ENERGYSOLUTIONS

CS-RS-PR-005

Radiological Area Emergency Response for Field Projects

Global Commercial Services **Revision 1**

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1.0 SCOPE

1.1 Purpose

The purpose of this procedure is to describe the appropriate responses to be taken by Energy*Solutions* Global Commercial Services project personnel to events classified as emergency in nature and requiring immediate response, that occur within or may impact a Radiologically Controlled Area (RCA).

1.2 Applicability

This procedure provides the actions to be taken by personnel assigned to a Global Commercial Services field project, in the event of an emergency that occurs within or may affect a radiologically controlled area which is under the jurisdiction of the U.S. Nuclear Regulatory Commission (NRC) or an agreement state. Complementary industrial safety directives and first aid actions are specified in general terms in References 2.1, 2.2 and 2.4. Emergency actions to be taken for a specific project are normally contained in the project-specific Health and Safety Plan (HASP). If the project does not have a HASP or if the specific emergency is not covered in the HASP, Energy*Solutions* personnel will follow emergency response protocols established by the client or site representatives.

2.0 REFERENCES

2.1 US NRC, Title 10 Code of Federal Regulations Part 20 (10 CFR 20), *Standards for Protection Against Radiation*

2.2 US NRC, 10 CFR 30.32(h)(3), Application for Specific Licenses

2.3 US NRC, 10 CFR 30.72, Schedule C, Quantities of radioactive materials requiring consideration of the need for an emergency plan for responding to a release

2.4 ES-RS-PG-001, *Radiation Safety Program*

2.5 ES-AD-PR-005, *First Notifications*

2.6 ES-AD-PR-008, *Condition Reports*

2.7 CS-RS-PG-001, *Commercial Services Radiation Protection Program*

2.8 CS-SE-PR-001, Control of Radioactive Material (RAM) Quantities of Concern

2.9 CS-SE-PR-002, Control of Safeguard Information (SGI)

2.10 CS-RS-PR-010, Personnel Monitoring for Exposure

3.0 GENERAL

This procedure authorizes Energy*Solutions* project personnel and the project Radiation Protection Supervisor (RPS) to take or approve reasonable actions that may depart from normal conditions in an Energy*Solutions* Radioactive Materials license, when such actions are immediately required to protect personnel from serious harm and to protect public health and safety. Any deviation from the normal license conditions is only

allowed when it is not immediately apparent that other actions consistent with license conditions can provide adequate or equivalent protection. As required by the license, regulatory agency (NRC or Agreement State) notification is required after such an action, in addition to the notifications required by References 2.2 and 2.4.

3.1 Definitions

None

3.2 Responsibilities

Note: Depending upon personnel qualifications and the size of the project, project personnel may be assigned multiple roles and/or responsibilities.

3.2.1. Project Manager (PM)

The PM is responsible for ensuring that the proper procedures/programs are implemented on the project site as required by customer agreements and contracts. The PM is responsible for ensuring that these programs and procedures are properly incorporated into project-specific plans and procedures and for ensuring that Energy*Solutions* and/or client programs and procedures are available for use by project personnel. The PM or designee provides required training to project employees, including instructions on emergency actions in the event of a medical emergency and/or unusual event that may involve personnel exposure to radiation and radioactive materials (Reference 2.7).

3.2.2. Radiation Safety Officer (RSO)

The Global Commercial Services RSO maintains and oversees implementation of the Commercial Services Radiation Protection Program. This includes ensuring that radiation safety, radioactive materials management, and radiological operations procedures and programs are kept up to date such that they comply with current regulations and incorporate current and relevant industry practices and regulatory guidance. The Global Commercial Services RSO will also make applicable notifications to the appropriate regulatory agencies as necessary.

3.2.3. Radiation Protection Supervisor

The Radiation Protection Supervisor (RPS) is responsible for implementing the Global Commercial Services Radiation Protection Program and project-specific radiological requirements. The RPS may manage and oversee technicians performing radiation protection surveys, radiological site monitoring and other radiation protection activities.

