EMERGENCY MANAGEMENT ROUNDUP

EXPECT THE UNEXPECTED

DOE METEOROLOGICAL COORDINATING COUNCIL (DMCC) ASSIST VISIT PROGRAM

14th DMCC Meeting

San Antonio, TX

May 7, 2007

U.S. Department of Energy
METEOROLOGICAL COORDINATING COUNCIL

EMERGENCY MANAGEMENT ISSUES

OVERVIEW

- Assist Visit Objectives
- Value-Added to HA and CA Emergency Response Elements
- Results in Improvements to Existing Meteorological Programs Since 1996
- Evaluation Criteria
  - Meteorological Monitoring (ANS-3.11/DOE EH-0173T Chapter 4)
  - Consequence Assessment (DOE O 151.1C/DOE G 151.1-1/DOE EH-0173T)
- Previous Assist Visits
- Self-Assessment Guide

ASSIST VISIT OBJECTIVES

- Evaluate Meteorological Monitoring and Consequence Assessment Program Adequacy to Meet Present and Future Mission Requirements
- Evaluate Effectiveness of Program Links to EP & R, ES & H, Environmental Compliance, Safety, Licensing, and NEPA Organizations
- Assess Data Representativeness and Whether DQOs are Met Relative to Site Applications
- Identify Program Benefits to DOE/NNSA & Other Program Stakeholders to Demonstrate Value-Added
- Encourage Onsite Meteorological Research to Further Understand Local Atmospheric Processes on Transport and Dispersion
- Identify Needs to Upgrade and Modernize Program to Meet Future Mission Applications and to Keep Pace with State-of-the-Art of Atmospheric Sciences

VALUE-ADDED OF A DMCC ASSIST VISIT

- Quality of Meteorological Data Matters (GIGO)
- Quality and Applicability of Atmospheric Transport and Dispersion Model also Matters (GIGO)
- DMCC Assist Visit Program is Focused on Improving Meteorological Program Products
  - Higher Quality Representative Meteorological Data
  - State-of-the-Art Models Applicable to Site-Specific Transport and Dispersion Characteristics

1996-2006 DMCC ASSIST VISIT PROGRAM IMPROVEMENTS

- **Sample of Program Improvements**
  - Acquisition of Improved Instrumentation
  - Improvement of Lightning Detection/Display System
  - Improvement of Consequence Assessment-Meteorological Monitoring Interfaces
  - Acquisition of State-of-the-Art Atmospheric Transport and Dispersion Model
  - Development of Integrated Meteorological Program to Support Safety Assessment Managers and Emergency Managers
  - Improvement of Data Acquisition and Certification Procedures
  - Improved Program Funding to Meet Present/Future Requirements
  - Improved Management Awareness of Meteorological Program as Part of ISMS

DMCC ASSIST VISIT PERFORMANCE CRITERIA

ANSI/ANS-3.11 (2000) and DOE EH-0173T [Meteorological Monitoring]

DOE Order 151.1, DOE G 151.1-1 and DOE EH-0173T [Consequence Assessment]

ANSI/ANS-3.11 PERFORMANCE CRITERIA

- ANS-3.11 (2000): 24 PERFORMANCE CRITERIA TO ENSURE THAT METEOROLOGICAL PROGRAMS DELIVER ADEQUATE DATA FOR END-USERS
  - Meteorological Monitoring System (5)
  - Siting of Meteorological Observation Instruments (3)
  - Data Acquisition (5)
  - Data Base Management (7)
  - System Performance (4)

METEOROLOGICAL MONITORING SYSTEM

Basic Meteorological Measurements

- Wind Speed –Wind Direction
- Temperature –Precipitation

Supplemental Meteorological Measurements

- Atmospheric Moisture –Solar and Net Radiation
- Barometric Pressure –Mixing Height
- Soil Temperature –Soil Moisture - Remote Sensing

Meteorological Observation Towers

- Fixed Meteorological Tower — Lightning Protection
- Extreme Conditions (Natural Phenomena Survivability)

Meteorological Monitoring for Stability Class Determination

SITING OF METEOROLOGICAL OBSERVATION INSTRUMENTS

Overview

- Sensor Heights
- Access
- –Distance from Obstacles
- –Influence of Topography

Topographic Effects

- Appendix B: Complex Terrain (Mountain/Shoreline)

Instrument Orientation

- Aerodynamic Effects of Obstacles
- Diabatic Effects

Optional Site Selection Techniques

DATA ACQUISITION

Recording Mechanisms

- Primary (Electronic) — Back-up (Electronic or Analog)

Sampling Frequencies

- Digital Data Acquisition Systems —Multi-Point Recorders
- Minimum Number of Samples for σ_θ

Data Processing/Statistical Methodology

- Hourly-Average (10-min., 15-min. average)
- Wind Data
  - Speed: Scalar —Direction: Vector
  - Variable Trajectory Model Treatment
  - Doppler Sodar/Radar Wind Profiler Exceptions
- Other Primary Variables (60-min. average)

DATA BASE MANAGEMENT

Site Data Bases

- Data Applications (SAR, ASER, EIS, EPHA, Consequence Assessment)
- Temporal Representativeness —Life Cycle Data Collection

Data Validation

- Use of Parameter and Inter-Parameter Checks
- Periodic Data Review and Flagging
- Data Comparison to Expected Range of Values
- Data Comparison to Nearby Representative Location
- Further Evaluation of Flagged Data:Qualified Personnel

Data Recovery Rates

- Individual Parameters: 90%
- Joint Frequency Distributions: 90%

DATA BASE MANAGEMENT

Data Substitution

- Alternative Spatially Representative Data Source
- Archiving Original Data Prior to Adjustment
- Data Replacement Methodology
  - Redundant Sensor
  - Linear Interpolation for Very Short Periods
  - Substitution with Nearby Representative Data

