*Provisional Translation

TEPCO's Fukushima Daiichi NPS
Review Meeting on the Implementation Plan on Handling ALPS Treated Water
Minutes of the 3rd Review Meeting

Date: December 24, 2021 (Friday) 15:00-16:03
Location: Conference room B, C and D on the 13th floor of the Nuclear Regulation Authority

Participants:

The Nuclear Regulation Authority (NRA)

Nobuhiko Ban	Commissioner of the NRA

The Secretariat of Nuclear Regulation Authority (S/NRA)

Shuichi Kaneko	Director General for Emergency Response
Jun Takeuchi	Director of the TEPCO's Fukushima Daiichi NPS Accident Measures Office
Tomoki Shibutani	Director for the TEPCO's Fukushima Daiichi NPS Accident Measures Office
Kohei Iwanaga	Director for the TEPCO's Fukushima Daiichi NPS Accident Measures Office
Hideaki Masaoka	Deputy Director for the TEPCO's Fukushima Daiichi NPS Accident Measures Office
Ayako Otsuji	Deputy Director of the TEPCO's Fukushima Daiichi NPS Accident Measures Office
Yasuhiro Chimi	Chief Safety Examiner of the TEPCO's Fukushima Daiichi NPS Accident Measures Office
Takuro Arai	Safety Examiner of the TEPCO's Fukushima Daiichi NPS Accident Measures Office
Hisakawa Shinon	Examiner of the TEPCO's Fukushima Daiichi NPS Accident Measures Office

Tokyo Electric Power Company Holdings, Inc. (TEPCO HD)

Junichi Matsumoto	General Manager of Project Management Office & Chief Officer for ALPS treated water Management, Fukushima Daiichi Decontamination and Decommissioning Engineering Company (Fukushima Daiichi D&D Engineering Company)
Tadashi Yamane	Mechanical Equipment for Treated Water Installation Project Group Manager, ALPS treated water program department, Fukushima Daiichi NPS, Fukushima Daiichi D&D Engineering Company

Kenro Furukawasono	Civil Equipment for Treated Water Installation Project Group Manager ALPS treated water program department, Fukushima Daiichi NPS, Fukushima Daiichi D&D Engineering Company
Hiroaki Saneshige	Planning Radiation/Chemical Analysis and Evaluation for Treated Water Project Group Manager, ALPS treated water program department, Fukushima Daiichi NPS, Fukushima Daiichi D&D Engineering Company
Shimizu Kenji	General Manager, ALPS Treated Water Program Department, Fukushima Daiichi NPS, Fukushima Daiichi D&D Engineering Company
Tomomi Okamura	Disaster Prevention and Radiation Center, Fukushima Daiichi NPS, Fukushima Daiichi D&D Engineering Company

○Kaneko (S/NRA):

We will start the third meeting of Review on the Implementation Plan on Handling ALPS Treated Water.

Continuing from the last time, Kaneko of the Secretariat of NRA will work on the progress.

Thank you in advance.

In addition, we would like to ask for your cooperation in the smooth progress of the web conference, which will be done by linking each of TEPCO's Tokyo and Fukushima Daiichi websites online.

Regarding the previous two examinations, we have been examining the establishment of an organization or the expansion of tanks as a preparatory step for the disposal of ALPS treated water and the release to the ocean. From this Tuesday, we have received an amendment of application for approval of the implementation plan. We would like to start examining the main body of the facilities and maintenance related to the release of treated water into the ocean or related to its operation.

Today, however, the topic of the meeting is the installation of facilities related to the release of ALPS treated water into the ocean. After listening to TEPCO's explanation on the details of the facilities and the future image of their operation, we have prepared a list of major issues to be discussed based on the discussions we have done so far. After sharing our understandings, we intend to start discussions that will lead to future examinations.

I think some of the issues will be discussed today, but I will divide them into several occasions to discuss those issues.

Also, if there are any additional issues in the discussion, I would like to add them and proceed with the review.

Then, I will enter into the agenda immediately.
TEPCO's application document is very large amount so that TEPCO have prepared materials to explain it in a simpler manner.
With regard to this, I would like TEPCO to give us an explanation of the main points, particularly with emphasis.
Thank you in advance.

○Matsumoto (TEPCO HD) :
Do you hear me well?

○Kaneko (S/NRA) :
Yes, hear well.

○Matsumoto (TEPCO HD) :
This is Matsumoto, TEPCO. I would like to report on the change of the implementation plan for the Fukushima Daiichi NPS Specified Nuclear Facility, which TEPCO filed an application on December 21, 2021, as well as the ocean discharge-related facilities for ALPS treated water today.
As Mr. Kaneko mentioned earlier, there is a large volume of material in the application, so today we prepared it in the form of Material 1-1.
Also, it is still a 96-page document, so I would like to discuss this with TEPCO focusing on the main points that TEPCO is currently thinking about, and I would like to receive your opinions and comments from the secretariat of NRA later on.
Thank you in advance.