3.3 Precautions and Limitations

3.3.1. In the case of an injury, responding personnel are not to perform any first aid beyond their capabilities or beyond the formal training that they have received.

3.3.2. In the case of a fire, 911 or the site emergency number must be called immediately to summon a local fire fighting or emergency response crew(s).

3.3.3. Unless specifically trained, Energy*Solutions* personnel should only attempt to extinguish small fires that can be contained with available portable extinguishing equipment.

3.4 Records

3.4.1. First Notification records will be submitted and maintained in accordance with Reference 2.5 and Condition Reports will be submitted maintained in accordance with Reference 2.6.

3.4.2. Communications with regulatory agencies with regards to site emergencies will be coordinated by the Project Manager.

3.4.3. When applicable, the Global Commercial Services RSO will notify the NRC of incidents that occur while working under an Energy*Solutions* Radioactive Material License maintained by Global Commercial Services, in accordance with Subpart M of Reference 2.3 (See Table 4.1).

4.0 REQUIREMENTS AND GUIDANCE

4.1 Emergency Plan(s)

4.1.1. For temporary job sites where quantities of radioactive materials may exceed the limits provided in Schedule C of 10 CFR 30.72 (Reference 2.3), an Emergency Plan is required. The Project Manager will coordinate the development of the Emergency Plan using the guidance shown below.

4.1.2. According to 10 CFR 30.32(h)(3) (Reference 2.2), an Emergency Plan must include the information on the following:

- Facility description
- Types of accidents
- Classifications of accidents
- Detection of accidents
- Mitigation of consequences
- Assessment of releases
- Responsibilities
- Notification and coordination
- Communication
- Training

- Safe shutdown
- Exercises
- Hazardous chemicals

4.1.3. Table 5-1 reproduces the information provided in 10 CFR 30.72 for radioactive materials that require an Emergency Plan. If an Emergency Plan is prepared, the Plan will be followed in the event of any radiological emergency.

4.1.4. In some cases, the level of response or notification is dependent upon the quantity category as established in the Internal Atomic Energy Agency (IAEA) Code of Conduct. The IAEA Code of Conduct lists 26 radionuclides and identifies three threshold activity levels for each, referred to as Categories 1, 2, and 3. Sixteen of these radionuclides are commonly used in radioactive sources; the other 10 are unlikely to be used in individual sealed sources with activity levels that would place them within Categories 1 through 3. Categorization is based on the definition of a dangerous source, with Category 1 sources being potentially the most hazardous. The Category 1, 2, and 3 concentration limits for some radioisotopes commonly encountered on Energy*Solutions* project sites are provided in Table 5-2.

4.1.5. In addition to Emergency Plans prepared in accordance with the previous paragraphs, the NRC has enacted enhanced security and control measures for each licensee possessing IAEA Category 1 or Category 2 quantities of radioactive materials (References 2.8 and 2.9). These measures require the licensee to have a program to monitor and immediately detect, assess, and respond to unauthorized access to IAEA Category 1 or Category 2 radioactive materials and the devices that contain the material. On a project site where Category 1 or Category 2 quantities are present, the immediate response to any actual or attempted theft, sabotage, or diversion of the radioactive materials is to call the local law enforcement agency.

4.2 Personnel Injury

4.2.1. If any person receives a minor injury in a radiologically controlled area, he/she should leave the immediate work area following normal health protection procedures, if possible, and notify the RPS. The RPS will direct a survey of the person, including the injured area, direct the decontamination of the injury as practicable (if no further harm will result), release the individual for appropriate medical treatment, and document the injury and the survey results.

