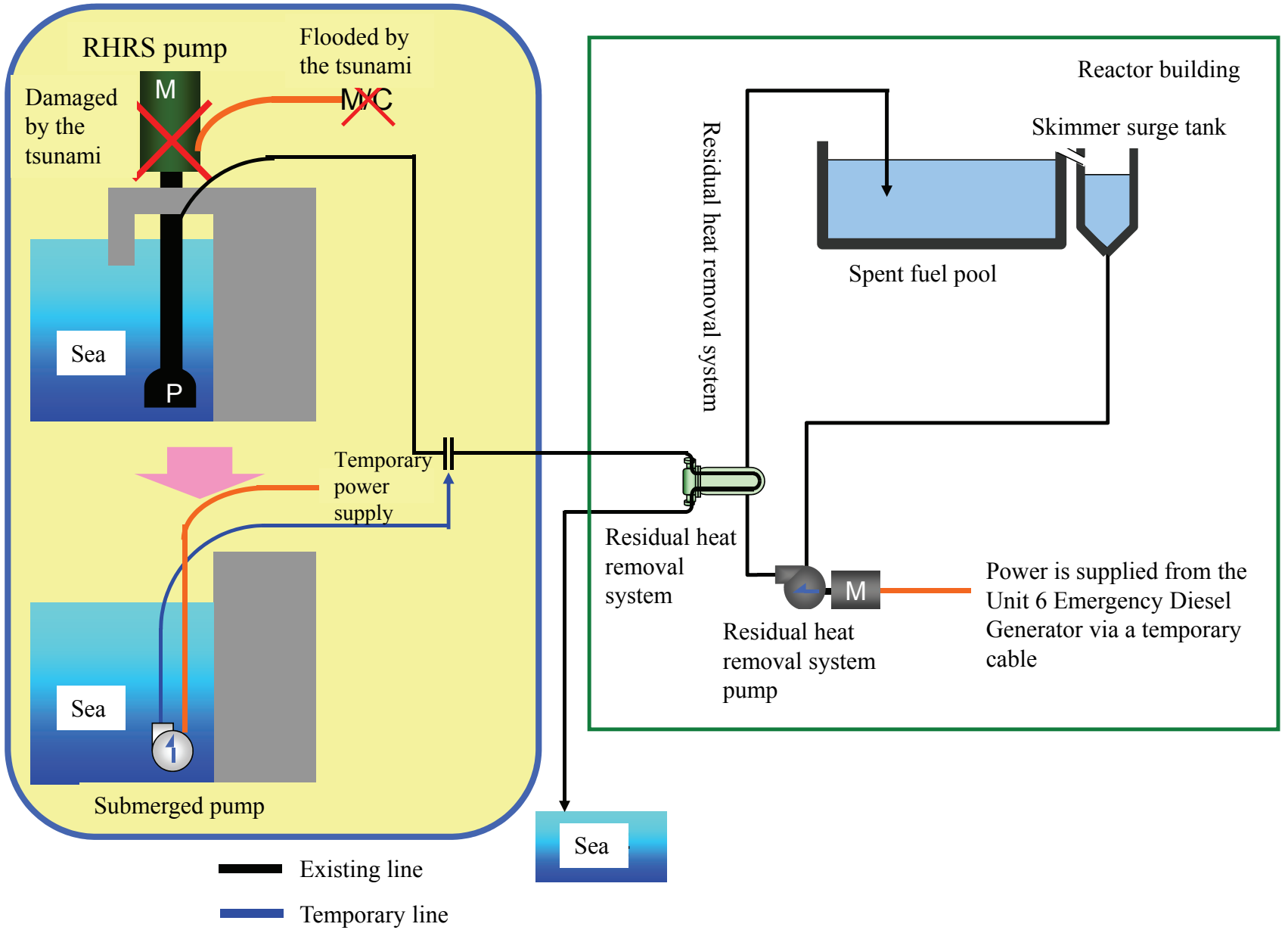
Alternative cooling system for the Unit 4 spent fuel pool



Created by TEPCO

Attachment IV-42

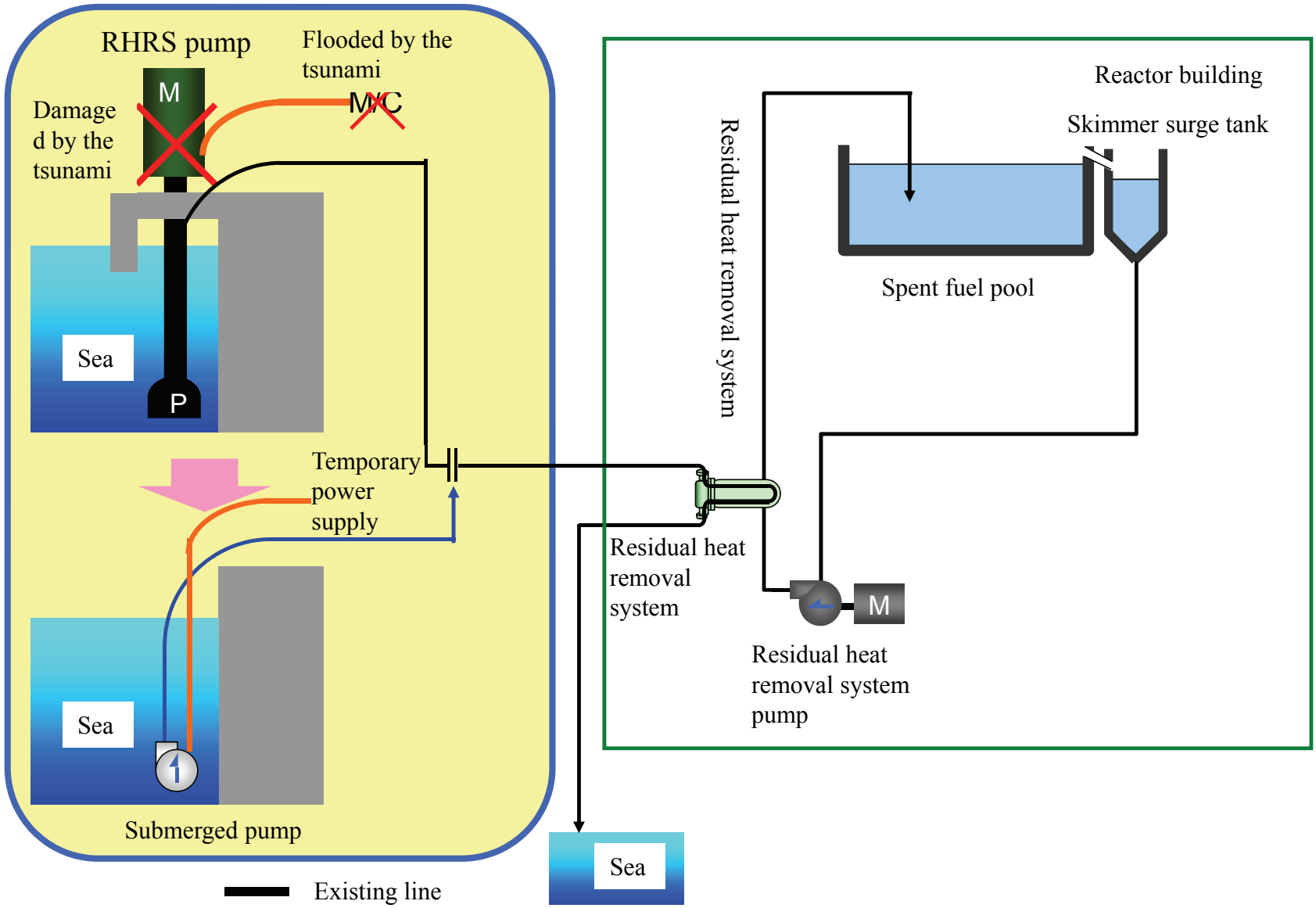
Cooling system for the Unit 5 spent fuel pool



Created by TEPCO

Attachment IV-43

Cooling system for the Unit 6 spent fuel pool



Created by TEPCO

Attachment IV-44

This page intentionally left blank.

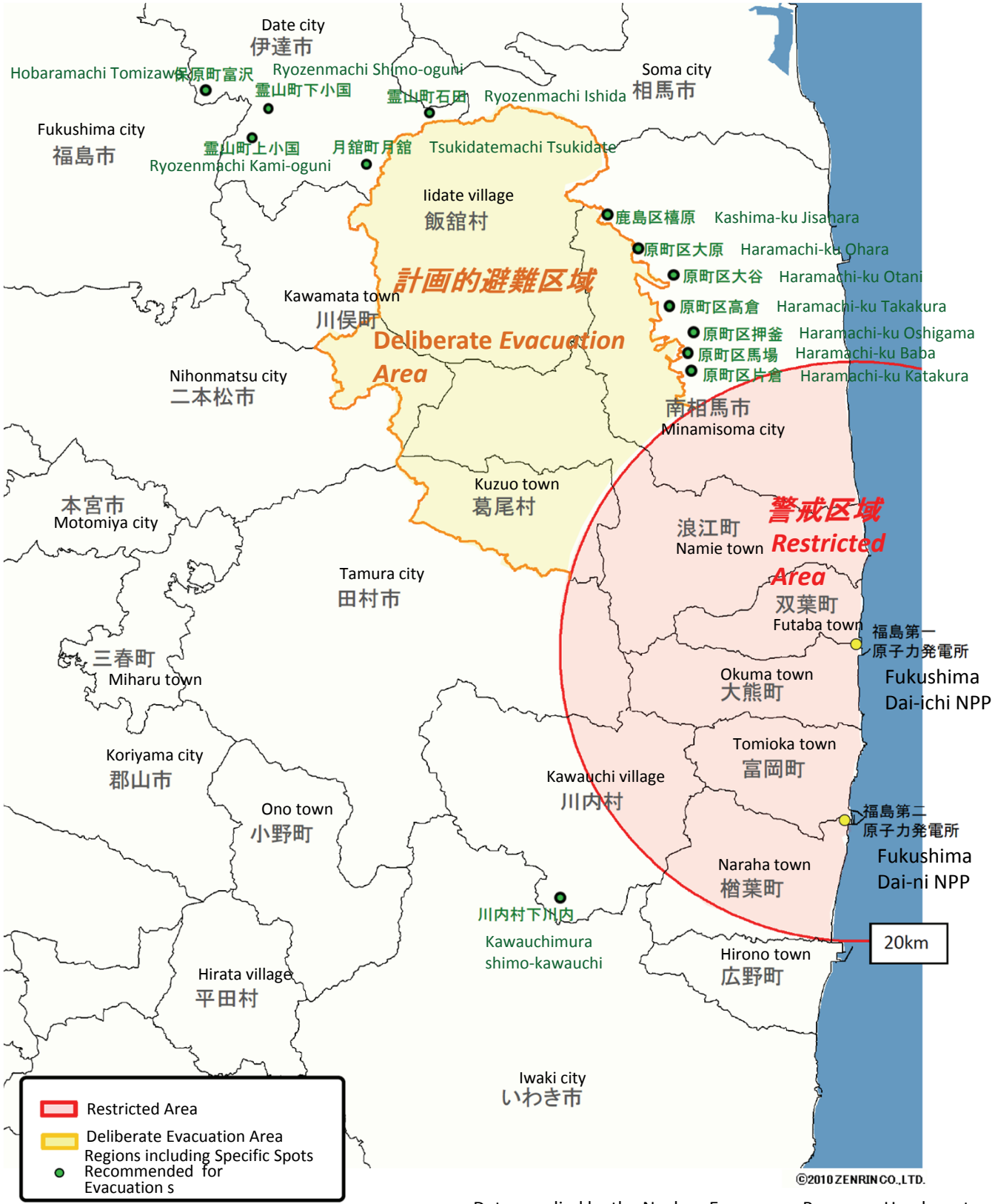
Geographical overview of the restricted area, deliberate evacuation areas, areas prepared for emergency evacuation and regions including specific spots from where evacuation is recommended (before the cancellation of areas prepared for emergency evacuation)

Attachment V-1

Data supplied by the Nuclear Emergency Response Headquarters

Geographical overview of the restricted area, deliberate evacuation areas, areas prepared for emergency evacuation and regions including specific spots from where evacuation is recommended (after the cancellation of areas prepared for emergency evacuation)

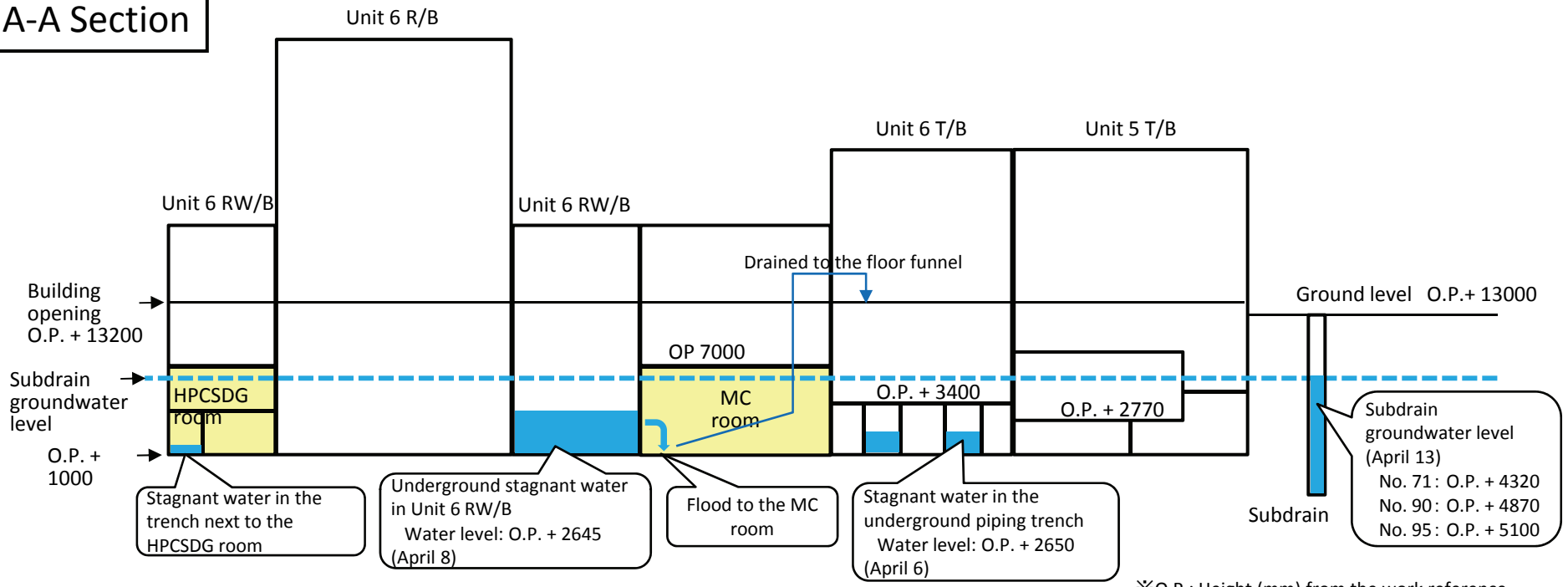
Attachment V-2



Data supplied by the Nuclear Emergency Response Headquarters

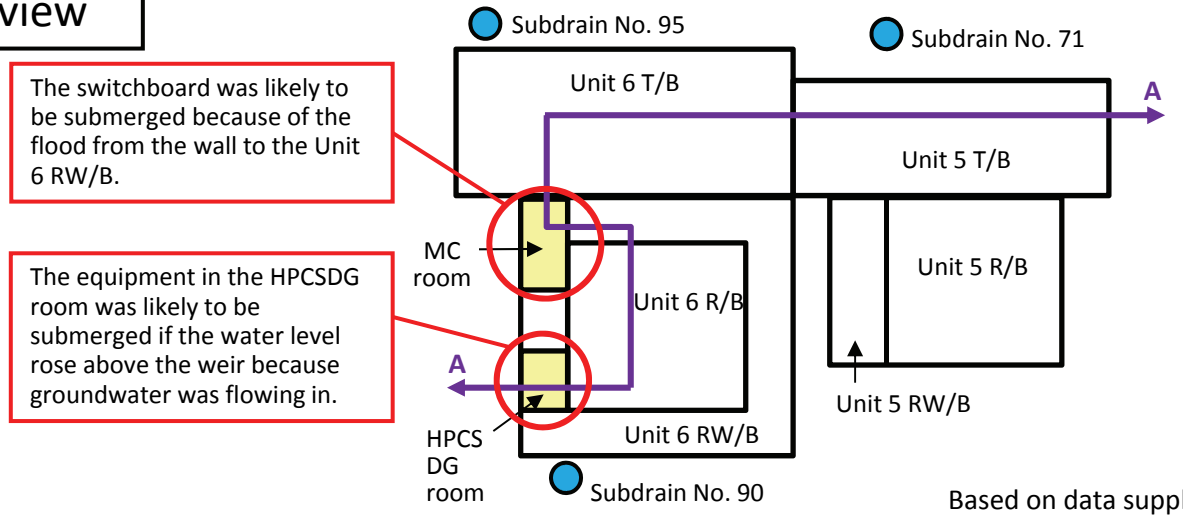
Overview of the penetration of groundwater into the basement of Unit 6 buildings

A-A Section



※O.P.: Height (mm) from the work reference level of Onahama Peil

Plan view

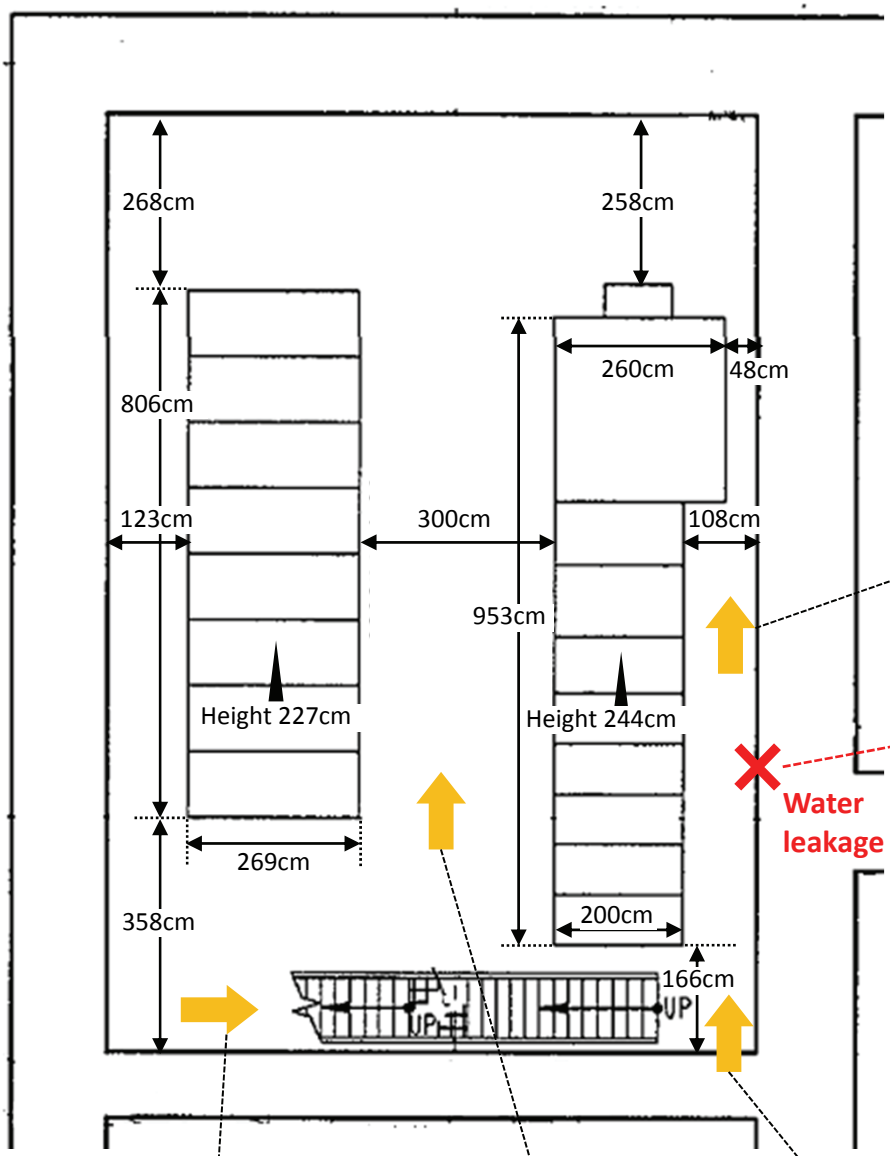


Based on data supplied by TEPCO.

Attachment V-3

Photographs showing the penetration of water into the MC room (as of March 26)

Attachment V-4

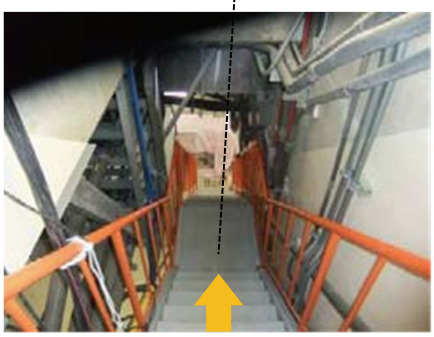


(Photo by TEPCO on Aug 22)

(Photo by TEPCO on Mar 26)

Close up

(Photo by TEPCO on Mar 26)



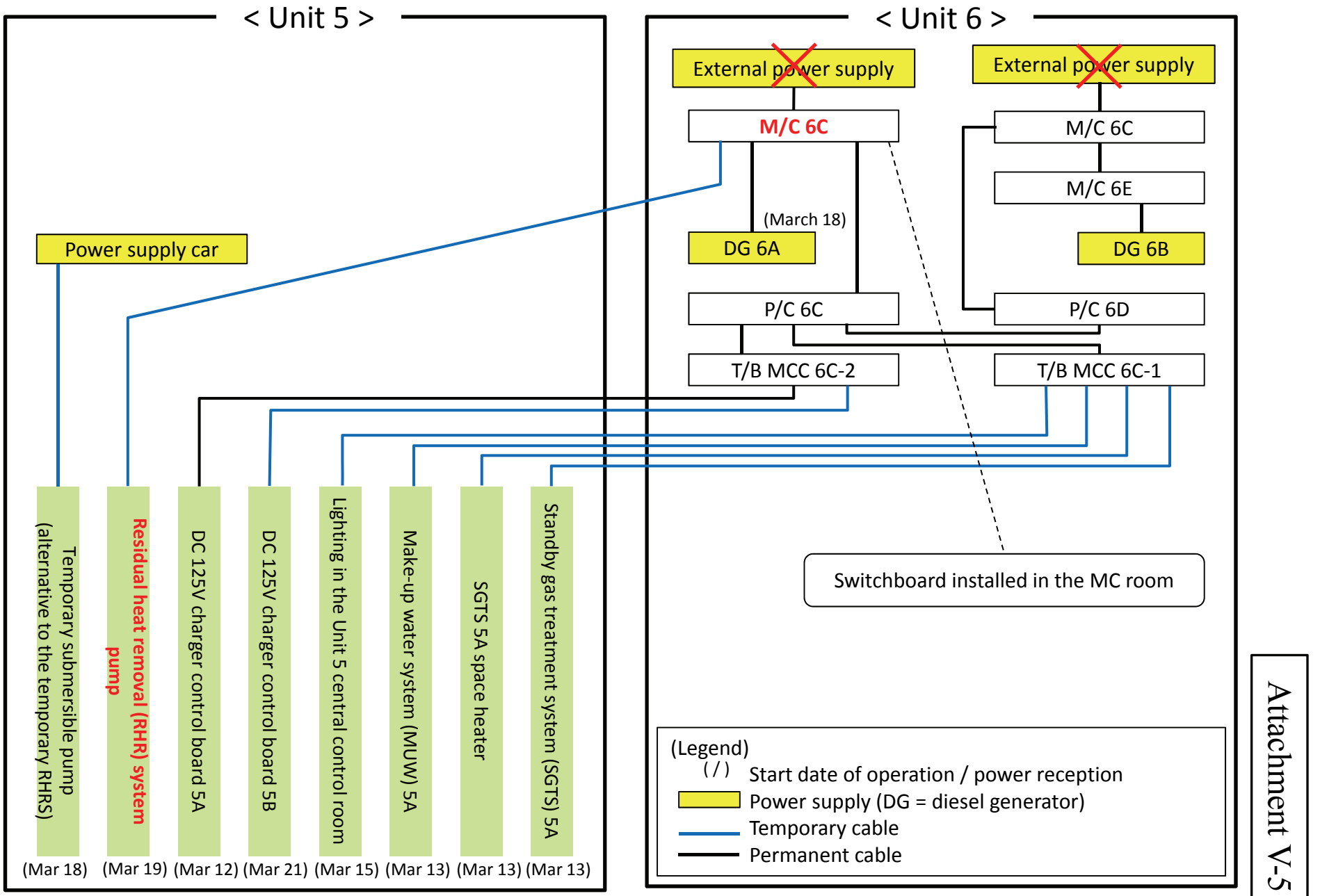
(Photo by TEPCO on Aug 22)

(Photo by TEPCO on Aug 22)

(Photo by TEPCO on Aug 22)

Prepared by TEPCO.