Please see Material 1-1.
On page 3, we have shown an outline of the dilution and discharge facilities of ALPS treated water as a whole, and we have shown an image of the system.
The scope of this application is as follows: dilution and discharge facilities for ALPS treated water as shown on page 3, the area enclosed by the orange dotted line, and, on the other hand, the lower right, the water discharge facilities, and ALPS treated water is diluted and released from the undersea tunnel 1 kilometer ahead of the sea.
As for ALPS Treatment Water Dilution and Discharge Facility, as shown in page 3, the Dilution and Discharge Facility is comprised of three facilities: measuring and checking facilities, transfer facilities, and dilution facilities.
Then, I would like to explain one by one.

First, we will see page 4.
Among the dilution and discharge facilities for ALPS treated water, the facilities shown here are for measuring and checking.
Prior to releasing ALPS treated water, we assume that we should measure thoroughly tritium and other nuclides.
To this end, we have changed the function of the K4 area tank groups, which we are currently installing in the K4 tank area, so that we can make sure that the measurement and confirmation are thoroughly done.
Although the K4 area tank group is shown on the right, there are 35 tanks of about 1,000 m3 class in the K4 tank area.
The function of thirty of these will be transferred for this purpose.
Each group consisting of ten tanks has approximately 10,000 m3 units. The table at the bottom right shows that we are currently considering a configuration in which we can continuously work and discharge the tanks while rotating the functions of the tanks according to their roles, such as acceptance, measurement, confirmation, and discharge.
In addition, since we measure and check the water in units of 10,000 m3, we think that whether the water in 10,000 m3 is uniform is an important point.
As explained in the measurement and confirmation process described in ②, a circulation pump is installed for a group of five tanks each and the 10 tanks will be connected for circulation operation.
In addition, a stirring equipment is submerged in each tank, so that the content of tank is stirred respectively.
The page jumps a little, but please see page 42 for the standpoint of equalization.
From the standpoint of equalization, we have installed circulation pumps for each of the five tanks, and in addition to circulating the respective tanks, we have installed stirring equipment inside each of the tanks for stirring operation.
First of all, we conducted a stirring verification test in November, 2021, and we have written the results on pages 43, 44, and 45.
This time, we have charged a solution of sodium tertiary phosphate into this tank, and confirmed that the contents have become homogenized by stirring.
Regarding the results, as shown on page 45, we have found that the actual measurement results are approaching the target 80 ppb evaluation value in this verification test.
In addition, we intend to conduct circulation tests around February next year, 2022, in which 10 tanks are connected by installing circulation pumps.
Regarding the results of our review, we hope to report them to the review meeting as soon as the results are finalized.

Then, please return to the documentation and see page 5.
This is an overview of the transfer equipment of the dilution and discharge equipment.
This is the configuration of the system mentioned earlier from the tank for measurement and confirmation to the seawater piping in the lower right on figure, which is to be mixed with seawater for dilution.
The system consists of a pump that transfers ALPS process water, a valve that regulates the flow rate of treated water, and an emergency shut-off valve that shuts off the discharge immediately in the event of an error.
Each of these pumps and valves is redundant. Two units are available, one for normal operation and the other for standby.
As for the emergency shut-off valve, two valves are installed in series, namely, one valve is installed downstream of the flow control valve and another valve is installed before mixing with the seawater piping. The system is so designed as even if one of the two valves should not close, another valve will be shut down to provide an emergency stop.
For such interlocks, see page 50.
The main items of closing interlock with emergency shut-off valves on the transfer line of ALPS treated water are shown here.
If an abnormality is detected, such as abnormal level or failure of the radiation monitor, an abnormality or failure of the flowmeter, and then, a trip of the seawater transfer pump or an abnormality in the seawater flowmeter in downstream, the emergency shut-off valves (1) and (2) are so designed as to be closed to stop ocean release.
Understandable trip signals such as tripping of seawater pumps can be set up easily. However, if abnormal values are detected by the flow rate and radiation monitor, we would like to determine the set value from now on by considering the error of the instrument and fluctuations in measurement.
In addition, although this is not a malfunction of the equipment, we are considering that even if an abnormality is confirmed in the monitoring of the sea area, the discharge will be stopped once. I would also like to explain my views on this issue at the review meeting that will be held later.