4.2.2. For serious injuries in a radiologically controlled area, the major consideration should be the immediate health and safety of the individual injured. In this instance, initial response personnel should first call or direct another individual to call emergency medical personnel, secure the area or equipment to ensure that no further injuries occur and then attend to the injured party. Monitoring the individual for contamination or

removing personnel protective equipment (PPE) should not be an initial concern and should not be attempted unless it can be done without delaying emergency response actions and without causing further harm to the individual. Initial response personnel are not to perform any first aid beyond their capabilities or beyond the formal training that they have received.

4.2.3. The person making the emergency call should inform the emergency medical personnel (or the dispatcher) that the situation involves radiological hazards (e.g., in a Contamination Area, Radiation Area or injured person is wearing PPE). Emergency response numbers are normally listed in the project HASP and/or posted on-site.

4.2.4. Once an emergency situation involving a serious injury has been stabilized and the injuries have been attended to, the RPS will monitor the injured person and remove PPE if practical before releasing the individual to leave with emergency response personnel. If the injured individual needs to be transported immediately to a medical facility (before surveys and removal of PPE), the RPS or a member of the Health Physics staff will accompany or follow the individual with appropriate survey instruments, PPE and supplies such as rope and smears. At the medical facility, a controlled area should be established, if possible, including a receptacle for potential contaminated waste. After stabilization of the injured person, surveys will be performed of the injured individual, emergency medical personnel, the transport vehicle, the controlled area, and equipment/material that could have become contaminated as a result of contact with the injured individual or PPE. These surveys must be performed prior to medical personnel, equipment or material is allowed to leave the immediate area.

4.2.5. In extremely rare cases, emergency exposures to high levels of radiation may be necessary to rescue injured personnel or to protect major property. Rescue and recovery operations that involve radiological hazards can be very complex issues with regards to the control of exposure. When human life is endangered, and saving a life is possible, occupational dose limits may be exceeded per 10 CFR 20.1001. The NRC generally recommends emergency response doses should not exceed the Environmental Protection Agency (EPA) guidelines of 10 rem total effective dose equivalent (TEDE) for protection of valuable equipment and 25 rem TEDE for lifesaving activities. The type of response to these operations is typically left up to the personnel in charge of the emergency situation. If the situation involves substantial risk, volunteers should be used.

4.2.6. All responses to injured personnel that require first aid (on or offsite) will be reported to Energy*Solutions* according to Reference 2.5.

4.3 Fire

4.3.1. Areas will be evacuated by all non-emergency personnel when a fire, heavy smoke, or noxious fumes occur in a radiologically controlled area.

4.3.2. The Energy*Solutions* Project Manager and/or fire response personnel will be immediately notified. This is true for all fire events, including minor events where personnel in the immediate vicinity have extinguished the fire.

4.3.3. Energy*Solutions* will take the following steps in practicing fire safety:

- The local fire department will be summoned and informed that radiological materials are involved.
- Unless specifically trained, Energy*Solutions* personnel should only attempt to extinguish small fires that can be contained with available portable extinguishing equipment.
- Fire extinguishing agents such as CO_2, foam, or dry chemicals are preferred, as these minimize the volume of potentially contaminated liquids.
- Firefighting personnel will be surveyed prior to exiting the event area, except for those in need of immediate medical assistance outside the controlled area.
- Minimization of the spread of contamination will be kept in mind at all times.

4.3.4. A fire that results in damage to facilities or equipment that is estimated to exceed $5,000 requires notifications according to Reference 2.5.

4.4 Radiological Spill

4.4.1. Should radioactive liquids or contaminated materials be accidentally released from a tank, piping, or other container, the actions in this section will be taken, as appropriate. Energy*Solutions* personnel are to follow the general instructions shown below which have been developed using the SWIMS acronym:

- "S" = Stop the spill
- "W" = Warn other personnel
- "I" = Isolate the spill area
- "M" = Minimize personnel exposure
- "S" = Secure the appropriate equipment

4.4.1.1. Stop the Spill - If the spill has occurred from a source which may or is continuing to release radioactive material, take such measures as necessary to stop the spill, such as closing a valve or blocking the path of the spill with absorbent material. The potential personnel risk in these actions must be weighed against the potential safety and economic cost if no actions or limited actions are taken. If mechanical action is needed, such as closing a valve or disabling a pump, knowledge of the effect on the total system or machinery involved is required prior to such actions.

