

7. Conclusion

The Act on Special Measures Concerning Nuclear Emergency Preparedness of Japan (Law No.156, 1999) stipulated that the Nuclear Emergency Response Headquarters under the Cabinet Office was responsible for preventing the release of radioactive materials to the environment. But the concrete legal framework was not in place before the Fukushima Daiichi Nuclear Power Station (1FNPS) accident for emergency responses to contamination due to radioactive materials released to the public environment.

Under such circumstances, relevant government authorities including the MOE and local governments such as Fukushima Prefecture have been engaged in large scale decontamination works for diverse and vast areas including housing areas, public facilities, roads, farmland, forests near residential areas, etc. These works have been undertaken to ensure public safety for facilitating early return of residents to their homes and restoration of their daily lives. Such decontamination works are unprecedented worldwide and have been implemented with all possible ideas, accumulated experiences and knowledge in a trial-and-error approach.

The decontamination works continue. Key experience and knowledge of significance obtained to date are reviewed and summarized below.

(1) Fixing of legal, institutional and technical foundations

In August 2011, the Act on Special Measures Concerning the Handling of Radioactive Pollution by the Accident at the Nuclear Power Station caused by the Great East Japan Earthquake which occurred on March 11, 2011 (Law No. 110, 2011) (the “Act on Special Measures”) was enacted in response to the 1FNPS accident. Thereafter, competent authorities including the MOE formulated relevant ministry ordinances, standards, guidelines, etc. as needed.

The MOE started the decontamination works under its direct jurisdiction based on the Common Specifications provisionally formulated in a trial-and-error approach, using the then existing rules and mechanisms practiced by the Ministry of Land, Infrastructure and Transport (MLIT), the Ministry of Agriculture, Forestry and Fisheries (MAFF), etc. In doing so, the MOE needed assistance from the experienced staff of MLIT and MAFF. The MOE lacked experienced personnel for public works under its direct jurisdiction. The MOE continued thereafter improving the Common Specifications step-by-step through trial-and-error in field experiences. Consequently, the whole framework of decontamination works has been specified to a certain degree, including concrete work implementation details. Prompt initiation of decontamination works, as needs emerged, has become possible, and quality of work has been pursued for improvement.

(2) Roles borne by the decontamination business operators in decontamination works

There were two big requirements to implement large scale decontamination works, besides technical competence for decontamination: one was the capacity to deliver the large amounts of equipment and human resources needed to the decontamination sites appropriately and in a timely manner, and the other was the project management capability to implement large scale decontamination works efficiently and effectively under tight time pressures.

Especially to note in the decontamination works after the Great East Japan Earthquake in 2011 was that the works had to be implemented under limited lifeline infrastructures. Under such circumstances, it was absolutely a must to involve credible local construction industry members for the decontamination works. They had experience and relevant technologies, which they accumulated by quickly restoring the area after such things as severe weather storms (e.g. typhoons and heavy snow). The decontamination business operators, whose key players were construction companies, have been engaged in the decontamination works while introducing non-conventional ideas by accumulating further experiences and knowledge.

Since the works which could be mechanized were limited in the decontamination works,

large workforces were needed. But in nearby areas (especially Miyagi and Iwate Prefectures), large workforces were also in big demand for restoring the areas from the aftermaths of the earthquake and tsunami and for reconstruction. The decontamination business operators could manage to recruit a large number of workers with the cooperation of local construction companies, and the like. However, many of these workers were not experienced in site works of civil engineering and construction. These workers needed education, not only technical knowledge on decontamination or radiation protection, but also occupational safety and health for civil engineering and construction. Consequently, the decontamination business operators had to spend a large amount of time and do a lot of work to provide those many workers with education on decontamination and regular training of occupational safety and health.

Furthermore, the decontamination business operators often found it necessary to be very flexible in updating the work schedules, depending on the progress: for example, acquisition of agreement to land use for temporary material storage required before commencing decontamination work; or its progresses at each temporary storage site did not proceed as quickly as initially planned. The situation has been different from ordinary contracts for public construction works, in which the order is awarded after the land use conditions, and the like are fixed.

(3) Significance of decontamination model projects and existing technologies used in decontamination

Soon after the accident, several pilot projects of decontamination were implemented including “decontamination model projects” of the Cabinet Office. Such pilot decontamination projects did not necessarily show standard decontamination models, but they certainly brought good outcomes in identifying efficient and effective decontamination methods, and measures to ensure radiation workers’ safety. It was a very meaningful step toward large scale decontamination works thereafter. The experiences and knowledge obtained from these pilot projects have also shown that the technologies having been accumulated in the construction industry or their improved technologies can be effectively used in decontamination works, too, and that improvement in working procedures and management is equally important in implementing decontamination works.

Another point to note is that accurate and efficient air-dose monitoring is needed in evaluating the appropriateness of the decontamination works and to this end various innovative monitoring technologies have been developed and applied, including mobile monitoring vehicles and drone monitoring helicopters.

Further to note is that such decontamination pilot projects have also worked, not only in accumulating technical knowledge, but in developing competent field workers with technical knowledge. They also could facilitate the understanding of local community residents about the decontamination works and their outcomes.