Following this, we have returned to you on page 6.
On page 6, this is the dilution facility of the dilution and discharge facility.
This is where the treated water and seawater are mixed. Seawater for dilution is taken by a seawater pump from water intake of Unit 5 and guided to the seawater pipe header.
For this, we prepare three pumps, and we will install a flowmeter on each line to keep a flow rate for dilution.
We also plan to use the flow rate of this seawater and the flow rate of the treated water on the

previous page to confirm that the tritium levels are less than 1, 500Bq/L after diluting ALPS treated water.
Regarding the capacity of seawater transfer pumps, we would like to provide a capacity to secure a flow rate that dilutes ALPS treated water more than 100 times.
Specifically, as described in the footnote, we would like to prepare three pumps with a capacity of approximately 170000 per cubic meters per unit per day, namely 7086 cubic meters per hour.
The treated water transferred from the header is mixed with seawater. Please see page 46 for the situation of mixing.
At present, TEPCO has installed an analytical shape model as shown in the figure below on page 46, in which we simulate the injected treated water is mixed and diluted with seawater.
Regarding the specific results, although there are models and calculation results on pages 47 and 48, it has been found that mixing dilution begins rapidly when the treated water is injected from the injection pipe into the seawater header.
As the specific results are shown on page 48, it was found that up to 0.23% (approximately one-430th) of ALPS treated water is diluted.
In addition, the average dilution is up to 0.14% (about one-710th dilution).
Also, if you release 150000 becquerels per liter of ALPS treated water, you will have up to 350 becquerels per liter, averaging about 220 becquerels per liter, which is equivalent to the calculated tritium density.

Then please return to page 7.
This section provides an overview of the water discharge equipment for the related facilities.
In the lower right corner of page 7, we are going to install a discharge vertical shaft in order to dig a undersea tunnel.
The discharge shaft is composed of two facilities : the upper-stream storage after the treated water is diluted and mixed, and the down-stream storage as the water discharge facility.
In particular, this is said to be a weir or a bulkhead in the middle above. In terms of design, it is not necessary to install this bulkhead, especially because of the dug of the tunnel. However, TEPCO intends to directly confirm the concentration when tritium is released using this up-stream storage.
The up-stream storage has a volume of about 2000 m3. At the initial stage of starting the release, once diluted water of 2000 m3 is stored in the storage to measure the concentration of tritium directly.
Regarding this, since the measurement of tritium is a weak β-ray, we believe that the concentration of tritium can be confirmed online by the flow rate of treated water and seawater to be diluted. However, there were many opinions that we would directly confirm the measurement, so we have decided this design.

On the downstream side, the design includes a discharge tunnel from the downstream water tank and a discharge outlet.

For specific tunnels, see page 8.
As shown in the top plan view, the breakwater on the north side will be partially modified, and the water outside the port will be taken from the vicinity of the water outlet of Units 5 and 6.
Seawater has been taken in according to the blue arrow, and the water has been taken in from the location where the seawater pump of Unit 5 is installed, and there is a red white square, then it will be guided to the discharge tunnel from the discharge shaft.
As shown a picture below, the water overflowing from the upper-stream storage of discharge vertical shaft enters the down-stream storage, and the difference in gravity that the water surface of the down-stream storage is approximately 2m higher than the actual sea surface is utilized to discharge the water.
As you can see in this picture, about one-third of the water discharge tunnels are dug downward and then, horizontally, rising and being guided to the outlet.
The point of arrival is the seabed approximately 12m below the sea level.
In addition, I would like to explain the specific standards and the results of conformity with the standards at a review meeting in near future.
With regard to this water intake, as shown in the plan view, we will newly install a partitioning weir.
There was originally a silt fence, which restricted the movement of seawater within the port. This time, however, in order to avoid the mixing inlet seawater with seawater in the harbor which is a relatively high concentration of radioactivity, we are considering installing a partition weir that is more effective than a silt fence.
This is installed in such a way as to put an impervious sheet on the embankment of the stone pile, and I think that it is more effective than silt fence in blocking water.
Thus, we want to keep seawater, which has a relatively high concentration in the harbor, from interchanging with seawater for dilution.

Next, see page 10.
This will be the layout of the dilution facilities for ALPS treated water and related facilities.
Just in the middle of this plan, there is a relatively large orange square, which is currently located in the K4 area tank group and is used as a tank for measurement and confirmation.
Among some circulation pumps and circulation piping, the line of treated water is indicated in green.
When the transfer pump is referred to as the direction, it will be installed on the north side and then guided along the road to the sea side yard of Unit 5.

Here, ALPS treated water merges with the seawater by transfer pipe which is taken by the pump on sea side, and is diluted and released in a plan view.
As for the emergency isolation valve, the emergency isolation valve 1 is at almost the same level as the reactor building of Unit 5 at the site height of 11.5m, and the emergency isolation valve 2 is installed as close as possible to the seawater header in order to minimize the amount of treated water released in the event of an emergency isolation.

Next, see page 11 for the schedule.
We estimated that the ordinary review period is 6 months, and the schedule was described in this way.
We intend to have pre-service inspection in mid-April, around the spring of 2023 as stated in this figure, and then put the facility into service.
The details of the application are described from page 13. I would like to make a little more supplementary to what we have not talked about so far.