4.4.1.2. Warn Other Personnel - Other personnel in the immediate area and those entering the area of the spill must be told of the event to enable all personnel to take the appropriate response actions. Health Physics personnel must be notified as soon as possible.

4.4.1.3. Isolate the Spill Area - The extent of the release/contamination should be quickly assessed and non-vital personnel should be kept out of the immediate vicinity. If necessary, warning signs and/or ropes should be posted at all entrances to the area. Personnel who have been contaminated should remain in the immediate vicinity to prevent the spread of contaminants until health physics personnel release them. Two exceptions to this are: (1) when the ambient radiation levels are high and there is a potential for personnel to receive excessive dose; and (2) personnel have suffered life-threatening traumatic injuries requiring immediate emergency medical attention (See Section 4.2).

4.4.1.4. Minimize Personnel Exposure - Only vital personnel should be allowed to enter the spill/release area. Appropriate actions in the release area would include Health Physics personnel surveying potentially exposed workers, and characterizing the contamination. If possible, Health Physics personnel will establish radiological control points to limit the spread of contamination. Operations or Health Physics personnel may take actions to reestablish safe working conditions and decontaminate the area. Personnel should be aware that chemical and other physical hazards in addition to radioactive materials could also be present as a result of the incident.

4.4.1.5. Secure Appropriate Equipment - Floor drains, sump pumps, non-HEPA filtered ventilation and fans, and/or other operating equipment should be secured or shut down, if equipment is the source of the spill or if it may spread the contamination. Knowledge of the systems and equipment involved is necessary prior to taking such action.

4.4.2. Any unplanned release of radioactive material to the environment, radiological spills or contamination outside of restricted areas, (and/or chemical and biological spills outside of containment control devices) requires notifications according to Reference 2.5.

4.5 High or Off-Scale Dosimetry

4.5.1. If a worker finds his/her personnel dosimeter off-scale or reading unexpectedly high, he/she must leave the area immediately.

4.5.2. The worker in question must warn others in the area and any nearby Health Physics personnel what has occurred prior to leaving the area.

4.5.3. Other workers in the area must immediately check their own dosimeter and leave the area until the cause is determined.

4.5.4. The RPS will conduct an investigation into the high dose measurement and request a dose assessment from the designated Project Health Physicist, if necessary.

4.5.5. The RPS will notify the Global Commercial Services RSO and determine if a dose assessment is required.

4.6 Loss or Theft of Radioactive Materials

4.6.1. Loss or theft of radioactive material which could result in unnecessary radiation dose above 100 mrem to the public or the unlawful use of radioactive materials could be viewed as an incident of domestic terror. As such, it is imperative that the proper authorities be notified as soon as possible following the recognition of the loss or theft of radioactive materials, in addition to the Project Manager.

4.6.2. All thefts should be reported to local law enforcement, the Project Manager, and the Commercial Services RSO as soon as practical. If radioactive materials controlled under a client's radioactive material license are discovered missing, Energy*Solutions* field personnel should first notify the client.

4.6.3. Notifications are also required to the NRC or state regulatory agencies if radioactive material controlled under an Energy*Solutions* or a client's radioactive materials license is lost or stolen. Notifications to the NRC are described in Section 4.9. Notification requirements to other regulatory agencies (e.g., state agencies) should be noted in project planning or safety documents.

4.7 Personnel Overexposure

4.7.1. If the dose limits provided in Reference 2.1 are exceeded, or are suspected to have been exceeded, or if an Energy*Solutions* administrative exposure limit are exceeded the RPS will immediately restrict the personnel suspected of having received excess dose from further activities in radiologically controlled areas. The RPS will then notify the Global Commercial Services RSO and the Project Manager as soon as practical (Reference 2.10).

