EMERGENCY RESPONSE TRAINING AT THE INTERNATIONAL ATOMIC ENERGY AGENCY

A. BRAMNIK
Incident and Emergency Centre, International Atomic Energy Agency
Vienna International Centre, PO Box 100, 1400 Vienna - Austria

ABSTRACT

The International Atomic Energy Agency's (IAEA) Incident and Emergency Centre (IEC) is the global focal point for emergency preparedness and response (EPR) to nuclear and radiological incidents or emergencies, regardless of whether they arise from accidents, natural disasters, negligence or deliberate acts; however, the responsibility for EPR for nuclear or radiological emergencies ultimately rests with the State, as does the protection of human life, health, property and the environment. The IEC maintains the Incident and Emergency System (IES) to ensure that the Agency is prepared to respond in a timely, appropriate and efficient manner to any event that may have actual, potential or perceived radiological consequences to health, property or the environment. The IES is comprised of IAEA Secretariat staff members that are trained to perform specific functions within the IES which is operational 24 hours a day, 7 days a week.

IAEA staff members undergoing certification in the IES must complete three levels of training: General orientation, team or position-specific training, and a demonstration of proficiency. Annual refresher training requirements include classroom training, hands-on practice and full-scale exercises that simulate nuclear and radiological incidents or emergencies. However, there are unique challenges to maintain the IES and implement the training programme. Some of these challenges include the Agency's rotation policy that states most professional staff members can only work at the IAEA for a limited number of years; the need to respond to situations around the world in different time zones and potentially in different languages; and managing the wide range of expertise available throughout the Agency.

To overcome these challenges, the IEC developed strategies to make the training programme simple, flexible, and effective. In order to make the most efficient use of resources, response staff training is focused on one or more functions every month during the year. In addition, staff members are encouraged to participate in training activities that involve multiple positions, such as combined activation drills for Emergency Response Manager and Logistics Support Officer roles. Lastly, the IEC conducts exercises to engage staff and Agency management, including participation with Member State national-level exercises that may be conducted outside of normal business hours. This paper summarizes the experience gained in providing this training, describes how the IEC manages the training programme, and shares lessons learned from developing and implementing training for international organization emergency responders.

1. Introduction

Nuclear and radiological incidents and emergencies do occur and we must be prepared to respond. The International Atomic Energy Agency's (IAEA) fulfils its roles in response to nuclear and radiological incidents and emergencies through the Agency's Incident and Emergency System (IES) and the Incident and Emergency Centre (IEC). The IEC also acts as custodian of the IAEA's Incident and Emergency System to ensure that the IAEA is prepared to respond to any event that may have actual, potential or perceived radiological consequences to health, property or the environment. EPR arrangements for nuclear and radiological incidents or emergencies are based on the international EPR framework.

The international EPR framework facilitates development and maintenance of capabilities and arrangements for preparedness and response to nuclear and radiological incidents or emergencies. The framework is based on three elements: Legal instruments, IAEA safety

standards, and international operational arrangements. The Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency are the main legal instruments on EPR which form the legal basis for the international EPR framework. They place specific obligations on the States Parties and the IAEA. The IAEA safety standards on EPR along with a range of technical guidance, tools and training materials provide a robust framework of fundamental principles, requirements and guidance for building sound emergency preparedness and effective emergency response. International operational arrangements are the practical means by which the IAEA, its Member States and the relevant international organizations maintain preparedness and effectively respond to any nuclear and radiological incident or emergency.

In 2005, the IAEA announced the establishment of the IEC to serve as a global focal point for preparedness, event reporting, information sharing, and response to nuclear and radiological incidents and emergencies irrespective of their cause. While emergency response capabilities have existed within the IAEA since the conclusion of the Emergency Conventions in 1980, such as the establishment of the original IAEA Emergency Assistance Services and Emergency Response System, the decision to create an integrated Centre within the IAEA became more pressing with the anticipated increase in the use of nuclear applications as well as heightened concern over the malicious use of nuclear or radioactive materials.

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2. IAEA's Incident and Emergency System

2.1 Overview

The IAEA's emergency response role comprises of: Notification and official information exchange; Assessment of potential emergency consequences and prognosis of possible emergency progression; Provision of public information; Provision of assistance on request; and Coordination of inter-agency response. The IAEA discharges these roles through the IES, which consists of a warning point, an on-call system, an on-duty system, and a Steering Group.