(4) Considerations in choosing decontamination methods and operation conditions

Decontamination methods to be applied, their operation conditions and the decontamination effects depend on various environmental conditions such as site situations, material properties or surface conditions of the objects subject to decontamination, or their aging variation with time. Therefore, the best decontamination methods or conditions are difficult to specify beforehand, even for a particular object to be decontaminated. For example, for decontaminating paved road surfaces, high-pressure water cleaning was effective to some extent in the early stage, but after some time, when radioactive cesium migrated from the ground surface deep into the materials, scraping of the paved road surface by shot-blasting became a practical and effective approach, instead of cleaning the surface.

It should be noted that the decontamination effect was not the only criterion for choosing the decontamination method and operation conditions. Construction workability as well as

maintainability of target objects was also considered. Final selection of the decontamination methods and conditions were made only when the consent of local residents was obtained in the respective communities.

(5) Strengthening management for appropriate decontamination works

It was necessary to systematically fix documented work procedures, mechanisms, etc. for smooth operation of the decontamination works, in order to implement unprecedented large-scale decontamination works.

Nevertheless there were cases when the decontamination works not specified in the guidelines or in the Common Specifications became necessary, because the decontamination works had been implemented under the relevant knowledge being limited. In such cases, government supervisory personnel and the decontamination business operators jointly worked out the appropriate procedures to apply. Some of these procedures have been incorporated into the standard work procedures when it was deemed as being possible to generalize them. Thus, the PDCA cycle (Plan – Do – Check – Act) has been pursued for improvement.

In January 2013 it was reported that decontamination had been questionable in some cases. The report was about an incident which could have damaged public trust in the community. The MOE launched immediately the “Headquarters for Proper Decontamination Promotion” and formulated the “Appropriate Decontamination Program” consisting of three main pillars: Thorough responsibility for decontamination works by the decontamination business operators; Establishment of comprehensive management systems; and Strengthening of MOE organizational settings.

Based on this “Appropriate Decontamination Program,” emergency hotline telephone number “Decontamination Dial 110 (Hotline)” was set up at the MOE to receive information on questionable cases of decontamination. The information received was examined for confirming the facts and, as needed, attention of the decontamination business operators was drawn to the problems. Their responses to the information were disclosed on the MOE homepage.

(6) Communication with local residents

When implementing a big undertaking like the decontamination works, sufficient time is needed for preparation. But on the other hand, strong desires were expressed by the local residents to initiate decontamination works at the earliest possible time. It was very important, therefore, to establish mutual trust with the local residents through sincere communication, in implementing decontamination works, empathy with them in mind.

In the areas such as the Special Decontamination Areas, from where residents had evacuated, they could not witness the decontamination works by themselves. When planning decontamination work in such areas, opportunities were arranged for them to visit the site for their prior consent to the work or to confirm the decontamination works for themselves. For facilitating their prior consent, significant efforts were made to sincerely respond to them by hearing and evaluating their requests, and repeating explanatory responses to their concerns.

Since the decontamination works affect the buildings, houses and land directly, prior consent of their owners is legally required for the works. Therefore, drawings and photos were attached as appropriate to the document of consent in order to clearly stipulate the contents of agreement for both parties. The results of dose measurements before and after the decontamination works were also reported using drawings, and the like to relevant parties as appropriate including the owners.

(7) Collaboration with relevant organizations and information dissemination

It was absolutely indispensable, in implementing the decontamination works, to respond to

all kinds of concerns and dissatisfactions of local residents about the decontamination methods and decontamination works, and concerns about safety of temporary storage sites. The MOE cooperated with Fukushima Prefecture and set up the “Decontamination Information Plaza,” in order to disseminate relevant information on decontamination and radiation, and to set up an activity base for experts. The Decontamination Information Plaza has promoted communication with local communities by providing various exhibits and pamphlets, arranging workshops or opinion exchange meetings, dispatching registered experts to local governments or communities upon request, or responding to consultations from the local residents. The MOE has also made efforts to facilitate people’s understanding through operating its websites and the Call Center, and information dissemination via mass media.

The MOE has kept close contacts with international organizations such as the IAEA in implementing the decontamination works and in parallel promoted information sharing with the international communities based on bilateral national cooperation agreements, and the like.

This report assembled comprehensively, with key attention to the decontamination works by the MOE, the basic policy of decontamination, its implementation framework, knowledge about managing the decontamination works based on the actual decontamination works experienced in the fields, and individual decontamination methods, conditions and effects thereof. The report was compiled by the Editorial Committee, which determined its structure, contents, items to survey, division of responsibilities, etc. Its members are listed below (The Mitsubishi Research Institute, Inc. served as the secretariat).

The report has assembled the experiences and knowledge concerning decontamination of radioactive materials in Japan, focusing on the activities of the MOE. But it is important to collect and preserve all relevant documents and data, not only those of MOE but those of relevant ministries, local governments, research institutes and other related institutions, in order to prepare for possible accidents in the future at nuclear facilities and also to contribute to the relevant research activities.

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