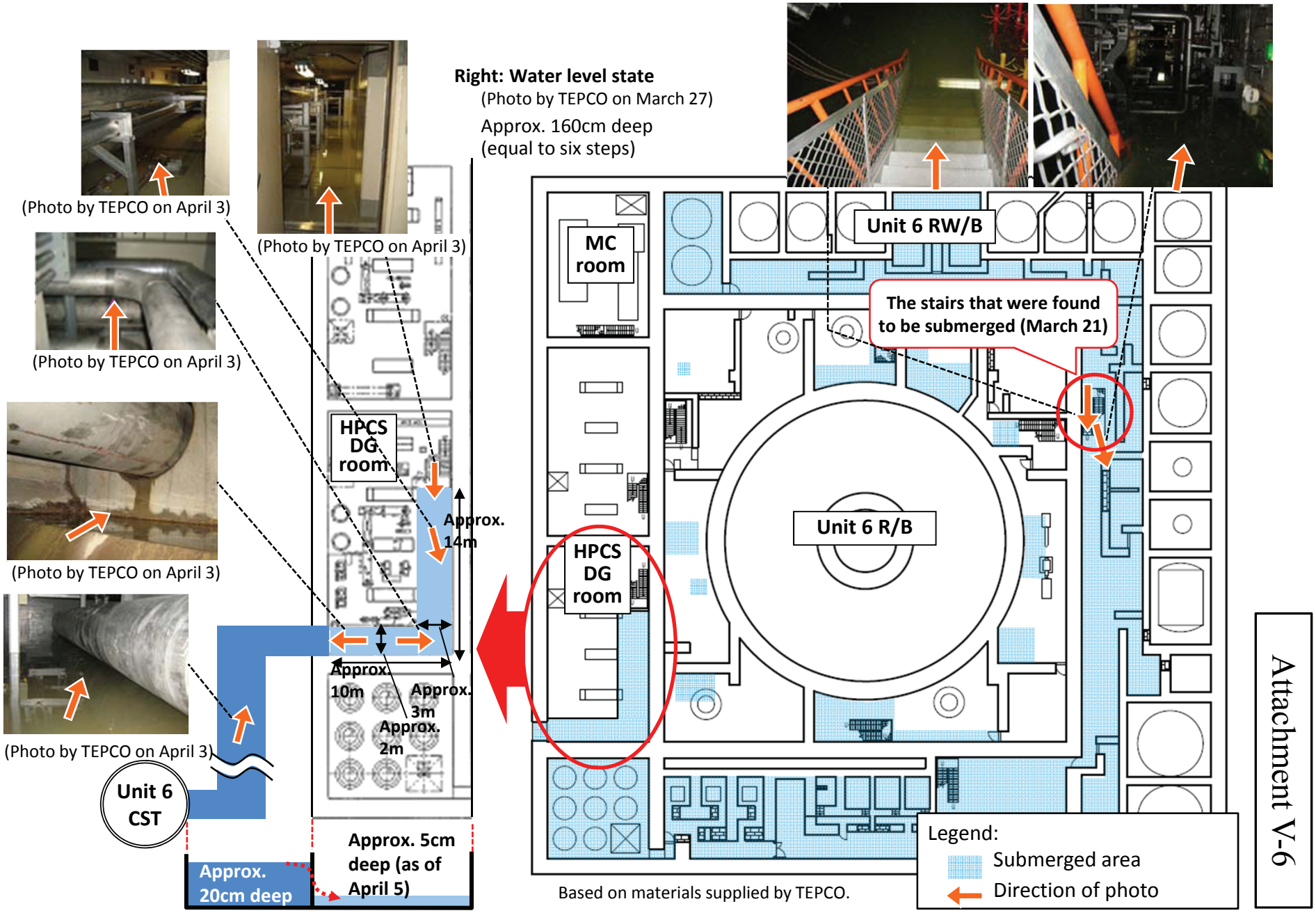
Overview of efforts to supply power from Unit 6 to Unit 5 (as of March 21)



Based on data supplied by TEPCO.

Attachment V-5

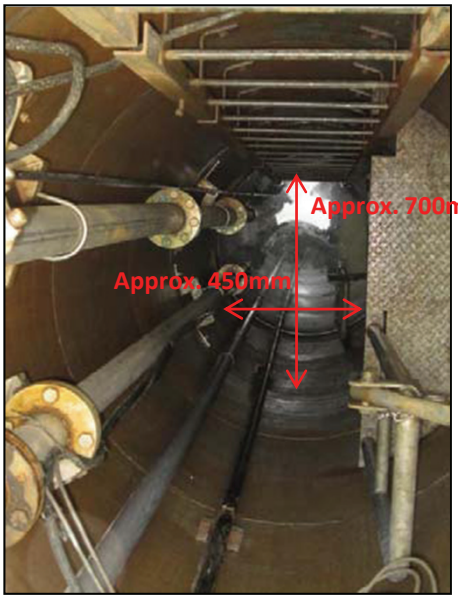
Overview of water that remained in the second basement area of the Unit 6 R/B and RW/B



Attachment V-6

Configuration and layout of the subdrain system

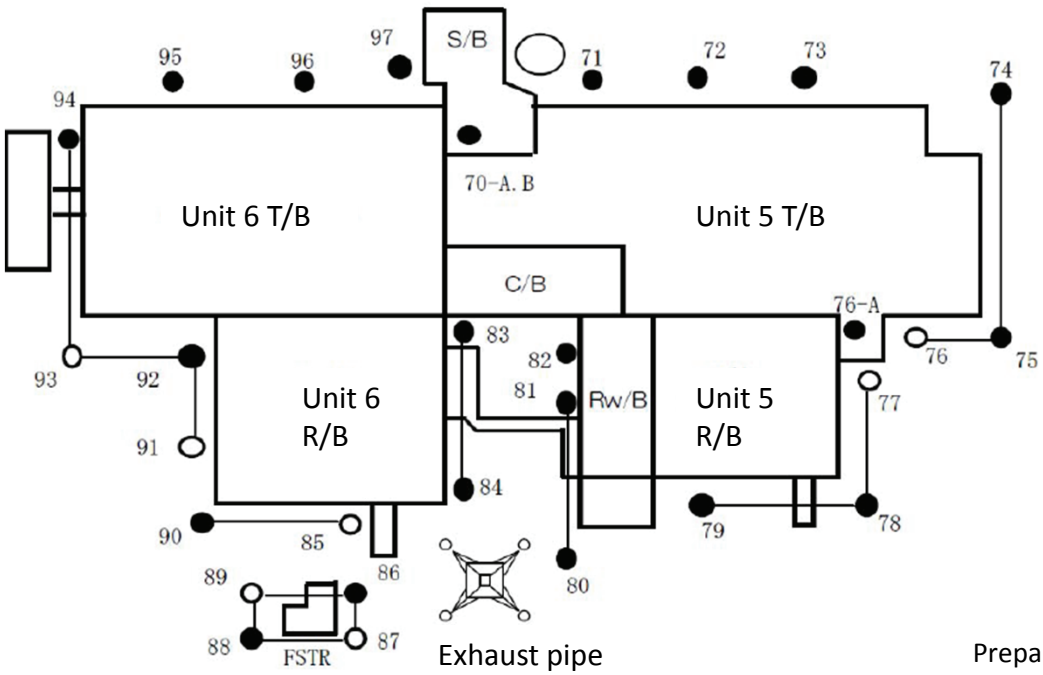
Attachment V-7



Available opening: approx. 450mm × approx. 700mm

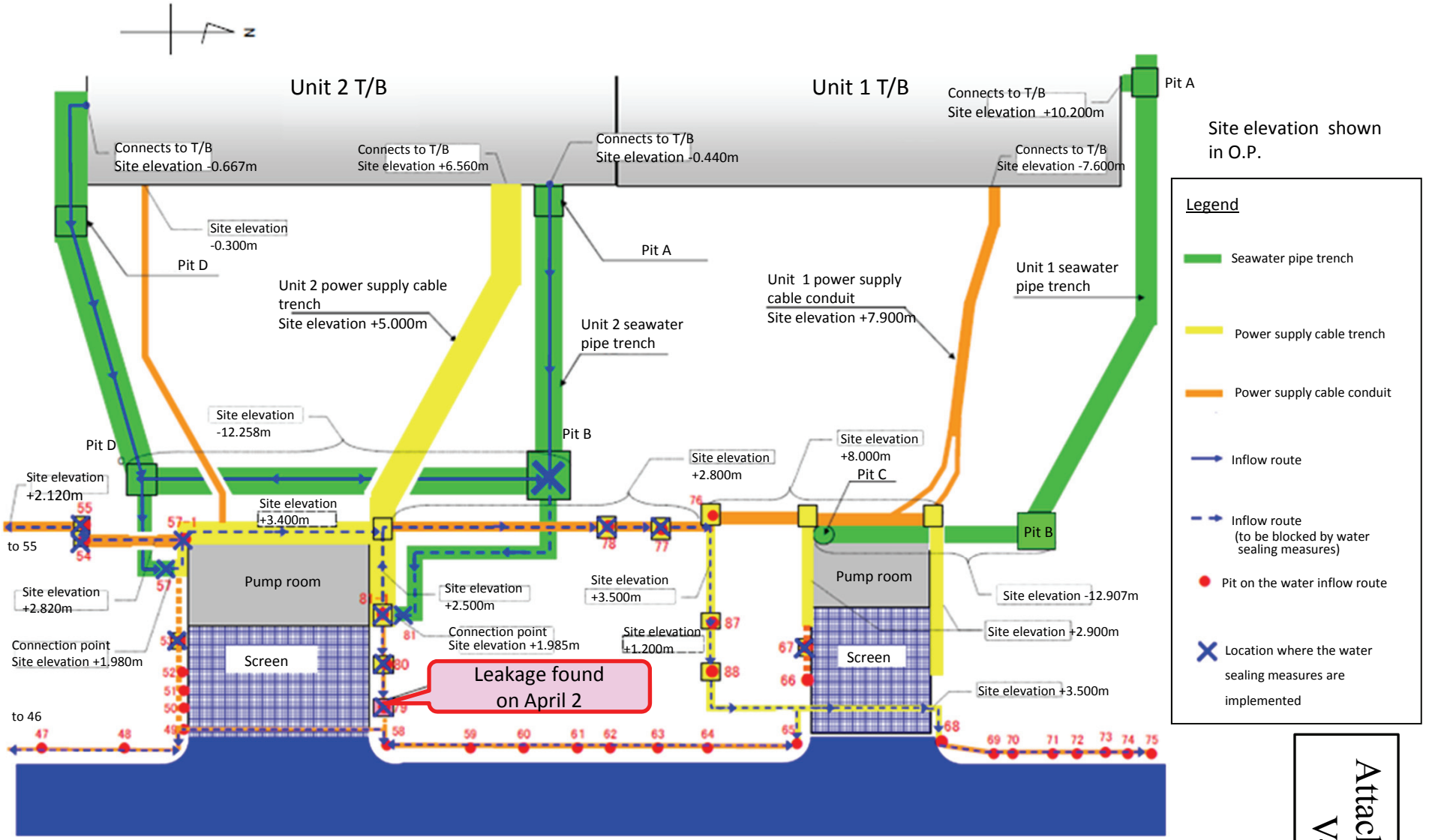
(All five photos were taken by TEPCO on May 2 in subdrain No. 56 located in the southeast of the Unit 4 T/B)

Layout of the subdrain in Units 5 & 6



Prepared by TEPCO.

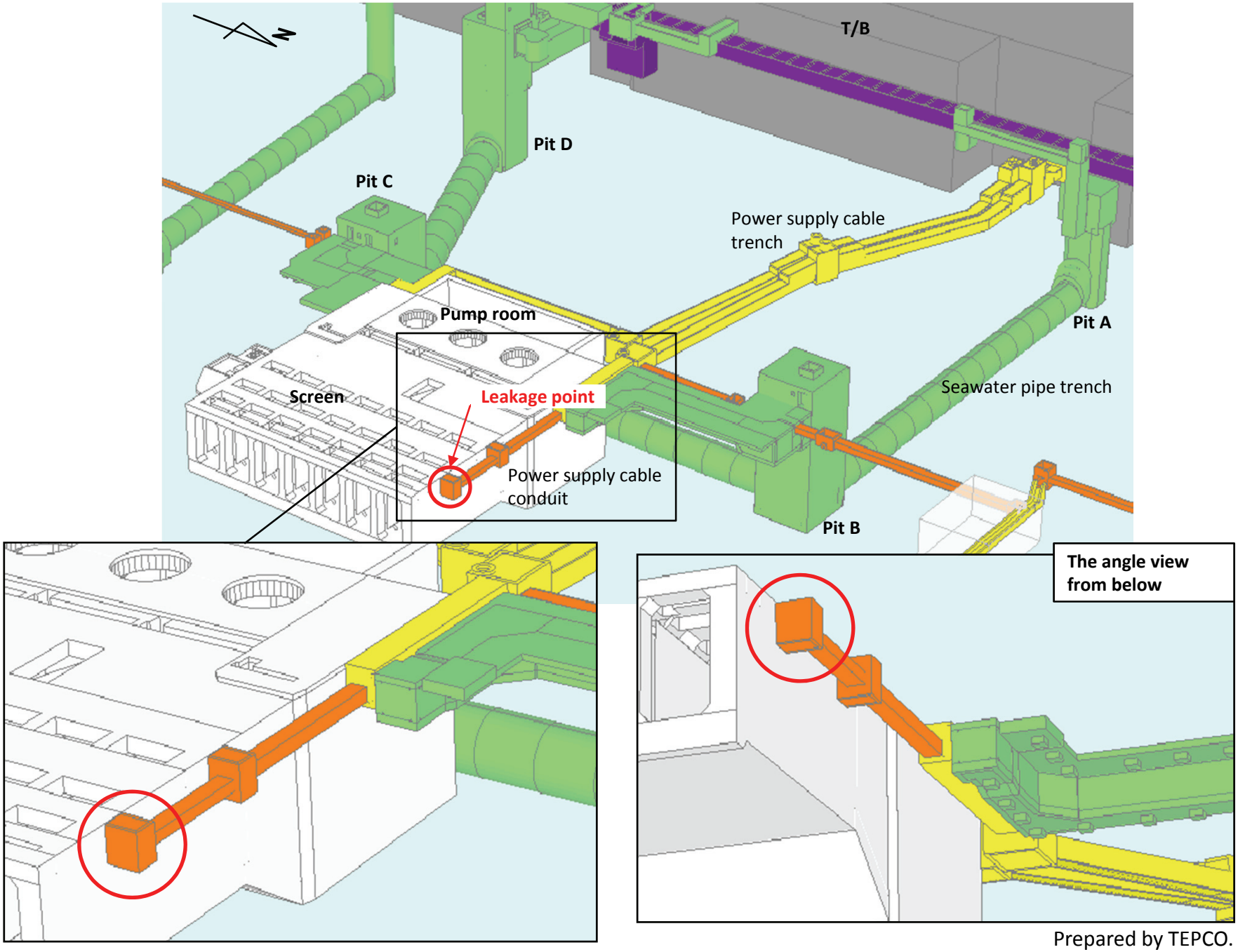
Highly contaminated water outflow routes near the Unit 2 water intake (plane view)



Attachment V-8

Prepared by TEPCO.

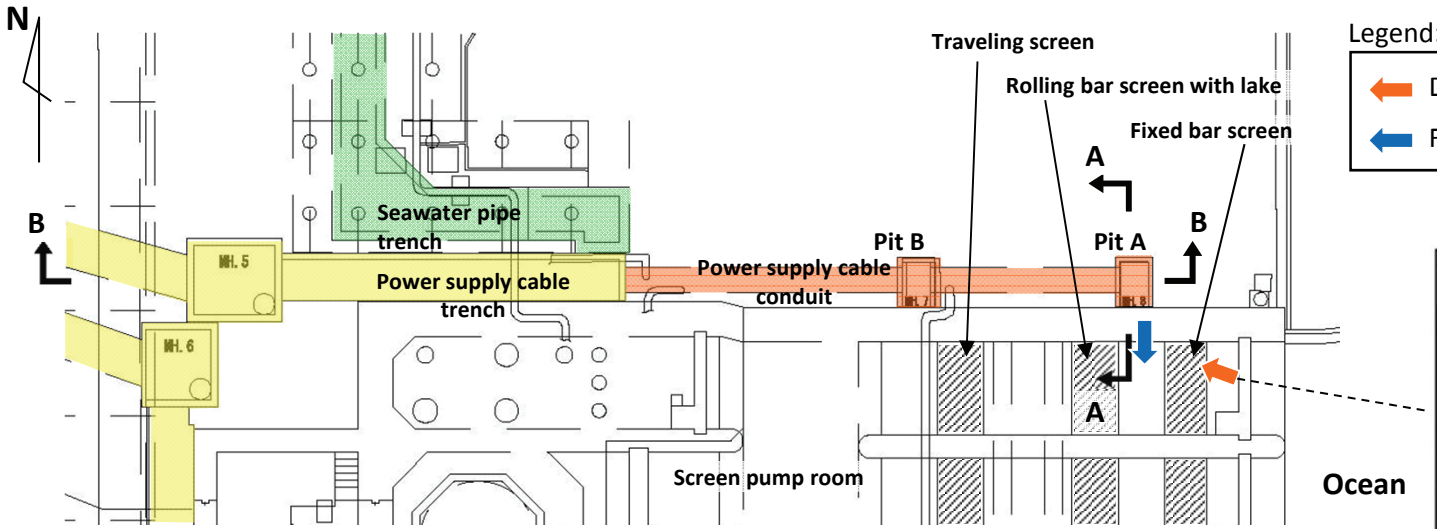
Highly contaminated water outflow routes near the Unit 2 water intake (sketch)



Prepared by TEPCO.

Attachment V-9

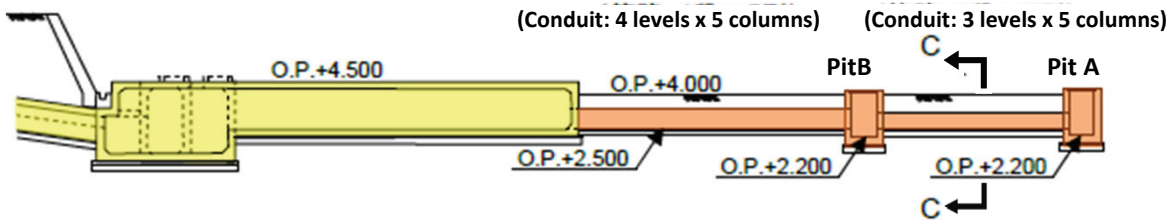
Response to the outflow of highly contaminated water near the Unit 2 water intake (status at the time of detection)



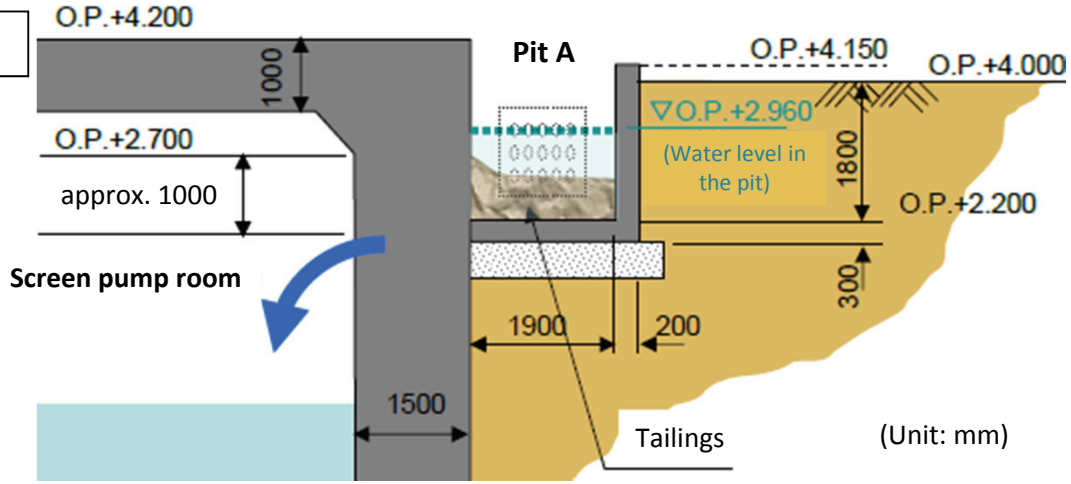
Legend:
- Direction of photo
- Flow to the ocean

Photo of outflow (taken by TEPCO at approximately 12:40 on April 2)

B-B Section

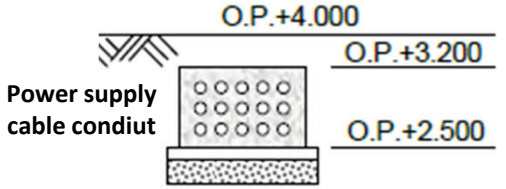


A-A Section



(Unit: mm)

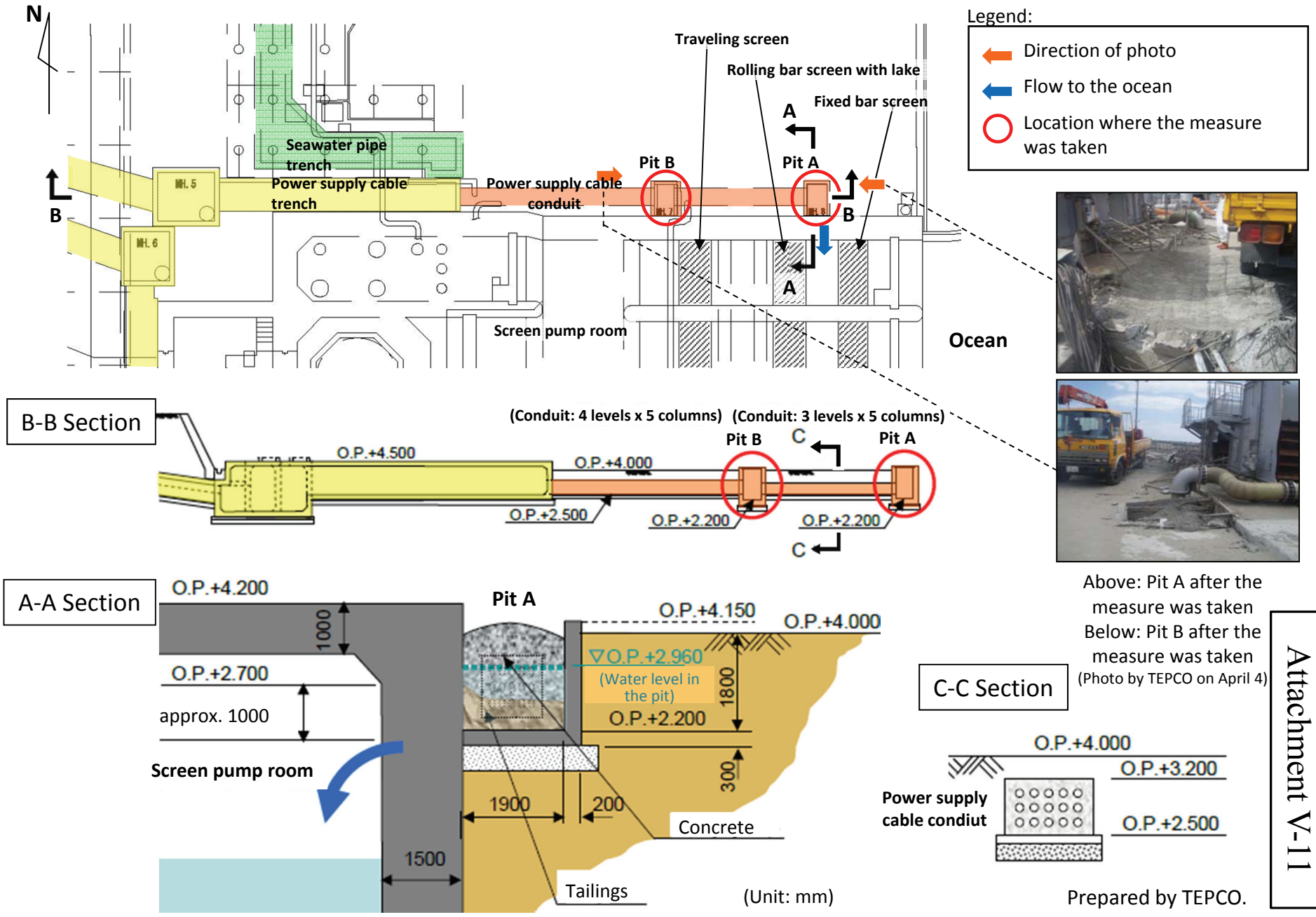
C-C Section



Prepared by TEPCO.

