



# **DOE Meteorological Coordinating Council (DMCC)**

## **Self-Assessment Tool Meteorological Aspects of Consequence Assessment**

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## 1. Introduction

The DOE Meteorological Coordinating Council (DMCC) has performed numerous meteorological program and consequence assessment assist visits at DOE/NNSA sites since 1996. Each of these program evaluations led to observations and recommendations that improved the meteorological monitoring program and the meteorological portions of the consequence assessment system when they were implemented.

DMCC recognizes that all DOE/NNSA sites may not be able to take advantage of the DMCC assist visit program. Accordingly, the DMCC developed a tool to enable self-assessment by DOE/NNSA site analysts, or self-assessment augmented by DMCC assistance. This tool can be a valuable resource to the DOE/NNSA meteorological program and emergency management community. The availability of the DMCC Self-Assessment Tool, *Meteorological Aspects of Consequence Assessment*, can improve the quality of self-assessments of the meteorological programs and the interfaces between the meteorological program and the consequence assessment program.

Presented below are the five attributes of an effective meteorological program, as determined by the DMCC leadership:

1. Designed with meteorological monitoring capabilities that fully address applicable mission requirements; and appropriate to the activities, hazards, and topographical characteristics of the site or reservation.
2. Constructed with program elements that reflect sound management practices and scientific principles that meet the numerous regulatory requirements associated with the atmospheric sciences.
3. Accessible to dedicated, experienced, and fully-qualified professionals who perform duties related to protecting personnel, facilities, and equipment from severe or extreme meteorological conditions; respond to onsite accidents involving hazardous materials; and prepare environmental, safety, health, and/or consequence assessments.
4. Equipped with adequately housed facilities including communications systems, computer systems, and scientific instruments that maximize output and effectiveness.
5. Provided with proper, dedicated equipment and instrumentation necessary to resolve the relevant meteorological parameters defining atmospheric transport and dispersion processes and identifying meteorological conditions that could produce a threat or challenge to the safety or health of personnel; damage or destroy property or equipment; or lead to accidents resulting in injury or loss of life.



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In addition to the programmatic attributes that the consequence assessment system reviewer considers, the following questions provide an insight to the quality of the consequence assessment program when conducting a self assessment:

***What is the quality of the atmospheric transport and diffusion models that are provided to meteorological program customers? Are these models, applicable to the flow patterns at the site, available to meet customer needs?***

Individuals who perform a self-assessment of the meteorological aspects of the consequence assessment program should be knowledgeable in both the atmospheric sciences and consequence assessment, and possess a thorough understanding of the processes and applicable procedures for carrying out assigned tasks. The individual conducting the self-assessment should also be experienced in doing these types of readiness assurance activities.

This self-assessment tool is designed to cover an effective and accurate assist visit of all meteorological aspects of the site's consequence assessment system. This tool includes instructions for preparing, conducting, and following up with self-assessment activities.

The components of the self-assessment tool include the following:

- Self-assessment instructions and administrative checklist
- Self-assessment tool package, with Lines of Inquiry (LOI)
- Acronyms

## 2. Self-Assessment Instructions

The requirements for self-assessments of DOE emergency management programs are long-standing. The self-assessment of the meteorological aspects of the consequence assessment program should fit into the already established facility/site protocols for advance planning, conduct, and reporting results.

Additional guidance on self-assessments is provided in Section 4.5, DOE G 151.1-3, *Programmatic Elements*. Facilities/sites desiring to closely match the DMCC Assist Visit process may also draw information related to the planning and conduct of an assessment from Sections 2 through 4, *DMCC Meteorological Monitoring Program Appraisal Tool*.

## 3. Performance Criteria and Lines of Inquiry (LOIs)

Meteorological-related consequence-assessment-system performance criteria are based on DOE G 151.1-3, Appendix D.

LOIs provide nine performance criteria that enable the reviewer(s) to ask appropriate initial and follow-up questions to obtain the maximum amount of information from the site program managers. These LOIs uncover programmatic weaknesses with a minimum number of focused questions. Writing space is provided for reviewer notes on each inquiry to assist in the information gathering process.



