OVERVIEW

The March 2011 Fukushima accident underscored how important prior planning is when it comes to safely handling extreme events at a nuclear reactor. The NRC continues to conclude U.S. plants can survive many scenarios, such as loss of offsite power or flooding. After Fukushima, however, the NRC ordered every U.S. commercial reactor to have strategies for dealing with the long-term loss of normal safety systems. Instead of figuring out which events might happen, the order focused on significantly improving the plants' flexibility and diversity in responding to extreme natural phenomena, such as severe flooding and earthquakes.

The plants' strategies must protect or restore key safety functions indefinitely in the case of an accident. The strategies focus on keeping the reactor core cool, preserving the containment's barrier that prevents or controls radiation releases, and cooling the spent fuel pool. Plants with more than one reactor must be able to do this for every reactor on the site at the same time.

The strategies must protect the plant indefinitely, so plants may need to bring in additional equipment or resources. The order reflects this by having three phases with different requirements.

The plants have all submitted a plan for what they intend to do and use in each of these phases. The plans must also explain how the plants will have everything in place by the end of 2016. The NRC reviewed those plans and has issued interim staff evaluations, which let the licensee know whether the NRC thinks the plants are on the right track. The NRC will inspect the plants throughout this process to ensure the strategies will get the job done. The agency website's Japan Lessons Learned section has more information about the mitigating strategy requirements and related guidance.

MITIGATING STRATEGIES RESOURCES

You can find more information on mitigating strategies and related guidance at the NRC website (www.nrc.gov) in the Japan Lessons Learned section.

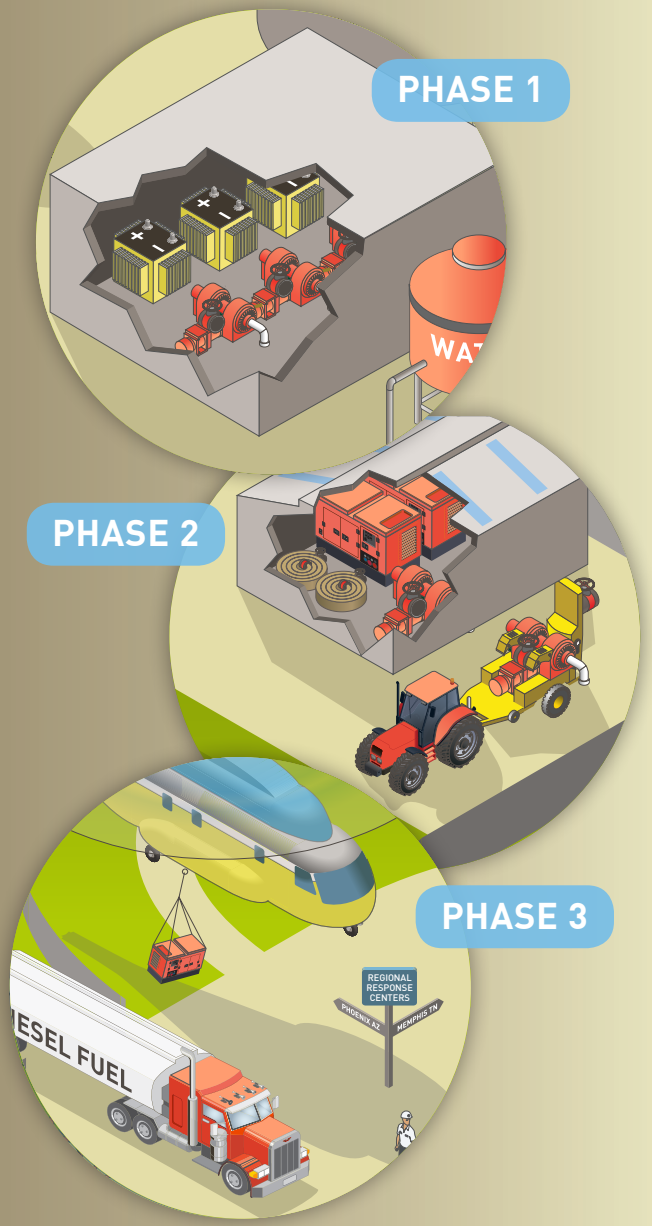
www.nrc.gov/reactors/operating/ops-experience/japan-dashboard/mitigating-strategies.html

