IAEA
International Atomic Energy Agency
Atoms for Peace and Development

Final Report

The 4th IAEA-MOE Experts Meeting on Environmental Remediation

Tokyo, Date City, Minamisoma City

06 – 10 November 2017

A. Introduction

The 4th IAEA-MOE Expert Meeting allowed the IAEA team to discuss the current status (progress, challenges and solutions) of environmental remediation activities taking place in off-site areas affected by the accident at Fukushima Daiichi Nuclear Power Station; and provide advice to Japan, as appropriate, for advancing the environmental remediation work; with a view to sharing relevant findings with the international community. The meeting addressed the following six topics:

- Updates and Future Plans for the Environmental Remediation Activities
- Lessons Learned from Environmental Remediation Activities (Decontamination Project Report)
- Involvement of Local Stakeholders in the Decision-Making Process and Communication of Environmental Remediation Activities to the International Community
- Follow-up of the Recommendation Proposed by the IAEA team at the 3rd Experts' Meeting
- Possibility of Preparing a Consolidated Meeting Summary Report on the Results and Achievements of Experts' Meetings
- Site Visit – Environmental Regeneration Plaza (Fukushima Ambassador Program), Date City, Minamisoma City, and Soil-recycling in Minamisoma City

This report summarizes the main findings of the IAEA team and some recommendations to the Japanese authorities for further consideration in progressing with the environmental remediation activities and related works.

B. Meeting Results

This session presents an overview of the main findings and issues addressed in each of the topical sessions of the meeting.

Updates and Future Plans for Environmental Remediation Activities

The MOE reported significant progresses that have been made with the remediation of off-site areas in the Special Decontamination Area (SDA) and the Intensive Contamination Survey Area (ICSA). According to the planned activities, the full-scale decontamination was completed in the SDA, and the planned decontamination activities in the ICSA have almost come to end. The MOE explained to the IAEA team that the decontamination activities have played an important role in the reduction of air dose rates. Additional reported progress was the initiation of Interim Storage Facility (ISF) operation and the growing amount of soil delivered to the ISF. By April 2017, the evacuation orders have been lifted in 9 municipalities in the SDA. The Act on Special Measures for Reconstruction and Revitalization of Fukushima (Act No. 25 of 2012) was revised and enacted on May 19, 2017. Based on this revised Act, the heads of the municipalities in the Areas where Returning is Difficult (hereinafter referred to as the "ARD") should develop a plan for community reconstruction and recovery, and the plan should include project timelines and proposals for land use. This plan should be discussed with the Governor of Fukushima Prefecture and then approved by the Prime Minister. Based on the approved plan, decontamination activities and infrastructure development will be implemented.

It was reported by the MOE that progress was also made with the demonstration project on soil recycling that has been conducted at the Eastern Temporary Storage Site in Minamisoma City since 2016. This recycling project was initiated on the agreement with the Minamisoma City to investigate options to use the soil generated from decontamination activities (hereinafter referred to as "removed soil") as construction material. The average of radioactivity of the removed soil at the storage site is around 2,000 Bq per kg, and the soil of which the activity level is 3,000 Bq per kg and less has been tested for use as embankment material. The test team has confirmed that the soil can be used as construction material, and the team has a plan to convey the results to the potential stakeholders with a view to recycling the removed soil.

Lessons Learned from Environmental Remediation Activities (Decontamination Project Report)

The MOE briefed the IAEA team on the status of works undertaken by the MOE on the upcoming Decontamination Project Report. The objective of the report is to explain the effectiveness of the decontamination work to the Japanese citizens in a plain language and to share the information and the lessons learned with the international community. This second version has been prepared after the major wide area decontamination project was complete, while the first version was prepared with the information with progress up to 2013. The draft ***Table of Contents*** was reviewed by the IAEA experts in October 2017. MOE will incorporate the comments while developing the report. The second version will cover the overview of the accident and decontamination project, decontamination methods employed, decontamination project management, verification of decontamination efforts, remaining issues and lessons learned.

