WSR-88D Site-Specific Scanning Strategies

Presented by

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Technical Advisory Committee

Outline

- Overview
  - History
  - Potential Benefits
  - Potential Concerns
- Short-Term Plans
- Longer-Term Plans
- Options - Recommendation

History

- Original NEXRAD Environmental Assessment approval was based on lowest elevation angle of 0.5 degree
  - Antenna can physically go from -2° to +60° in elevation
- Earlier radars operated manually below 0.5°

History

(continued)

- In 1995, lower elevation angles were requested to support the Lake Effect Snow Project
  - NWS Director rejected by saying it was too early in the NEXRAD program to lower elevation angles; could jeopardize remaining installations
  - Later, NEXRAD PMC decision was also “No”
- 2001 DOC Inspector General report for Missoula WFO recommended the NWS:
  - Conduct engineering and environmental studies of lower scanning strategies
  - Make appropriate adjustments

History

(continued)

- A National Research Council committee assessed NEXRAD flash flood forecasting capabilities at Sulphur Mountain in 2005 and reported:
  - "It is obvious that use of a lower antenna elevation angle from an elevated radar site would provide greater low-level coverage in directions not obscured by intervening terrain."

Potential Benefits

- Improved detection of low-level weather by radars at elevated locations
- Literature, based upon simulations, indicate great promise
  - For example, a study that considered the Missoula, Montana WSR-88D (Brown et al. 2001) states that "Using the lowest elevation angle (+0.5°) of the current WSR-88D scanning strategies, simulated rainfall rates detected in the valleys progressively decrease from about 80% of the surface value near the radar to only 1% of the surface value at 220 km. However, using an elevation angle of -0.8°, simulated rainfall rates detected at all ranges out to 220 km are about 80%-95% of the surface value."

Potential Benefits

(continued)

- Improved detection of shallow precipitation events
- Improved detection of severe weather events

Potential Concerns

- Impact of lower elevation angles on:
  - NEXRAD Agency User Systems (AWIPS, OPUP, WARP, ITWS, etc.)
  - NWS Central Server
  - External Government and private sector users
  - Added coverage implies slower VCPs

Potential Concerns

(continued)

- Public concern / perception of increased RF energy exposure
- Cost (software, systems, communications, environmental impact studies)

Short-Term Plans

- Analysis and test preparations in 2006
- Status:
  - A working group has been actively planning a field test for six WSR-88D sites
  - A mature Field Test Plan has been drafted
  - Project was added to NWS Operations and Services Improvement Process (OSIP)
  - Brief NPMC next week

Short-Term Plans

(continued)

- Forge ahead in 2006
  - If NWS funding is found, conduct Environmental Assessments; requires about 260 days (est. $ 250K)
  - Modify WSR-88D software
  - Submit FY09 PPBES initiative for network-wide deployment

Short-Term Plans

(continued)

- If approved, start test in 2007 (Build 9)
  - Number of sites depend on funding, many sites volunteering
    - Mountain top sites first priority
    - One- to 2-year test to obtain sufficient metrics for cost/benefit analysis

Short-Term Plans

(continued)

- Make lower elevation data available to local site, create two Level II data streams
  - AWIPS software change or OPUP install
  - Legacy data stream not changed for associated and external users
  - New data stream for real-time analysis and archive

Longer-Term Plans

- Complete analysis of results; issue report
  - Work through OSIP with test results, cost/benefit
- Use test results to fine-tune final configuration
- Work toward wider implementation

Options to PMC

1. Stop all further work; no longer consider (no agency requirement)
   - Pro: future spending and ROC resources can be applied to other projects
   - Con: the potential benefits of site-specific scanning strategies and metrics will never be realized

Options to PMC

(continued)

2. Continue planning field test pending funding availability
   - Pro: minimal resources will be applied to the project ensuring readiness if and when funds become available
   - Con: resources to maintain an uncertain project may be a waste of resources

Options to PMC

(continued)