See page 21.
This section presents the results of this dose assessment in relation to the standards for radiation protection around the site regarding the control of radioactive material release, etc.
Regarding the release of ALPS treated water, there are two conditions. For radionuclides other than tritium, the sum of the Notification concentration ratio is less than 1, and for tritium, the release is controlled to be less than 1, 500Bq/L by dilution.
Therefore, as shown in the equation below, the contribution of tritium to the impact of radiation on the site boundaries is 0.025, such derived that 1,500Bq over 60,000Bq of the Notification concentration, and that of other radioactive nuclides than tritium is 0.010, where the sum of the Notification concentration ratios of other nuclides is less than 1 and the dilution ratio by seawater is 100 times or more. They are added up to 0.035, which is lower than 0.22 mSv/year assigned to the discharge of liquid waste.

Then, please turn pages and proceed to page 26.
Pages 25 and 26 are for earthquakes among the design considerations for natural phenomena. As shown on page 25, the NRA indicates the concept of application of seismic standards from Class S to Class C. TEPCO considers that seismic resistance class C is appropriate for ALPS treatment water discharge facilities.
Considering the possible loss of function of equipment and the ability to respond quickly, we have decided to apply the class C.

Then, please proceed to page 61 and 62.
Regarding the management of radioactive liquid waste, these two pages show how to set up and manage the nuclear species of the radioactive liquid waste in discharging the ALPS treated water. Regarding this, we confirm that tritium concentration is less than 1500Bq/L and that other nuclear species satisfy the criteria that the sum of the Notification concentration ratio is less than 1.
Also, at the proceeding interview on October 18, we got three comments from the NRA, which are shown on page 62 specifically.
They are i) when examining the selection of nuclides to be measured in ALPS treated water, after confirming the presence of nuclides that cannot be proven to be absent in ALPS treated water, taking into account quality control of selecting process of such nuclides that it is difficult to measure radioactivity concentration and necessary to determine it in the evaluation, ii) presenting the details of the examination when Fe-55, Ni-59, Mo-93, Sn-121m are selected as other nuclides from the results of the investigation of decommissioning activities and disposal facilities, iii) clarifying the criteria and reasons with which such nuclides are excluded from the scope of measurement that whose Notification concentration ratio is equal to or less than 1/100 due to decay in the elapsed time after the earthquake.
Regarding this matter, I would like to report its results to the review meeting after our consideration is summarized.

Then, at the end, please see page 63.
When submitting the application for the discharge facilities for ALPS treated water, we intend to conduct the application in accordance with the Reactor Regulation Act and the basic policy for the disposal of ALPS treated water, which was decided by the Japanese government on April 13.
From the government policy TEPCO has determined that four points would be better to be described in the implementation plan in terms of the facilities and operations.
In other words, ①tritium concentration in discharged water diluted with seawater is less than 1500Bq/L; ② the annual tritium release is within the range of 22 trillion Bq; ③emergency isolation valves are installed to isolation the transfer of ALPS treated water in abnormal events; and ④ radiological effects on humans and the environment when ALPS treated water is discharged into the ocean are to be evaluated. We intend to explain these four points again at the following Review Meetings.
Especially with regard to ① and ③, I have previously described an overview. Regarding ④, I have attached the radiological impact assessment to the application form as a reference material. I would also like to report on the results of the assessment in following Review meetings.
Regrading ②, i.e. the annual discharge amount of tritium is within the range of 22 trillion Bq, basically, the amount of tritium discharged per discharge unit (10 tanks) is calculated by

multiplying the concentration of tritium before dilution by the amount of treated water released. Therefore, we believe that we can manage the annual discharge amount of tritium by managing the accumulation of each release. We would like to explain the specific operation methods latter. It has become a little longer, but that is all of my explanation.

○Kaneko (S/NRA):
Thank you, Mr. Matsumoto.
So, I would like to go into confirming the contents. First, if you have any questions about what Mr. Matsumoto explained, such as what you would like to clarify, facts, or what you would like to thoroughly understand, I would like to take them first. Do you have any questions?
Is there anything you would like to confirm thoroughly as a premise of discussion?
In general, the outline is based on what TEPCO has announced in the past, so there may be many questions.
Is that okay with you?
Now that you have explained an overview of this application, but in order to conduct our review, we will discuss the content of the application and clarify the details deeply. To do so, we also believe that we need to thoroughly check some points like matters relating safety or response measures when something is wrong. At this time, we have summarized what we regard important in document 1-2, so we would like to explain about this.

○Arai (S/NRA):
Please refer to document 1-2.
I would like to explain the main issues related to the content of this application.
Regarding the issues to be presented today, as stated at the beginning of the material, they have become matters that we would like you to explain in particular in detail in future reviews.
As these issues are currently being addressed, it should be noted that there may be additions to these issues depending on the progress of future examinations and confirmations in the review.
In addition, we would like you to thoroughly show us the concepts of regulatory requirements and government policies regarding the relevant items of the equipment, for example, exposure to workers and emergency measures.
So, let me explain the contents of the material.