Attachment V-10

Response to the outflow of highly contaminated water near the Unit 2 water intake (status after the injection of concrete)

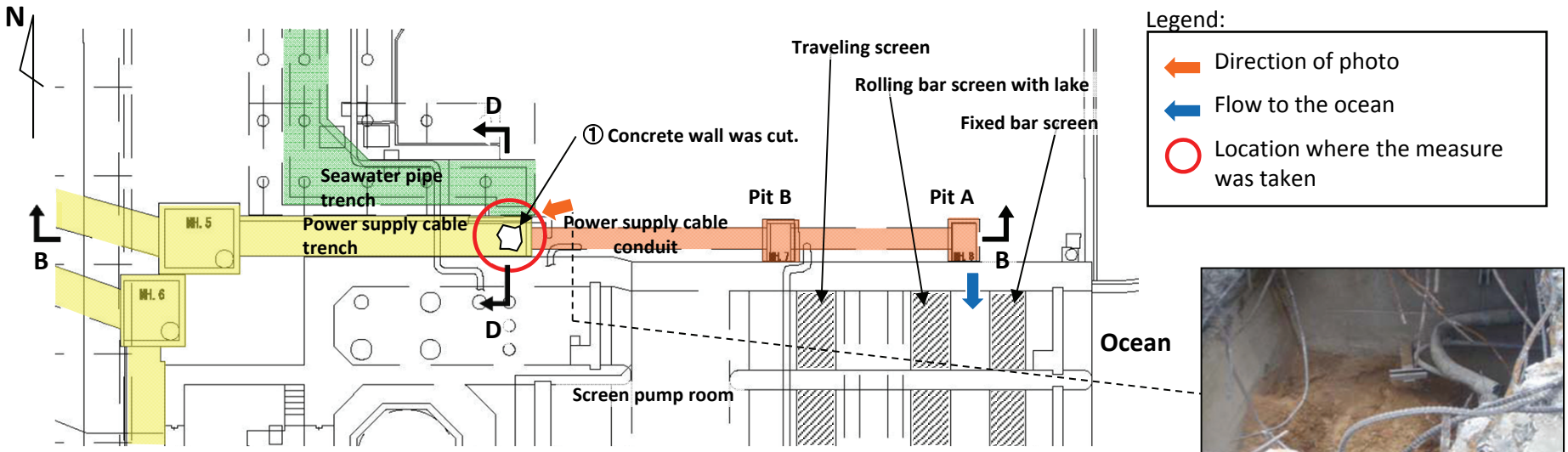


Above: Pit A after the measure was taken
Below: Pit B after the measure was taken
(Photo by TEPCO on April 4)

Prepared by TEPCO.

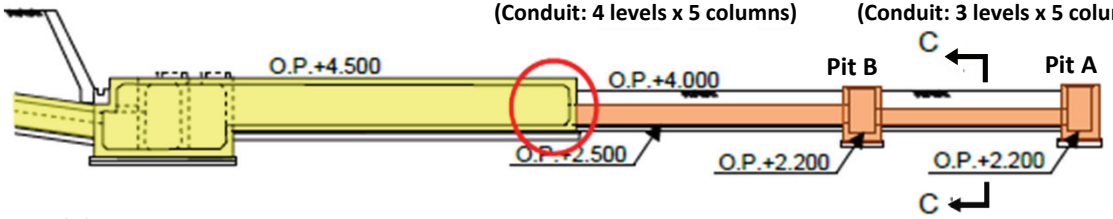
Attachment V-11

Response to the outflow of highly contaminated water near the Unit 2 water intake (status after the injection of polymer, etc.)



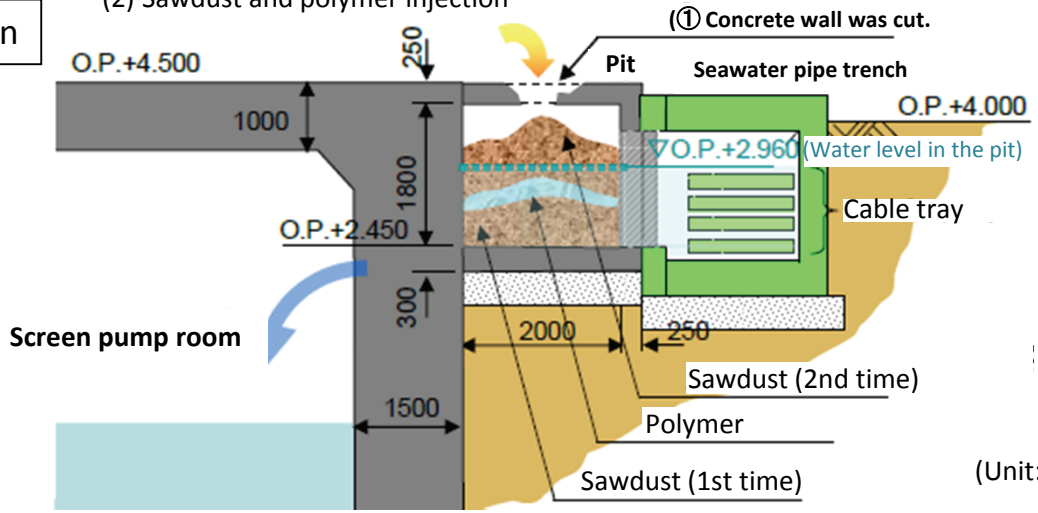
Polymer injection
(Photo by TEPCO at 13:47 on April 3)

B-B Section

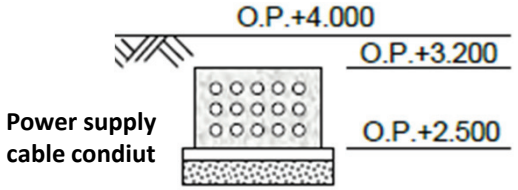


(2) Sawdust and polymer injection

D-D Section



C-C Section

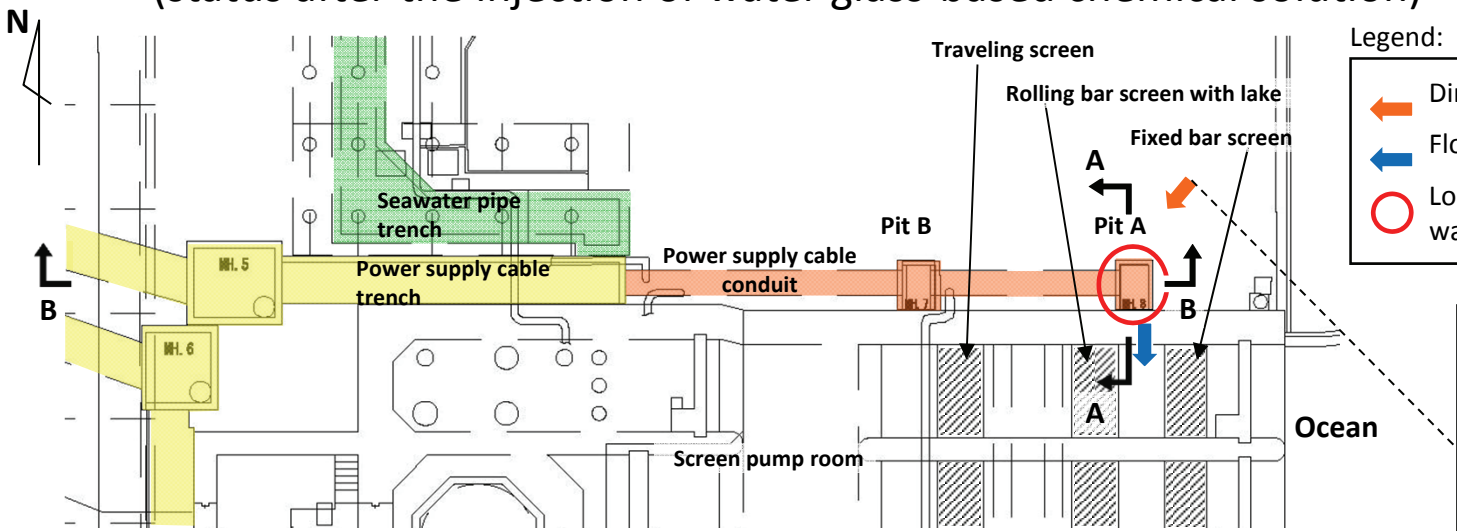


(Unit: mm)

Prepared by TEPCO.

Attachment V-12

Response to the outflow of highly contaminated water near the Unit 2 water intake (status after the injection of water glass-based chemical solution) - (1)

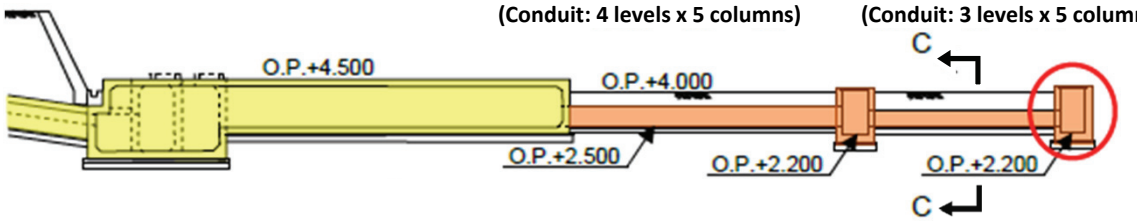


Legend:

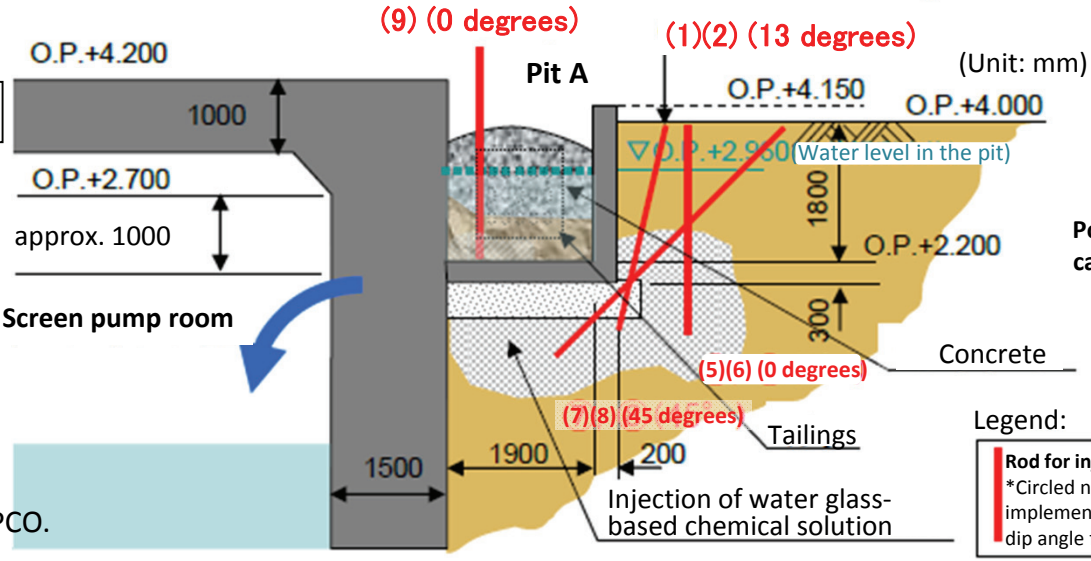
- Direction of photo
- Flow to the ocean
- Location where the measure was taken

Injecting the solution
(Photo by TEPCO on April 5)

B-B Section

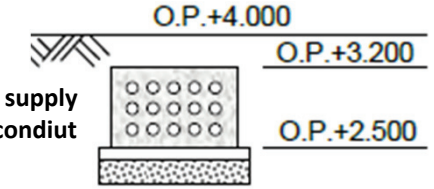


A-A Section



(Unit: mm)

C-C Section



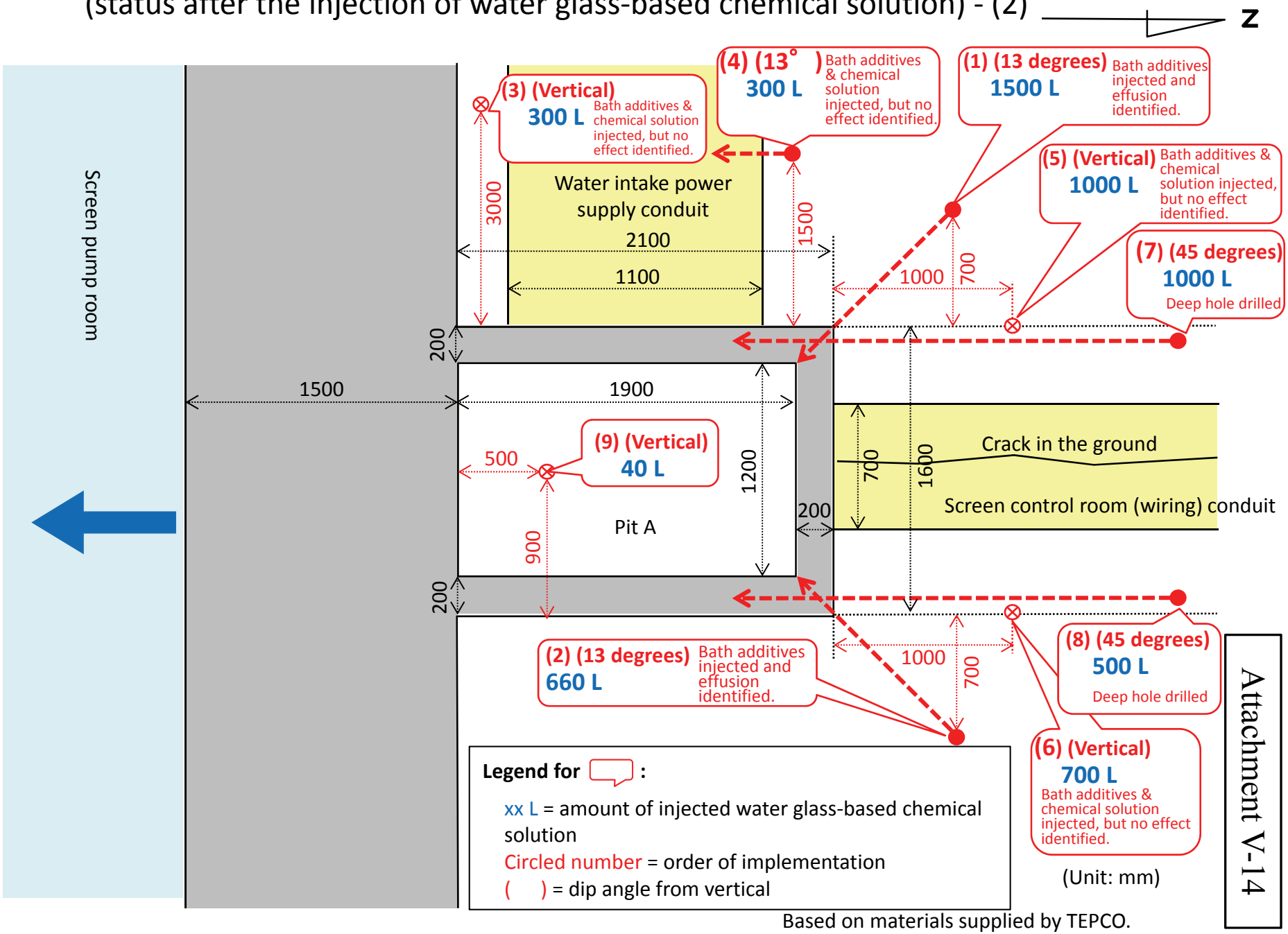
Legend:

Rod for injecting water glass-based chemical solution.
*Circled numbers indicate the order of implementation. Numbers in parentheses indicate the dip angle from vertical.

Prepared by TEPCO.

Attachment V-13

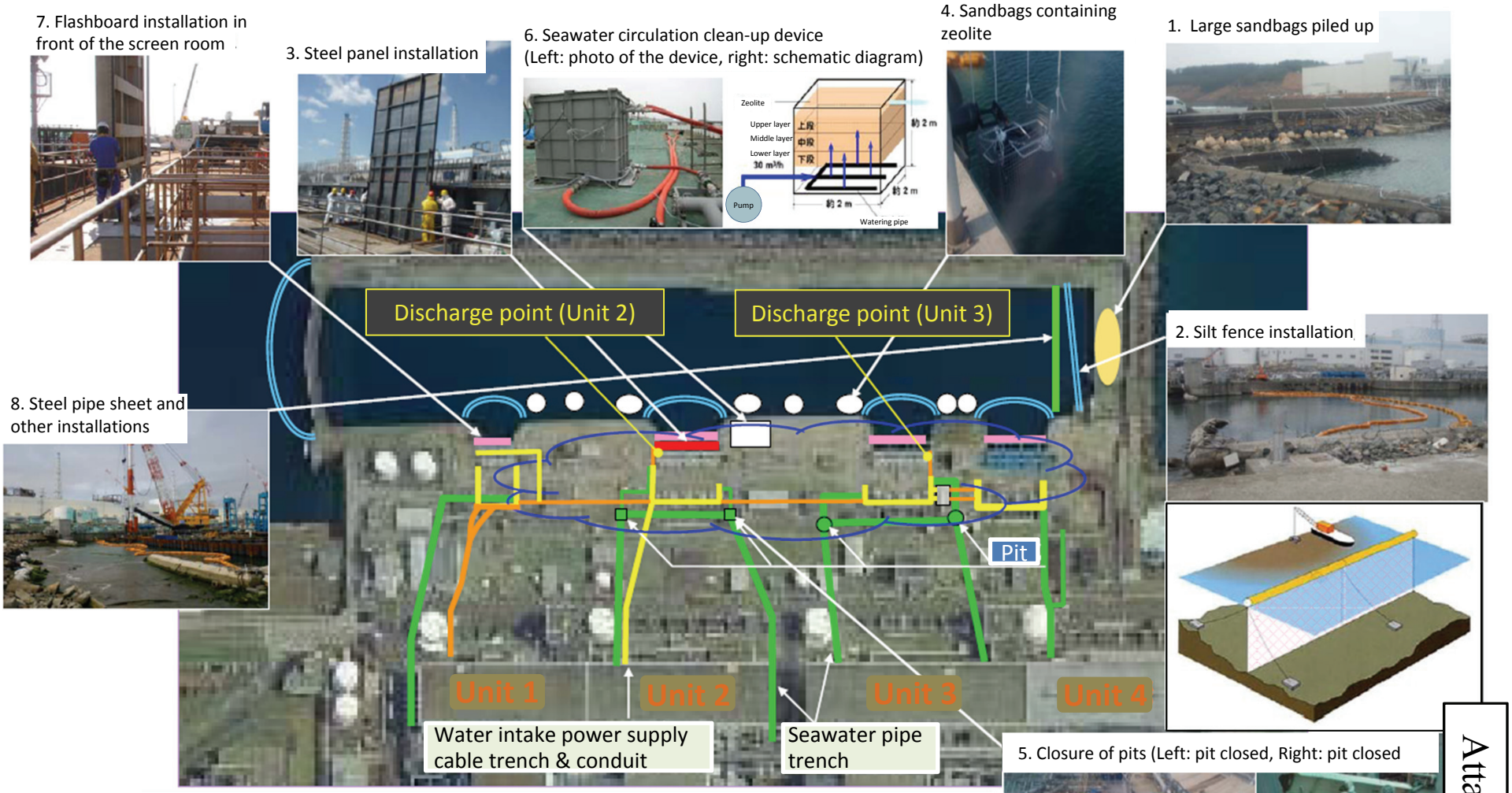
Response to the outflow of highly contaminated water near the Unit 2 water intake (status after the injection of water glass-based chemical solution) - (2)



Based on materials supplied by TEPCO.

Attachment V-14

Enhanced measures for preventing the spread of radioactive water (bird's eye view of the sites where measures were implemented)

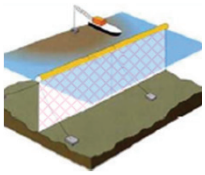
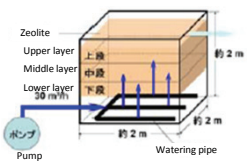


1. Large sandbags (April 5 - 8)
2. Silt fence (April 11 - 14)
3. Steel panel installation (April 12 - 15)
4. Sandbags containing zeolite (April 15, 17, 19)
5. Closure of pits and other routes (pits with seawater pipe trench: April 5 - 30, pits with power supply cable trench: April 2 - June 25)
6. Seawater circulation clean-up device (installed: mid – late May, operational: from June 13)
7. Flashboard installation in front of the screen room (June 12 - 29)
8. Steel pipe sheet pile installation (July 12 – late September) [Sea sweeping started on July 12, steel pipe sheet pile installation: started Aug 17 and completed on Sep 6]

Prepared by TEPCO.