Involvement of Local Stakeholders in the Decision-Making Process and Communication of Environmental Remediation Activities to the International Community

The presentation from a Japanese expert discussed how communication activities could be promoted for the future from the sociological point of view. It was emphasized stable decommissioning and decontamination efforts at the on/off sites are essential and should be the basis for effective community recovery and enhanced image for Fukushima. The presentation proceeded with various questions/answers which showed gap of knowledge and misperceptions generally held by the people outside Fukushima. The percentage of the population that left Fukushima prefecture due to the evacuation was 1.7% whilst the survey showed higher figures are generally perceived. It was also noted that the population of Fukushima Prefecture had been decreasing even before the accident, and that the decrease rate has come back to the pre-accident level after 2013. Consumer perception of the health effect of radiation within the established limits was also discussed. Results showed that around 20% of the survey responders have been consistently unwilling to accept any risks associated with the ingestion of food produced in the regions while the remaining 80% are more tolerant to the low risks that cannot be confirmed to affect the health (Consumer Affairs Agency, 2017). Regarding local tourism recovery, the expert mentioned that the recovery rate was 87.9% in 2015 compared to the pre-accident situation, but has not been fully recovered. This is because, as was explained by the expert the Fukushima area was popular for school field trips before the accident, but now the schools have difficulties in getting consent from parents for a Fukushima trip. The expert then identified additional challenges for Fukushima recovery, including reputational damage that harms the economy directly, need for

reconstruction of the municipalities that underwent evacuation orders (12 municipalities), and social perception of the decontamination and decommissioning work (contaminated water, decontamination waste, status of reactors, etc.). The expert also suggested a change in the approach of communication moving from "issues for science" to "issues for communication and social studies." A deficit in social scientific expertise to address the current issues was emphasized in the suggestion.

Follow-up of the Recommendation Proposed by the IAEA team at the 3rd Experts' Meeting

Follow-up actions which have been taken by the MOE in response to the recommendations made by the IAEA team during the 3rd Experts' Meeting were reviewed during the meeting. The recommendations of the IAEA team and the MOE's responses to each of them are summarized as follows:

The IAEA team suggested that the MOE in cooperation with other relevant organizations in Japan should focus its efforts on developing remediation plans targeting the ARD reconstruction.

- **The MOE responded that the municipalities would create the remediation plans for the ARD based on the amended Act on Special Measures for Reconstruction and Revitalization of Fukushima, and that the government seeks to achieve the long term goal (1mSv per year) by means of monitoring, control of food safety and risk communication as well as decontamination.**

The IAEA team indicated that this was the time to start a process to review the national policy on environmental remediation (the Act on Special Measures[1]) in a way to provide alignment with the IAEA GSR Part 3, specifically by addressing the requirements contained in the chapter related to "Existing Exposure Situations". In this regard, the accumulated national experience should also be captured in reviewing the Act.

- **The MOE responded that the review of the Act has been conducted by the MOE's committee, and that further review, especially from the perspective of radiological protection, should be performed by another body such as the Radiation Council.**

The IAEA team noted that the results presented on the effectiveness of the remediation consisted of diagrams showing an overall summary of the remediation efforts. The IAEA team considered that it would be more useful if the data from different cities (with different circumstances) could be presented, so that a better understanding of the variability in the effectiveness of the work done could be captured and subsequently analysed.

- **The MOE described that the amount of soil removal per area for each municipality in the SDA showed linear correlation with the impact on air dose rate reduction, while in the ICSA, there was no clear correlation between the amount of soil removed and reduction of radiation.**

[1] The word "the Act on Special Measures" here (and hereinafter) refers to "The Act on Special Measures concerning the Handling of Radioactive Pollution (Act No. 110 of 2011)."

The IAEA team indicated that the classification of the amounts of soil according to the activity concentration intervals was based on information about where the soils came from and not on individual determinations of the activity concentration of the materials contained in each bag. The only measurement available for the bags was the exposure rate at the surface of each one of them. With that in mind, it was considered appropriate to assess the adequateness of establishing straightforward procedures for sampling and analysing soils in the bags. The overall idea was that by doing so, classification of quantities of contaminated soil per activity concentration intervals could be obtained. Provided that criteria dictating the management of soils are based on the activity concentrations, this procedure could facilitate decisions on the best way to subsequently manage the soils contained in the bags.