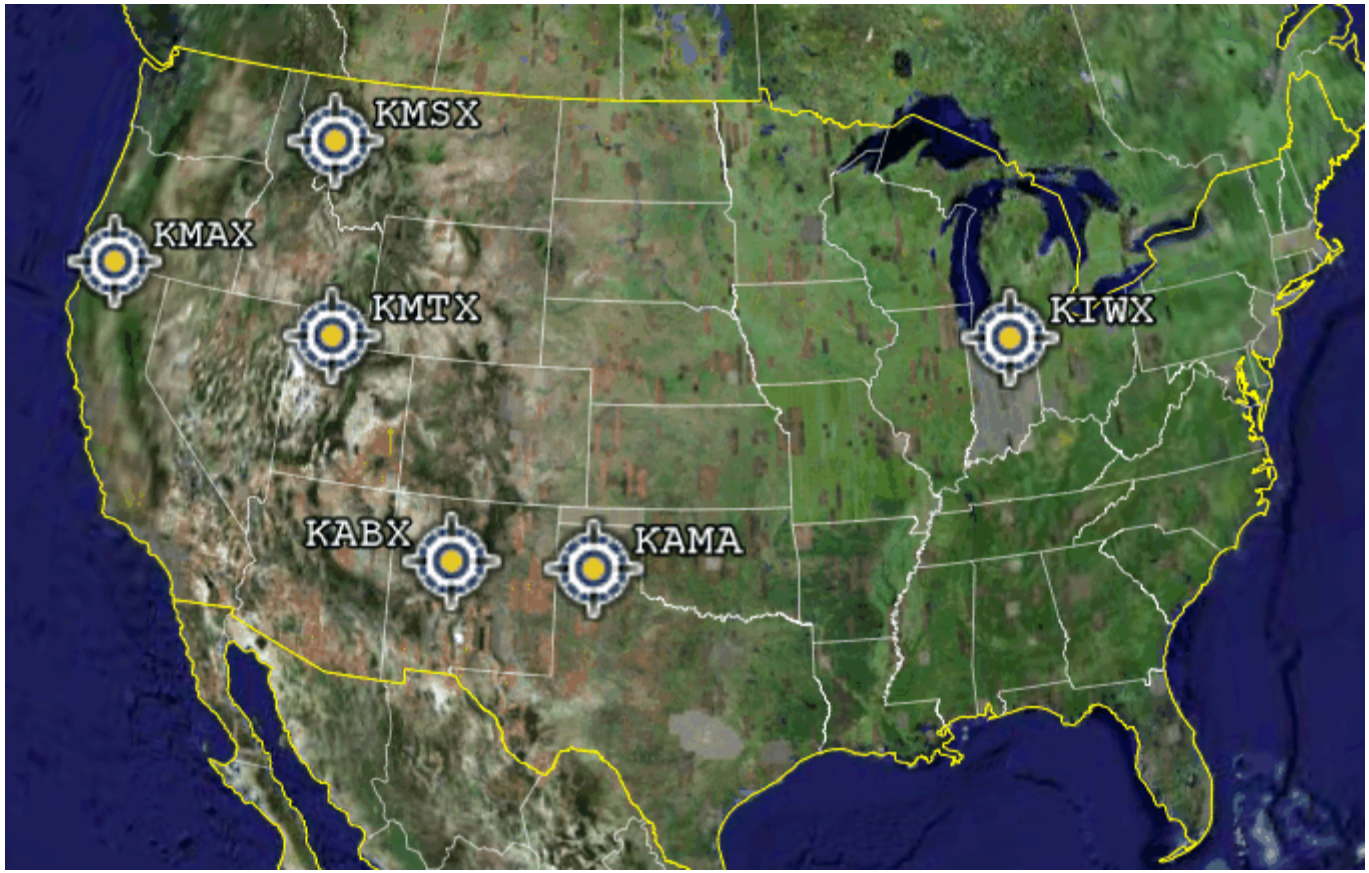
3. Validate as an agency requirement and actively pursue a funding initiative to support field test and implementation
   - Pro: a field test will be completed resulting in improved radar detection capabilities
   - Con: delays beginning of field test to at least FY09 and implementation to FY11

Recommendation to PMC

- Plan to recommend Option 2: Approve the Site-Specific Scanning Strategies Field Test pending funds

