

MEMORANDUM FOR:	Matthew M. Kuzemchak, NWS NEPA Coordinator
FROM:	Jessica Schultz, Radar Focal Point, National Weather Service
SUBJECT:	Finding of No Significant Impact for Lowering the Minimum Scan Angle of the KGSP, KCAE, KRAX Weather Surveillance Radars - Model 1988 Doppler (WSR-88Ds) serving the Greer, SC; Columbia, SC; and Raleigh, NC, areas – DECISION MEMORANDUM

Based on the subject environmental assessment, I have determined that no significant environmental impacts will result from the proposed action. I request your concurrence in this determination by signing below. Please return the memorandum for our files.

1. I concur \_\_\_\_\_ //signed 4/18/19// \_\_\_\_\_ Date
2. I do not concur \_\_\_\_\_ Date

Attachment

## MEMORANDUM

**TO:** All Interested Government Agencies and Public Groups

Under the National Environmental Policy Act, an environmental review has been performed on the following action.

**TITLE:** Lowering the Minimum Scan Angle of the KGSP, KCAE, and KRAX Weather Surveillance Radars - Model 1988 Doppler (WSR-88D) serving the Greer, SC; Columbia, SC; and Raleigh, NC, areas

**LOCATION:** Greenville-Spartanburg International Airport, Greer, SC; Columbia Metropolitan Airport, West Columbia SC; and North Carolina State University (NCSU) agricultural research facility, Clayton, NC

**SUMMARY:** The National Weather Service (NWS) operates three existing WSR-88Ds serving the Greer, SC; Columbia, SC; and Raleigh, NC, areas. The radar identifiers are KGSP, KCAE, KRAX, respectively. The KGSP WSR-88D is located at Greenville-Spartanburg International Airport in Greer, Spartanburg County, SC. The KCAE WSR-88D is located at Columbia Metropolitan Airport in West Columbia, Lexington County, SC. The KRAX WSR-88D is located at the NCSU agricultural research facility in Clayton, Johnston County, NC. The KGSP, KCAE, and KRAX WSR-88Ds were commissioned between June 1995 and March 1996 and are three of 159 WSR-88Ds in the nationwide network.

The KGSP, KCAE, and KRAX WSR-88D antennas each transmit a narrow focused main beam with a width of 1 degree. In normal operation, the WSR-88D antenna rotates horizontally to cover all directions (i.e. azimuths). The radar antenna also varies the scan angle at which it points with respect to the horizon. The scan angle is measured along the axis of the main beam and can be changed in 0.1 deg increments. Currently, the KGSP, KCAE, and KRAX WSR-88Ds operate at a minimum of scan angle of +0.5 degrees (deg) above the horizon. NWS proposes to reduce the minimum scan angle of the KGSP and KRAX WSR-88Ds from the current minimum of +0.5 deg to +0.2 deg and the minimum scan angle of the KCAE WSR-88D from the current minimum of +0.5 deg to +0.4 deg. (the proposed action). Lowering the minimum scan angles would provide enhanced coverage of the lower portions of the atmosphere. No construction activities or physical modification of the KGSP, KCAE, or KRAX WSR-88Ds would be required to implement the proposed action; the only change would be to the radar's operating software.

**RESPONSIBLE OFFICIAL:** Jessica Schultz, Radar Focal Point, National Weather Service, 1200 Westheimer Drive, Norman, OK 73069, Tel. (405)573-8808, email: [jessica.a.schultz@noaa.gov](mailto:jessica.a.schultz@noaa.gov)

The environmental review process led us to conclude that this action will not have a significant effect on the human environment. A copy of the finding of no significant impact, and the supporting final environmental assessment is enclosed for your information. Please submit any comments to the responsible official named above by **May 25, 2019**. Also, please send one copy of your comments to me in 1325 East-West Highway, Room 3353, Silver Spring, MD 20910.

Sincerely

Matthew M. Kuzemchak  
NWS NEPA Coordinator

Enclosure

## **FINDING OF NO SIGNIFICANT IMPACT (FONSI)**

### **LOWERING THE MINIMUM SCAN ANGLE OF THE WEATHER SURVEILLANCE RADARS-MODEL 1988, DOPPLER (WSR-88Ds) SERVING THE GREER, SC; COLUMBIA, SC; AND RALEIGH, NC; AREAS**

