SUMMARY
The Department of Energy (DOE) is currently implementing a new concept for supporting Consequence Management (CM) operations. It supports operations within the Continental United States (CONUS) and Outside the Continental United States (OCONUS) and includes the development of downwind hazard predictions, data assessment, operational planning, medical advice and planning, and radiation monitoring and sampling. This evolving concept introduces some new CM response elements and a phased deployment of the Federal Radiological Monitoring and Assessment Center (FRMAC) to facilitate the priority management, planning, and response operations for radiological emergency response situations. Implementation of this new concept better enables the DOE to rapidly provide CM support and assistance to federal, state, and local authorities to protect the health and safety of the public.

I. BACKGROUND
The DOE Nevada Operations Office (DOE/NV), under the direction of DOE Headquarters (DOE/HQ), is the central point of coordination for the support of all CM operations for DOE. As such, DOE/NV provides CM planning and operational support for all incidents and accidents involving nuclear materials, weapons of mass destruction, and other radiological situations as required and directed by DOE/HQ.

DOE/NV is responsible for coordinating and directing these DOE CM capabilities and assets:
- Consequence Management Official (CMO)
- Consequence Management Planning Team (CMPT)
- Federal Radiological Monitoring and Assessment Center (FRMAC)
- Radiological Monitoring and Assessment Center (RMAC)
- Aerial Measuring System (AMS)
- Radiation Emergency Assistance Center/Training Site (REAC/TS)
- Atmospheric Release Advisory Capability (ARAC)

DOE/NV integrates DOE’s follow-on CM assets with the operational capabilities of the:
- Accident Response Group (ARG)
- Nuclear/Radiological Advisory Team (NRAT)
- Nuclear Emergency Search Team (NEST)
- Joint Technical Operations Team (JTOT)
- Radiological Assistance Program (RAP) response teams
- Department of Defense Joint Task Force for Consequence Management (JTF-CM)
- Federal Bureau of Investigation Forensics

II. COMPONENTS OF THE DOE CM CONCEPT
A. Consequence Management Official
The CMO deploys from DOE/NV within four hours of notification to support the Lead Federal Agency (LFA) as part of the Foreign Emergency Support Team (FEST) or Domestic Emergency Support Team (DEST). In an OCONUS response, the CMO integrates into the Department of State (DOS) Consequence Management Response Team (CMRT). In a CONUS response, the CMO works directly for the DOE Senior Energy Official (SEO). The CMO provides the SEO with a single point of contact for the coordination and direction of DOE assets in the field and ensures an integrated CM response. The primary role of the CMO is to provide direct support to the LFA in the form of technical advice and recommendations on radiological CM issues. It is the responsibility of the CMO to explain radiological hazard predictions and assessment data to the LFA Senior Official and support the development of Protective Action Recommendations.

B. Consequence Management Planning Team
The CMPT deploys within four hours of notification to support the LFA, normally the Federal Emergency Management Agency for CONUS events, and closely follows the CMRT in support of the DOS for OCONUS events. The CMPT will normally be part of an interagency coordination
center (ICC) and will address CM priorities established by the LFA. Through the CMO, the team provides additional technical advice and supports the development of a CM plan that addresses radiological hazards, medical impacts, mitigation of consequences, and the deployment and use of other DOE assets in support of CM operations. The team provides interagency senior management with technical briefings and CM data products.

Composition of the CMPT consists of:
- One Team Leader (DOE/NV)
- Two Effects Prediction personnel (Sandia National Laboratories [SNL])
- Two Health Physics/Data Assessment personnel (Bechtel Nevada [BN])
- Two Communications and Logistics specialists (Bechtel Nevada)
- One Medical Advisor (REAC/TS)

Under the direction of the CMO, the CMPT coordinates and directs the in-field deployment and utilization of the FRMAC/RMAC, AMS, Regional RAP Teams, and ARAC.

C. Consequence Management Home Team
The Consequence Management Home Team (CMHT) is activated immediately following a deployment order for the NRAT, CMO, CMPT, or any other CM-related asset. The team will be the exclusive source for coordinating effects predictions, modeling, and data assessment for field operations until the CMPT is set up and operational. After the CMPT becomes operational, the CMHT continues to support the CMPT and CMO as required.

CMHT operations are conducted at the Remote Sensing Laboratory in Las Vegas, Nevada, and integrate scientists from Sandia National Laboratories for nuclear effects modeling. Communications are established with the CMPT and all field elements requiring effects data or other information via STU-IIIIs and the Imaging and Communications Environment laptop terminals deployed with the team.