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Self-assessment LOIs provide for interviews with the consequence assessment customers in emergency preparedness and response and management.



### Performance Criterion #1

***Basis: DOE G 151.1-3, Appendix D, Criterion P11.22***

A formal Quality Assurance Program should be implemented and maintained for control of the tools used in consequence assessment, such as the meteorological monitoring system hardware and software, and dose modeling hardware and software.

#### Lines of Inquiry

**Question 1-1:** Are quality assurance and quality control procedures in place for consequence assessments that cover the meteorological monitoring system hardware and software, and dose modeling hardware and software?

**Response:**

**Question 1-2:** Are all areas of the meteorological aspects of the consequence assessment program covered by the QA program?

**Response:**

**Question 1-3:** Are technical requirements in place that provide for Software Quality Assurance (SQA), which includes documentation of the software code, maintenance of the hardware, verification and validation of the consequence assessment system, and configuration control of the system after inauguration?

**Response:**

**Question 1-4:** Are methods and models used in consequence assessment documented in such a manner that the analyses and results can be critically reviewed, understood, and, if necessary, reconstructed by independent experts?

**Response:**

**Question 1-5:** Are the meteorological data validated by reviewing for possible erroneous values by qualified personnel?

**Response:**

**Question 1-6:** Is a calibration program in place for the meteorological system?

**Response:**

**Question 1-7:** Are meteorological data recovery rates determined on a regular basis?

**Response:**



**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



## Performance Criterion #2

***Basis: DOE G 151.1-3, Appendix D, Evaluation Criterion P/E 11.6***

All DOE/NNSA facilities/sites that have access to National Atmospheric Release Advisory Center (NARAC) or have procedures in place to activate or request NARAC capabilities must ensure that facility/site meteorological data and information on source terms for actual or potential releases of hazardous materials to the atmosphere are available or can be made available to NARAC in a timely manner to facilitate near real-time computations.

### Lines of Inquiry

**Question 2-1:** Can the facility/site meteorological data and information on source terms for actual or potential releases of hazardous materials to the atmosphere be made available to NARAC in a timely manner?

**Response:**

**Question 2-2:**

**Response:**

**Question 2-3:**

**Response:**

**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



### Performance Criterion #3

**Basis: DOE G 151.1-3, Appendix D, Evaluation Criterion 11.12**

Adequate meteorological information is obtained for use in transport and dispersion calculations to project the consequences of the hazardous material release to the environment, onsite and offsite.

#### Lines of Inquiry

**Question 3-1:** Is the meteorological monitoring system equipped with an adequate number of towers, locations, and instrumentation on each tower, commensurate with the hazards at the facility/site?

**Response:**

**Question 3-2:** Are the monitoring levels that provide wind speed, wind direction, air temperature, temperature difference between two vertical levels on a tower, precipitation, and any combination of additional measurements necessary to determine stability class adequate for the facility/site?

**Response:**

**Question 3-3:** Are local meteorological factors considered in the calculation models used for consequence assessment (e.g., lake breeze, urban heat island, mountain/valley winds, and other terrain effects)?

**Response:**

**Question 3-4:** Are meteorological measurements representative of conditions at possible release locations on the site?

**Response:**

**Question 3-5:**

**Response:**

**Question 3-6:**

**Response:**

**Summary:**



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**This Performance Criterion is:**

Met

Partially Met

Not Met



### Performance Criterion #4

***Basis: DOE G 151.1-3, Appendix D, Evaluation Criterion P/E 11.1***

A Timely Initial Assessment (TIA) of the actual or potential consequences of an emergency needs to be performed effectively and efficiently, shortly after initial classification, using any available real-time event and meteorological data to provide an event-specific estimate of consequences.

#### Lines of Inquiry

**Question 4-1:** Does the meteorological monitoring system supply real-time data to emergency response personnel and others as needed for consequence assessment?

**Response:**

**Question 4-2:**

**Response:**

**Question 4-3:**

**Response:**



**Question 4-4:**

**Response:**

**Question 4-5:**

**Response:**

**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



### Performance Criterion #5

***Basis: DOE G 151.1-3, Appendix D, Evaluation Criterion P/E 11.2b.***

Assessments should be updated when there are actual and projected changes in facility status, release conditions, or meteorology, or when there are data from field monitoring teams.