The warning point is a 24 hour communication centre through which incoming messages are received and acted on. Since the IEC is not normally continuously staffed, the Security Control Centre of the United Nations Security and Safety Service in Vienna serves as a warning point. The on-call system ensures that the initial response to any incoming message is timely and adequate. The following on-call officers are available to facilitate and coordinate the initial response: an Emergency Response Manager (ERM); a nuclear installation specialist; a radiation safety specialist; a nuclear security specialist; an external event specialist; a logistics support officer; and a public information officer. The on-duty system ensures that the IAEA response is effective and commensurate with the nature and magnitude of the event/situation. It consists of three modes of operation (Normal/Ready, Basic, and Full Response Modes), a set of response functions and a roster of trained staff members. The IES Steering Group oversees the response of the IAEA and guides the response on matters of policy.

2.2 IES Responders

During the Basic or Full Response Modes, the IEC operational area may be staffed with as many as 20-30 IES responders during a given shift. The Basic Response Mode operates only during business hours, while a response that requires 24/7 shift staffing is considered the Full Response Mode. Within the IEC operational area, responders work in one of five

primary teams or groups: Response Management Team; Technical Team; Liaison Officers; Public Information Officers; and Logistics Team. These teams work together within the IEC, as well as externally with counterpart organizations in the Member States and International Organization, in order to fulfill the Agency's five emergency response roles. At the end of 2016, approximately 200 IAEA staff members were qualified for one or more response position in the IES, and approximately 50 more staff members were pursuing their Initial Certification in the IES.

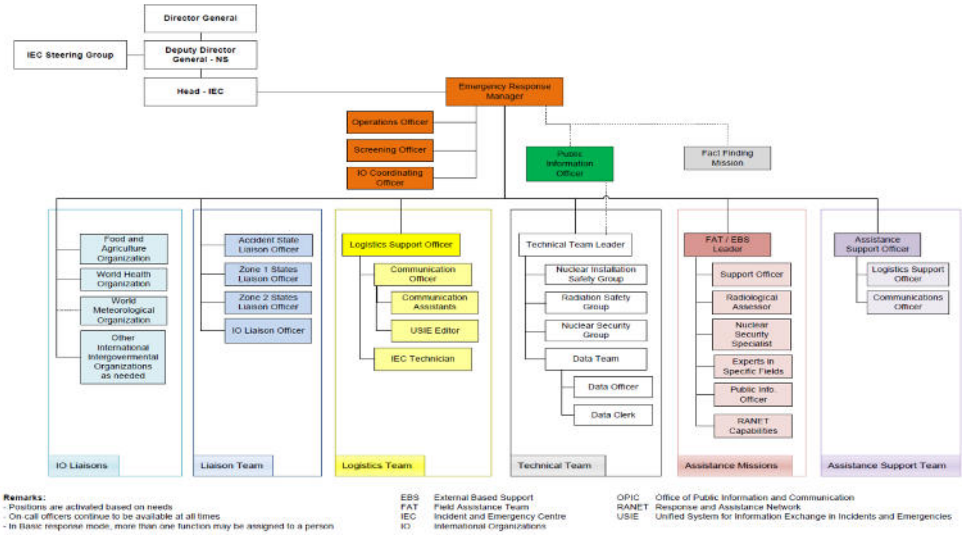

Figure 1: Full Response Mode Staffing Chart

3. Emergency Response Training

3.1 Overview

IAEA staff members engaged in the IES come from every department within the Agency, and no scientific or technical background is required to participate. Staff are considered to be in one of three categories: Pursuing Initial Certification; Expanding Certification; or Maintaining Certification in the IES. Pursuing Initial Certification means that the individual is certifying for a response position in the IES for the first time. Expanding Certification means that the individual has completed Initial Certification in the IES and is certifying for a new response position. Maintaining Certification means that the individual has completed Initial Certification in the IES and is maintaining his or her certification for one or more IES response positions.