BACKUP SLIDES

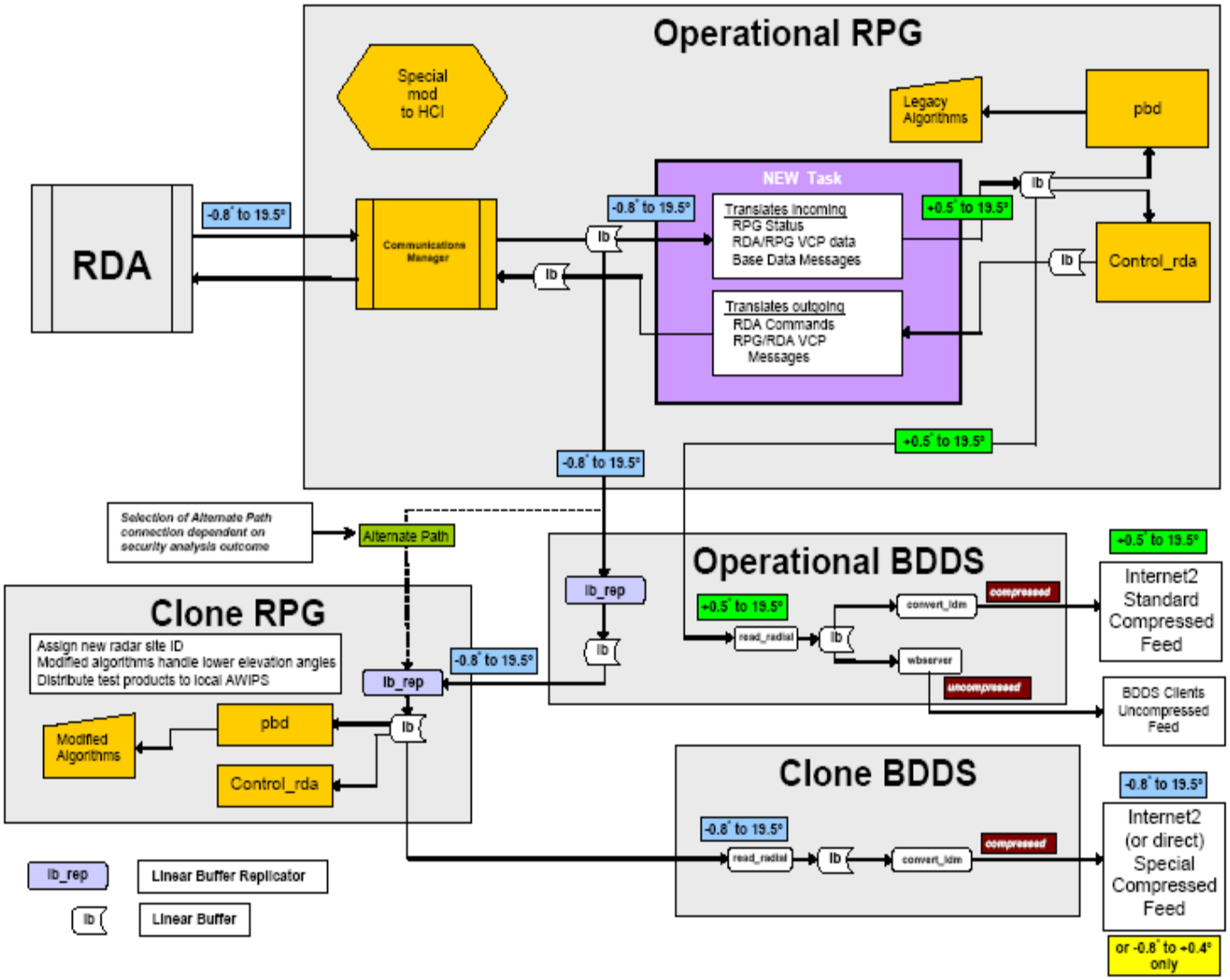
Six Field Test Sites



Site-specific Scans

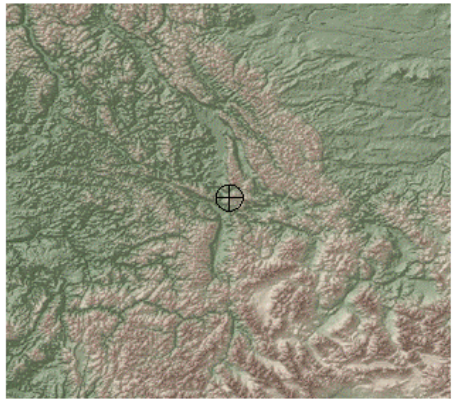
- Missoula, MT (KMSX), add elevation angles of -0.8°, -0.4°, and 0.0°
- Salt Lake City, UT (KMTX), add elevation angles of -0.4° and 0.0°
- Amarillo, TX (KAMA), add elevation angle of +0.2°
- North Webster, IN (KIWX), add elevation angles of +0.2°
- Medford, OR (KMAX), add elevation angles of -0.8°, -0.4°, and 0.0°
- Albuquerque, NM (KABX), add elevation angle of +0.2°

