Elements of the Russian Emergency Preparedness Program

Randolph L. Sullivan, NRC

National Radiological EP Conference

St. Louis, Missouri

March 2006


16


2 10 2005

Volgodonsk NPP

- 1000 MWe VVER, a PWR
- Large Staff (~2200)
- Site Director, Chief Engineer and several Deputy Chief Engineers

Utility Structure

- **Federal** Agency for Atomic Energy
- Federal State **Unitary** Enterprise
- Russian State 'Concern' for Generation of Electric and Thermal Power at Nuclear Power Plants
- "Rosenergoatom" 'Concern' (**Utility**)
- **Volgodonsk NPP**

National Policy

- **Decree** titled "On Protection of Public and Territories against Emergency Situations of Natural and Technological Character," (11/11/94)
- Russian Federation **Decree issued 12/30/03**, titled "Government System for Emergency Situation Prevention and Mitigation"
- **Laws** defining requirements for public protection from emergencies of a natural or technological character
- **Regulation** created by the Federal Agency for Atomic Energy and "Rosenergoatom" Concern (State owned utility)
- **Implemented by** the Director General of "Rosenergoatom" 11/04

Readiness Inspection

- 11/04 Ministry for Emergency Situations comprehensive inspection reviewed Volgodonsk NPP
- Issued inspection report declaring the station “fully ready to respond”

Readiness Inspection

The inspection reviewed the following areas:

- **Compliance** with requirements for response to emergency situations of natural and technological character
- **Capability** to prevent emergency situations, and provide fire safety
- **Readiness** of communications and public notification systems
- **Preparedness** for accident mitigation, rescue and other response
- **Possession** of financial and material resources
- **ERO** prepared to respond to emergency situations
- **Capability** to protect the public

Observations of Requirements

- Extensive system of federal laws
- Regular inspection to verify compliance
- Prescriptive and burdensome regulatory structure
- Delineates responsibilities for federal, regional, local civil authorities and the Utility
- Cooperation between governmental entities and NPP is inspected

Station Emergency Plan

- Specific actions Station Shift Supervisor
- Start & complete times for critical tasks
- Deputy Chief Engineers functions, e.g., Safety, Operations, Maintenance, etc.
- Staffing plan for two levels of backup
- Staff is organized into “brigades” under the direction of Deputy Chief Engineers

Emergency Classification Level

- Three ECLs unique to Russia
  - Normal day-to-day activity
  - Emergency Preparedness
  - Emergency

EALs for Emergency

- 60 mr/hr within plant spaces
- 20 mr/hr within 3 km
- 2 mr/hr within 30 km planning zone
- Similar criteria for radioactive iodine releases
- Judgement EALs for fire, natural disaster and terrorism
- Lower levels for “Emergency Preparedness”

PAGs

- 5 rem TEDE for mandatory sheltering
- 50 rem for mandatory evacuation
- Calculated as 10-day doses
- Similar limits for thyroid dose
- In compliance with IAEA standards
- Much higher criteria than those used elsewhere

PARs

- Typical EP practice is to evacuate areas within a set distance around the plant and downwind
- Implemented for General Emergency without radioactive release
- In Russia protective actions only where protective action criteria projected or measured

ECL / PAR Measurements

- NPPs have online environmental radiation monitoring systems
- Data available at Emergency Centers, city and Region
- Provides parameter necessary for ECL and PAR
- EAL System is unique and simple

Classification of Emergencies

- SS responsible for recognition
- Notifies Station Director or Chief Engineer
- Station Director declares the Emergency
- SS performs immediate actions
- If SS cannot find senior official, makes declaration within 10 minutes event
- Notification of the authorities begins within 5 minutes of the event whether Emergency is declared or not

Notification

- SS makes 4 notifications: Utility, Federal Response, City and Rostov Region
- Notifications begin within 5 minutes and complete within 10 minutes of event
- SS simultaneously orders Electrical Plant Supervisor to notify 15 additional entities
- Must begin within 10 minutes of event and completes within 20 minutes
- Notifications verbal with no form
- Simple statement of event
- Follow up notifications performed in Emergency Center are formalized and approved by management

Radiological Monitoring

- Plant has about 450 process and area radiation monitors, ~400 in plant and ~50 on site
- Radiation monitors on roofs assist with source term estimates
- Online environmental monitoring system in 19 locations