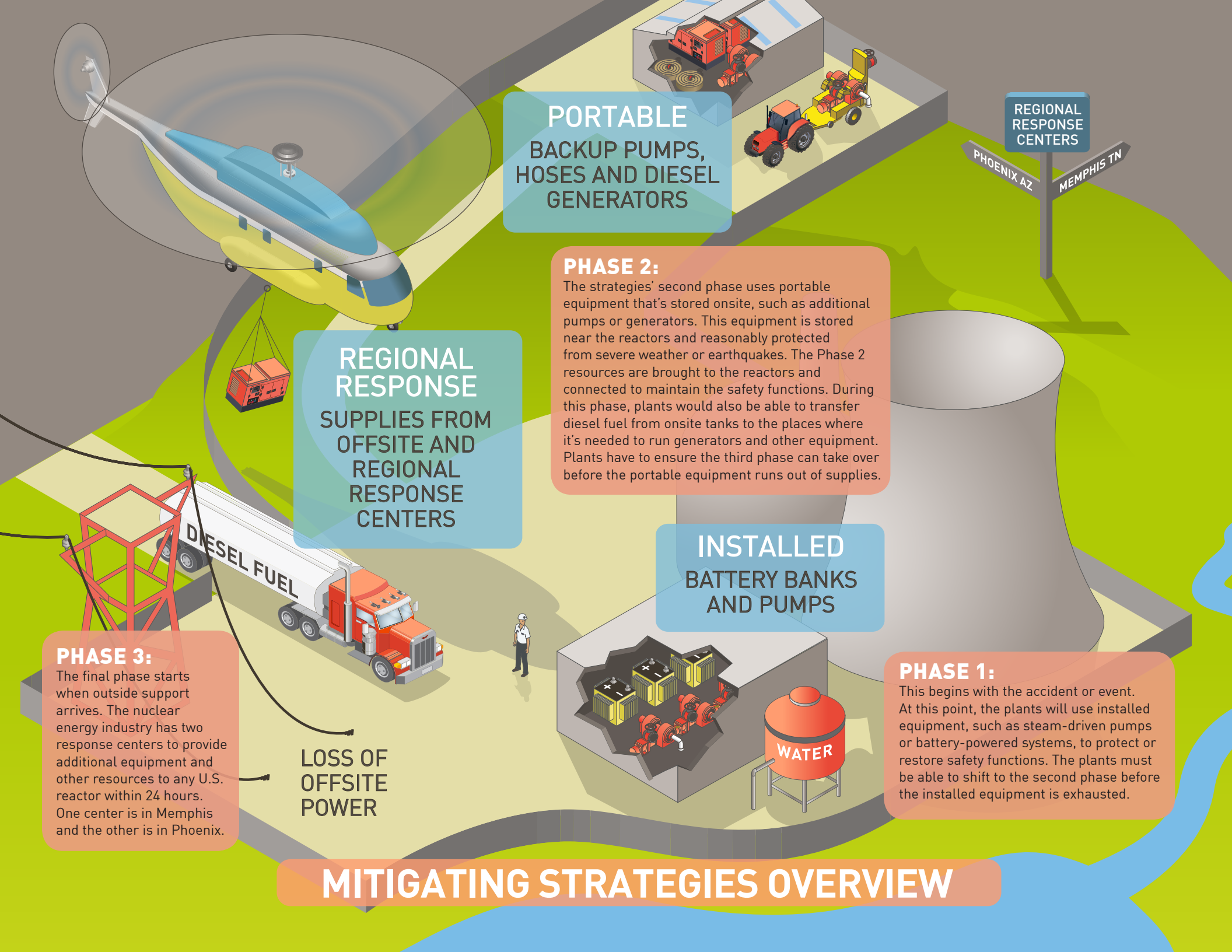
NUREG/BR-0523
April 2015

@NRCgov

U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Mitigating Strategies: Safely Responding to Extreme Events




PORTABLE
BACKUP PUMPS, HOSES AND DIESEL GENERATORS
REGIONAL RESPONSE CENTERS
PHOENIX AZ
MEMPHIS TN
PHASE 2:
The strategies' second phase uses portable equipment that's stored onsite, such as additional pumps or generators. This equipment is stored near the reactors and reasonably protected from severe weather or earthquakes. The Phase 2 resources are brought to the reactors and connected to maintain the safety functions. During this phase, plants would also be able to transfer diesel fuel from onsite tanks to the places where it's needed to run generators and other equipment. Plants have to ensure the third phase can take over before the portable equipment runs out of supplies.
REGIONAL RESPONSE
SUPPLIES FROM OFFSITE AND REGIONAL RESPONSE CENTERS
DIESEL FUEL
INSTALLED
BATTERY BANKS AND PUMPS
PHASE 3:
The final phase starts when outside support arrives. The nuclear energy industry has two response centers to provide additional equipment and other resources to any U.S. reactor within 24 hours. One center is in Memphis and the other is in Phoenix.
LOSS OF OFFSITE POWER
WATER
PHASE 1:
This begins with the accident or event. At this point, the plants will use installed equipment, such as steam-driven pumps or battery-powered systems, to protect or restore safety functions. The plants must be able to shift to the second phase before the installed equipment is exhausted.
MITIGATING STRATEGIES OVERVIEW