Attachment V-15

Enhanced measures for preventing the spread of radioactive water (list) Attachment V-16

No.	Measure	Period	Overview	Condition
1	Installation of large sandbags	April 5 - 8	Sixty-two large sandbags piled up on the damaged area of the breakwaters (outlying facilities).	
2	Installation of silt fences	April 11 - 14	Silt fences spread out in six locations: the water intake curtain wall, in front of the screen pump rooms, and the damaged area of the penetration resistant structures.	 
3	Installation of steel panels	April 12 - 15	Seven steel panels installed in front of the screen pump room of Unit 2.	
4	Submersion of sandbags containing zeolite	April 15 and 17, May 19 (additional submersion)	Sandbags containing zeolite submerged in front of the seawall between the screen pump rooms of each Unit.	
5	Closure of pits and other routes	- Closure of pits with seawater pipe trench: April 5 - May 30 - Closure of pits with power supply cable trench and other routes: April 2 - June 25 (including countermeasures against leakage of contaminated water in Unit 2)	Water blocking measures implemented in the following pits and locations where there was a risk of leakage of radioactive solution: - Closure of pits with seawater pipe trench - Closure of power supply cable trench	 
6	Installation of seawater circulation clean-up device	Installation: mid – late May Operation: June 13	Seawater circulation clean-up device that uses zeolite as an absorbent installed on the seawall between the screen pump rooms of Units 2 and 3. Seawater clean-up is currently being conducted.	 
7	Installation of flashboards in front of the screen rooms	June 12 - 29	Steel flashboards installed on the sea side of the screen pump rooms.	
8	Insertion of steel pipe sheet piles around outlying facilities	July 12 - September 28	Steel pipe sheet piles and the other members inserted inside large sandbags piled up on the damaged area of the breakwaters (outlying facilities).	

Prepared by TEPCO.

Attachment V-17

Level of contaminated water in the Unit 3 T/B (in the pit)

Unit: mm

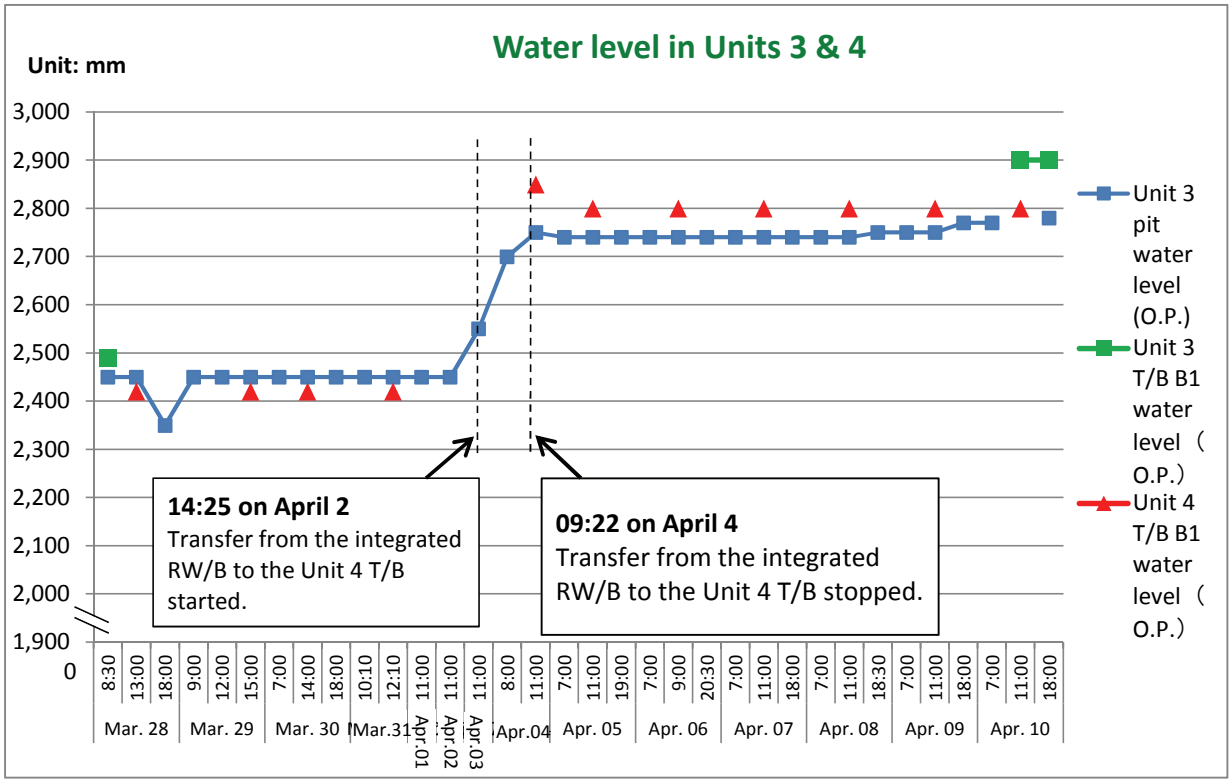
Date	Mar. 28			Mar. 29			Mar. 30			Mar. 31	
Time	8:30	13:00	18:00	9:00	12:00	15:00	7:00	14:00	18:00	10:10	12:10
Unit 3 pit water level (O.P.)	2,450	2,450	2,350	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,450
Unit 3 T/B B1 water level（O.P.）	2,490										
Unit 4 T/B B1 water level（O.P.）		2,420				2,420		2,420			2,420

Unit: mm

Date	Apr. 01	Apr. 02	Apr. 03	Apr. 04		Apr. 05			Apr. 06		
Time	11:00	11:00	11:00	8:00	11:00	7:00	11:00	19:00	7:00	9:00	20:30
Unit 3 pit water level (O.P.)	2,450	2,450	2,550	2,700	2,750	2,740	2,740	2,740	2,740	2,740	2,740
Unit 3 T/B B1 water level（O.P.）											
Unit 4 T/B B1 water level（O.P.）					2,850		2,800			2,800	

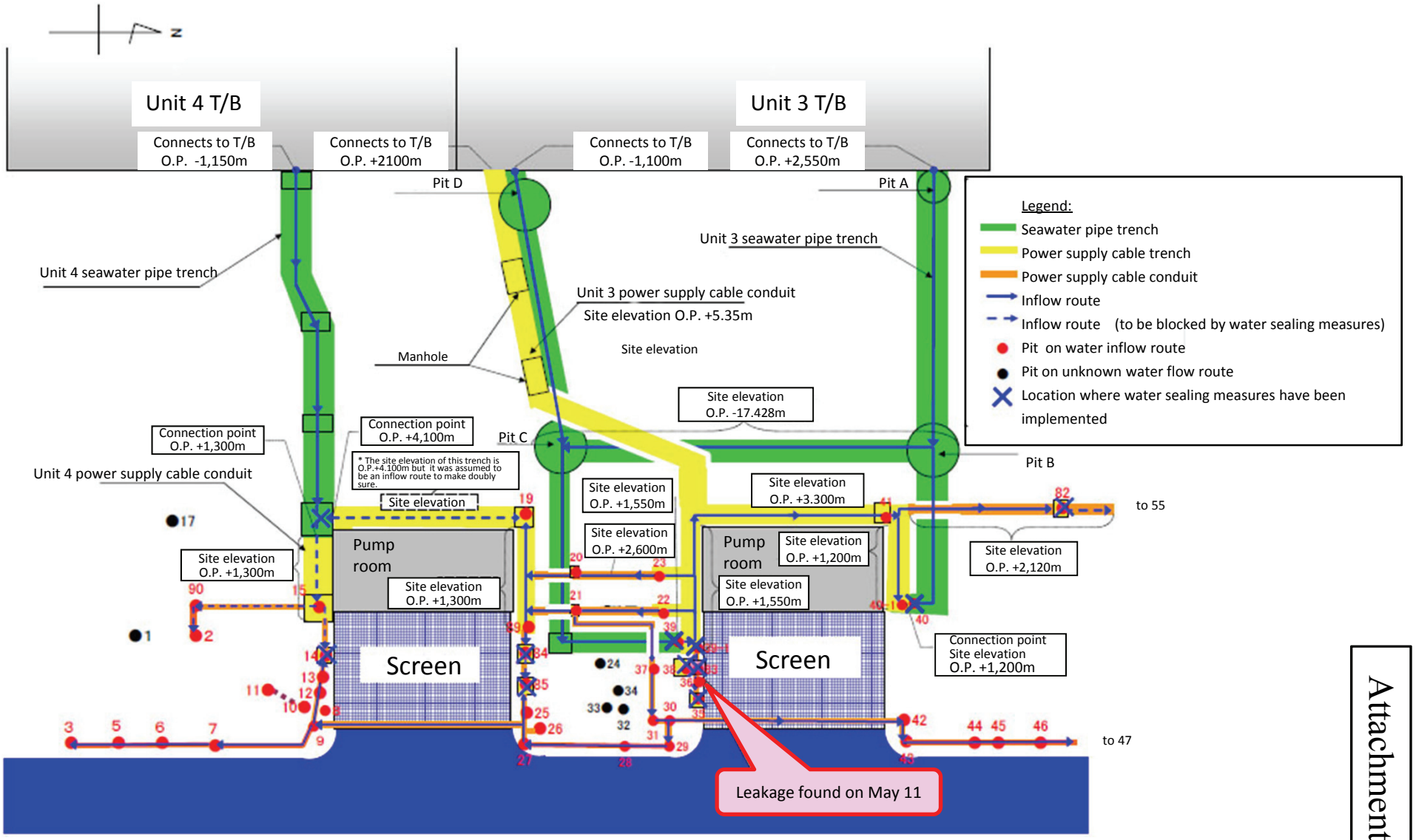
Unit: mm

Date	Apr. 07			Apr. 08			Apr. 09			Apr. 10		
Time	7:00	11:00	18:00	7:00	11:00	18:30	7:00	11:00	18:00	7:00	11:00	18:00
Unit 3 pit water level (O.P.)	2,740	2,740	2,740	2,740	2,740	2,750	2,750	2,750	2,770	2,770		2,780
Unit 3 T/B B1 water level（O.P.）											2,900	2,900
Unit 4 T/B B1 water level（O.P.）		2,800			2,800			2,800			2,800	



Based on data supplied by TEPCO.

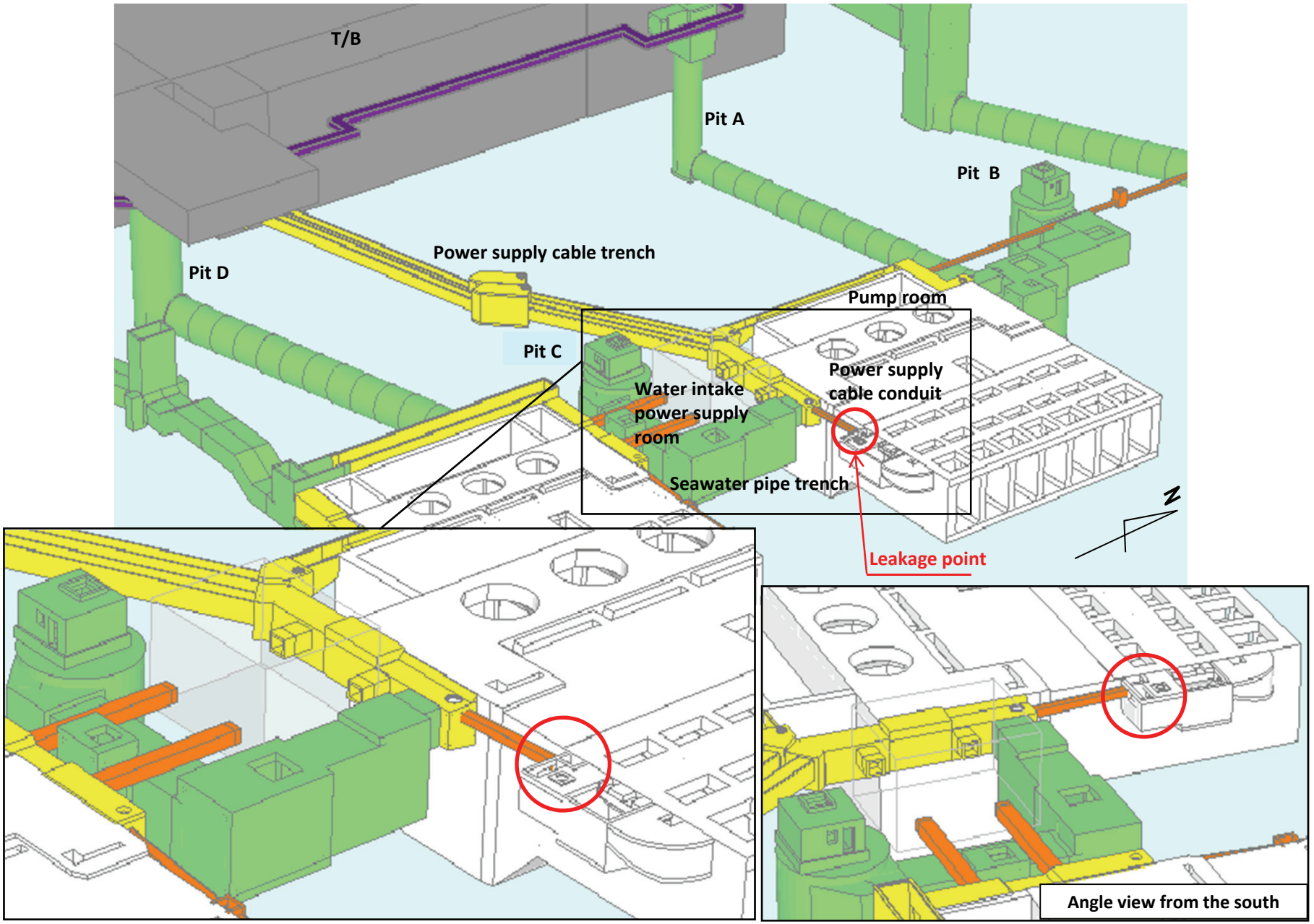
Highly contaminated water outflow routes near the Unit 3 water intake (birds eye view)



Prepared by TEPCO.

Attachment V-18

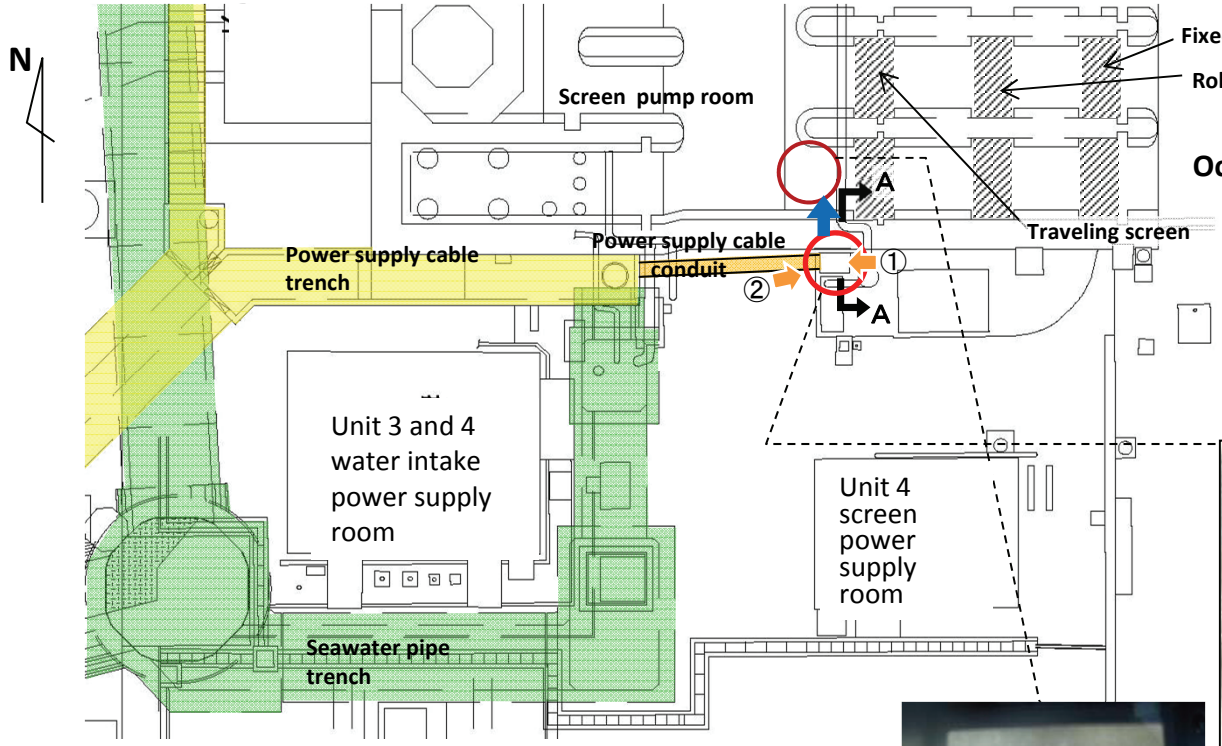
Highly contaminated water outflow routes near the Unit 3 water intake (sketch)



Prepared by TEPCO.

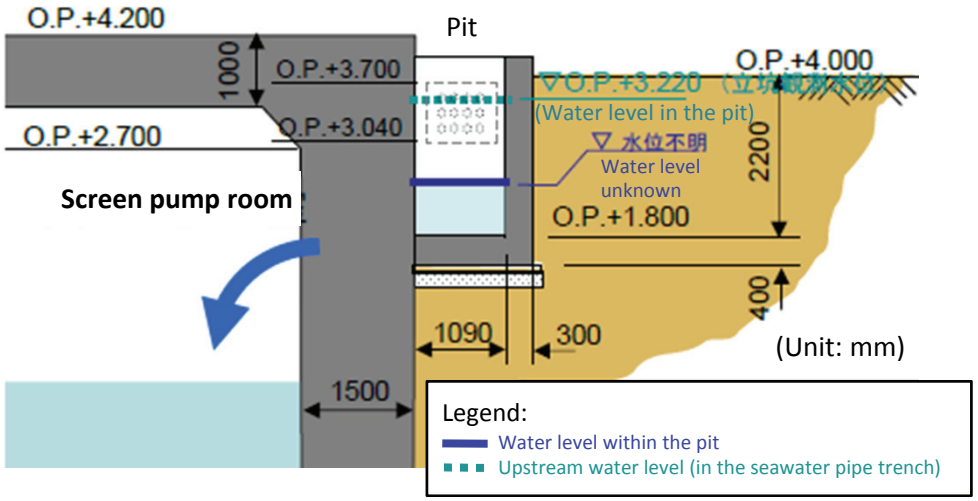
Attachment V-19

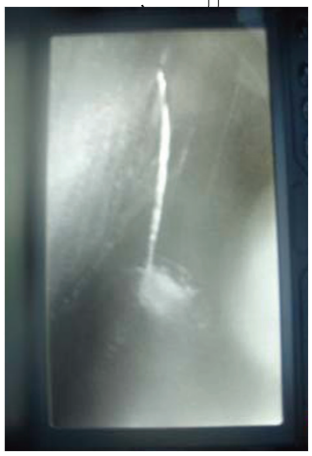
Response to the outflow of highly contaminated water near the Unit 3 water intake



Legend:
- Direction of photo
- Flow to the ocean
- Location where the measure was implemented

A-A cross section





Water leakage from the power supply cable pit to the screen area (photo by TEPCO at 18:30 on May 11)

Above: water flow to the power supply cable pit (photo by TEPCO at 10:30 on May 11)
Below: after concrete injected into the pit where leakage found (photos by TEPCO at 17:30 on May 12)

Prepared by TEPCO.

Attachment V-20

The International Nuclear and Radiological Event Scale

("INES") at nuclear facilities and installations

	INES LEVEL	Criteria on people and the environment		Criteria on radiological barriers and control		Criteria on Defense-in-Depth	
ACCIDENT	LEVEL 7 (MAJOR ACCIDENT)	- Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures.. (An atmospheric release of radioactive material equivalent to more than tens of thousands of terabecquerels of iodine-131).	Chernobyl NPP, USSR (now in Ukraine 1986				
	LEVEL 6 (SERIOUS ACCIDENT)	- Significant release of radioactive material likely to require implementation of planned countermeasures. (An atmospheric release of radioactive material equivalent to the order of thousands to tens of thousands of terabecquerels of iodine-131).					
	LEVEL 5 (ACCIDENT WITH WIDER CONSEQUENCES)	- A limited release of radioactive material likely to require implementation of some planned countermeasures. - Several deaths from radiation. (An atmospheric release of radioactive material equivalent to the order of hundreds to thousands of terabecquerels of iodine-131).	Windscale Pile, UK (1957)	- Severe damage to reactor core (meltdown of more than several percent of fuel, or a release of radioactive material from the fuel bundles equivalent to more than several percent of the reactor core inventory) - Release of large quantities of radioactive material within an installation with a high probability of significant public exposure. This could arise from a major critical accident or fire.	Three Mile Island, NPP, USA (1979)		
	LEVEL 4 (ACCIDENT WITH LOCAL CONSEQUENCES)	- Minor release of radioactive material unlikely to result in implementation of planned countermeasures other than local food controls. - At least one death from radiation. ((An atmospheric release of radioactive material equivalent to the order of tens to hundreds of terabecquerels of iodine-131).	JCO critical accident (1999)	- Meltdown of or damage to fuel resulting in a release of radioactive material of more than 0.1% of the fuel bundles. - Release of large quantities of radioactive material within an installation with a high probability of significant public exposure.	Saint-Laurent NPP, France, (1980)		

INCIDENT	LEVEL 3 (SERIOUS INCIDENT)	- Exposure in excess of ten times the statutory annual limit for workers. - Non-lethal determininistic health effect (e.g. burns) from radiation.		- Exposure rates of more than 1 Sv/h in an operating area. - Severe contamination in an area not expected by design, with a low probability of significant public exposure.		- Near accident at a nuclear power plant with no safety provisions remaining. - Lost or stolen highly radioactive sealed source. - Misdelivered highly radioactive sealed source without adequate procedures in place to handle it.	Fire incident in Vandellos NPP, Spain (1989)
	LEVEL 2 (INCIDENT)	- Exposure of a member of the public to more than 10 mSv. - Exposure of a worker to more than the statutory annual limit.		- Radiation levels in an operating area of more than 50 mSv/h. - Significant contamination within the facility into an area not expected by design.		- Significant failures in safety provisions but with no actual consequences. - Found highly radioactive sealed orphan source, device or transport package found with safety provisions intact. - Inadequate packaging of a highly radioactive sealed source.	Accident involving broken steam generator heat transfer tube at Mihama No.2 plant, Japan (1991)
	LEVEL 1 (ANOMALY)					- Overexposure of a member of the public to more than the statutory annual limits. - Minor problems with safety components with significant defense-in-depth remaining. - Low activity lost or stolen radioactive source, device or transport package.	"Monju" sodium leakage incident, Japan (1995), etc.
No Safety Significance (Below Scale / Level 0)							

Based on the "International Nuclear Event Scale" prepared by the Nuclear and Industrial Safety Agency

Attachment VI-1

"Report on the results of the seismic response analysis of the reactor building and equipment, and piping systems, which are important for seismic safety, of the Fukushima Daiichi Nuclear Power Station Unit No.2, using the seismic records observed at the 2011 Tohoku District - off the Pacific Ocean Earthquake (Outline)" dated June 17, 2011 and prepared by Tokyo Electric Power Company (Abstract)

1. (Dispensed)

2. Reactor building

To establish the condition of the reactor building during the earthquake, the seismic response analysis of the reactor building of Fukushima Daiichi Nuclear Power Station Unit No. 2 based on the 2011 Tohoku District - off the Pacific Ocean Earthquake was conducted using seismic records observed at the base mat of the building.