Radiological Monitoring

- Monitoring van
- On site and offsite teams
- City has two monitoring teams
- Military radiological brigade can be onsite in ~8 hours
- “Rosenergoatom” support group can be onsite in ~14 hours

Radiological Monitoring

- Priority is monitoring evacuation routes and populations
- Differs from practice of locating plume
- Consistent with public health and safety

EMERGENCY RESPONSE FACILITIES

- **Onsite Emergency Center** below ground facility
- **Radiological shielding**, blast doors, independent electrical power, fuel, food, independent water sources, fire detection, fire suppression, air system, etc.
- **Video-conference** with teams at HQ, Technical Center, Gov HP center, three Gov labs, reactor designer and reactor constructor *(IAEA "Good Practice")*

EMERGENCY RESPONSE FACILITIES

- EC has **multiple communications links** with government, support and oversight agency locations
- **Personnel decon** facilities and medical facility
- Can support extended emergency operations
- **Plant parameter display system** available throughout the EC, plant, city and other EP centers *(IAEA "Good Practice")*

EMERGENCY RESPONSE FACILITIES

- **Decon station** for vehicles and personnel leaving the plant
- NPP has **two onsite shelters** for plant personnel (1200 and 160) with protective features similar to Emergency Center

EMERGENCY RESPONSE FACILITIES

- **Plenty of equipment** in multiple ERFs and warehouses
- A **duplicate EC** in Volgodonsk, except larger for HQ response team and City

Offsite EP

- **Rostov Region** is organized into districts
- **Volgodonsk city** is the most populated area near the site (13.5 km)
- **30 km** surveillance and preparedness **zone** around NPPs
- **Civil authorities** expected to implement protective actions beyond the surveillance zone if necessary
- **Preparations** within the zone **inspected by** Ministry for Emergency Situations

Offsite EP

- **3-km zone** around the plant in which no one may live
- **5-km zone** where plant is responsible for public notification (via siren)
- VNPP has two small villages within the 5-km zone
- **District officials and Mayor** within Rostov Region are responsible for protective action decision making and implementation

Offsite EP

- **Communications point** has several channels of communication with NPP
- **Preplanned messages** loaded on city radio and TV system and to commercial channels
- **Siren system** alerts the people to the need to tune to the radio or TV
- **Message provides** preliminary notification

Offsite EP

- **Can direct people** to go indoors, seal windows, take potassium iodide and prepare for evacuation
- **City divided into districts** - each has assembly points for people to await transportation
- **Each district** assigned a reception area where people are accommodated, perhaps in private homes

Offsite EP

- **Annual training** provided for implementing evacuation
- **City/ Region EP Commission** has oversight and tests responders
- **Ministry for Emergency Situations** inspected city plan in 2003 including a building evacuation
- **Legacy** of measures implemented during World War II
- **Mandated** by Federal law
- **Function** not the responsibility of NPP

Public Training

- **Federal law requires** public education for civil defense, including NPP evacuation
- Many **members of the public** annually receive 14 hours of training in preparedness
- **6 hours** are for technological and nuclear accident preparedness
- **Company** managers, ORO staff, committee members, building wardens, etc **receive training**
- **Extensive program for school children**
- There are **no annual PI brochures**

Drills and Exercises

- **6** training drills in 2005
- Emergency management staff and "Rosenergoatom" **support organizations**
- **More training drills** for the teams: damage control, medical, fire, survey, etc.
- **Exercises** with offsite agencies are conducted annually

Drills and Exercises

- Volgodonsk NPP used **integrated terrorist event based scenarios** into the 2002 and 2004 exercises *(IAEA "Good Practice")*
- **Internationally observed exercise** planned for 2007

Conclusions

- The Russian EP program **addresses necessary aspects** of NPP EP
- There are **extensive regulatory requirements** and oversight
- **Impressive** response facilities
- **Extensive** stores of equipment
- **Impressive** drill and exercise program

Conclusions

- **EALs** are simple and bear further consideration
- **Impressive** public education
- **Impressive** in-plant /onsite monitoring systems
- **Impressive** on-line environmental monitoring system

Conclusions

In my opinion -

The Russian EP program is protective of public health and safety


2 10 2005

Questions?

Randy Sullivan, CHP

RXS3@NRC.GOV

(301) 415-1123