

# Functional Requirements of Personal Evacuation Supporting System in the Preparation for the Radiological Emergency

Seon-Jae KIM<sup>a</sup>, Hyeong-Ki Shin<sup>b</sup>, Myung-Jo Jung<sup>a</sup>

<sup>a</sup>Department of Research Management, Korea Institute of Nuclear Safety, Daejeon, 305-338, KOREA,

<sup>b</sup>Department of Radiation Safety, Korea Institute of Nuclear Safety, Daejeon, 305-338, KOREA

\*Corresponding author: [sjkim@kins.re.kr](mailto:sjkim@kins.re.kr)

## 1. Introduction

If the radiological disaster such as Fukushima or Chernobyl nuclear accident occurs and radioactive materials are released beyond the boundary of the nuclear installation, it is absolutely required to evacuate the residents in the vicinity of nuclear installation to the designated evacuation shelter safely and immediately to protect the residents from radiation exposure.

For the national preparation against radiological accidents, radiological emergency preparedness should be established in accordance with the act on physical protection and radiological emergency, and other legal requirements.

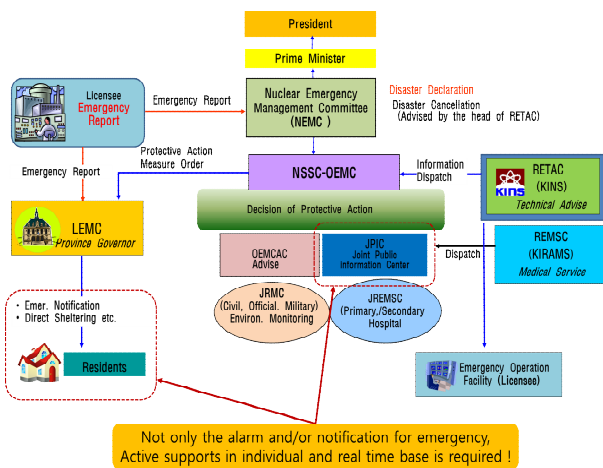


Figure 1. The national radiological emergency response scheme in Korea.

The national radiological emergency response scheme is composed of the several committees and management and advisory centers in central government and/or local government according to their responsibilities and functions as shown in Figure 1. JPIC (Joint Public Information Center) has the charge of providing accurate and unified information about radiological disaster. The role of JPIC is very crucial since public announcement and communication affects the result of evacuation/sheltering and public protection directly. Therefore, Not only the alarm or notification

for emergency, more active supporting measures for residents are required in order to protect them from radiological emergency safely in case of emergency and to enhance the public acceptance during an emergency exercise.

Utilizing the recent IT technology based on the personal data communication device which is well equipped by wireless internet and GPS modules, for example smart phone, the personalized and computerized supporting system for residents evacuation can provide the exact information about emergency and evacuation on an individual basis in real time.

In this study, for the development of the support system which can be utilized in the radiological emergency, the review and investigation on the functional requirements and anticipated effects of the system are conducted.

## 2. Radiological Emergency Preparedness

Based on the concepts of emergency management as represented in figure 2, Korea Institute of Nuclear Safety (KINS) has developed the computerized technical advisory system for a radiological emergency, so called AtomCARE, which is composed of sub modules such as SIDS, IERNet, STES, REMDAS, FADAS, ERIX, etc.

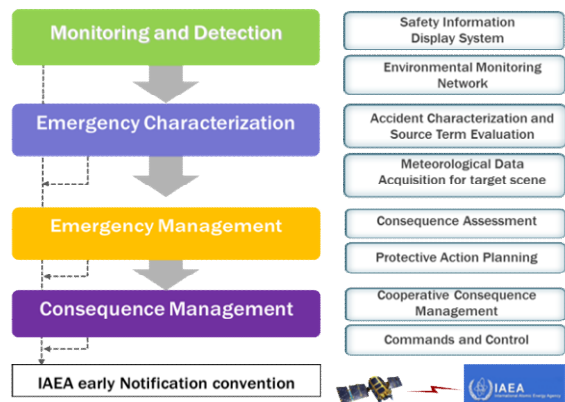


Figure 2. The concepts of emergency management for nuclear installations and required sub-modules.