In the seismic response analysis, a model that could adequately represent the characteristics of the building and structures, and the ground was created (Fig. 1).

As a result of the seismic response analysis, the maximum shearing strain on the seismic-resistant walls was 0.43×10^{-3} (in the east-west direction, 5th floor), and it was confirmed that all seismic-resistant walls other than the one in the east-west direction on the 5th floor showed stress and distortion to the same or lesser extent than those of the first flexion point of the Skelton curve (Fig. 2, 3).

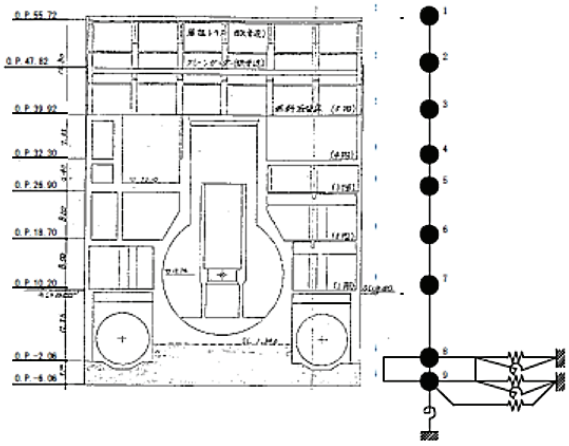


Fig. 1. Unit 2 Reactor Building (Model)

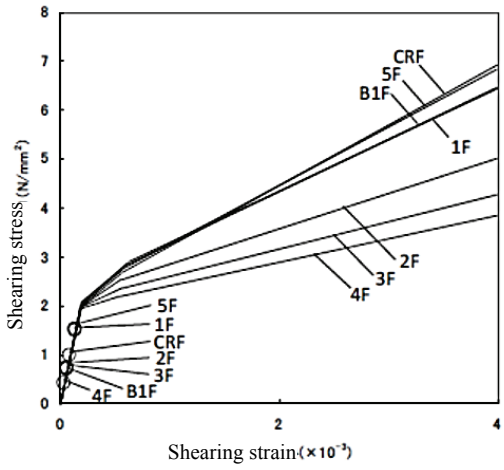


Fig. 2. Shearing Strain on the Seismic-resistant Walls (north-south direction)

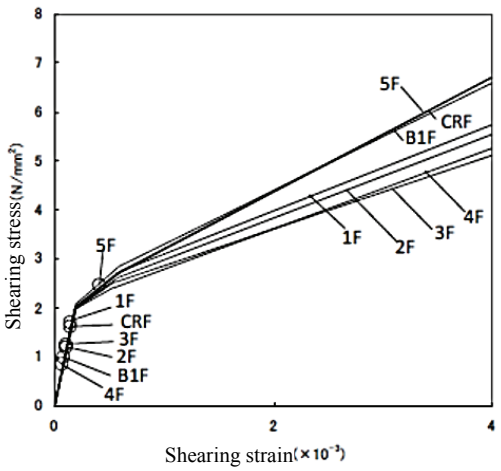


Fig. 3. Shearing Strain on the Seismic-resistant Walls (east-west direction)

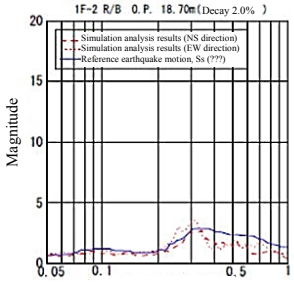
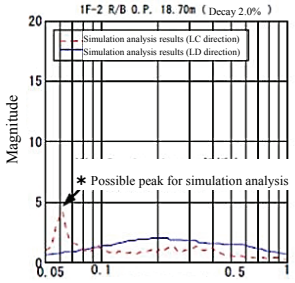
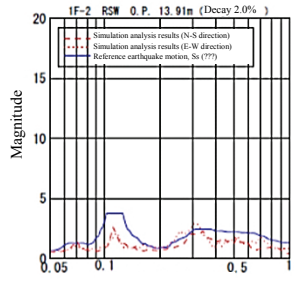
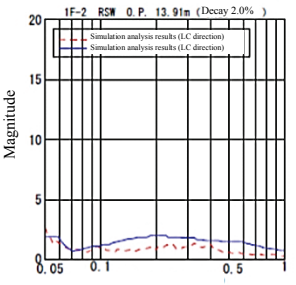
3. Equipment and piping systems important to seismic safety

The seismic response analysis based on seimic records observed of the Tohoku District - off the Pacific Ocean Earthquake was conducted on large components such as the reactor of the Fukushima Daiichi Nuclear Power Station Unit No. 2, and a comparison was made between the resulting seismic loads, etc. and those already obtained through the seismic safety evaluation with past reference seismic motion, Ss.

As a result of the comparison, the seismic loads, etc. due to the Earthquake partly exceeded those obtained through the seismic safety evaluation. However, through the seismic assessment of the main facilities that had functions important to safety related to the "shutdown" and "cooling" of the reactor and "confinement" of radioactive substances, it was confirmed that the calculated stress and others were below the evaluation criteria (Table-1). From the results, it is estimated that the main facilities that have functions important to safety were able to maintain the safety functions at the time of and right after the earthquake.

Table 1. Summary of the impact assessment on equipment and piping systems important to seismic safety
(Fukushima Daiichi Nuclear Power Station Unit 2)

Equipment, etc.		Seismic response load	Reference seismic motion, Ss	Results of Simulation analysis	Seismic assessment results
Seismic load, etc.	Reactor pressure vessel base	Shearing force (kN)	4960	5110	Reactor pressure vessel (foundation bolt) Calculated value: 29 MPa Evaluation criteria: 222 MPa
		Moment (kN・m)	22500	25600	
		Axial force (kN)	5710	4110	
	Reactor containment base	Shearing force (kN)	7270	8290	Reactor containment (dry well) Calculated value: 87 MPa Evaluation criteria: 278 MPa
		Moment (kN・m)	124000	153000	
		Axial force (kN)	3110	2350	
	Core shroud base	Shearing force (kN)	2590	3950	Core support structure (shroud support) Calculated value: 122 MPa Evaluation criteria: 300 MPa
		Moment (kN・m)	13800	21100	
		Axial force (kN)	760	579	
	Fuel subassembly	Relative displacement (mm)	16.5	33.2	Control rod (insertion performance) Evaluation criteria: 40.0 mm
Magnitude for assessment	Refueling floor	Magnitude (horizontal) (G)	0.97	1.21	Residual heat removal system pump (motor mounting bolt) Calculated value: 45 MPa Evaluation criteria: 185 MPa
		Magnitude (vertical) (G)	0.56	0.70	
	Base mat	Magnitude (horizontal) (G)	0.54	0.68	
		Magnitude (vertical) (G)	0.52	0.37	

Floor response spectrum (reactor building)	< Intermediate floor (O.P. 18.70 m) >  (Horizontal)  (Vertical)	Main steam piping Calculated value: 208 MPa Evaluation standard value: 360 MPa Residual heat removal system pipe Calculated value: 87 MPa Evaluation standard value: 315 MPa
Floor response spectrum (reactor shield wall)	< Reactor shield wall base (O.P. 13.91 m) >  (Horizontal)  (Vertical)	

Attachment VI-2

"Report on the analysis of seismic records observed at the Onagawa Nuclear Power Station during the 2011 Tohoku District - off the Pacific Ocean Earthquake and the results of the tsunami survey (Outline)" dated April 7, 2011 and prepared by Tohoku Electric Power (Excerpt)

1. Seismic records observed at the Onagawa Nuclear Power Station

The Tohoku District – off the Pacific Ocean Earthquake was one of the largest earthquakes ever to hit Japan. Some of the maximum acceleration values observed on each floor of Unit 1, 2, and 3 reactor buildings exceeded the maximum response acceleration spectrum in terms of reference earthquake ground motion, Ss, which had been developed based on the revised version of the Regulatory Guide for Reviewing Seismic Design. However, there was little difference among the values (see Table 1).

Table 1. Comparison between the earthquake seismic records observed and the maximum response acceleration spectrum in terms of reference earthquake ground motion, Ss

Observation location		Seismic records observed			Maximum response acceleration spectrum in terms of reference earthquake motion, Ss (gal)		
		Maximum acceleration value (gal)					
		N-S direction	E-W direction	Vertical direction	N-S direction	E-W direction	Vertical direction
Unit 1	Rooftop	2000(*)	1636	1389	2202	2200	1388
	Refueling floor (5th floor)	1303	998	1183	1281	1443	1061
	1st floor	573	574	510	660	717	527
	Base mat	540	587	439	532	529	451
Unit 2	Rooftop	1755	1617	1093	3023	2634	1091
	Refueling floor (3rd floor)	1270	830	743	1220	1110	968
	1st floor	605	569	330	724	658	768
	Base mat	607	461	389	594	572	490
Unit 3	Rooftop	1868	1578	1004	2258	2342	1064
	Refueling floor (3rd floor)	956	917	888	1201	1200	938
	1st floor	657	692	547	792	872	777
	Base mat	573	458	321	512	497	476

(*) Information only, as the acceleration scaled out the seismometer

"Summary of the analysis results of seismic records observed at the Onagawa Nuclear Power Station during The 2011 Tohoku District - off the Pacific Ocean Earthquake" dated April 7, 2011 and prepared by Tohoku Electric Power (Excerpt)

1. (Dispensed)

2. Seismic response analysis results using the observation records on the base mat

To roughly evaluate distortion in the seismic-resistant walls of the reactor buildings (the maximum response shearing strain) and the shearing force, which affected the seismic-resistant walls on each floor, a seismic response analysis was conducted using the seismic records observed on the base mat (Fig. 4).

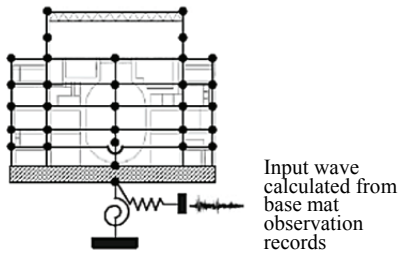


Fig. 4. Outline of the seismic response analysis using the observation records on the base mat

(1) Confirmation of the maximum response shearing strain

The results of the seismic response analysis confirmed that the maximum response shearing strain was below the evaluation criteria* (Table 2).

Table 2. The maximum response shearing strain on the seismic-resistant walls of the reactor buildings

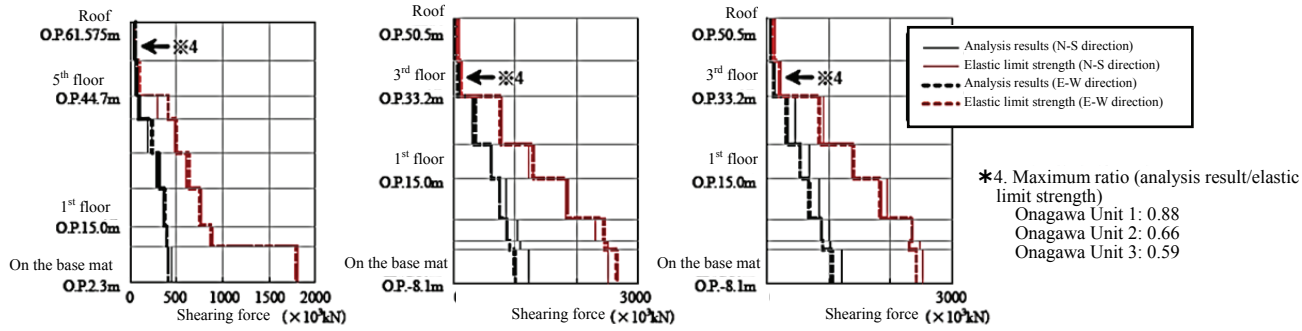
		Analysis results	Evaluation criteria*	(Ref.) Reference earthquake ground motion, Ss
Onagawa Unit 1	N-S direction	0.36×10^{-3}	2.0×10^{-3}	0.65×10^{-3}
	E-W direction	0.35×10^{-3}		0.56×10^{-3}
Onagawa Unit 2	N-S direction	0.49×10^{-3}		1.15×10^{-3}
	E-W direction	0.28×10^{-3}		0.55×10^{-3}
Onagawa Unit 3	N-S direction	0.81×10^{-3}		0.99×10^{-3}
	E-W direction	0.18×10^{-3}		0.41×10^{-3}

* The evaluation criteria is specified in the "Rules of Seismic Design Technology for Nuclear Power Stations (JEAC4601-2008)" by the Japan Electric Association. They are obtained by multiplying the safety factor of 2 on the final shearing strain of the ferroconcrete seismic-resistant walls.

(2) Confirmation of shearing forces affecting seismic-resistant walls on each floor

The results of the seismic response analysis confirmed that the shearing force, which had affected the seismic-resistant walls on each floor, was below the shearing force (elastic limit strength) that the reinforcement elastic range on each floor could bear (Fig. 5).

Fig. 5. Confirmation of shearing force affecting seismic-resistant walls on each floor of the reactor buildings



Onagawa Unit 1 Onagawa Unit 2 Onagawa Unit 3

Conclusion and future efforts

As a result of the analysis of the earthquake observation records obtained from the Onagawa Nuclear Power Station, some values exceeded reference earthquake ground motion, Ss. However, there was little difference among them. In addition, through the seismic response analysis using the observation records, it was confirmed that the functions of the reactor buildings were maintained during the earthquake as well.

Attachment VI-4

"Report on the analysis and evaluation of earthquake seismic records observed at the Onagawa Nuclear Power Station during the 2011 Tohoku District - off the Pacific Ocean Earthquake and the assessment of the impacts on the equipment important for seismic safety (Outline)" dated July 28, 2011 and prepared by Tohoku Electric Power (Excerpt)

1. Impact assessment of equipment important for seismic safety

Rough evaluations (evaluation of structural strengths and evaluation of the maintenance of dynamic functions) of the functions of the main equipment at the time of earthquakes, which "shut down" and "cool" the reactors and "confine" radioactive substances at the Onagawa Nuclear Power Station Units 1, 2, and 3 and are important for seismic safety, were conducted on the impacts of the Tohoku District – off the Pacific Ocean Earthquake on March 11, 2011 (the "March 11 Earthquake") and the Off-Miyagi Prefecture Earthquake on April 7, 2011 (the "April 7 Earthquake") based on the results of an analysis of the reactor buildings (reported on April 7 and 25, 2011, respectively) using the seismic records observed from each earthquake.

The results confirmed that the values generated by each piece of equipment during the March 11 Earthquake and the April 7 Earthquake were below the evaluation criteria for maintaining its functions (see Table 1 and Table 2).

Table 1. Structural strength evaluation results

Function	Equipment evaluated (areas covered)		Generated value (N/mm^2)		Evaluation standard value (N/mm^2)	Judgment
			March 11 Earthquake	April 7 Earthquake		
Shutdown	Core support structure (shroud support leg)	Unit 1	71	69	250	○
		Unit 2	85	111	209	○
		Unit 3	80	58	209	○
Cooling	Residual heat removal system pump (mounting bolt)	Unit 1	88	103	185	○
		Unit 2	22	21	444	○
		Unit 3	27	26	444	○
	Residual heat removal system pipe (pipe body)	Unit 1	140	151	363	○
		Unit 2	114	157	366	○
		Unit 3	204	213	324	○
Confinement	Reactor pressure vessel (foundation bolt)	Unit 1	62	71	222	○
		Unit 2	117	89	499	○
		Unit 3	72	73	499	○
	Reactor containment (sand cushion)	Unit 1	120	129	255	○
		Unit 2	0.34	0.41	1	○
		Unit 3	0.33	0.31	1	○
	Main steam piping (pipe body)	Unit 1	135	139	366	○
		Unit 2	157	207	375	○
		Unit 3	240	304	375	○

Table 2. Results of an evaluation of the maintenance of dynamic functions

Function	Equipment evaluated (areas covered)		Relative displacement (mm)		Evaluation standard value (mm)	Notes
			March 11 Earthquake	April 7 Earthquake		
Shutdown	Control rod (insertion performance) (relative displacement of fuel subassembly)	Unit 1	20.5	17.5	40.0	・At the time of the March 11 Earthquake: already confirmed that all control rods were inserted. ・At the time of the April 7 Earthquake: already confirmed that all control rods were inserted.
		Unit 2	13.9	10.2	40.0	
		Unit 3	12.2	9.5	40.0	

Existing and newly introduced accident management measures (Unit 1)

Function	Newly introduced accident management measures (Developed from March, 1994)	Existing accident management measures (as of March, 1994)
Reactor shutdown	X Alternative reactivity control (RPT and ARI)	X Manual scram X Manual operation of the water level controls and the standby liquid control system
Water injection into reactor and containment	X Alternative water injection measures (measures to inject water into the reactor and containment by the make-up water condensate and the fire protection system pump; and measures to inject water into the reactor by the shutdown cooling system from the containment cooling system)	X Manual startup of ECCS etc. X Manual depressurization of the reactor and operation of low pressure water injection X Alternative water injection measures (measures to inject water into the reactor by condensate and the feed water system and control rod drive hydraulic system)
Heat injection from containment	X Cooling container function * Alternative cooling using the drywell cooler and reactor water clean-up system * Restoration of the broken equipment of the containment cooling system * Pressure-resistant vent	X Cooling container function * Manual startup of the containment cooling system * Vent passing through the atmospheric control system and standby gas treatment system
Power supply system	X Power supply measures * Accommodation of power supply (480V of accommodation from an adjacent plant) * Restoration of the broken equipment of the emerging diesel generator * Dedicated use of the emerging diesel generator	X Power supply measures * Restoration of off-site power and manual startup of the emerging diesel generator * Interconnectivity of power supply (6.9kV of interconnectivity from an adjacent unit)

Compiled from the “Report on Development of Accident Management for Fukushima Dai-ichi NPS” (May, 2002) by

Attachment VI-5

Existing and newly introduced accident management measures (Units 2 to 5)

Function	Newly introduced accident management measures (Developed from March, 1994)	Existing accident management measures (as of March, 1994)
Reactor shutdown	X Alternative reactivity control (RPT and ARI)	X Manual scram X Manual operation of the water level controls and the standby liquid control system
Water injection into reactor and containment	X Alternative water injection measures (measures to inject water into the reactor container by make-up water condensate and the fire protection system pump X Automated depressurization of the reactor	X Manual startup of ECCS etc. X Manual depressurization of the reactor and operation of low pressure water injection X Alternative water injection measures (measures to inject water into the reactor by condensate and the feed water system and control rod drive hydraulic system†)
Heat injection from containment	X Cooling container function * Alternative cooling using the drywell cooler and reactor water clean-up system * Restoration of the broken equipment of the residual heat removal system * Pressure-resistant vent	X Cooling container function * Manual startup of the containment cooling system * Vent passing through the atmospheric control system and standby gas treatment system
Power supply system	X Power supply measures * Accommodation of power supply (480V of accommodation from an adjacent plant) * Restoration of the broken equipment of the emerging diesel generator * Dedicated use of the emerging diesel generator	X Power supply measures * Restoration of off-site power and manual startup of the emerging diesel generator * Interconnectivity of power supply (6.9kV of interconnectivity from an adjacent unit)

†: Not implemented at Unit 2

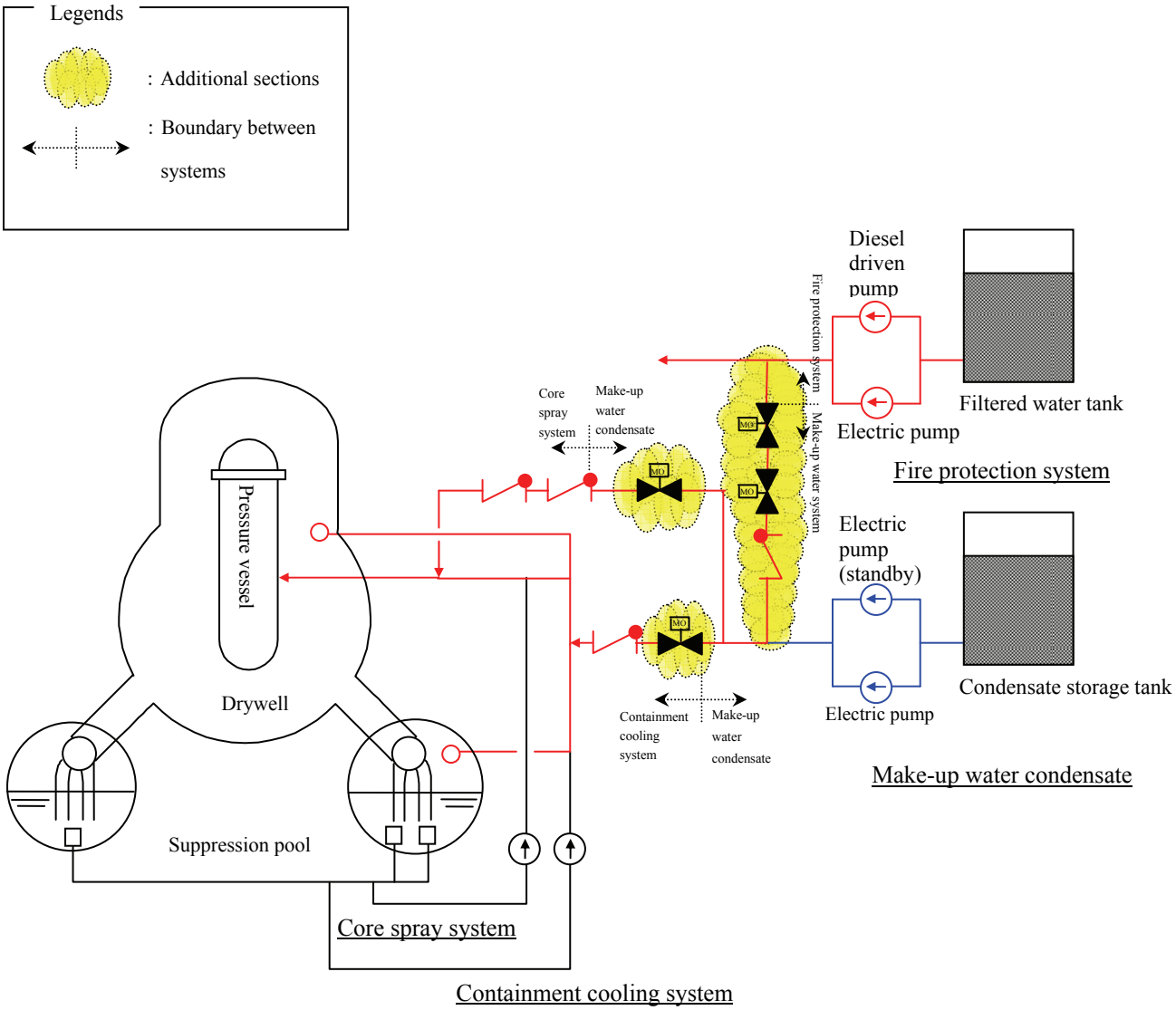
Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO

Existing and newly introduced accident management measures (Unit 6)