4.7.2. The Project Manager will follow the Energy*Solutions* First Notification procedure (Reference 2.5) for notifying Commercial Services and Corporate management personnel. The RPS will collect dosimeters from any personnel who were potentially over-exposed and send permanent dosimeters (e.g., TLDs, OSL) for processing. Electronic and self-reading "pocket dosimeters" should also be collected, read and the results for each person recorded.

4.7.3. If the dose limits set forth in Reference 2.1 are exceeded, notifications will be made to the NRC or agreement state as described in Section 4.9.

Notification requirements of other regulatory agencies will be described in site-specific plans and procedures, as necessary.

4.7.4. If on-site activities are being monitored under a client's license, it is the responsibility of the RPS to notify the client license RSO (or equivalent) and the Project Manager of all potential over-exposures.

4.8 Release to the Public and the Environment

If there is an unplanned radiological spill, release, or spread of contamination to the environment, it is the responsibility of the RPS to notify the client license RSO (or equivalent), the Project Manager, and the Global Commercial Services RSO as soon as practical. The Global Commercial Services RSO will determine if the event is reportable in accordance with Reference 2.5. A release to the environment includes a release of radioactive material to a waterway (or storm drain system), soil, or the atmosphere.

If an individual member of the public exceeds an exposure of 100 mrem TEDE for the year due to project activities, it is the responsibility of the RPS to notify the client license RSO (or equivalent), the Project Manager, and the Global Commercial Services RSO as soon as practical. The Global Commercial Services RSO will report the event in accordance with Reference 2.5 and this procedure. Public monitoring is performed in accordance with Reference 2.10.

4.9 Emergency Notification

4.9.1. A list of key Energy*Solutions* Global Commercial Services personnel, including work, home, and mobile phone numbers, will be posted within the facility for notification in the event of a radiological emergency. This list should include, at a minimum, the project RPS, the Project Manager, and the Global Commercial Services RSO.

4.9.2. Notifications of site illnesses, injuries, near misses, and unplanned radiological exposures will be reported by project personnel according to Reference 2.5.

4.9.3. If the project is being conducted under an Energy*Solutions* NRC license or a client's NRC license, the NRC will be notified of incidents according to Subpart M of Reference 2.3 or according to this procedure. Notification requirements are summarized in Table 5-3 of this procedure.

4.9.4. If the project is being conducted under a client's Agreement State license, the appropriate state agencies will be notified of incidents in a manner consistent with applicable state notification requirements or the NRC notification requirements presented in Attachment 5.3, unless otherwise stated in a site-specific plan or procedure or the client's Agreement State license.

5.0 ATTACHMENTS AND FORMS

5.1 Attachments (Tables)

Table 5-1
Quantities of Radioactive Material Requiring Emergency Plan

Radioactive Material [1,2]	Release Fraction	Quantity (Ci)
Actinium-228	0.001	4,000
Americium 241	0.001	2
Americium-242	0.001	2
Americium-243	0.001	2
Antimony-124	0.01	4,000
Antimony-126	0.01	6,000
Barium-133	0.01	10,000
Barium-140	0.01	30,000
Bismuth-207	0.01	5,000
Bismuth-210	0.01	600
Cadmium-109	0.01	1,000
Cadmium-113	0.01	80
Calcium-45	0.01	20,000
Californium-252	0.001	9 (20 mg)
Carbon-14 (non-carbon dioxide)	0.01	50,000
Cerium-141	0.01	10,000
Cerium-144	0.01	300
Cesium-134	0.01	2,000
Cesium-137	0.01	3,000
Chlorine-36	0.5	100
Chromium-51	0.01	300,000
Cobalt-60	0.001	5,000
Copper-64	0.01	200,000
Curium-242	0.001	60
Curium-243	0.001	3
Curium-244	0.001	4
Curium-245	0.001	2
Europium-152	0.01	500
Europium-154	0.01	400
Europium-155	0.01	3,000
Germanium-68	0.01	2,000