First, regarding (1) the overall policy, I would like you to clearly explain the positioning of the ocean release of ALPS treated water in the entire process of the specified nuclear facilities and the role of the ALPS treated water discharge facilities, which are expected to reduce the risk of the specified nuclear facilities as a whole.

Regarding the following two points (2-1 and 2-2), specific details have been added to the points that were presented in the bullet at the recent NRA Commission Meeting on December 22.
Now let me explain them.

First, regarding (2-1) the main points of examination under the Reactor Regulation Act, (1) ALPS treated water discharge facilities, ① the adjustment and monitoring of the mixed dilution rate of ALPS treated water into seawater, please explain specifically the mixing dilution rate with seawater required for the tritium concentration, the method of mixed dilution and its monitoring, and their validity, which are necessary for the release of ALPS treated water to be carried out to the extent that the effective dose at the site boundary is less than 1 mSv/year as stipulated in the items for which the measures should be taken.
For ②, please explain specifically the methods for equalizing the radioactivity level of ALPS treated water in the K4 tank prior to release and its validity.
Regarding ③, when setting the mixed dilution rate and evaluating the effective dose at the site boundary, consider the effects of radioactive materials that may exist at the water intake site of seawater, and when the effects cannot be ignored, please explain the measures to prevent the transfer of radioactive materials in the port to the water intake site.
Next, as for ④, I understand it is about the emergency isolation valves which TEPCO explained before. Regarding the interlock mechanism, please explain the functions, logic circuits, and how to set threshold values.
Regarding ⑤, i.e. the specifications of the equipment, for each SSC that constitutes the ALPS treated water discharge facilities, please explain the safety functions, the effects of the loss of safety functions, the basic specifications and the setting basis, the main structure, and the applicable codes, guides and standards that apply to each of the equipment in an organized manner.
I would like to go to the next page.
This is the second one of ⑤. The potential radiological consequences of the ALPS treated water discharge facilities were explained earlier. Because this time ALPS treated water will be included, please clearly explain measures against natural phenomena and those against human-induced events.
Lastly, regarding ⑥ related to the design, please explain the facilities, systems, and procedures required to deal with ALPS treated water in the event that an abnormality occurs due to a failure of the equipment when the water is discharged to the ocean, and ALPS treated water is discharged to the ocean in an unintended manner.
Also, please evaluate the amount of discharge when these measures are taken.
In addition, in the assessment, please select the most severe event in terms of the release of ALPS

treated water, and in the analysis, assume a single failure of the equipment that results in the most severe analysis results.

Regarding (2), two measures for operational safety are described in it.
As for the first ①, please explain the policy for selecting nuclides that could affect the dose assessment other than the 62 nuclides to be removed by ALPS, tritium, and C-14.
The above explanations in (2-1) were the main points under the Reactor Regulation Act.
Subsequently, in (2-2), the main items to be confirmed regarding the engagement with the government policy are described.
First, regarding the annual release of tritium in (1), please explain the method for operation of discharge so that the release of tritium in ALPS treated water may not exceed the annual release control value of 22 trillion becquerels and the method of confirming it.
As for (2), please explain the judgment criteria and response procedures to stop discharging when abnormal values are identified in the sea area monitoring.

Finally, as for (3), I have written the main issues regarding the Radiological Impact Assessment Report, which is attached to the Implementation Plan as a reference material.
As for the first bullet, please explain that the evaluation methods described in the Radiological Impact Assessment Report are referred to the relevant safety standards and guides established by IAEA. In addition, please explain that the evaluation results are sufficiently small compared to the range of variation in the annual dose of exposure to the public due to regions and living environments, etc.
As for the following bullet, with regard to the source term setting based on the discharge control upper limit of the source term setting, please indicate the rationale of setting and its validity, including the flow for selecting the operational control target nuclides.
Please also explain the assessment of changes in the annual release of tritium, considering the fluctuation in the annual operation rate of the ALPS treated water discharge facilities.
The diffusion model is presented here. Please explain the appropriateness of the diffusion model that it can be applied to this evaluation, including the rationale for simulating the diffusion of the sea area near the Fukushima Daiichi. Also, please show the appropriateness of the modeling coverage by showing the concentration of radioactive materials at the model boundaries.
Next, please explain the concept of selection of the transition model, such as the completeness of the model and the concept of the model excluded from the evaluation.
In addition, please explain the selection concepts of the exposure route, such as the completeness of the route and the concept of the route excluded from the evaluation.
Regarding the last page, values which are not found in the literature, such as IAEA Guides, are

used in the evaluation. Please explain the rationale and validity for using such values by considering the uncertainty in the evaluation.
Lastly, as for the assessment of the impact of potential exposure, there is the flow shown in Fig. 3 in GSG-10 of IAEA, but regarding the points in the assessment without using the flow, please explain its concept including the rationale for the establishment of the scenario used for the assessment.
That is my explanation.