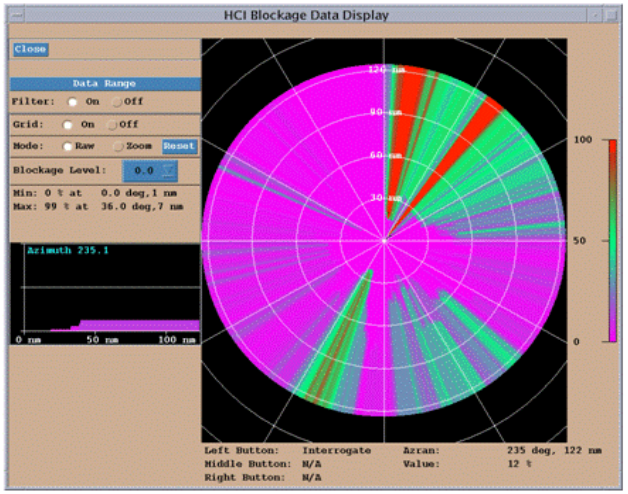
Test Configuration

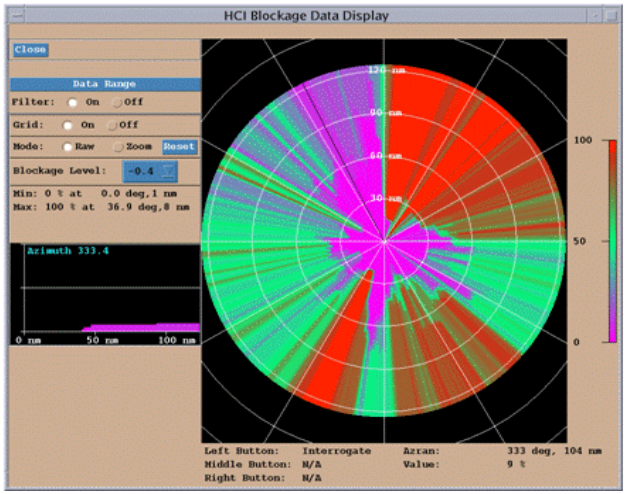


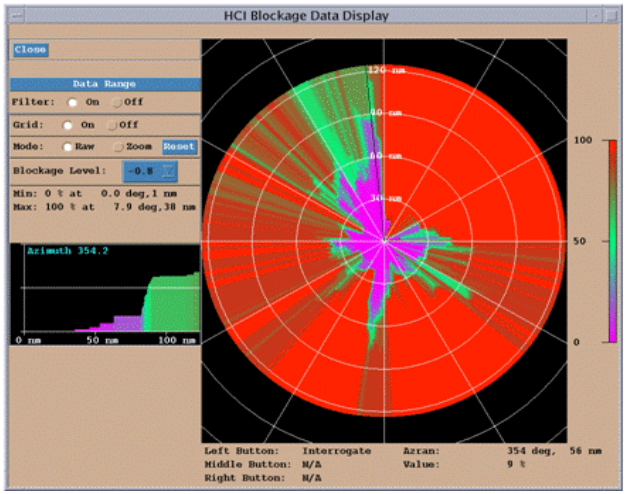
KMSX Blockage Files

KMSX topography and blockage files for 0.0, -0.4, and -0.8 degree elev. angles



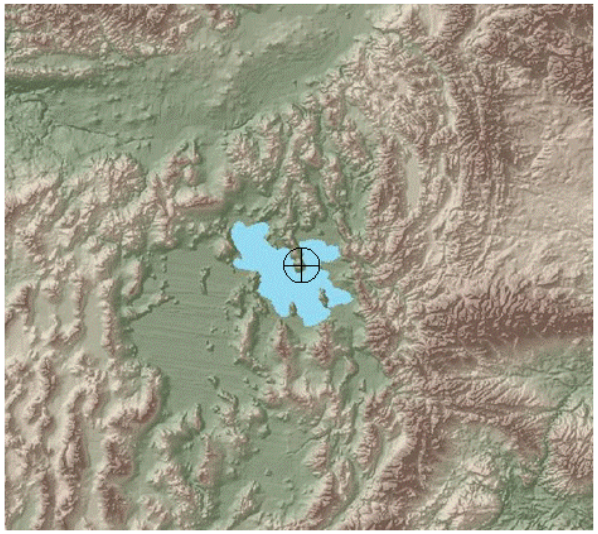


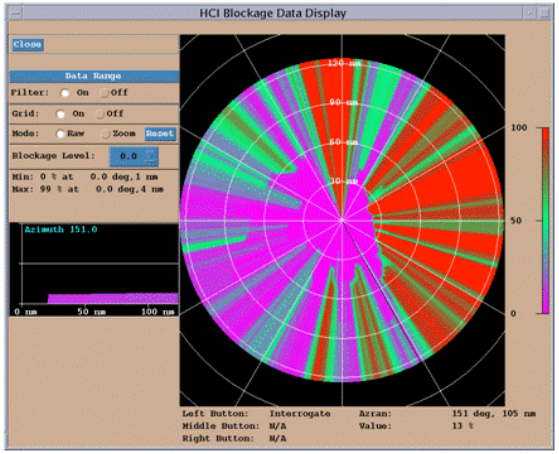


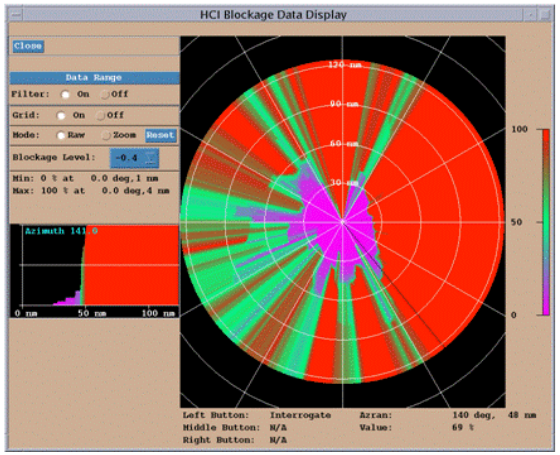


KMTX Blockage Files

KMTX topography and blockage files for
0.0 and -0.4 degree elev. angles

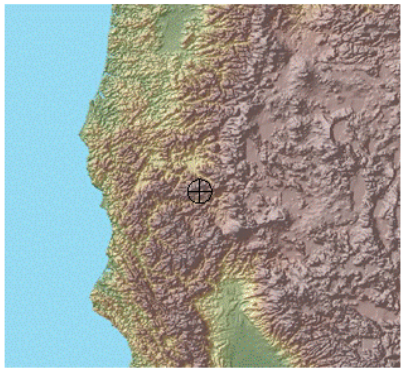


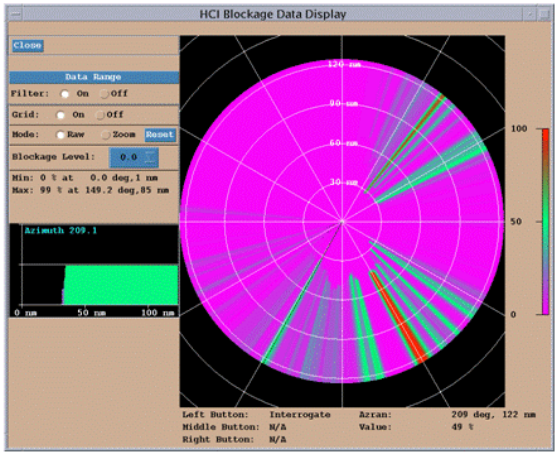


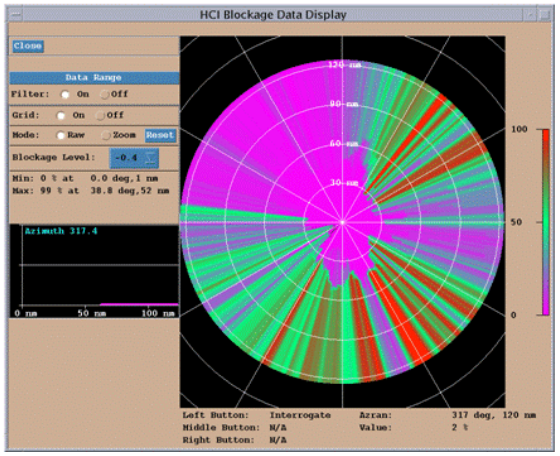


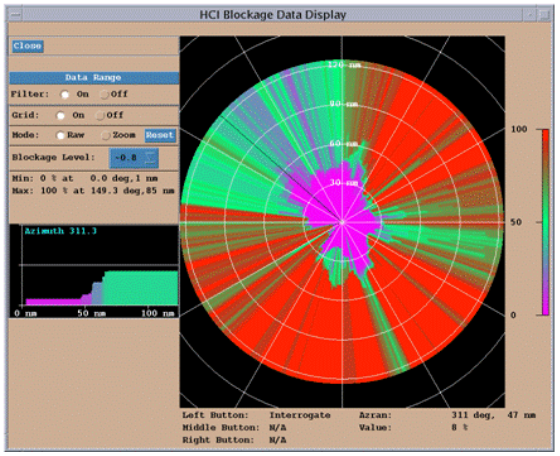
KMAX Blockage Files