Staff members undergoing Initial Certification must complete: (1) General Orientation Training, (2) all training classes for the intended IES response position, and (3) a demonstration of proficiency. IES General Orientation Training is the first step staff must take towards their Initial Certification in the IES. This training introduces the IEC roles and responsibilities, equipment used in the IEC's operational area, and an overview of responses to past nuclear and radiological incidents and emergencies. General orientation training is a half-day training class and is offered at least four times per calendar year.

Annual training requirements for certified IES responders include classroom training, hands-on practice and full-scale exercises that simulate nuclear and radiological incidents or emergencies. In order to make the most efficient use of resources and allow staff members the greatest flexibility in choosing options for training classes, each month the training is structured to concentrate on one or more focus area. Every month, the IEC offers training that encompasses one or more of the response position areas: Response Management Team; Technical Team (including technical On-Call Officers); Liaison Officers; Public Information Officers; and Logistics Team.

Each focus area is covered three months during the year. For example, three months each year the focus covers training and development for the Technical Team. During these months the IEC staff offers: Technical Team classroom training; hands-on training opportunities for Nuclear Installation Specialists, Radiation Safety Specialists, Nuclear Security Specialists, and Data Officers/Clerks; short Technical Team drills via e-mail; Practical Sessions; and other activities or special topics that are intended for members of the Technical Team.

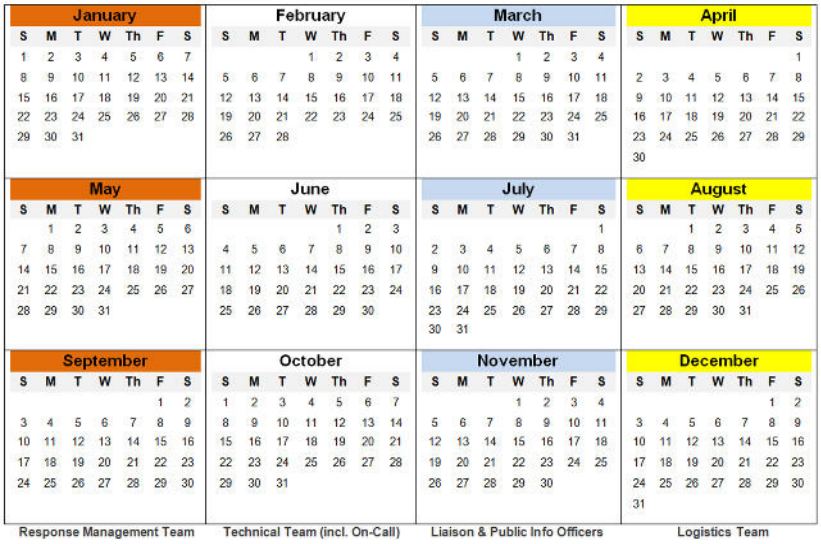

Figure 2: 2017 Monthly Training Focus Areas

3.2 Practical Sessions

Reviewing procedures or checklists is helpful before responding to an incident or emergency; but, there is no substitute for hands-on practice in an operational area. To help support classroom training, the IEC hosts up to two hours of Practical Sessions each month related to the monthly training focus areas. Practical Sessions are not required for IES certification; instead, they are optional, “drop-in,” hands-on practice opportunities. These represent additional opportunities to practice skills learned in training classes. Sample scenarios may be used during these sessions, and the trainers address specific questions from the participants.

3.3 Exercises and Drills

As mentioned, there is no substitute for hands-on work in an operational environment. Staff members who are pursuing or have completed their Initial Certification in the IES must be able to locate references, be familiar with their response checklists, use tools, and excel at selected activities in the IEC prior to a potential event response. Exercises are important opportunities for staff members to practice these and demonstrate proficiency in the IEC operational area. Staff members must complete one exercise or training drill as part of their certification in the IES. IES responders must also complete at least one exercise or event response every 12 months to maintain their certification(s) in the IES. Staff expanding their certification to selected positions (such as the Emergency Response Manager and the Logistics Support Officer) may also need to complete a Task Performance Evaluation: An individual examination of the staff member’s ability to conduct required On-Call response actions, within a time limit, and that is evaluated by two-to-four members of the IEC staff.