○Kaneko (S/NRA):
Thank you, Mr. Arai,
Regarding the materials using for the above explanations, there might be some parts which are not fully understand. If you have any questions from TEPCO, e.g., what is the meaning of this, please ask now.
Please, Mr. Matsumoto.

○Matsumoto (TEPCO HD):
Thank you very much for clarifying the issue.
So, basically, we would like to make preparations so that we can answer everything, and I would like to report to you at the review meeting at an appropriate time.
Is it correct to understand that regarding the positioning of discharge of ALPS treated water into the sea and the expected roles of the discharge facilities, we are expected to explain the reasons why we should construct these facilities and proceed the process of the decommission, as the first overall policy.

○Kaneko (S/NRA):
I am Kaneko.
Basically, you are right.
In the entire decommissioning of the Fukushima Daiichi NPS, when looking at the activity over a long period of basis to some extent, as this discharge into the sea is assumed to continue decade by decade. So, I think that it is like a kind of vision, but I would like you to explain carefully about what could be possible to be done further and to be proceeded with after what has been progressed and achieved through this discharge into the sea, and how this could contribute to the risk reduction of Fukushima Daiichi NPS.

○Matsumoto (TEPCO HD):
I understand.

I think this is the first important point, so I will prepare for this as soon as possible.

○Kaneko (S/NRA):
Yes. Are there anything else that needs to be clarified in particular? Do you have anything that bother you about how to explain it? Also, I don't mind if you check it not now but later, but if you have at this stage, please ask us.

○Matsumoto (TEPCO HD):
We don't have anything in addition.
I would like to proceed with it while consulting with you carefully in the future.

○Kaneko (S/NRA):
I understand.
Now we have just looked over what were prepared in the materials. There are contents partly in your explanation that correspond to this issue. There is also a content about the point in your explanation. In proceeding with discussion from now on, there are remarks about where to start and about that the overall policy should be started early because it is the basis of the holistic view as Mr. Matsumoto mentioned. I think that there may be TEPCO's convenience or schedule which needs consideration to finish up the content. Regarding how to proceed with discussion, if you have a prospect at this stage about what issue or what kind of discussion should be started early, please let us know.

○Matsumoto (TEPCO HD):
This is Matsumoto, TEPCO.
Thank you very much.
As I mentioned earlier, regarding the overall policy, since it is an overall policy at any rate, I will prepare for it as soon as possible so that it may be explained.
The application for this implementation plan was submitted at the so-called basic design stage.
So, in the future, when we are in the stage that we proceed with the detailed design and start the actual construction work and build the facilities. I am worried about it if there will be a return at the detailed design stage, or that there will be arguing about that this is a problem with the basic design.
Therefore, we would like to discuss at the review meeting preferentially about what has a large impact on detailed designs.
Specifically, we are considering the design of facility such as installing an undersea tunnel and discharging from the seabed. With regard to water intake and discharge, we would like to prepare

for the review as soon as possible and we will proceed with the preparation in order to explain at the review meeting.

○Kaneko (S/NRA)
I understand.
Then, May I have an image that the design of the tunnel as discharge facility and the facility for taking water and diluting explained in the material, and applicable standards to the construction of those facilities, and strength against natural phenomena, etc. should be reviewed at the very beginning?

○Matsumoto (TEPCO HD):
I agree with you.
In the document 1-1 of today, we are thinking about the related facilities surrounded by the orange color on page 7, and the overview of them on page 8.

○Kaneko (S/NRA)
I understand.
In that case, in connection with that, if we have in mind at this moment about what we want to be clarified in such a manner at that time or to be explained properly at that time, I think it would be better to convey those points from our side. Are there anything from the Secretariat?
Please, Mr. Takeuchi.

○Takeuchi (S/NRA):
I am Takeuchi, NRA.
As issues to be reviewed early, we have also indicated about the undersea tunnel, the water intake method, and the water discharge related matters in our major issues document today. You explained about the seawater with relatively high concentration in the side of Units 1 to 4 and the partitioning weir. However, we found that some descriptions in the application document are not enough to be understood or incomplete, so I would like you to explain properly about the design concept of its installation including transfer rate
Generally, we have presented the points at issue from Arai earlier today. We do not have any particular opinions about the materials that you explained today. However, when we confirm about our points at issue, there are still some parts in the application document that are not sufficiently explained in terms of the content, including the explanatory materials of today. I would like you to carefully prepare the materials from now on so that the points to be confirmed, the basis and the concept thereof may be fully understandable.

○Kaneko (S/NRA):
Mr. Matsumoto, please.