KMAX topography and blockage files for
0.0, -0.4, and -0.8 degree elev. angles









Lower Elevation Angles

- Objective: Improve scanning strategies at NEXRAD sites where the lowest elevation angle overshoots weather, particularly at mountaintop sites.

- Deliverables: Site-Specific Volume Coverage Patterns
- Status: ECP 0267P activated, Working Group active, OSIP SON submitted, Funds not identified
- Expected Completion Date: Following Field Test, Sep 2009
- Next Milestone/Deliverable: Supplemental Environmental Assessment [Aug 2006 – Jul 2007]; Field Test analysis and report

"Site-Specific Scan Strategies (4S)" Project

FIELD TEST

February 2006

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Performance Parameters

1. 4S Working Group
2. Equipment & Resources
3. Software & Test Configuration
4. Security
5. Funding & OSIP

Schedule (CY06-09)

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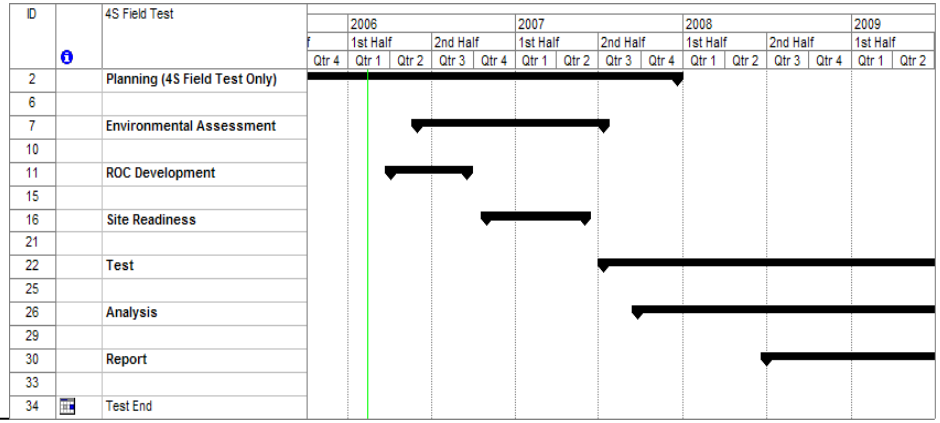

Y

Key Issues / Risks

- **Funding**
- Supplemental Environmental Assessment
  - 260 day process
  - FONSI must result
- Timing - Want to avoid multiple Builds for test
- External System participation (AWIPS)
- OSIP

"4S Field Test" Funding
(Fund Source Unknown)

R

FY06 - $ 280 K (95% NEPA)

FY07 - $ 30 K

FY08 - $ 10 K

R. Steadham / Feb 06

Project task is executable