Function	Newly introduced accident management measures (Developed from March, 1994)	Existing accident management measures (as of March, 1994)
Reactor shutdown	X Alternative reactivity control (RPT and ARI)	X Manual scram X Manual operation of the water level controls and the standby liquid control system
Water injection into reactor and containment	X Alternative water injection measures (measures to inject water into the reactor container by make-up water condensate and the fire protection system pump X Automated depressurization of the reactor	X Manual startup of ECCS etc. X Manual depressurization of the reactor and operation of low pressure water injection X Alternative water injection measures (measures to inject water into the reactor by the feed water system and control rod drive hydraulic system; measures to inject water into the reactor container by a seawater pump)
Heat injection from containment	X Cooling container function * Alternative cooling using the drywell cooler and reactor water clean-up system * Restoration of the broken equipment of the residual heat removal system * Pressure-resistant vent	X Cooling container function * Manual startup of the containment spray cooling system * Vent passing through the atmospheric control system and standby gas treatment system
Power supply system	X Power supply measures * Accommodation of power supply (480V of accommodation from an adjacent plant and 6.9kV of accommodation from the dedicated diesel generator for the high pressure core spray system) * Restoration of the broken equipment of the emerging diesel generator * Dedicated use of the emerging diesel generator	X Power supply measures * Restoration of off-site power and manual startup of the emerging diesel generator * Interconnectivity of power supply (6.9kV of interconnectivity from an adjacent unit)

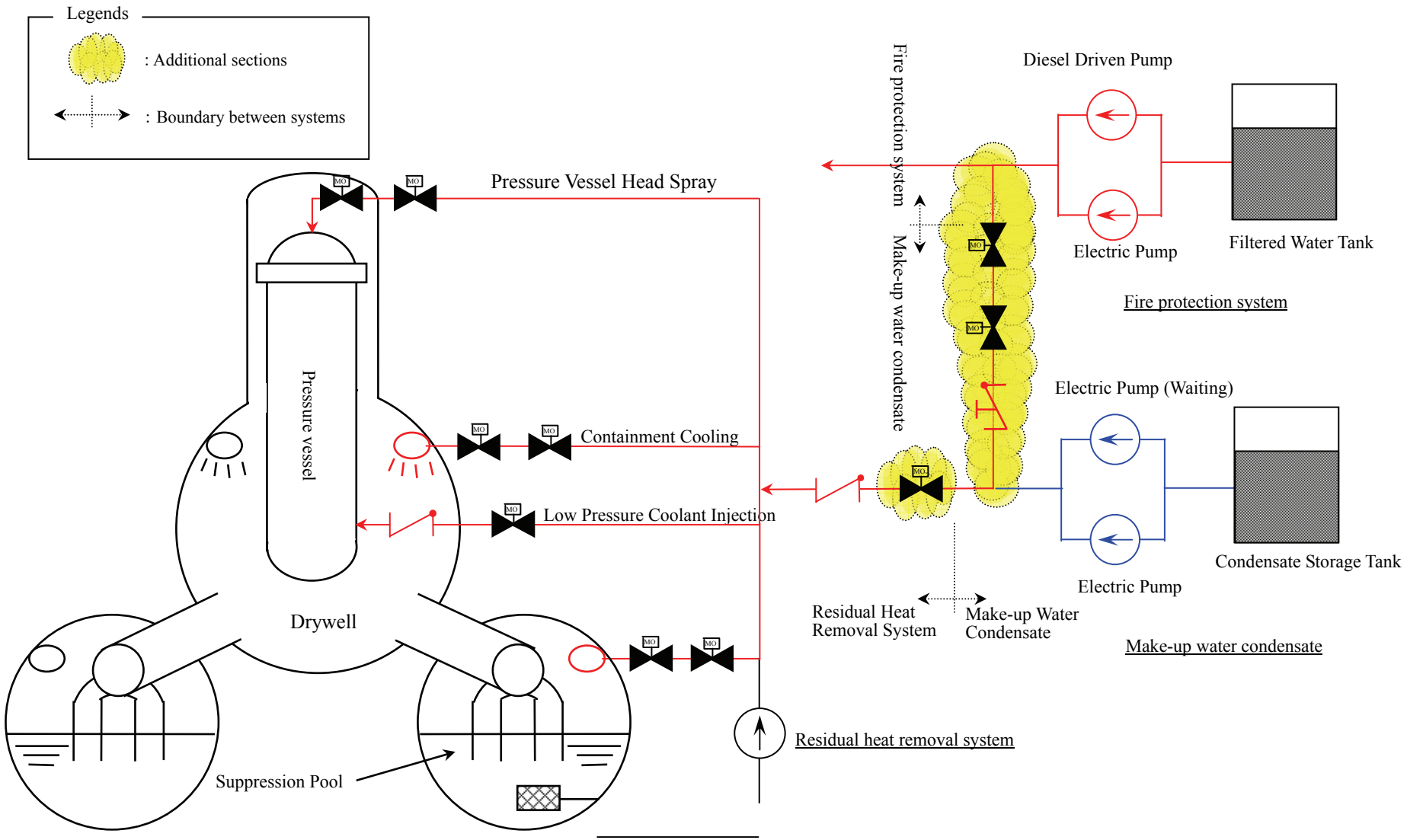
Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO

Attachment IV-6



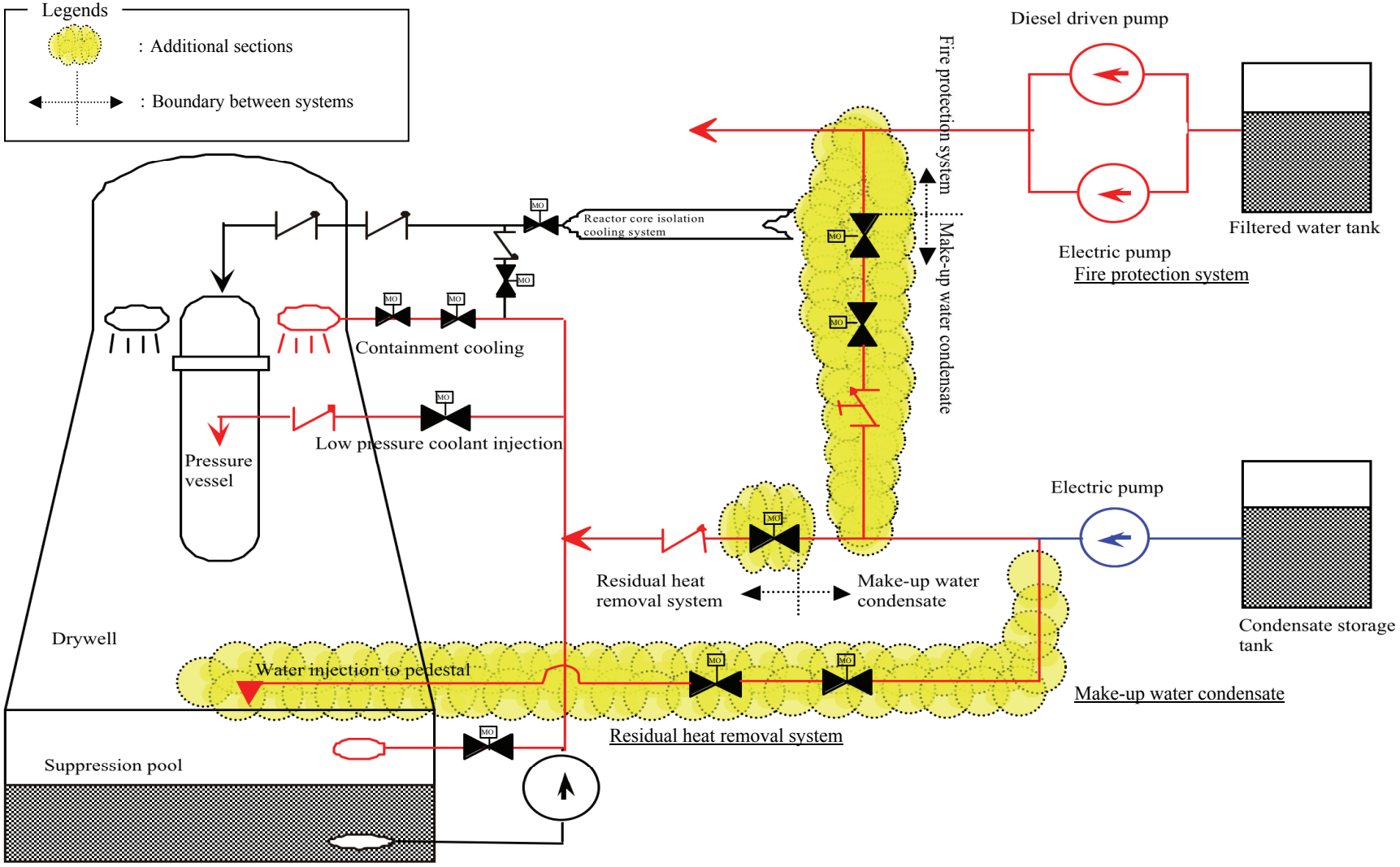
Conceptual diagram of alternative water injection facilities (Unit 1)

Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO



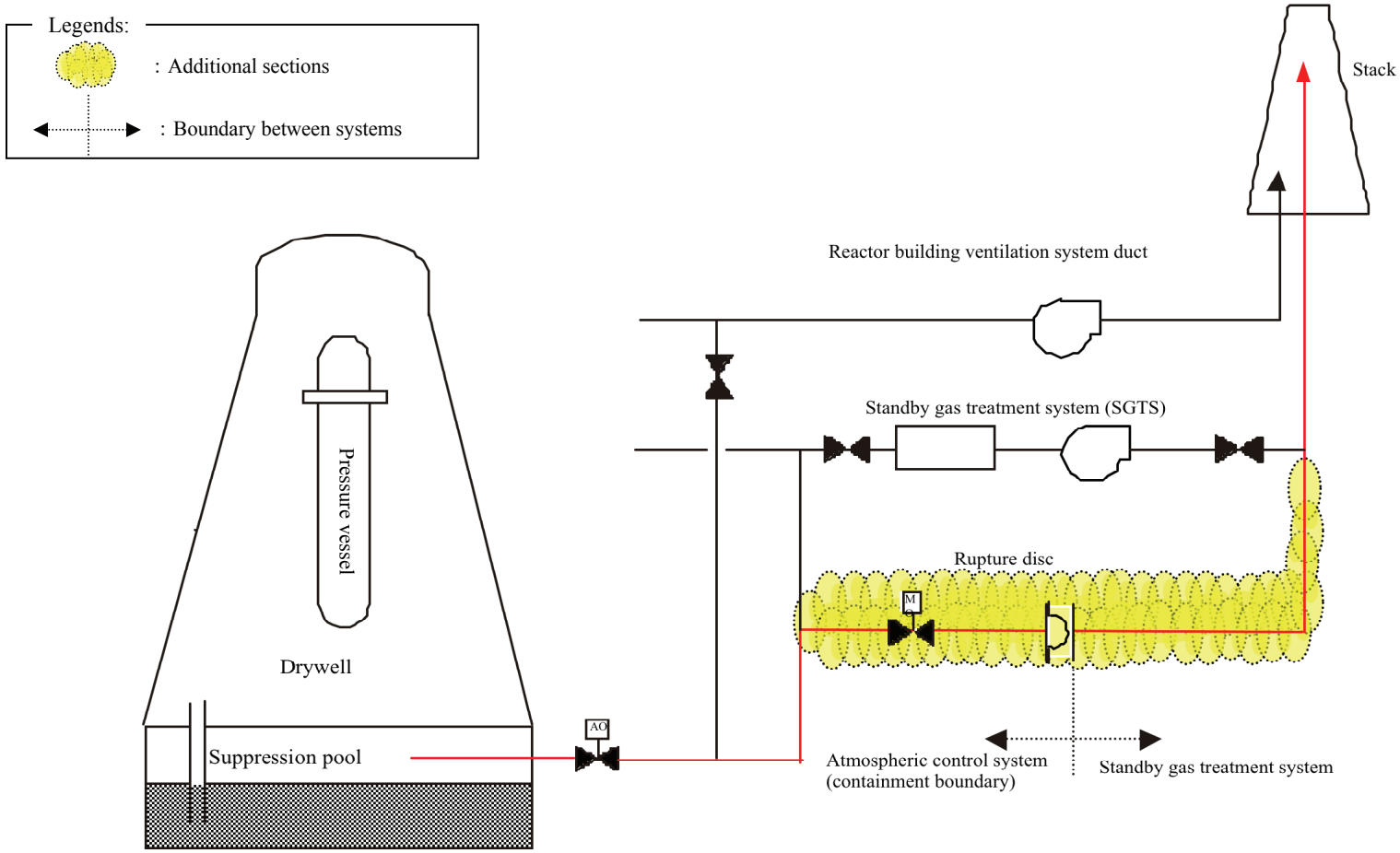
Conceptual diagram of alternative water injection facilities (Units 2 to 5)

Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO



Conceptual diagram of alternative water injection facilities (Unit 6)

Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO

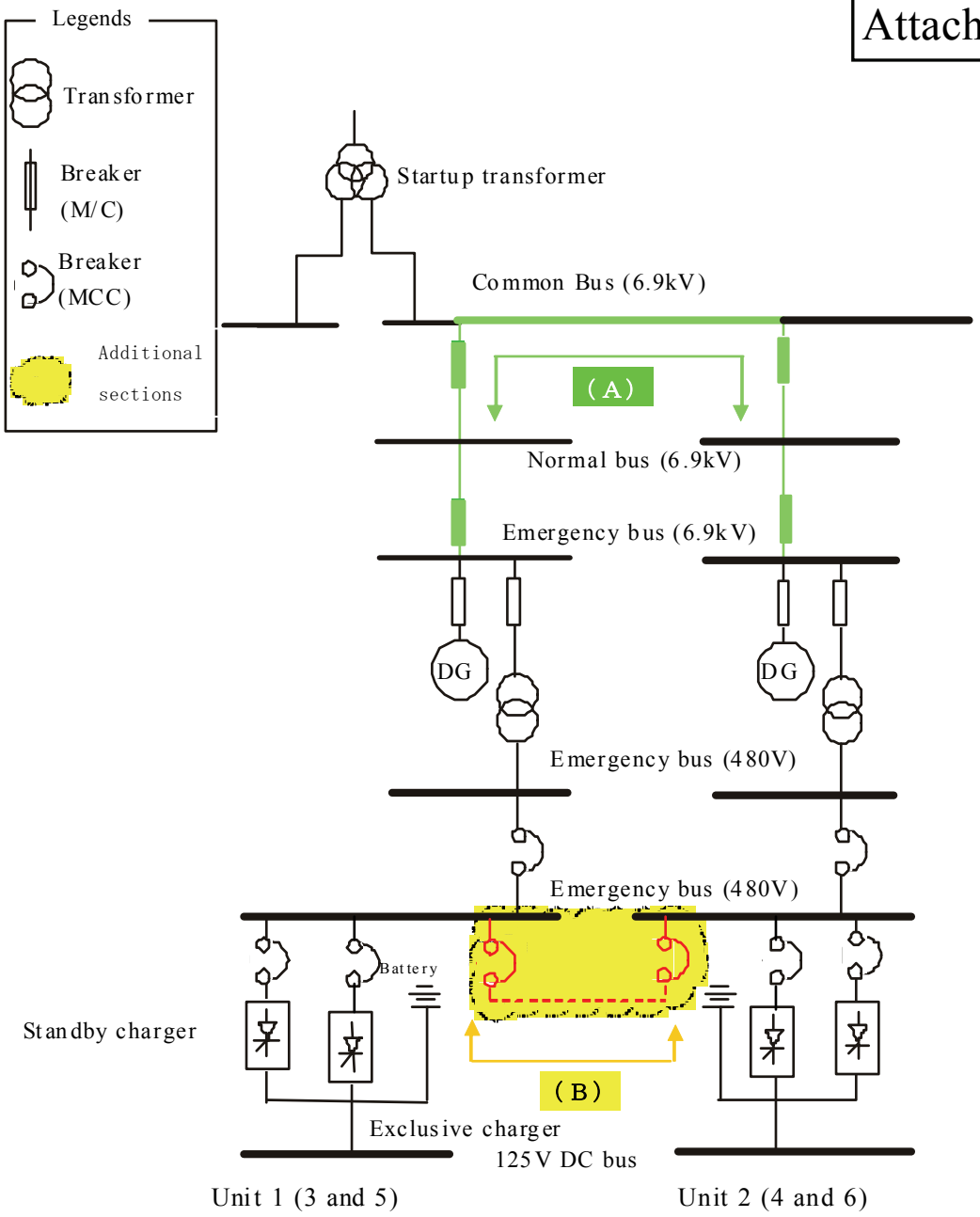


Attachment VI-7

Conceptual diagram of hardened vent system (Units 1 to 6)

Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO

Attachment VI-8



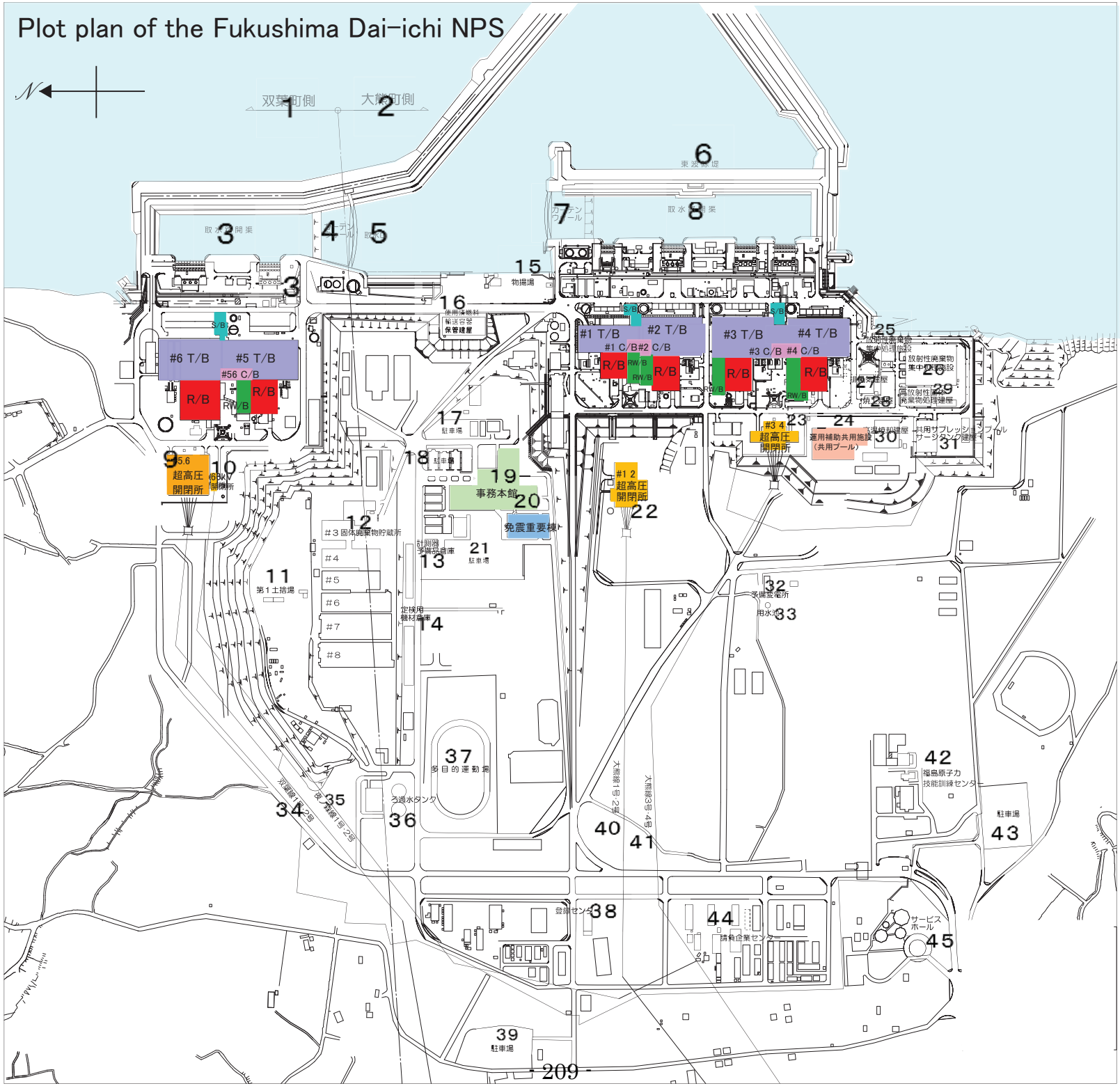
Route (A) : Capable of an AC power supply of 6.9kV.
Line for supplying high voltage AC power used until March 1994

Route (B) : Capable of an AC power supply of 480V.
Tie line for supplying low voltage AC power installed from June 1998 to August 2000

Conceptual diagram of the power supply interconnectivity (Units 1 to 6)

Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO

Plot plan of the Fukushima Dai-ichi NPS



Explanatory note

- R/B Reactor building
- T/B Turbine building
- RW/B Reactor waste treatment building
- C/B Control building
- S/B Service building
- Common auxiliary facilities (shared pool)
- Ultrahigh voltage switchyard
- Main office building
- Seismic isolation building

Attachment VI-9

Based on data and documents by Tokyo Electric Power Company

福島第一原子力発電所　配置図：General layout of the Fukushima Daiichi NPS

図上部　左⇒右

①双葉町側：Futaba-machi
②大熊町側：Okuma-machi
③取水路開渠：Intake channel open ditch
④カーテンウォール：Curtain wall
⑤取水口：Water intake
⑥東波防堤：　East breakwater
⑦カーテンウォール：Curtain wall
⑧取水路開渠：Intake channel open ditch