○Matsumoto (TEPCO HD):
I am Mr. Matsumoto, TEPCO.
Thank you for pointing out.
First of all, regarding the partitioning weir, this selection is done by TEPCO's judgement. We think that it is on the extension of a breakwater, and it is a substitute for the silt fence currently installed. Although it is shown on the figure, the specifications or the specific design are not clearly stated in the implementation plan actually .
Therefore, as Mr. Takeuchi pointed out, we would like to present the specific design and specifications at the review meeting, and we will reflect them in the implementation plan as necessary.
In addition, the second comment you pointed out is also reasonable, and when preparing the explanatory materials in the future, I would like to present them in the materials that could properly answer your questions from the Secretariat.

○Kaneko (S/NRA)
Are there any other matters that need to be conveyed at this point or that will be necessary for future discussions?
Yes, Mr. Masaoka.

○Masaoka (S/NRA):
This is Masaoka, NRA.
Thank you for your explanation.
I would like to ask what has changed from what you indicated at the meeting of the Commission on Supervision and Evaluation of the Specified Nuclear Facilities in August. When I looked at your material at this time, for example on the page of upstream of the discharge vertical shaft, the design of discharge guide has changed a little, and the location of the outlet has changed. I would like you to explain about the outline of what has changed since August and the concept of the design.

○Kaneko (S/NRA):
Mr. Matsumoto, please.

○Matsumoto (TEPCO HD):
This is Matsumoto, TEPCO.
I am sorry for my incomplete explanation.
Please look at the guide on page 6.
At the time of our explanation in August, we originally drew a figure with an image that the pipe of the seawater pipe header was inserted into the upper stream storage of the discharge vertical shaft. However, in the stage of design or study afterward, we got worried about air accumulating at this portion in the end, so this time we have put air vent with an opening on the upper side of it, changing its name to the discharge guide.
And the design of the specific facility was slightly changed at the tunnel on page 8.
Please look at the plane view. Previously, it extended straight to the east about 1km from the site. However, this time, considering the condition of the bedrock on the seabed, it is has put aside to the north approximately 20m just before the final point instead of just straight to the north.
In this picture, it looks like it is curved slightly to the left, so the location of the final point is slightly different, and this time the discharge tunnel is designed to run downward first and after that horizontally and run upward finally. Those could be regarded as differences. However, as for the discharge tunnel, the results of the geological survey are being evaluated just after the completion of the drilling at sea. Therefore, the specific tunnel design has not yet fixed at the present time, so I would like to explain this at a later review meeting, etc.
Differences in main equipment and facilities are those two points.

○Masaoka (S/NRA):
This is Masaoka, S/NRA
I understand.
Since the discharge guide is a portion for air-vent, and there is a part coming down just before it, it seems to drop the seawater more safely with a siphon effect in mind.
And, I understand that the details of water discharge tunnel will be determined based on the future investigation.

○Kaneko (S/NRA):
Are there any other points?
Is that okay with you?

○Iwanaga (S/NRA):
This is Iwanaga, NRA.
As I told you in August, looking at page 6 in the document, I also mentioned in this regard about

checking the water quality of the water intake side, including the concentration of radioactive materials. Since I would like you to start the examination early at this point. I would like you to develop the ideas as specifically as possible and prepare to avoid any discrepancies in the discussion. What do you think about this?

○Matsumoto (TEPCO HD):
I understand.
Originally, monitoring results inside and outside the harbor are also available, so we will prepare for explanations based on them.

In addition, taking into account the matter about the entrainment (of sea-bottom soil) during the construction of the partition embankment pointed out formerly by the executive members of the Commission on Supervision and Evaluation of the Specified Nuclear Facility. I would like to explain that the seawater to be taken in does not pose any problem or does not cause any problem also during the construction work.

○Iwanaga (S/NRA):
This is Iwanaga, NRA.
I understand this matter well.
However, there is a possibility that an entrainment will occur during construction, but when this is in operation, I think it will be settled on the bottom, so I would like to proceed with the discussion in a clear and easy-to-understand manner so that it will not be complicated too much.

○Matsumoto (TEPCO HD):
I understand.

○Kaneko (S/NRA):
Are there any other points?
Is that okay with you?
From me it may be a little bit of a small matter, but I would like to mention something that I am a little concerned about your future explanations and our discussions.
Since the materials you explained to us this time and the notation in the application document are not necessarily the same, I think it would be better to ask when you give us a more detailed explanation.
First of all, I would like to mention about the water intake and water discharge at the moment. I understand that three systems of water intake have been prepared and designed with two of them

in operation and one as a reserve.
In that sense, it is a good thing to have a reserve. As you have explained from the beginning, basically, the concentration is measured on a real-time basis through calculation based on the ratio of the amount of water taken from this intake to the amount of water that comes from ALPS treated water, or the amount of water that flows into. Therefore, I think it may be a problem if this flowmeter is not reliable enough.
In this sense, only one flow meter is installed on each system in this picture, but I am just worried about whether it is enough or not.
Whether a reserve is necessary or not, or it may be said that the operation is assumed to be just stopped when the flow rate cannot be measured. Considering the operation, I am a bit worried about what kind of design concept should be adopted, so when we discuss the design of specific equipment, we would like to confirm the point.
This is one point.