- **The MOE responded that as air dose rates and other parameters have been monitored around the temporary storage sites, there is no need for measurement of radioactivity for safety management. The IAEA team explained that the suggestion was not about safety but about eventual classification of waste soil for recycling options. The MOE officials responded that there are no data available at this time.**

The IAEA team emphasized the need to consider individual doses, as measured with personal dosimeters, to support remediation decisions. An optimized monitoring program to follow up the behaviour of the affected media (soil, vegetation, etc.) could be put into place. The IAEA team advised that a comprehensive health monitoring program should be prepared to support the returning evacuees. Monitoring with whole body counters could also be proposed to assess the level of internal exposure.

- **The MOE responded that the government continues to monitor the individual dose of the returnees using personal dosimeters for external exposure and whole body counters for internal exposure.**

The possibility that the MOE publish/make available information on the amount of waste produced by various decontamination techniques was suggested by the IAEA team. This information would be very relevant in the planning of remediation work in the event of another unlikely wide scale accident.

- **The MOE declared it was committed to presenting the information that is useful to the international community and is making efforts to describe the knowledge and experience obtained from the decontamination projects in the upcoming Decontamination Project Report.**

As the MOE moves ahead in implementing waste management activities and construction of facilities (e.g., ISF, treatment plants, etc.), the IAEA team advised that the MOE could consider conducting safety assessment of these activities and facilities and have them evaluated by an independent agency. This approach would be in line with the advice provided in the report of the remediation mission in 2013.

- **It has been stated by the MOE that the construction of facilities, such as ISF, have been planned based on the advice from experts. The MOE is and has been committed to safety management while securing transparency and objectivity.**

The IAEA team noted that it would be helpful for the MOE to assess the overall practices of stakeholder engagement in the decision making process and extract important lessons learned. If considered appropriate, reorient future practices accordingly, especially during the repopulation of the evacuated areas and continuous remediation to reach the long term clean-up goal.

- **The MOE responded that the review of the Act on Special Measures has been conducted by the MOE's committee (Committee for Review of the Act on Special Measures), including stakeholder engagement.**

Possibility of Preparing a Consolidated Meeting Summary Report on the Results and Achievements of the Experts Meeting

Many relevant aspects have been discussed during the four IAEA-MOE Meetings. Experts participating in these meetings and also the involved IAEA staff members were of the opinion that all these discussions – that have been briefly compiled in summarized meeting reports – could be compiled and presented in an expanded report. Therefore in this 4th meeting IAEA team proposed to develop a "Consolidated Meeting Summary Report" with the topics covered over the two-year series of meetings. Again, it is worth emphasising that the proposal was made with a recognition that the previous three meeting outcomes have been summarized in a short report format, only highlighting the major findings and recommendations. The topics to be covered would include decontamination activities, waste management, knowledge management, stakeholder engagement, monitoring technologies, and recovery activities. The proposed consolidated report would also contain the recommendations made by the IAEA team to the MOE. The proposed report will be developed under a sole responsibility of the IAEA with supports of the relevant experts who contributed to the individual topics mentioned above. The IAEA proposed to develop a draft report by the beginning of 2019 and present it at a technical meeting. The IAEA team also proposed to put forward the draft report for review by the MOE for factual check.

Additional Activities – Site-Visit to Fukushima

The site-visit to Fukushima prefecture was attended by both the IAEA team and the MOE.

An international expert introduced to the IAEA team the "Fukushima Ambassadors Program" developed by the Fukushima University. This program was designed to provide students from a mixed national and international group a hands-on learning opportunity that focuses on the chronologic physical, economical, and social consequences of the tsunami and subsequent nuclear accident in Fukushima.