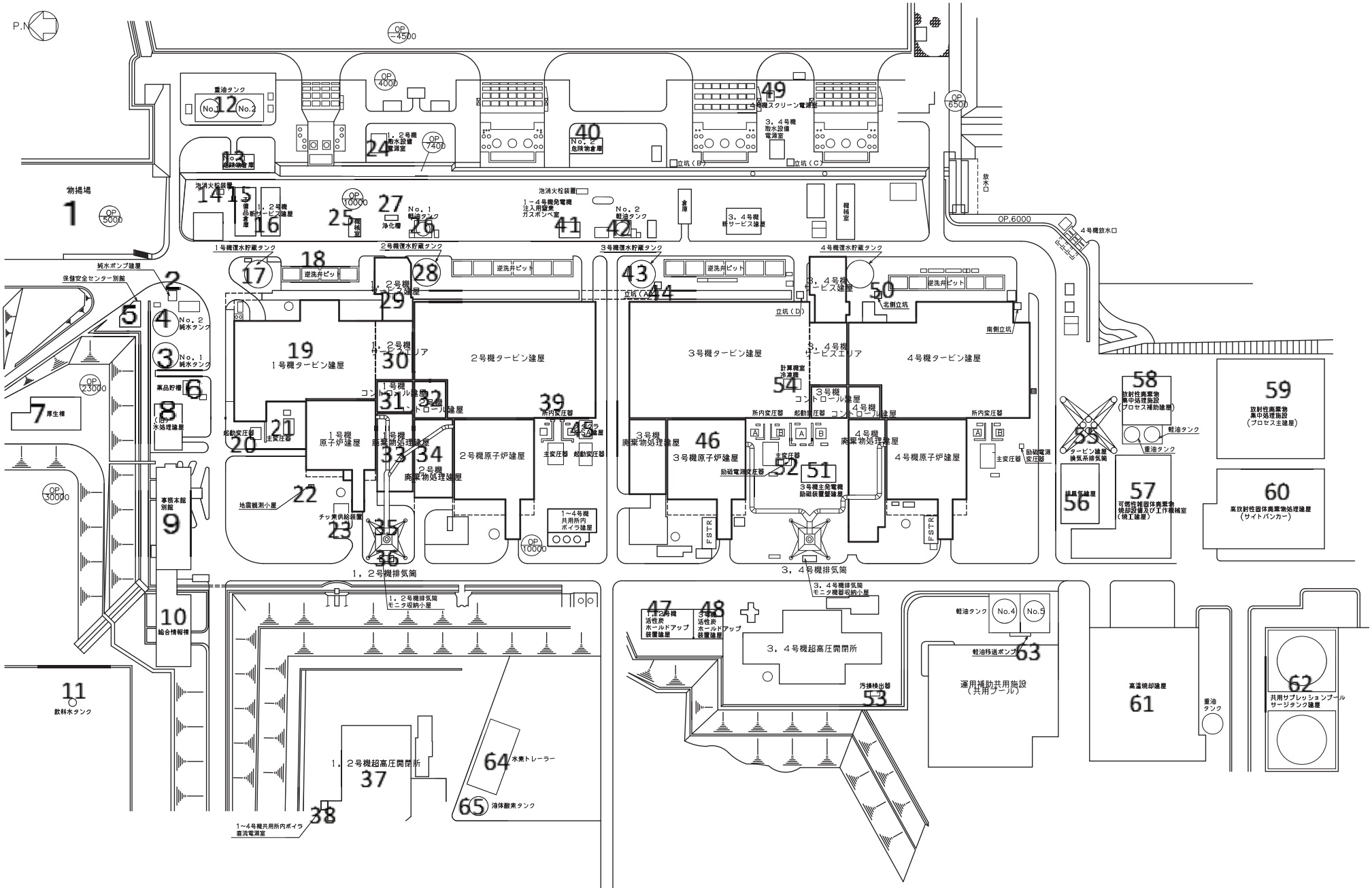
図中央部　左⇒右

⑨超高圧開閉所：Ultra high voltage switch yard
⑩６６ＫＶ開閉所：66 kV switching station
⑪第１土捨場：　Spoil bank No.1
⑫固体廃棄物貯蔵所：Solid waste storage
⑬計測器予備品倉庫：Storage for spare measurement equipment
⑭定検用機材倉庫：Storage for equipment used for periodic inspections
⑮物揚場：Shallow draft quay
⑯使用済燃料輸送容器保管建屋：Building for storing spent fuel transport
⑰駐車場：Parking lot
⑱駐車場：Parking lot
⑲事務本館：Administration building
⑳免震重要棟：Seismic isolation building
㉑駐車場：Parking lot
㉒超高圧開閉所：Ultra high voltage switchyard
㉓超高圧開閉所：Ultra high voltage switchyard
㉔運用補助共用施設(共用プール)：Auxiliary common facilities (common pool)
㉕放射性廃棄物集中処理施設：Centralized radioactive waste disposal facilitiy
㉖放射性廃棄物集中処理施設：Central radioactive waste disposal facilitiy
㉗排風気建屋：Exhaust building
㉘焼工建屋：Incinerator and machine building
㉙高放射性固体廃棄物処理建屋：High-radioactive solid waste disposal building
㉚高温焼却建屋：High temperature incinerator building

㉛共用サプレッションプールサージタンク建屋：Common suppression pool surge tank building
㉜予備変電所：Auxiliary substation
㉝用水池：Reservoir

図下部　左⇒右
㉞双葉線 1 号・2 号：Futaba Transmission Line, L1 and L2
㉟夜ノ森線 1 号・2 号：Yorunomori Transmission Line, L1 and L2
㊱ろ過水タンク：Filtered water tank
㊲多目的運動場：Sports ground
㊳登録センター：Registry center
㊴駐車場：Parking lot
㊵大熊線 1 号・2 号：Okuma Transmission Line, L1 and L2
㊶大熊線 3 号・4 号：　Okuma Transmission Line, L3 and L4
㊷福島原子力技能訓練センター：Fukushima Nuclear Skills Training Center
㊸駐車場：Parking lot
㊹請負企業センター：Contractor Center
㊺サービスホール：Service hall

Plant layout for Units 1 to 4 of the Fukushima Dai-ichi NPS



Based on data and documents by
Tokyo Electric Power Company

Attachment VI-10

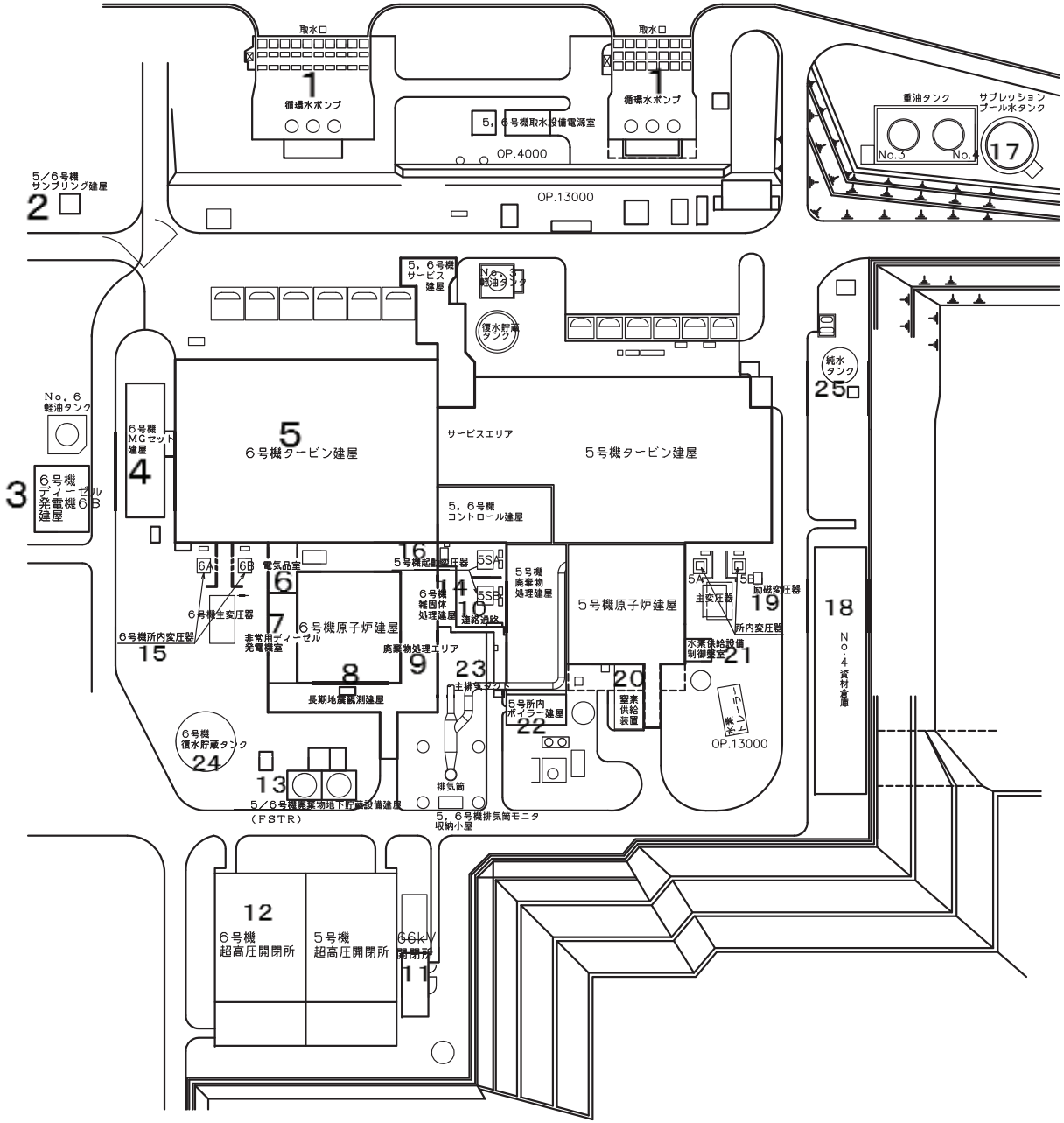
Attachment VI-10: Plant layout for Units 1 to 4 of the Fukushima Dai-ichi NPS

①物揚場：Shallow Draft Quay
②純水ポンプ建屋：Deionized water pump building
③No.1 純水タンク：Deionized water tank 1
④No.2 純水タンク：Deionized water tank 2
⑤保健安全センター別館：Health and Safety Center annex
⑥薬品貯槽：Chemical storage
⑦厚生棟：Welfare building
⑧（旧）水処理建屋：(Old) Water disposal building
⑨事務本館別館：Administration annex
⑩総合情報等：General information building
⑪飲料水タンク：Drinking water tank
⑫重油タンク：Heavy oil tank
⑬No.1 危険物倉庫：Hazardous materials storage 1
⑭消火栓装置：Foam fire extinguishing system
⑮予備品倉庫：Storage for spare items
⑯新サービス建屋：New service building for Units 1 and 2
⑰1 号機復水貯蔵タンク:Condensate storage tank for Unit 1
⑱逆洗弁ピット：Reversing valve pit
⑲1 号機タービン建屋：Turbine building for Unit 1
⑳起動変圧器：Startup transformer
㉑主変圧器：Main transformer
㉒地震観測小屋:Cabin for seismic observation
㉓窒素供給装置:Nitrogen supply equipment
㉔1，2 号機取水設備電源室:Power room for the water intake facility for Units 1 and 2
㉕機械室:Machinery room
㉖No. 1 軽油タンク:Light oil tank 1
㉗浄化槽:Water-purifier tank
㉘2 号機復水貯蔵タンク：Condensate storage tank for Unit 2
㉙1，2 号機サービス建屋:Service building for Units 1 and 2
㉚1，2 号機サービスエリア：Service area for Units 1 and 2
㉛1 号機コントロール建屋：Control building for Unit 1
㉜2 号機コントロール建屋：Control building for Unit 2
㉝1 号機廃棄物処理建屋：Radioactive waste disposal building for Unit 1
㉞2 号機廃棄物処理建屋：Radioactive waste disposal building for Unit 2

㉟1，2 号機排気筒：Exhaust stack for Units 1 and 2
㊱1，2 号機排気筒モニタ収納小屋：Cabin for monitoring the exhaust stack for Units 1 and 2
㊲1，2 号機超高圧開閉所　Ultra-high voltage switchyard for Units 1 and 2
㊳1～4 号機共用所内ボイラ直流電源室：DC power room for the common house boiler for Units 1 to 4
㊴所内変圧器：Unit auxiliary transformer
㊵No.2 危険物倉庫：Hazardous materials storage 2
㊶1～4 号機発電機注入用窒素ガスボンベ室：Nitrogen gas cylinder room for injection into the generator of Units 1 to 4
㊷No.2 軽油タンク Light oil tank 2
㊸3 号機復水貯蔵タンク:　Condensate storage tank for Unit 3
㊹立坑：Pit
㊺メタクラ２ＳＡ建屋：Metal-clad switchgear 2SA building
㊻3 号機原子炉建屋：Reactor building for Unit 3
㊼1, 2 号機活性炭ホールドアップ装置建屋: Building for activated carbon hold up equipment for Units 1 and 2
㊽３号機活性炭ホールドアップ装置建屋：Building for activated carbon hold up equipment for Unit 3
㊾4 号機スクリーン電源室：Power room for the Unit 4 screen
㊿北側立坑：North pit
(51)3 号機主発電機励磁装置盤建屋: Building for energizing the control panel of the main generator of Unit 3
(52)励磁電源変圧器：Exciter transformer
(53)汚損検出器：Pollution detector
(54)計算機室冷凍機：Cooling machine for the computer room
(55)タービン建屋換気系排気筒：Turbine building ventilation system exhaust stack
(56)排風気建屋：Exhaust building
(57)可燃性雑固体廃棄物焼却設備及び工作機械室（焼工建屋）：Incinerator for burnable solid waste and the machine tool room (incinerator and machine building)
(58)放射性廃棄物集中処理施設（プロセス補助建屋）：Central radioactive waste disposal facility (building for auxiliary processes)
(59)放射性廃棄物集中処理施設（プロセス主建屋）：Central radioactive waste disposal facility (building for main processes)
(60)高放射線性固体廃棄物処理建屋（サイトバンカー）：Highly radioactive solid waste disposal building (on-site bunker)
(61)高温焼却建屋：High temperature incinerator building

㊷共用サプレッションプールサージタンク建屋 : Common suppression pool surge tank building (common pool)
㊸軽油移送ポンプ：Light oil transfer pump
㊹水素トレーラー：Hydrogen trailer
㊺液体酸素タンク：Storage for liquid oxygen

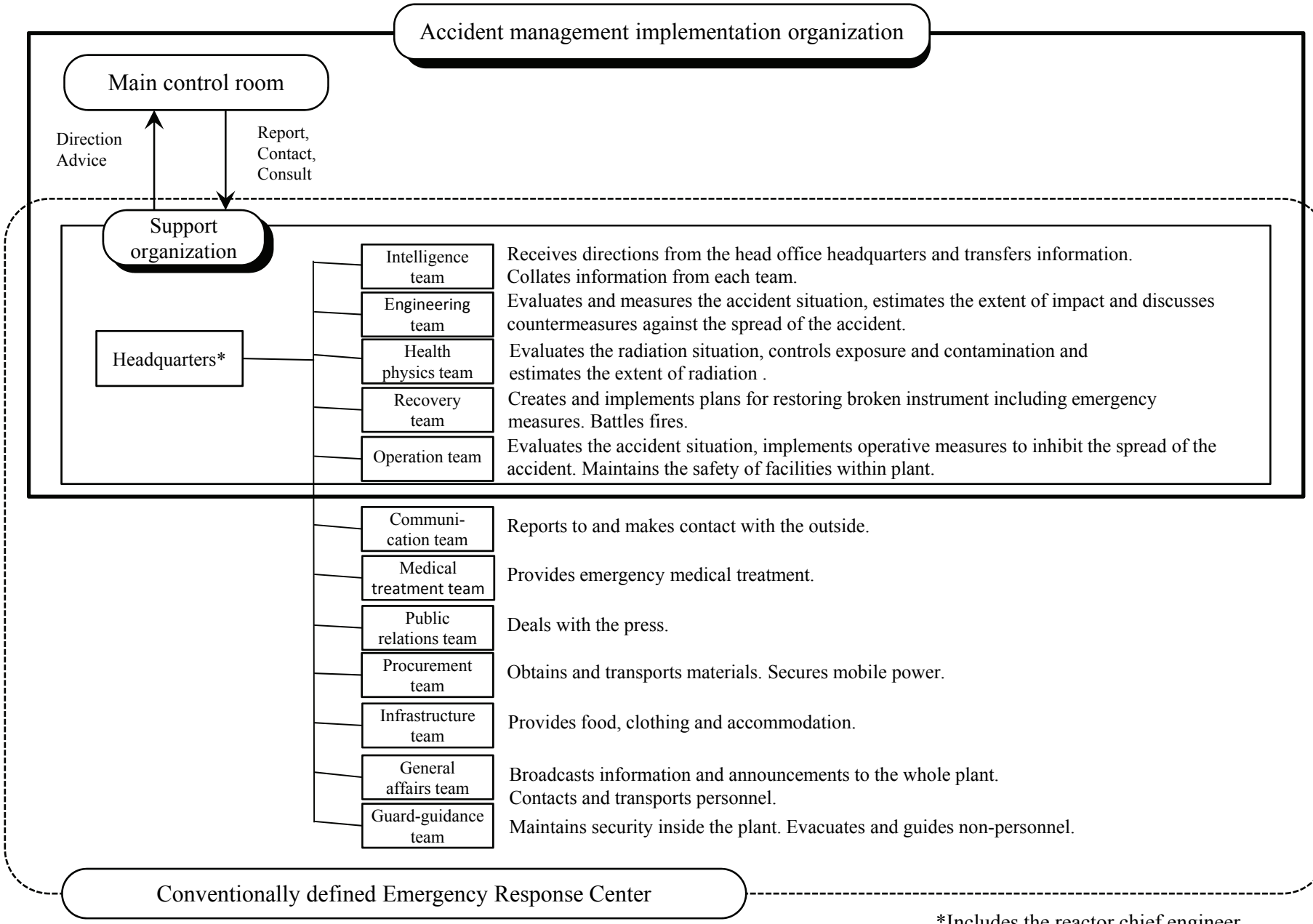
Plant layout for Units 5 and 6 of the Fukushima Dai-ichi NPS



Based on data and documents by
Tokyo Electric Power Company

Attachment VI-10: Plant layout for Units 5 and 6 of the Fukushima Dai-ichi NPS

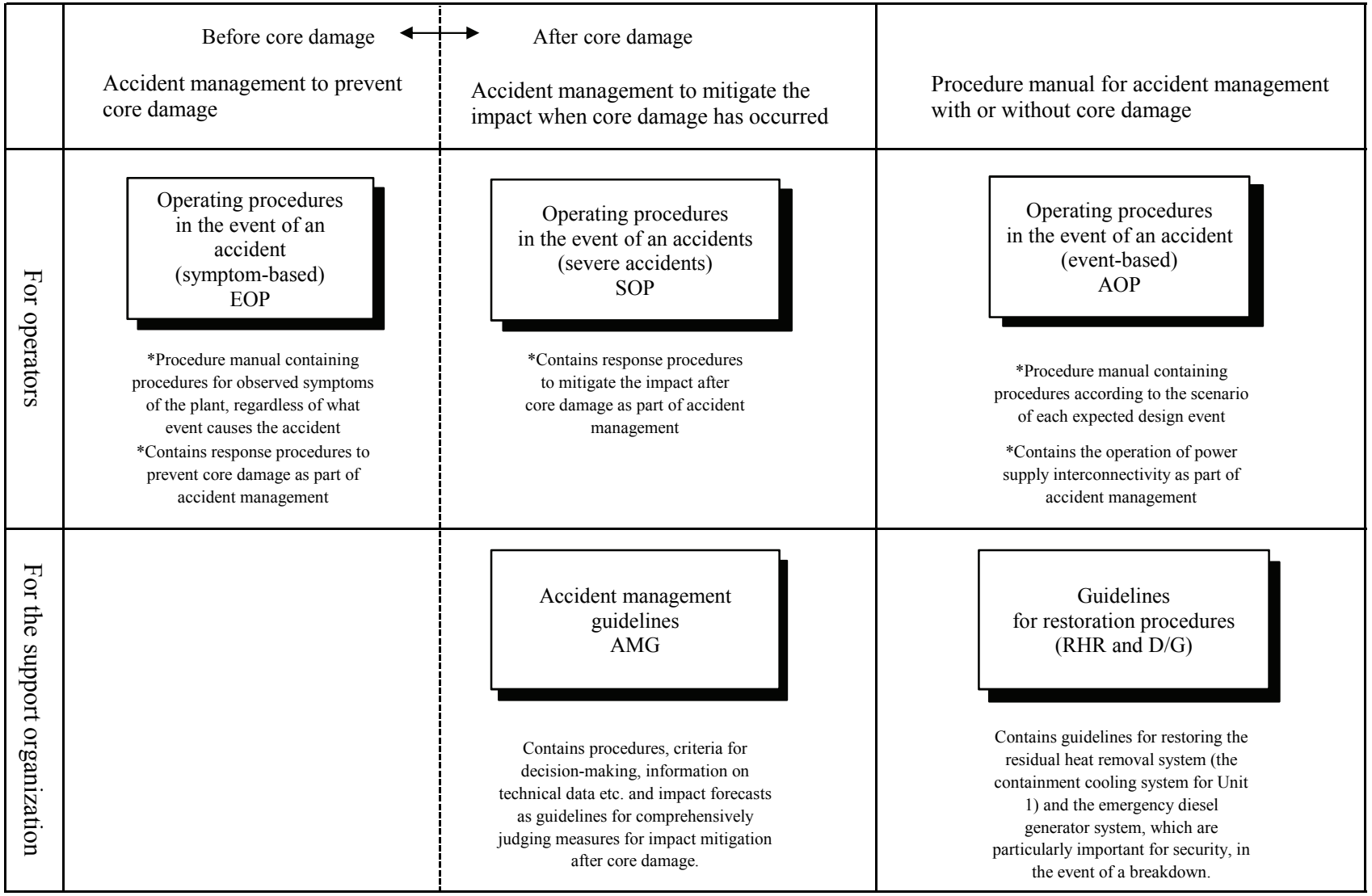
①循環水ポンプ: Water circulating pump
②5/6 号機サンプリング建屋: Sampling building for Units 5 and 6
③6 号機ディーゼル発電機建屋: Diesel generator building for Unit 6
④6 号機 MG セット建屋: Building for the MG set of Unit 6
⑤6 号機タービン建屋: Turbine building for Unit 6
⑥電気品室: Electrical items room
⑦非常用ディーゼル発電機室: Emergency diesel generator room
⑧長期地震観測建屋: Building for long-term seismic observation
⑨廃棄物処理エリア: Radioactive waste disposal area
⑩連絡通路: Passageway
⑪開閉所: Switchyard
⑫6 号機超高圧開閉所: Ultra-high voltage switchyard for Unit 6
⑬5/6 号機廃棄物地下貯蔵設備建屋: Underground storage for radioactive waste for Units 5 and 6
⑭6 号機雑固体処理建屋: Building for the disposal of solid waste for Unit 6
⑮6 号機所内変圧器: Unit auxiliary transformer for Unit 6
⑯5 号機起動変圧器: Startup transformer for Unit 5
⑰サプレッションプール水タンク: Suppression pool water tank
⑱No.4 資材倉庫: Material storage 4
⑲励磁変圧器: Exciter transformer
⑳窒素供給装置: Nitrogen supply equipment
㉑水素供給設備制御室: Control room for hydrogen supply equipment
㉒5 号所内ボイラー建屋: Building for the Unit 5 house boiler
㉓主排気ダクト: Main exhaust duct
㉔6 号機復水貯蔵タンク: Condensate storage tank for Unit 6
㉕純水タンク : Deionized water tank 1



Accident management implementation organization

Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002) by TEPCO

Attachment VI-11



*AOP: Abnormal operating procedures

*SOP: Severe accident operating procedures

*EOP: Emergency operating procedures

*AMG: Accident management guidelines

Overview of the configuration of accident management procedures

Compiled from the "Report on Development of Accident Management for Fukushima Dai-ichi NPS" (May, 2002)

Attachment VI-12

Attachment VI-13

Method and frequency of accident management training programs

Training target		Content of training	Training method/frequency	
Support organization personnel	Personnel other than engineering team	Primary knowledge	Training method	Self-study Lectures by the Technical GM, etc.
			Frequency	Once while in the job
	The site superintendent, deputy site superintendent of the headquarters, and section chief, assistent section chief, and members of the engineering team	Primary knowledge, Advanced knowledge	Training method	Self-study Lectures by the Technical GM, etc.
			Frequency	Once while in the job
Operators	Shift supervisors and assistant shift supervisors	Primary knowledge, Advanced knowledge	Training method	Self-study Lectures by the Electricity Generation GM, etc.
			Frequency	Once while in the job
	Everyone under the senior operator	Primary knowledge	Training method	Self-study Lectures by the Electricity Generation GM, etc.
			Frequency	Once while in the job

NB: The operators in corresponding operations for accident management to fullest possible the extent are trained by the Full Scope Simulator at the BWR Operator Training Center.

