Use of NARAC in Hazards Analysis

M.L. Baker
Washington Group International
WSMS Mid-America

Use of NARAC in Hazards Assessments Overview

- Challenges & Solutions
- Lessons Learned
- Positive Attributes
- Room for Improvement

Challenges & Solutions
Time

- Challenge:
  - Previous codes provided instantaneous results
  - NARAC: ~5-10 min for chemicals
    ~15-30 min for radionuclides
- Solution:
  - Incorporate runs into other tasks
  - Plan for the time

Challenges & Solutions
Format of Results

- Challenge:
  - Previous codes provided receptor-specific results
  - NARAC gives results at fixed distances
- Solution:
  - Created spreadsheet to manipulate results
    - Calculates results @ specified receptors based on linear interpolation
    - Calculates distance to PAC and determines classification
    - Converts between chemical concentration units

Challenges & Solutions
Output Parameters

- Challenge:
  - Standard NARAC outputs did not provide needed information
    - Results not available for 30 & 100 m receptors
    - Concentration results given as 10 min Time-Weighted Average
- Solution:
  - NARAC created specialized scenario to determine 15 min Time-Weighted Average
  - New grid was developed to calculate closer receptors

Challenges & Solutions
Wind Direction

- Challenge:
  - Previous codes did not factor wind direction
    - No topographical effects considered
  - NARAC includes topography
    - Results may be affected
- Solution:
  - Wind direction tests
    - Analyze several common STs
    - Various wind directions based on topography
  - Use worst-case wind direction for all receptors

Use of NARAC in Hazards Assessments
Lessons Learned

- Limitations of NARAC machines
  - Schedule to avoid a large number of runs simultaneously
  - Communicate frequently with NARAC staff
- Memory Leak
  - Save often
  - Shut down NARAC and/or restart machine periodically
- Double-check input
  - Errors can cost significant amount of time
  - Using “Export to Scenario” can compound problem
  - Changing location does not change wind location

Use of NARAC in Hazards Assessments
Positive Attributes

- NARAC staff
  - Always helpful (and patient)
  - Encourage coordination
- More realistic results
  - Reduces amount of analysis required
    - May be able to show inventory does not exceed PAC @ 30 m
  - Reduces the cost of emergency planning
    - Eliminates planning for unreasonable events

Use of NARAC in Hazards Assessments
Room for Improvement

- HA-specific machine
  - Eliminate HA analysts using machines needed for drills and emergencies
  - Can incorporate specific needs for HA analysis
- More detailed information about the codes
  - Currently difficult to verify if more specialized scenarios are appropriate for analyzed events
  - Eliminate confusion about use of input parameters
- SQA documentation
  - Provide information to meet requirements

Use of NARAC in Hazards Assessments Conclusions

- Initial period of adjustment and learning
- Using NARAC for HAs has proven beneficial and is well received
- Currently the software is under-utilized and additional information is needed
- Room for improvement on both sides