Data Archiving

- Raw Data: Rolling 5-Year Retention Period
- Validated Data: Retain for Life of Facility

Data Reporting

- Annual Joint Frequency Distributions
- Tailor to Specific Customer Application

SYSTEM PERFORMANCE

System Accuracy

- Total System RMS Methodology
- Table 7-1 Minimum System Accuracy

System Calibrations

- Based on ANSI/ANS-3.2
- Periodicity: Usually 6-Months
- Table 7-2 Recommended Field Calibration Tests

QA Program and Documentation

- Consistent with ANSI/ANS-3.2 (1994), “Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants”
- Frequent Field Surveillances
- Periodic Internal and External Audits and Appraisals

SYSTEM PERFORMANCE

System Protection, Maintenance, & Service

- Protection from Electrical Faults (e.g., Lightning)
- Protection from Severe Environmental Conditions
  - Tornado
  - Dust Storm
  - Icing
  - Poor Air Quality
- Maintained to Ensure Data Recovery Objectives
- Functional Checks after Extreme Event Exposures
- Surveillance and Remote Access Procedures

MONITORING SYSTEM EVALUATION

- **ANS-3.11 (2000) Objective**
  - **Meets Objective**
  - **Partially Meets Objective**
  - **Does Not Meet Objective**
  - **Related Observation(s)**

CONSEQUENCE ASSESSMENT SYSTEM EVALUATION

- **DOE Order 151.1C/DOE Guide 151.1-1**
  - **7 Specific Evaluation Criteria (1.1-1.7)**
- **DOE/EH-0173T Revised Chapter 4 Summary (2005)**
  - **Items g, h, i, j, l, x, z, cc**
  - **8 Specific Evaluation Criteria (2.1-2.8)**
- **Consequence Assessment Emergency Management Guide (12/20/05 Draft)**
  - **87 Criteria Integrated through Other Emergency Preparedness & Response Elements**
  - **Protective Actions, EALs, Offsite Integration**

CONSEQUENCE ASSESSMENT

Evaluation Criterion 1-1

- Consequence Assessment Model Adequacy

Evaluation Criterion 1-2

- Acquisition/Application of Meteorological Data in Consequence Assessments

Evaluation Criterion 1-3

- Environmental Monitoring Program and Consequence Assessment (DOE G 450.1-1)

CONSEQUENCE ASSESSMENT

Evaluation Criterion 1-4

- Availability of “Real-time” Meteorological Parameters for Emergency Response

Evaluation Criterion 1-5

- Facility-specific Considerations/Local Meteorological Factors Affecting Transport and Dispersion in CA Models

Evaluation Criterion 1-6

- Quality Assurance of Consequence Assessment Tools

Evaluation Criterion 1-7

- Provision of Meteorological Information to Offsite Authorities

CONSEQUENCE ASSESSMENT

Evaluation Criterion 2-1

- **Meteorological data representative of site and intended application**

Evaluation Criterion 2-2

- Model appropriate for a intended application and documented in modeling protocol

Evaluation Criterion 2-3

- For chemical accidents: Accurate assessment of time-varying source term

CONSEQUENCE ASSESSMENT

Evaluation Criterion 2-4

- If meteorological measurements at single location cannot adequately represent atmospheric conditions for transport and dispersion computations supplemental measurements should be made

CONSEQUENCE ASSESSMENT

Evaluation Criterion 2-5

- Consequence analyses for postulated accidental releases should be made for each downwind direction using conservative meteorological assumptions for each release scenario
- For a ground-level release, these assumptions should include coupled slow wind speed and stable atmospheric conditions (e.g., F stability at 1.0 m/sec)
- For elevated releases, a full range of wind speed-stability class conditions should be evaluated since a moderate wind speed and neutral atmospheric conditions may be more conservative than a slow wind speed and stable conditions

CONSEQUENCE ASSESSMENT EVALUATION

- **DOE O 151.1/DOE G 151.1-1/DOE EH-0173T Objective**
  - **Meets Objective**
  - **Partially Meets Objective**
  - **Does Not Meet Objective**
  - **Related Observation(s)**

REMAINING ASSIST VISIT ELEMENTS

- Customer Satisfaction Interviews
  - Environmental Compliance (NESHAP, NPDES)
  - Emergency Management (EPHA, CA)
  - Integrated Safety Management (DSA, LCO, BIO)
  - Environmental Safety & Health (OSHA PSM)
  - Environmental Monitoring (ASER)
  - NEPA (EA, EIS, PEIS)
- Program Features Determination
  - Present Compliance Posture
  - Future Program Support

ROLL-UP

- Noteworthy Practices
- Observations
- Recommendations
- No-Fault Posture: Program Improvements at Sites Discretion within Budget Constraints

ASSIST VISITS

- April 1996: Nevada Operations Office, NTS (for ARL/SORD)
- April 1997: Pantex Site (for Battelle-Pantex)
- Sept. 1997: Oak Ridge Reservation (Y-12, ORNL, ETTP) for OROO
- Oct. 1997: WIPP (for Washington TRU Solutions)
- Aug. 1999: WIPP (for Washington TRU Solutions)
- Aug. 2002: WIPP (for Washington TRU Solutions)
- May 2003: SNL – Albuquerque (for University of California)
- May 2004: Oak Ridge, Y-12 (for BWXT Emergency Management)
- Sept. 2004: INL (for ARL/FRD)
- Aug. 2005: WIPP (for Washington TRU Solutions)
- Aug. 2006: LANL (for LANS)