The IAEA team then met with Mayor of Date City. This meeting was arranged to discuss the current challenges within the city regarding response to the radioactive contamination. The Mayor explained to the IAEA team that the first challenge concerns decontamination activities. Date City took different approaches for different contamination level areas, dividing the city into three different areas according to cumulative exposure dose (A area for higher than 20 mSv per year, B area for 5 – 20 mSv per year, and C area for 1 – 5 mSv per year). The A area was decontaminated in full scale. The B area was decontaminated for high dose rate areas, and the C area was decontaminated only for identified hotspots. It was explained by the Mayor that the city's decision on the decontamination approach was based on the amount of waste generation and temporary storage site availability in the city. Currently, the city is communicating with the residents to establish that

the current approach is safe enough to protect the public health and the environment and full scale decontamination all over the city is not necessarily needed to achieve this goal.

The second reported challenge by the Mayor was the waste transportation to the ISF from temporary storage sites within the city boundary. The total amount of decontamination waste is approximately 270,000 m^3, and these wastes are stored at 253 different locations. Currently, 20,000 m^3 waste from 13 temporary storage sites have been transported to the ISF. Citizens are urging the Mayor to remove the waste and close the storage site as soon as possible.

After the meeting with the Mayor of Date City the IAEA Team visited the Site for demonstrating soil recycling in Minamisoma City. The MOE briefed the IAEA experts at the embankment test site, including the importance of soil recycling and the integrity of the test site.

The last step of the site visit was a meeting with the Mayor of Minamisoma City. The Mayor's interest focused on promotion of recycling the removed soil as construction material that also helps to reduce the cost of the decontamination activities.

The Mayor first explained that the city managed to recycle the disaster debris for reconstruction after the series of communication with the MOE. The Mayor's interest then turned to recycling soil. The city asked the MOE to assess the options to recycle removed soil for construction purpose. Most of the radioactivity containing soil generated from the city showed radiation levels below 3,000 Bq per kg. Further, the Mayor pointed out that the radioactivity level for designated waste is 8,000 Bq per kg, and the Ministry of Agriculture's guidance on farmland soil removal is 5,000 Bq per kg. The Mayor and his team were confused with these different regulatory levels and asked the MOE why the city's removed soil could not be used for reconstruction.

The Mayor also expressed his hope that the on-going demonstration project will help justify using the low-level removed soil for reuse in construction. The need to clear farmland from temporary storage sites, in a timely manner, was also mentioned.

Both Mayors in the meetings with the IAEA team emphasized the importance and the necessity of proper radiation education at national level and appropriate risk communication with the local communities, particularly given the fact that some residents have not come back to their home land because of perceived concerns against radiation.

C. Conclusions

This was the last of a series of four meetings in which representatives of the MOE and other Japanese authorities and professionals had the chance to discuss with the IAEA team of experts on specific points related to the remediation of off-site areas affected by the Fukushima Daiichi accident. As major conclusions from the 4th Experts Meeting the following findings and recommendations can be highlighted:

- The IAEA team noted that it would be helpful for the MOE to continuously assess the effectiveness of the stakeholder communication methods and strategies that the MOE adopts for more efficient approaches. In this regard, the IAEA team found that social media (called SNS

in Japan) is now a popular method for communication in Japan, and that social media could be one of effective communication methods with national and international stakeholders.

- The IAEA team suggested that the MOE carefully assess the potential of delays of ISF construction and soil/waste transportation due to the simultaneous construction project.
- The IAEA suggested that the MOE continue working on gathering technical and safety data and specifications for potential soil recycling/reuse with other relevant agencies. It was also suggested by the IAEA team, in doing so, to gather public input on a variety of policy options for ensuring protection of public health and the environment.
- The IAEA team suggested that the MOE consider the IAEA team's input for the MOE's preparation works of the Decontamination Project Report. It was suggested by the IAEA team that technical terms in the Report be used in a consistent way following the IAEA terminology; or alternatively, the key technical terms may be clearly defined in the Report. The IAEA team further noted that lessons learned could follow individual chapters instead of being gathered in the independent chapter at the end of the Report.

The IAEA's idea of the Table of Contents for the proposed "Consolidated Meeting Summary Report" was presented to the MOE during the meeting. The objectives of the proposed report are to consolidate the discussions over four meetings between the MOE and the IAEA, to share the experience and the knowledge obtained during the meetings with the international community, and to thereby enhance the understanding of different stakeholders on the different aspects related to environmental remediation. The scope of the report will be restricted to the topics and discussions covered during the meetings.