Radioactive Material [1,2]	Release Fraction	Quantity (Ci)
Gadolinium-153	0.01	5,000
Gold-198	0.01	30,000
Hafnium-172	0.01	400
Hafnium-181	0.01	7,000
Holmium-166m	0.01	100
Hydrogen-3	0.5	20,000
Iodine-125	0.5	10
Iodine-131	0.5	10
Indium-114m	0.01	1,000
Iridium-192	0.001	40,000
Iron-55	0.01	40,000
Iron-59	0.01	7,000
Krypton-85	1.0	6,000,000
Lead-210	0.01	8
Manganese-56	0.01	60,000
Mercury-203	0.01	10,000
Molybdenum-99	0.01	30,000
Neptunium-237	0.001	2
Nickel-63	0.01	20,000
Niobium-94	0.01	300
Phosphorus-32	0.5	100
Phosphorus-33	0.5	1,000
Polonium-210	0.01	10
Potassium-42	0.01	9,000
Promethium-145	0.01	4,000
Promethium-147	0.01	4,000
Radium-226	0.001	100
Ruthenium-106	0.01	200
Samarium-151	0.01	4,000
Scandium-46	0.01	3,000
Selenium-75	0.01	10,000
Silver-110m	0.01	1,000
Sodium-22	0.01	9,000

Radioactive Material [1,2]	Release Fraction	Quantity (Ci)
Sodium-24	0.01	10,000
Strontium-89	0.01	3,000
Strontium-90	0.01	90
Sulfur-35	0.5	900
Technitium-99	0.01	10,000
Technitium-99m	0.01	400,000
Tellurium-127m	0.01	5,000
Tellurium-129m	0.01	5,000
Terbium-160	0.01	4,000
Thulium-170	0.01	4,000
Tin-113	0.01	10,000
Tin-123	0.01	3,000
Tin-126	0.01	1,000
Titanium-44	0.01	100
Vanadium-48	0.01	7,000
Xenon-133	1.0	900,000
Yttrium-91	0.01	2,000
Zinc-65	0.01	5,000
Zirconium-93	0.01	400
Zirconium-95	0.01	5,000
Any other beta-gamma emitter	0.01	10,000
Mixed fission products	0.01	1,000
Mixed corrosion products	0.01	10,000
Contaminated equipment beta-gamma	0.001	10,000
Irradiated material, any form other than solid noncombustible	0.01	1,000
Irradiated material, solid noncombustible	0.001	10,000
Mixed radioactive waste, beta-gamma	0.01	1,000
Packaged mixed waste, beta-gamma	0.001	10,000
Any other alpha emitter	0.001	2
Contaminated equipment, alpha	0.0001	20
Packaged waste, alpha	0.0001	20
Combinations of radioactive material listed above[1]		

Table 5-2
IAEA Code of Conduct Sources

Radioactive Isotope	Category 1 (Ci)	Category 2 (Ci)	Category 3 (Ci)
Americium-241	1,600	16	1.6
Cesium-137	2,700	27	2.7
Cobalt-60	810	8.1	0.81
Iridium-192	2,200	22	2.2
Irom-55	20,000,000	200,000	20,000
Radium-226	1,000	10	1
Strontium-90	27,000	270	27

Table 5-3
Typical NRC Incident Notifications Required for Service Provider Licensees