Also, this is not just the matter of intake and discharge of water, but on page 5, regarding the design concept of the emergency isolation valve which is installed just before (the seawater pipe header), only the emergency isolation valves are installed in parallel on the pipes divided into two systems. Though, I have not yet been able to grasp the system in detail, it seems a little more complicated in the application document, so I am wondering why they are deliberately divided into two systems.
If only the function of the piping on which the emergency isolation valve is installed is looked at, it would probably be better to install it in series rather than in parallel. I am wondering a little why they are in parallel, and I would like to discuss about this at the agenda of transfer facility because this is just the part of the transfer facility.
Also, regarding the water discharge tunnel, as you mentioned earlier, I do not have sufficient knowledge of the details of the overall arrangement, the position, and the difference in height. And, in relation to the configuration around the tunnel, I would like to confirm whether or not the water will flow away successfully. I would like to confirm the point in response to your explanation.
Those are all I noticed and concerned about your explanation today.
Mr. Matsumoto, please.

○Matsumoto (TEPCO):
This is Matsumoto, TEPCO.
I have received three questions and matters pointed out, so I will prepare for them to explain them properly.
In particular, regarding the first question, I feel that it is necessary to discuss how to multiplex the

design from the viewpoint of the safety of this facility, and that the concept of safety design should be taken into consideration to a certain degree.
As Mr. Kaneko mentioned earlier, I recognize that the final means is to stop it. However, from the viewpoint of radioactivity, I don't know if it is appropriate to say that the object (of handling) is basically the water with concentration ratio of less than the values specified in the Notification except tritium, a nuclide with weak β-rays, having little risk from the viewpoint of radioactivity. . Regarding this matter, I would like to discuss with the Secretariat about how much redundancy shall be considered in the design.

○Kaneko (S/NRA):
Thank you.
I believe that there should be a kind of balance for the design. Of course, this issue, the first point I mentioned has a certain significance, so this kind of discharge into the sea will be carried out for that reason. I think it is necessary for the facility to be designed to be operated in a stable manner to a certain extent.
So, I mentioned a little bit roughly a while ago, but it is certainly right that it is safe to stop it in case measurement is unable. However, when considering risk reduction, I think whether it is appropriate to design with such a concept alone, as Mr. Matsumoto mentioned. I think we should share this matter as a design concept.

○Matsumoto (TEPCO HD):
I understand.
I also understand that it is necessary to consider from a different perspective of so-called safety design of nuclear power and nuclear reactors, and that it can be implemented more stably as long as it is implemented in the overall policy mentioned earlier.

○Kaneko (S/NRA):
Thank you very much.
I would like to discuss about this specific concept separately again.
What else do you think?
Is that okay with you?
I believe we have been able to share a general understanding as of today for what TEPCO has explained and the issues that we have presented. From the next time onward, we will proceed with some discussions from this water discharge or water intake system. So, we have seen some preparations for the time being. I think that a kick-off today has gone nearly well. In order to grasp the overall picture and make the path to proceed with the next step, I think it is important to do

so. What is the way to proceed with the future discussion? What are the points to be considered? I would like to ask the question about them to the side of TEPCO and the Secretariat.

○Masaoka (S/NRA):
This is Masaoka, S/NRA
As Mr. Takeuchi, the head of the office, Mr. Arai, stated so far, I would like you to thoroughly summarize the matters that should be addressed in the review regarding what should be done in response to each requirement for the measures to be taken. For example, I think that the structure of the AO valve, including the support system, and the behavior of the pump when the isolation valve is closed. I think it seems not so much from the viewpoint of safety, but this time, considering the Government policy, I would like to closely watch this matter. So, I would like to ask you to prepare this so-called summary material more carefully.

○Kaneko (S/NRA):
Mr. Matsumoto, please.

○Matsumoto (TEPCO HD):
Thank you.
As you pointed out, I am very aware that there is a strong interest in the facilities for discharge of ALPS treated water both at home and abroad, so I would like to carefully prepare the materials for these explanations.
By the way, as for the emergency shut-off valve which I mentioned earlier, we adopt a design of fail-safe system, and it will be designed to automatically close when power supply or air for driving are failed.
This point will also be presented in a document in the Review Meeting in the future.

○Kaneko (S/NRA)
Thank you.
Is that okay with you?
Do you have anything else?
That sounds good.
So, I would like to conclude today's third review meeting, but as it is the end of the year, I think it will be the beginning of the next year, but I will contact you again regarding the schedule.
We would like to hold the meeting as often as possible so that we can settle the issues in a relatively short period of time, so we would appreciate it if TEPCO could well prepare for the explanation earlier.

○Matsumoto (TEPCO HD):

I understand.

We will do our utmost.

○Kaneko (S/NRA):

Okay. So, the third review meeting is closed now.

Thank you very much for your cooperation.