The IEC staff conducts three to five real-time Full Response Exercises (FRE) per year. These exercises are internal to the IAEA and do not involve the participation of Member

States or other international organizations; however, some FREs may be in conjunction with an exercise being conducted by a Member States or International Organization. In such a case, the overall activity is used to test the operational arrangements under the Emergency Conventions, and is treated as a real-time Convention Exercise (ConvEx). A primary purpose of exercises is to evaluate IEC internal processes and procedures, as well as the effectiveness of the training program. To keep activities in the IEC operational area as realistic as possible, the IAEA uses names and locations of real nuclear installations – with permission from the responsible Member State. During these exercises, all communication between IES responders and any country or organization outside of the IAEA Secretariat goes to a Simulation Cell. Internal FREs are usually conducted during business hours of a single day, and often involve two shifts of responders serving for three-to-four hours per shift.

In addition, starting in 2017 the IEC began issuing short web-based drills to IES responders in the Technical Team. These drills are comprised of scenarios at nuclear installations or involving radioactive materials. When issued, responders have one-to-two weeks to review the included information, use the data as inputs to the IAEA's web-based incident and emergency assessment tools, and generate a short status report with the responders' own findings on that report. These drills allow responders to utilize the web-based assessment tools and think critically about emergency situations several times per year, instead of solely during annual refresher training. The IEC plans to continue developing and expanding the concept of web-based drills going forward.

4. Training Programme Lessons Learned

4.1 Challenges

As personnel are the most important part of any emergency response organization, it should come as no surprise that staffing issues comprise several challenges to the training programme at the Agency.

Firstly, as stated on the IAEA's website: "For Professional positions, the IAEA follows a policy of rotation out of the Organization. This policy allows Member States to benefit from the return of their nationals after gaining expertise at the IAEA, and it allows the IAEA to have a continuous influx of fresh knowledge and experience at all levels. This increase in international capacity is also of benefit to staff members, who get an opportunity to be part of a dynamic team facing the IAEA's challenges." While a rotation policy has benefits, the regular attrition of trained and certified IES responders creates a challenge that must be met; otherwise, there is a risk of inadequate staffing in response to an incident or emergency.

Secondly, the international nature of the IAEA's contacts means that staff must be prepared to respond to situations around the world, day or night, and not simply within working office hours for Vienna, Austria. In addition, responding to inquiries from Member States, International Organizations, and even the media may potentially require authenticating and verifying information in languages other than English.

In addition, the broad scope of the Agency's work – beyond simply its geographic reach – means that staff members employed at the IAEA span a wide range of expertise. While the IAEA has significant staff resources focused on nuclear power and radioactive materials development, safety, and security, the Agency is also engaged in various projects for nuclear applications, safeguards, and programme management. Identifying, recruiting, and retaining staff members across this spectrum of disciplines presents yet another challenge.

Lastly, participation in the Agency's IES is identified as an important activity by the highest levels of management; but, it is not a required activity for most staff. Unlike a national regulatory agency or government office, Agency staff members are not required to complete a certification in the IES or serve on-call or on-duty roles.

4.2 Solutions

To address these challenges, starting in 2015 the IEC revised the training programme from a whole-year schedule to a monthly focus approach. The IEC currently dedicates entire months to training one specific set of IES responders (Response Management Team, Technical Team, etc.). Previously, training was announced for the entire year at fixed, recurring intervals; however, these dates frequently had to change based on other Agency activities and actual event responses. In addition, it was not always clear to responders when they had to enroll for training classes.

Two hours Regular Training sessions:	
ERM - Initial Information Exchange/USIE:	2nd Wednesday of the 1st month of the quarter
ERM /Ops Officer- Full Response Operations:	4th Tuesday of the 3rd month of the quarter
LSO Activation/Emergency Travel Training:	2nd Wednesday of the 2nd month of the quarter
NIS Assessment and Tools Training:	2nd Wednesday of the 3nd month of the quarter
NSS Assessment and Tools Training:	2nd Thursday of the 1st month of the quarter
RSS Assessment and Tools Training:	2nd Thursday of the 2nd month of the quarter
EES Assessment and Tools Training:	2nd Thursday of the 3rd month of the quarter
Tech Team Leader Assessment Training:	3rd Thursday of the 3rd month of the quarter

Figure 3: Sample Schedule from 2014 Training Plan

The change from whole-year scheduling to monthly focus areas actually allowed IAEA staff members to better plan their year for IES training. Within each month the IEC can dedicate time and resources to a single focus; therefore, where an individual class used to be offered four times per year, that class might now be offered two or three times per month in each of three focus months. As the staff has adjusted to this scheduling method, they are more willing to look ahead and determine in which month or months they will best be able to complete required training activities.