#### Lines of Inquiry

**Question 5-1:** Are assessments updated when there are actual or projected changes in facility status, release conditions, or meteorology?

**Response:**

**Question 5-2:** Is regional forecast information used in parallel with real-time meteorology?

**Response:**

**Question 5-3:**

**Response:**



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**Question 5-4:**

**Response:**

**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



### Performance Criterion #6

***Basis: DOE G 151.1-3, Appendix D, Evaluation Criterion P/E 11.2c***

Different models, assumptions, and input data should be used, as available, to add to the understanding of the event and its consequences.

#### Lines of Inquiry

**Question 6-1:** Are appropriate meteorological data provided for the different models?

**Response:**

**Question 6-2:**

**Response:**

**Question 6-3:**

**Response:**

**Question 6-4:**

**Response:**

**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



### Performance Criterion #7

**Basis: DOE G 151.1-3, Appendix D, Evaluation Criterion P/E 11.7**

Natural phenomena (e.g., tornados, floods, severe wind, ice, or snow), which may result in or exacerbate an emergency condition at the facility, operation, and/or activity should be monitored.

#### Lines of Inquiry

**Question 7-1:** Are natural phenomena such as tornados, thunderstorms, floods, snow, icing, or high winds routinely monitored?

**Response:**

**Question 7-2:** If natural phenomena are monitored, how is it accomplished (e.g., weather web sites, Weather Channel, National Weather Service [NWS] contact)?

**Response:**

**Question 7-3:**

**Response:**



**Question 7-4:**

**Response:**

**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



### Performance Criterion #8

***Basis: DOE G 151.1-3, Appendix D, Evaluation Criteria P/E 11.10***

The tools used in consequence assessment, such as system hardware and software for meteorological monitoring and dose modeling, etc. should be available, reliable, calibrated and consistent with DOE and industry standards.

#### Lines of Inquiry

**Question 8-1:** Can the analyst quickly and reliably access the consequence assessment software and input meteorological data?

**Response:**

**Question 8-2:** Do the codes meet DOE or industry standards?

**Response:**

**Question 8-3:**

**Response:**



**Question 8-4:**

**Response:**

**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



### Performance Criterion #9

**Basis: DOE G 151.1-3, Appendix D, Evaluation Criterion P/E 11.12**

Adequate meteorological information needs to be obtained for use in transport and diffusion calculations to project the consequences of the hazardous material release to the environment, onsite and offsite?

#### Lines of Inquiry

**Question 9-1:** Are real-time meteorological data automatically used for consequence assessment?

**Response:**

**Question 9-2:** How are meteorological data supplied to the consequence assessment analysts?

**Response:**

**Question 9-3:** Are wind speed, wind direction, and an indicator of atmospheric stability available for use in transport and diffusion models?

**Response:**



**Question 9-4:**

**Response:**

**Summary:**

**This Performance Criterion is:**

Met

Partially Met

Not Met



## Emergency Management & Response (EM & R) Organization Lines of Inquiry

**Question 1:** Are meteorological data provided in support of drills and exercises?  
Are the needed parameters available and easily obtained?

**Response:**

**Question 2:** How are forecasts obtained to support drills and exercises?

**Response:**

**Question 3:**

**Response:**

**Question 4:**

**Response:**

**Question 5:**

**Response:**

**Question 6:**

**Response:**

**Summary:**



## 4. Acronyms

AV	Assist Visit
COA	Continuous Ongoing Assessment
DMCC	DOE Meteorological Coordinating Council
DOE	Department of Energy
EM & R	Emergency Management and Response
EMI SIG	Emergency Management Issues Special Interest Group
EOC	Emergency Operations Center
G	Guide
LOI	Lines of Inquiry
m	meter
NARAC	National Atmospheric Release Advisory Center
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
O	Order
QA	Quality Assurance
SQA	Software Quality Assurance
TIA	Timely Initial Assessment