However, these system has been developed for experts working in technical advisory center (RETAC), so the result of these system is needed to be converted to public announcement data which is easy to understand for public and to be provided to public through the active supporting measures.

### 3. Computerized Supporting System for Residents Evacuation

#### 3.1 Notification and Alerting of Emergency

The residents evacuation is started from the notification of emergency. The selective notification to residents/visitors who are inside or outside of EPZ(emergency planning zone) based on the individual distance from nuclear power plants at the early phase of accident. The timely information and guideline of appropriate actions should be provided with respect to the classification of emergency; white, blue and red emergency.

#### 3.2 Emergency Communication

The emergency call and assistance which can be connected directly to off-site emergency management center or radiation medical service center is necessary basically.

The guidelines of protective action and necessary administer first aid(*taking a potassium-iodide etc.*), should be provided based on the individual base depending on the distance from NPPs. It is also required to provide the emergency procedure and the successive information about consequence of accident through the disaster broadcasting via SMS, video news clip, etc.

The information about emergency controls of OEMC (Off-site Emergency Management Center)'s decisions including traffic control, food and water control, access control and livestock protection should be provided.

#### 3.3 Navigation to sheltering center

For the contribution to safety of residents, not only the alarm and/or notification for emergency, it is required as well to help them actively by navigating to safe shelter and protecting them from the radiation exposure. That means that the supporting system should have a capability of navigating the residents via the optimized evacuate route from the current location to the designated areas considering the destruction of road by the earthquake and the traffic control in real time basis.

In addition to that, the evacuate route should be selected to minimize the radiation exposure by taking account of the distribution of the radioactivity concentration which is analyzed based on the geographical features and meteorological information in the main server of AtomCARE.

#### 3.4 Secure the public

Utilizing the registered personal identification data and GPS data in the device, it is possible to identify who has arrived at the shelter, who are on the way and who didn't the escape the site in real time base and provide a personalized evacuation.

The estimation of the personal radiation exposure during the evacuation can be analyzed by combining the trajectory of evacuation and the distribution of the radioactivity concentration.

#### 3.5 Display the radiation information

It should be able to display the status and trends of the environmental radioactivity levels of the surrounding areas on GIS interface by obtaining the data from Integrated Environment Radiation Monitoring Network (IERnet) of AtomeCARE.

The system can also connect to SIREN(System for Identifying Radiation in Environments Nationwide) to show the distribution of the radioactivity concentration and the estimation of the radioactive materials dispersed into the air based on the meteorological information of a NPP site as shown in figure 3.

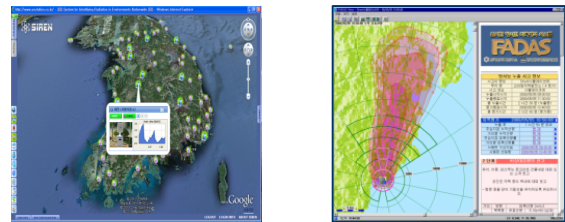


Figure 3. The display view of SIREN and FADAS of AtomCARE

## 4. Conclusion

The computerized supporting system for residents evacuation will contribute to ensure a safe and efficient evacuation in case of radiological emergency. Through supplying the exact information of emergency and protective action guides in real-time basis and on the individual base, safe response is possible. Utilizing the distribution of radioactivity concentration and geological location of individual, personalized supports can be possible.

In addition to that, it will enhance the effectiveness and reliability of the national exercise of radiological emergency preparedness. It will contribute to minimize the radiation risk of the public and reduce the concern of residents for nuclear accident, ultimately enhance nuclear safety and the public acceptance