Content of accident management training (an example)

Target	Content
Personnel of the support organization and all shift operators	Primary knowledge Overview of AM (what "AM" means) Overview of severe accidents (what "severe accident" means) Representative features of accident scenarios and their development An overview of the types of equipment for each function Positioning of accident management guidelines (AMG) etc.
Support organization: Site superintendent Deputy site superintendent Section chief of engineering teams Assistent section chief Members of engineering teams	Primary knowledge Overview of AM (what "AM" means) Overview of severe accidents (what "severe accident" means) Representative features of accident scenarios and their development An overview of the types of equipment for each function Positioning of accident management guidelines (AMG) etc.
Operators : Shift Supervisor Assistant Shift Supervisor	Advanced knowledge AMG etc. (flow guide) Development of representative accident scenarios and events at the plant Priorities corresponding to the plant's equipment for each function Overview of unknown events (metal-water reactions, etc.) Situation of the unknown event, method of confirmation and corresponding operations of unknown phenomena

NB: Te training methods, frequency and content are due to revision, as appropreate.

Compiled from the “Report on Development of Accident Management for Fukushima Dai-ichi NPS” (May, 2002) by TEPCO

Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company: timeline of activities (2011)

Month	Day	Main Activities
May	24	The government decides to establish the Investigation Committee at a Cabinet meeting. The Prime Minister appoints Dr. Yotaro Hatamura as chairperson.
May	27	The Prime Minister appoints Dr. Kazuo Oike, Dr. Shizuko Kakinuma, Mr. Yukio Takasu, Mr. Toshio Takano, Mr. Yasuro Tanaka, Ms. Yoko Hayashi, Mr. Michio Furukawa, Mr. Kunio Yanagida and Mr. Hitoshi Yoshioka as committee members.
Jun.	7	First Session Address by the Prime Minister. Address by the Chairperson. The Committee determines management procedures and investigation items. The Chairperson appoints Mr. Seiji Abe and Dr. Masao Fuchigami as technical advisors. Hearing of explanations from the Nuclear and Industrial Safety Agency of the Ministry of Economy, Trade and Industry.
Jun.	17	Inspection of Tokyo Electric Power Company's Fukushima Daiichi and Daini Nuclear Power Stations.
Jun.	30	As above.
Jul.	8	Second Session The Committee arranges the handling of materials and information, relevant interview methods and other procedures. The Committee determines investigation and verification items (details). Hearing of explanations from Tokyo Electric Power Company.
Jul.	15	Inspection of the Tokai Daini Nuclear Power Station of the Japan Atomic Power Company, Ltd.
Jul.	24	The Chairperson has a meeting with Mr. John P. Holdren, Assistant to the US President for Science and Technology.
Jul.	27	The Chairperson has a meeting with Mr. Yukiya Amano, Director General of the International Atomic Energy Agency (IAEA).
Aug.	5	Inspection of the Onagawa Nuclear Power Station of the Tohoku Electric Power Company, Inc.
Aug.	19	Inspection of the Haramachi Thermal Power Plant of the Tohoku Electric Power Company, Inc.
Sep.	9	Inspection of the Hamaoka Nuclear Power Station of the Chubu Electric Power Company, Inc.
Sep.	27	Third Session Reports on the investigation status.
Oct.	14	Inspection of the Kashiwazaki Kariwa Nuclear Power Station of Tokyo Electric Power Company.
Oct.	28	Fourth Session Reports on the investigation status. Discussion for the Interim Report.
Nov.	9	Hearing of opinions of Toshitsuna Watanabe, Mayor of Okuma, and Katsutaka Idogawa, Mayor of Futaba.
Nov.	29	Fifth Session Discussion of the Interim Report plan.
Dec.	26	Sixth Session Summary and announcement of the Interim Report.

Establishment of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company

May 24, 2011
Cabinet Decision

1. Purpose

The government establishes the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company (hereinafter referred to as the "Investigation Committee") with the aim of making policy proposals on measures to prevent further spread of the damage caused by the accident and a recurrence of similar accidents in the future. This will be done by conducting a multifaceted investigation in an open and neutral manner that is accountable to the Japanese public to determine the causes of the accident at the Fukushima Daiichi and Daini Nuclear Power Stations and the causes of the damage due to the accident.

2. Composition of the Investigation Committee

(1) The members of the Investigation Committee shall be appointed by the Prime Minister from persons with academic and other various backgrounds.
(2) The Prime Minister shall appoint the chairperson of the Investigation Committee from among its members.
(3) The chairperson may appoint technical advisors to give the Investigative Committee advice on technical matters.
(4) The Investigation Committee may, when necessary, ask any relevant minister including the Prime Minister, official of any relevant administrative organizations, officer or employee of relevant businesses, official of any international organization on nuclear energy, or any other relevant person, to attend a meeting with the Investigation Committee.

3. Responsibilities of the relevant ministers

(1) All relevant ministers and officials of related administrative organizations shall fully cooperate with the operations of the Investigation Committee and shall not refuse requests from the Investigation Committee for materials and explanations without reasonable grounds.
(2) The ministers concerned shall exercise their authority based on applicable laws to instruct the relevant businesses to fulfill any requests by the Investigation Committee's for on-site investigations, materials and explanations.

4. Other matters

Administrative affairs pertaining to the Investigation Committee shall be conducted by the Cabinet Secretariat in cooperation with the relevant administrative organizations.

Rules on the establishment of the Secretariat of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company

May 31, 2011
Decision of the Prime Minister

ESTABLISHMENT AND DUTIES

Article 1. The Secretariat of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company (hereinafter referred to as the "Secretariat") shall be established in the Cabinet Secretariat with the aim of assisting the investigation by the "Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company" and dealing with the administrative work of the Committee.

STRUCTURE

Article 2. The Secretariat shall have a secretary-general, counselor, senior planning officer and other necessary officials.

(2) The secretary-general shall manage the administrative work of the Secretariat.

(3) The counselor shall participate in the investigation, planning and development of important matters by following the instructions of the secretary-general.

(4) The senior planning officer shall be engaged in the administrative work related to the investigation, planning and development of technicalities by following the instructions of the secretary-general.

(5) The secretary-general, counselor, senior planning officer and other officials may be employed part-time.

POLICY AND TECHNICAL INVESTIGATION ADVISORS

Article 3. The Secretariat may have policy and technical investigation advisors.

(2) The policy and technical investigation advisors shall investigate and state their opinions on technical matters related to the jurisdiction of the Secretariat and handle the administrative work otherwise ordered by following the instructions of the secretary-general.

(3) The policy and technical investigation advisors may be employed part-time.

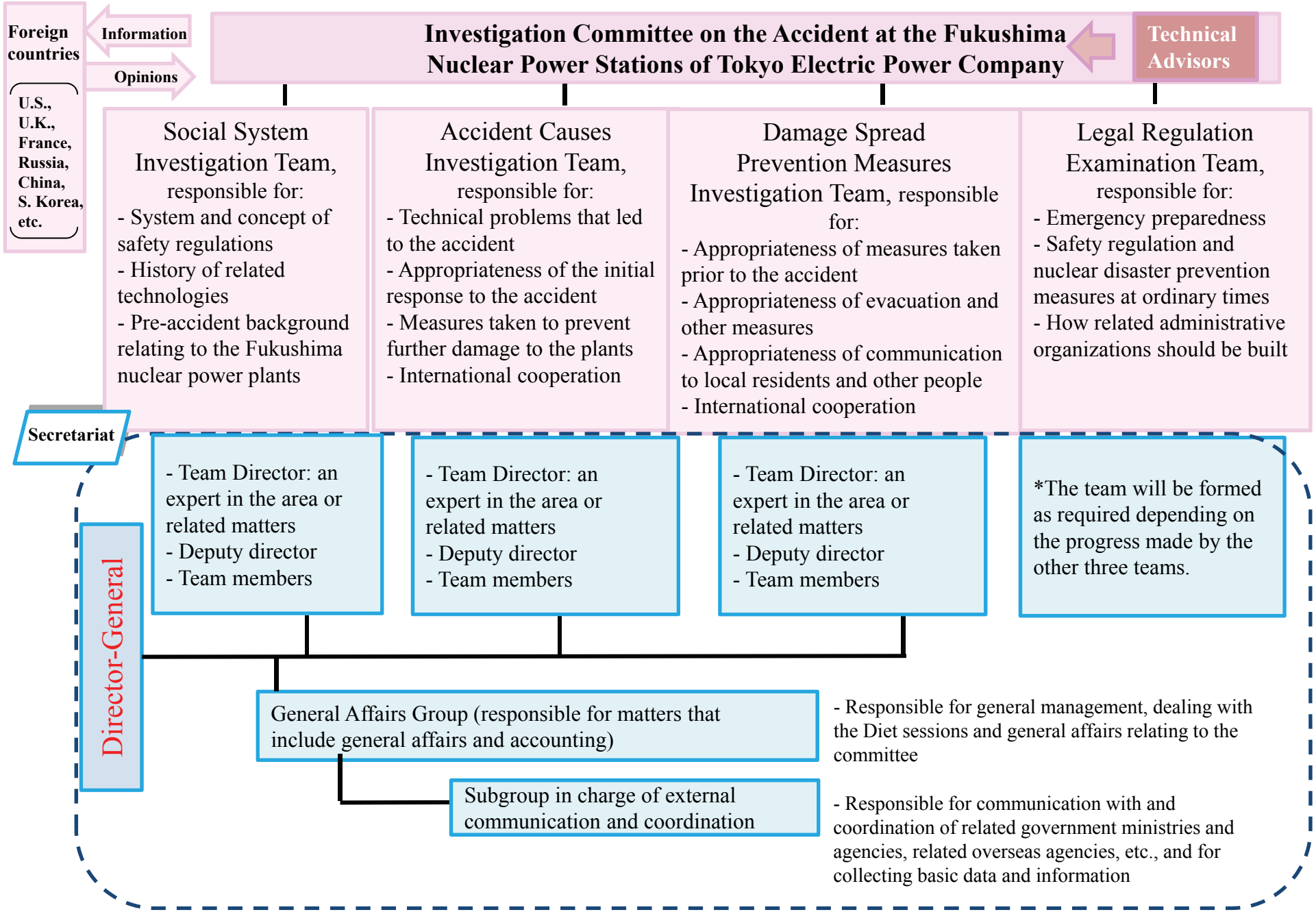
SUPPLEMENTARY RULE

Article 4. In addition to what is provided for in the preceding Articles, necessary matters in relation to the internal organization of the Secretariat shall be specified by the secretary-general.

SUPPLEMENTARY PROVISION

The rules herein shall be effective from June 1, 2011.

Structure of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company



List of experts (policy and technical investigation advisors) at the Secretariat of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company

Social System Investigation Team

【Team Director】

Dr. Hideyuki Horii

Professor, Department of Civil Engineering, Graduate School of Engineering, The University of Tokyo

(Area of specialization: sociotechnology, safety and security)

【Team Member】

Mr. Hideaki Shiroyama

Professor, Graduate School for Law and Politics, The University of Tokyo

(Area of specialization: public administration)

Accident Causes Investigation Team

【Team Director】

Dr. Seiichi Koshizuka

Professor, Department of Systems Innovation, Graduate School of Engineering, The University of Tokyo

(Area of specialization: computer simulation, severe accident analysis for nuclear reactors)

【Team Member】

Dr. Hiroyuki Oigawa

Director, Research Coordination and Promotion Office, Nuclear Science and Engineering Directorate, Japan Atomic Energy Agency

(Area of specialization: reactor physics)

【Team Member】

Dr. Yuji Nakasone

Professor, Department of Mechanical Engineering, Faculty of Engineering, Tokyo University of Science

(Area of specialization: strength of materials, computational solid mechanics)

Damage Expansion Prevention Measures Investigation Team

【Team Director】

Dr. Toshitaka Katada

Professor, Director, Research Center for Disaster Prevention in the Extended Tokyo Metropolitan Area, Gunma University

(Area of specialization: disaster information, evacuation behavior, disaster education)

【Team Member】

Dr. Katsuya Yamori

Professor, Disaster Prevention Research Institute, Kyoto University

(Area of specialization: disaster psychology, social psychology)

【Team Member】

Mr. Naoya Sekiya

Associate Professor, Department of Media and Communications, Faculty of Sociology, Toyo University

(Area of specialization: social psychology, disaster information theory)

Management procedures of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company

June 27, 2011

Decision of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company

In addition to what is provided for in "Establishment of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company (Cabinet Decision on May 24, 2011)," the procedures of meetings and other matters concerning the administration of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power (hereinafter referred to as the "Investigation Committee") shall be determined as follows:

DEPUTY CHAIRPERSON

Article 1. In the absence of the Chairperson, a Committee member nominated in advance by the Chairperson shall act on their behalf.

PROCEEDINGS OF THE INVESTIGATION COMMITTEE

Article 2. The Investigation Committee shall convene when summoned by the Chairperson.

(2) The Investigation Committee may not hold a meeting unless the majority of its members are present.

(3) In principle, decisions by the Investigation Committee shall be made with the unanimous agreement of all attendees. However, in the event that unanimous agreement is not reached, decisions shall be made by the majority of the members present at the discretion of the Chairperson.

DISCLOSURE OF PROCEEDINGS OF THE INVESTIGATION COMMITTEE

Article 3. In principle, proceedings of the Investigation Committee shall be

disclosed. However, they may not be disclosed in the event their disclosure is likely to be detrimental to the rights or interests of any third party or the public's interest, or otherwise approved by the Chairperson.

(2) In principle, documents distributed at and proceedings of a meeting of the Investigation Committee shall be disclosed. However, they may not be disclosed in the event their disclosure is likely to be detrimental to the rights or interests of any third party or the public's interest, or otherwise approved by the Chairperson.

SUBCOMMITTEE

Article 4. The Investigation Committee may resolve to have subcommittees if they are necessary for studying and deliberating specialized matters.

(2) In addition to what is specified by the resolution described in the preceding paragraph, necessary matters for the administration of subcommittees shall be specified by the Chairperson.

PARTICIPATION OF TECHNICAL ADVISORS IN THE INVESTIGATION COMMITTEE

Article 5. Technical Advisors may attend the Investigation Committee meetings with the approval of the Chairperson to state their opinions on matters requested by the Chairperson.

INSTRUCTION FOR THE SECRETARIAT TO INVESTIGATE

Article 6. The Investigation Committee and the Chairperson may have the Secretariat conduct necessary investigations.

MISCELLANEOUS PROVISION

Article7. In addition to what is provided for in the preceding Articles, necessary matters for the administration of the Investigation Committee shall be specified by the Chairperson.

Information and informative materials to be handled without disclosure

July 8, 2011

Terms of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company

1. (1) The members and technical advisors (hereinafter referred to as "Members and Advisors") of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company (hereinafter referred to as the "Committee") shall not disclose confidential information that becomes known to them during the investigation process of the Committee even after the completion of their roles as Members and Advisors.
(2) Information and informative materials obtained during the investigation process shall be kept securely in an appropriate place, such as the Secretariat of the Committee.

2. (1) In the event that the Committee is provided with information or informative materials from other parties on the condition that the information or informative materials are handled confidentially, it shall state specific reasons for their nondisclosure, including the possibility that the disclosure of such information or informative materials is not likely to be in the public's interest or may be detrimental to the rights and interests of any party concerned (including parties other than the information provider. This applies hereinafter). The Committee shall handle such information and informative materials confidentially if the Committee finds reasonable grounds for nondisclosure.
(2) If the Committee finds reasonable grounds (e.g., the potential for the interest of the public or the rights and interests of the parties concerned to be compromised) for the nondisclosure of information or informative materials not falling under (1), the Committee shall handle the information or informative materials confidentially.
(3) With regard to (1) and (2), in times of urgency, the Chairperson of the Committee may use his discretion to determine whether the Committee should handle the

information or informative materials confidentially.
(4) When preparing the interim and final reports, the Committee shall treat such information and informative materials confidentially.

3. If other parties handle information or informative materials confidentially and do not comply with the Committee's request for their provision despite the Committee not finding any reasonable grounds for nondisclosure, the Committee shall take appropriate measures, such as disclosing to the public the response of the parties.

Methods of Interview

July 8, 2011

Terms of the Investigation Committee on the Accident at the Fukushima Nuclear Power Stations of Tokyo Electric Power Company

1. Interviewer

In many cases, Secretariat members take the initiative in holding interviews as part of their fact-finding missions. Secretariat members, however, shall hold them together with the Committee members or technical advisors (hereinafter referred to as "Members and Advisors") should they wish to participate.

NOTE: The Secretariat shall inform Members and Advisors of the details of an interview in advance, and those wishing to participate shall do so. However, some changes may be required depending on the number of Members and Advisors wishing to participate.

2. Method of Interviewing

(1) Interviews, in principle, shall be conducted in confidence and in small groups.

NOTE 1: Depending on respective interviewees, there are various reasons for the above,including the following, which are considered major reasons: 1.) To obtain a testimony of truth; 2.) In many cases, interviews deal with information which is inappropriate to publicly disclose (e.g. for reasons pertaining to public security); 3.) Interviews often deal with testimonies relating to personal privacy.

(2) With the exception of interviews concerning information specified in 2.) of NOTE 1, an interview shall be disclosed in an appropriate manner (e.g., disclosure to the media or by recording) with the consent of the interviewee.

NOTE 2: The reasons specified in NOTE 1 are to keep interviews confidential. However, if the interviewee agrees to the interview being made available to the public, it shall be conducted in an open manner or on the premise that it will be disclosed. This is because in such cases, the reasons specified in 1.) and 3.) of NOTE 1 will not pose a problem while the issue stated in 2.) will be resolved by

the exception stated in (2) of 2. (“with the exception of interviews concerning information specified in 2.) of NOTE 1”).

3. Recording of Interviews

When an interview that is not to be disclosed is held, the Secretariat member in charge shall compile the information delivered in the interview and create a transcript.

In addition, the interview shall be recorded with the consent of the interviewee on a digital voice recorder to ensure accuracy. If the interviewee does not agree or there is no time to arrange a digital voice recorder, the interview shall be held without being recorded, in which case, however, the Secretariat member in charge shall take notes as accurately as possible.

4. Handling of Interview Results

(1) The Secretariat shall inform the Members and Advisors of the completion of each interview without delay.

(2) The Secretariat shall inform the Members and Advisors of the content of interviews as necessary when it compiles and reports the investigation results to the Committee.

(3) If the Members and Advisors ask to read the testimonies, in principle, the Secretary shall directly deliver copies of the testimonies to them by hand (or by an appropriate alternative method in order to prevent the information being leaked). If the Members and Advisors request the recordings of the testimonies, they shall listen to them at the Secretariat office.

5. Use of Interview Results

(1) Interview results shall not be used to pursue liability.

The Committee is not established for the purpose of pursuing the liability of any party. Therefore, the Committee shall not use material (i.e., the content of testimonies) obtained from interviews for the purpose of pursuing the liability of

any party.

(2) When the Secretariat compiles the investigation results of interviews that are not to be disclosed about each individual's involvement in contributing to the causes of the accident and spread of damage, the Secretariat shall give due consideration so that no individual cooperating with the investigation shall be identified.

Although the Secretariat shall disclose as necessary transcripts obtained from interviews not to be disclosed, it shall not divulge any information that may identify the interviewee or which the interviewee requests not to be disclosed. As a recording is likely to identify the interviewee, no recording shall be disclosed as long as the interviewee requests its nondisclosure.

List of English Abbreviations

Abbreviation	English Term
ADS	Automatic Depressurization System
AEC	Atomic Energy Commission
AM	Accident Management
AMG	Accident Management Guideline
AOP	Abnormal Operating Procedures
AO弁	Air Operated valve
APD	Alarm Pocket Dosimeter
ARI	Alternative Rods Injection
BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
BWR	Boiling Water Reactor
C/B	Control Building
CAMS	Containment Atmospheric Monitoring System
CCS	Containment Cooling System
CCSW	Containment Cooling Sea Water System
CDF	Core Damage Frequency
CFF	Containment Failure Frequency
CRD系	Control Rod Drive mechanism
CS	Core Spray System
D/DFP	Diesel-driven Fire Pump
DG	Diesel Generator
DGSW	Diesel Generator Sea Water System
DOE	United States Department of Energy
DSピット	Dryer Separator pit
D/W	Drywell
ECCS	Emergency Core Cooling System
EOC	Emergency Operation Center
EOP	Emergency Operating Procedures
EPZ	Emergency Planning Zone
ERC	Emergency Response Center
ERSS	Emergency Response Support System
FAO	Food and Agriculture Organization of the United Nations
FP	Fission Product
FP系	Fire Protection system

Abbreviation	English Term
FPC系	Fuel Pool Cooling system
HPCI	High Pressure Coolant Injection System
HPCS	High Pressure Core Spray System
HPCSDG	High Pressure Core Spray System Diesel Generator
IA系	Instrument Air system
IAEA	International Atomic Energy Agency
IC	Isolation Condenser
ICRP	International Commission on Radiological Protection
INES	The International Nuclear and Radiologial Event Scale
IPE	Individual Plant Examination
IPEEE	Individual Plant Examination for External Events
JAEA	Japan Atomic Energy Agency
JAEA/NEAT	JAEA/Nuclear Emergency Assistance & Training Center
JAMSTEC	Japan Agency for Marine-Earth Science and Technology
JAXA	Japan Aerospace Exploration Agency
JNES	Japan Nuclear Energy Safety Organization
LPCI	Low Pressure Coolant Injection System
LPCS	Low Pressure Core Spray System
M	Magnitude
M/C	Metal-Clad Switch Gear
M/DFP	Motor-driven Fire Pump
MCC	Motor Control Center
MO弁	Motor Operated valve
MSIV	Main Steam Isolation Valve
MUWC系	Make-Up Water Condensate system
NEA	Nuclear Energy Agency
NRC	Nuclear Regulatory Commission
NUPEC	Nuclear Power Engineering Corporation
O.P.	Onahama Peil
O.P.	Onagawa Peil
OECD NEA	OECD Nuclear Energy Agency
P/C	Power Center
P/P	Physical Protection

Abbreviation	English Term
PAZ	Precautionary Action Zone
PRA	Probabilistic Risk Assessment
PSA	Probabilistic Safety Assessment
PSR	Periodic Safety Review
PWR	Pressurized Water Reactor
R/B	Reactor Building
RCIC	Reactor Core Isolation Cooling System
RHR	Residual Heat Removal System
RHRS	Residual Heat Removal Sea Water System
RPS	Reactor Protection System
RPT	Recirculation Pump Trip
RSK	Reaktor-Sicherheitskommission
RW/B	Radioactive Weste Disposal Building
S/C	Suppression Chamber
SA	Severe Accident
SARRY	Simplified Active Water Retrieve and Recovery System
SBO	Station Black Out
SCSIN	Service Central de Sûreté des Installations Nucléaires
SFP	Spent Fuel Pool
SGTS	Standby Gas Treatment System
SHC	Shutdown Cooling System
SLC	Standby Liquid Control System
SOP	Severe Accident Operating Procedures
SPDS	Safety Parameter Display System
SPEEDI	System for Prediction of Environmental Emergency Dose Information
SR弁	main Steam Relief valve
T.P.	Tokyo Peil
T/B	Turbine Building
TAF	Top of Active Fuel
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
WBC	Whole Body Counter
WHO	World Health Organization
WSPEEDI	Worldwide Version of System for Prediction of Environmental Emergency Dose Information