The minimum shift composition of the CMHT to provide 24-hour support will consist of:
- One Scientist (BN) - Expertise in health physics, dose assessment, and protective actions
- A Modeling Scientist (SNL) - Expertise in effects predictions, plume and contamination deposition modeling
- Operations Planners (BN) - Expertise in operations planning, logistics, and communications

D. Federal Radiological Monitoring and Assessment Center/Radiological Monitoring and Assessment Center
In those situations where the emergency has progressed to a stage where monitoring and assessment operations are required, a FRMAC or RMAC is normally deployed to the scene. In these situations, CMO and CMPT functions are normally transferred to the FRMAC/RMAC upon its arrival. A CONUS response actually becomes a FRMAC with DOE leading the radiological monitoring and assessment effort. In OCONUS responses, the RMAC may be integrated with Host Nation assets or with the International Atomic Energy Agency to provide support to the Host Nation, as directed by the DOS. Current FRMAC operations are divided into three phases for a CONUS response and two for an OCONUS RMAC response.

1. Phase I. A Phase I FRMAC/RMAC provides a rapid, initial response capability to interface with state(s), the LFA, the DOS, or Department of Defense officials. The team consists of 15 DOE and contract personnel, and is capable of performing radiological monitoring and data assessment activities and providing the initial characterization of the radiological situation. The team develops monitoring and assessment plans, conducts initial monitoring of critical areas, and prepares for the arrival of the follow-on FRMAC/RMAC and other DOE response assets. If a RAP team has already been deployed to the incident scene, RAP monitoring assets are integrated into the Phase I FRMAC monitoring plan. Figure 1 depicts the organizational structure of a Phase I FRMAC/RMAC.

2. Phase II. If Phase I operations will exceed 18 hours and/or if the emergency situation requires greater capabilities than that of the Phase I team, Phase II assets are deployed.
additional 45 personnel, a Phase II FRMAC/RMAC response is designed to enhance the data collection and assessment capability of the Phase I team; establish additional voice, data, and fax links with DOE/NV and DOE/HQ; establish Geographic Information System support to the State and LFA; and finalize preparations for a full FRMAC response.

A Phase II FRMAC/RMAC is normally transported to the response area via military aircraft, but can be transported via appropriate civilian charter aircraft. Once on scene, FRMAC/RMAC field monitors are capable of training additional responders in monitoring methodology and techniques for screening people, animals, and property. Integrated with Phase I assets and available on-scene RAP assets, a Phase II FRMAC/RMAC provides a 24-hour sustained CONUS/OCONUS field capability. Figure 2 illustrates how the additional assets of a Phase II FRMAC/RMAC simply build on the organizational structure of Phase I.

3. Phase III. The follow-on Phase III is a full FRMAC that provides long-term monitoring and assessment during the latter part of the emergency phase and into the post-emergency phase of a response. A Phase III FRMAC is an interagency organization with representatives from various federal, state, and local radiological response organizations. It has the assets and capabilities to provide limited additional logistical and communications support for the interagency organizations responding to a radiological incident. Figure 3 illustrates the rounded-out organizational structure begun in Phase I and completed with the deployment of a full FRMAC.

IV. DOE’S OTHER CM ASSETS
The nature and scope of this paper does not provide sufficient space for addressing all of DOE’s CM assets in any detail. This does not reflect their degree of importance to the success of DOE’s CM operations. The AMS, ARAC, and RAP Teams play a major role in the initial estimate and assessment of the radiological situations, DOE’s CM elements are part of an integrated Federal or International effort. DOE assets always support an LFA and interface with other government and international agencies through some form of ICC. In an OCONUS situation, support is provided through DOS, which is the LFA. Figure 4 depicts a representative relational organization for DOE’s interaction with the LFA and other agencies.
hazard. AMS and ARAC are crucial assets used in the planning of monitoring operations. After their vital initial response efforts, RAP Teams extend the monitoring and assessment capabilities of the FRMAC. The REAC/TS physicians assist local medical authorities in understanding and dealing with the unique implications of a radiological emergency. All of these assets are part of an integrated team, trained and ready to support emergency response efforts related to radiological accidents and incidents.

V. ACTIVATION OF DOE’S CM ASSETS
When notified that a CM response is required, the DOE/NV Manager, with DOE/HQ concurrence, determines the immediate level of support required. The CMHT is immediately activated to begin planning and coordination efforts. In situations where a DEST or FEST is being deployed, a CMO will be the first CM asset deployed, followed shortly by the CMPT. The CMO and CMPT will determine the requirement for follow-on CM assets and recommend deployment schedules to the SEO. Should a FRMAC/RMAC response be required, a Phase I FRMAC can be expected to arrive at the emergency site within five to ten hours (depending on the travel time required) of notification to deploy. A Phase II FRMAC will normally be established at the emergency site within eight to twelve hours of notification, while a full FRMAC will normally be established within 24 hours. RAP teams, which may have been the first DOE asset to arrive, are integrated into follow-on assets as appropriate. The approximate response/arrival times of various DOE assets are indicated below. Times are indicative of a CONUS response; OCONUS response times will be obviously longer due to travel requirements.

VI. CONCLUSION
DOE’s implementation of this CM concept provides an integrated phased response capability to assist in the assessment, monitoring, and mitigation of any radiological accident or incident anywhere in the world.

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Figure 4. CM Relationships

Figure 5. DOE CM Asset Response Times