Scheduling training activities by set, previously-announced months has enabled the IEC to create easier tools for staff to enroll in training. Instead of trusting that staff members will proactively enter specific training dates into their calendars for the entire year ahead, or needing to send e-mails to individual IES responders the week of select training activities, the IEC now sends a single e-mail with the upcoming monthly schedule. Staff members can enroll in the training class on the date of their choice by clicking on embedded “one-click registration” links in each monthly e-mail. In addition, the IEC also created a one-question survey on the IES Home Page – an internal IAEA Microsoft SharePoint website – to enable staff members to provide their availability for exercises. Lastly, all staff members can see what training is required for their IES response position(s) by going to their personal home page in the IAEA’s Human Resources webpage, AIPS. In 2015 the IEC assigned each staff member in the IES a Learning Certification, which clearly states what response position the individual is qualified for; what training class(es) or activity is required to maintain the certification in that position; and if or when the staff member completed each activity in the previous 12 months. By making the training programme more predictable and easier to enroll in activities, the IEC has enabled more staff members to participate in a greater number of training classes and exercises.

As previously stressed, hands-on work in the operational area is one of the most important elements of the IES training programme. Therefore, the IEC conducts exercises to engage staff and Agency management, including participation with Member State national-level exercises. These exercises are sometimes intentionally scheduled outside of normal business hours in Vienna, Austria, in order to give staff members a sense of working in the operational area during evenings. In addition, these exercises usually involve receiving information in languages other than English, which is the official working language of the IAEA. Sometimes these are intentional "injects" into the scenario; but, sometimes this occurs naturally as a result of participation from a Member State requesting information about the simulated emergency. Besides these full-scale exercises, the IEC also conducts smaller exercises with mixed groups of IES responders. One such example is an "Activation Drill," which requires select On-Call Officers to work together in groups of two or three to activate the IEC into the Full Response Mode and send out initial information on a simulated emergency. This is another method to give staff members a more practical feel for responding to a nuclear or radiological incident or emergency, and encourage them to learn by doing.

4.3 Future Developments

The next element that must be developed in the IES training programme is eLearning. The demands on IAEA staff members continue to increase, and the rotation policy means that qualified IES responders may leave the Agency after a few years. Successful implementation of online learning activities will achieve significant, valuable outcomes such as: Streamlining the process for new responders wishing to complete their Initial Certification in the IES; Reducing the amount of time IAEA staff spend in classroom training; Enabling IES responders to review or refresh material at any time from the convenience of their PC; Strengthening the long-term response activities of the IES, by making available materials that can be viewed prior to responding to the IEC (if needed); and documenting a consistent, provable basis for additional online learning courses to be created in the future.

4.4 Results

Since adopting the new training structure, there has been very positive feedback from IAEA management and staff. The number of IES training classes offered per year increased from approximately 50 classes in 2014 to 75 classes in 2015 and 84 classes in 2016. In 2016, the IEC made available almost 150 hours of training class time to IAEA staff members (excluding participation in exercises). Lastly, the number of qualified IES responders increased from 185 at year-end 2015 to 191 at year-end 2016, despite the attrition mentioned above.

In addition to more quantitative results, the qualitative outcomes from the IES training programme have also improved. For 2015, 11% of IES responders' performance in the training programme was rated as "Exceeded Expectations," meaning that they completed all required training classes for their position(s) and participated in multiple exercises during the year. For 2016, 19% of IES responders' performance in the training programme was rated as "Exceeded Expectations," an increase of 8%. Overall, IES responders whose participation in the training programme "Met or Exceeded Expectations" increased from 78% in 2015 to 81% in 2016. As existing IES responders have become more comfortable with the revised training programme and new responders are only exposed to the current schema, it is expected that these results will continue to improve while being balanced against the regular loss of qualified responders stemming from the Agency's rotation policy.