Event	Telephone Report	Written Report	Regulatory Requirement
Lost, Stolen or Missing Radioactive Material			
> 1,000 times the quantity specified in 10 CFR 20, Appendix C	Immediately	Within 30 days	10 CFR 20.2201(a)(1)(i)
> 10 times the quantity specified in 10 CFR 20, Appendix C	Not required	Within 30 days	10 CFR 20.2201(a)(1)(ii)
Actual or Potential Individual Doses			
TEDE ≥ 0.25 Sv (25 rems)	Immediately	Within 30 days	10 CFR 20.2202(a)(1)(i)
Lens dose ≥ 0.75 Sv (75 rems)	Immediately	Within 30 days	10 CFR 20.2202(a)(1)(ii)
Shallow dose equivalent to the skin or extremities ≥ 2.5 Gy (250 rads)	Immediately	Within 30 days	10 CFR 20.2202(a)(1)(iii)
TEDE ≥ 0.05 Sv (5 rems) in 24 hours	24 hours	Within 30 days	10 CFR 20.2202(b)(1)(i)
Lens dose ≥ 0.15 Sv (15 rems) in 24 hours	24 hours	Within 30 days	10 CFR 20.2202(b)(1)(ii)
Shallow dose equivalent to the skin or extremities ≥ 0.5 Sv (50 rems) in 24 hrs	24 hours	Within 30 days	10 CFR 20.2202(b)(1)(iii)
Releases That Could Result in a Potential Intake of Radioactive Materials			
≥ 5 times the ALI given a 24-hour exposure	Immediately	Within 30 days	10 CFR 20.2202(a)(2)
≥ 1 ALI for a 24-hour exposure	24 hours	Within 30 days	10 CFR 20.2202(b)(2)
Reports of Excess Doses			
Whole body dose > 0.05 Sv (5 rem)	Not required	Within 30 days	10 CFR 20.2203(a)(2)(i)
Occupational dose to a minor > 0.005 Sv (500 mrem)	Not required	Within 30 days	10 CFR 20.2203(a)(2)(ii)
Dose to an embryo/fetus of a declared pregnant worker > 0.005 Sv (500 mrem)	Not required	Within 30 days	10 CFR 20.2203(a)(2)(iii)
Dose to member of public > than 1 mSv (100 mrem)	Not required	Within 30 days	10 CFR 20.2203(a)(2)(iv)

Violations of License Limits			
Levels of radiation or concentrations in a restricted area which exceed any applicable limit in the license	Not required	Within 30 days	10 CFR 20.2203(a)(3)(i)
Levels of radiation or concentrations in an unrestricted area in excess of 10 times any applicable license or regulatory limit	Not required	Within 30 days	10 CFR 20.2203(a)(3)(ii)
Other Events and Incidents That Could Impact Radiation Safety			
Defect in equipment that could create a substantial safety hazard	2 days (by a Director or Officer)	Within 30 days	10 CFR 21.21(d)(3)(i)
Event that prevents immediate protective actions necessary to avoid exposure to radioactive materials that could exceed regulatory limits	Immediately but no later than 4 hours	Within 30 days	10 CFR 30.50(a)
An unplanned contamination event or spill consisting of > 5 times any ALI that requires access to the contaminated area to be restricted for more than 24 hours by increasing radiological controls or by prohibiting entry into the area.	Within 24 hours		10 CFR 30.50(b)(1)
Equipment is disabled or fails to function as designed when required to prevent radiation exposure in excess of regulatory limits	Within 24 hours	Within 30 days	10 CFR 30.50(b)(2)
Unplanned fire or explosion that affects the integrity of any licensed material or device, container, or equipment with licensed material	Within 24 hours	Within 30 days	10 CFR 30.50(b)(4)
Lost or Stolen Radioactive Shipments			
For IAEA Category 1 and 2 materials	Immediately	NA	10 CFR 20.2201(a)(1)(i)
24 hours following an investigation and the materials are still missing	Immediately	NA	10 CFR 20.2201(a)(1)(i)

Notes: Telephone notifications shall be made to the NRC Operations Center at (301) 816-5100 or (301) 951-0550. This will normally be done by the Commercial Services Radiation Safety Officer. Immediate reports shall take place as soon as possible but no later than 4 hours after the discovery of an event.