#### **ENVIRONMENTAL ASSESSMENT (EA) SUMMARY**

##### **Purpose and Need**

NWS is part of the National Oceanic and Atmospheric Administration (NOAA) of the U.S. Department of Commerce. NWS operates a nationwide network of 159 Doppler weather radars, which collect data on atmospheric conditions, and include precipitation type and intensity, wind speed and direction, and storms, from near ground level to above 10,000 feet in elevation above the ground. NWS staff uses these data to prepare daily forecasts and issue severe weather watches and warnings, and to further NWS's mission to protect and enhance life and property and the nation's economy. The WSR-88D serving the Greer area is designated KGSP and the radar is located at Greenville-Spartanburg International Airport in Greer, Spartanburg County, SC. The WSR-88D serving the Columbia area is designated KCAE and the radar is located at Columbia Metropolitan Airport in West Columbia, Lexington County, SC. The WSR-88D serving the Raleigh area is designated KRAX and the radar is located at the North Carolina State University (NCSU) agricultural research facility in Clayton, Johnston County, NC. Operating these radars at lower scan angles would increase the area of radar coverage, providing additional data on atmospheric conditions to NWS forecasters and other data users. Compared to current situation, operating the KGSP, KCAE and KGSP WSR-88Ds at the proposed minimum scan angles would increase radar coverage area at 2,000 ft above site level (ASL) by 69.7 %, 9.9%, and 74.5 %, respectively. The height of radar coverage over downtown Charlotte, NC, would decrease from 3,300 ft above ground level (AGL) to 1,200 ft AGL and over the Triad from 3,600 ft to 2,800 ft AGL. These radar coverage improvements would be very beneficial to NWS forecasters and others parties (e.g. public safety agencies and emergency responders) using the radar information.

##### **Description of Proposed Action**

The KGSP, KCAE, and KRAX WSR-88Ds are S-band Doppler, dual polarized weather radars, which NWS uses to collect meteorological data to support weather forecasts and severe weather warnings for central and western portions of North and South Carolina. The KGSP, KCAE, and KRAX WSR-88D antennas transmit a narrow focused main beam with a width of 1 degree. In normal operation, the WSR-88D antenna rotates horizontally to cover all directions (i.e. azimuths). The radar antenna also varies the scan angle at which it points with respect to the horizon. The scan angle is measured along the axis of the main beam and can be changed in 0.1 deg increments. Currently, the KGSP, KCAE, and KRAX radar operates at a minimum scan angle (at the center of the beam) of +0.5 degrees (deg) above the horizon. NWS proposes to

reduce the minimum scan angles of the KGSP and KRAX WSR-88Ds from the current minimum of +0.5 deg to +0.2 deg and the minimum scan angle of the KCAE WSR-88D from +0.5 deg to +0.4 deg (the proposed action). Lowering the minimum scan angles would provide enhanced coverage of the lower portions of the atmosphere which would be very beneficial to NWS forecasters and others parties (e.g. public safety agencies and emergency responders) using the radar information. No construction activities or physical modification of the KGSP, KCAE, KRAX WSR-88D would be required to implement the proposed action; the only change would be to the radar's operating software.

### **Alternatives Considered**

NWS evaluated the benefits and potential impacts of lowering the minimum scan angle of the KGSP, KCAE, and KRAX WSR-88Ds to each angle between +0.4 and -0.2 deg in 0.1 degree increments. That analysis found that the proposed action would result in the greatest improvement in radar coverage while not causing significant environmental impacts. Based on this information, NWS selected a minimum scan angle of +0.2 deg for the KGSP and KRAX WSR-88Ds and +0.4 deg for the KCAE WSR-88D as the proposed action.

Operating the KGSP or KRAX WSR-88Ds at alternative minimum scan angles between +0.4 deg and -0.2 deg (i.e. minimum scan angles other than the proposed +0.2 deg) would result in similar environmental effects as the proposed action. Like the proposed action, those environmental effects would not be significant. Minimum scan angles of +0.4 or +0.3 deg would increase the radar's coverage area, but by less than the proposed action. Lowering the minimum scan angle to less than +0.2 deg would not increase coverage area of either radar compared to the proposed action, and would increase unwanted ground clutter returns to the radar. Because a minimum scan angle of +0.2 deg would achieve all of the feasible increase in radar coverage area while avoiding detrimental increase in ground clutter, NWS proposes +0.2 as the minimum scan angle for both the KGSP and KRAX WSR-88Ds, and rejected the alternatives of operating these WSR-88Ds at other minimum scan angles.

Operating the KCAE WSR-88D at an alternative minimum scan angle lower than +0.4 deg would result in greater environmental effects than the proposed action. Lower minimum scan angles would result in a minimal increase in the radar's coverage area, and would increase unwanted ground clutter returns to the radar. They would also result in the WSR-88D main beam impinging on the Columbia Metropolitan Airport ATCT cab, which would be avoided by the proposed action. Therefore, NWS proposes +0.4 as the minimum scan angle for the KCAE WSR-88D, and rejected the alternative of operating this WSR-88D at a lower minimum scan angle.

### **Environmental Consequences**

NWS prepared an Environmental Assessment (EA) analyzing the potential environmental consequences of the implementing the proposed action in compliance with the President's Council on Environmental Quality (CEQ) National Environmental Policy Act (NEPA)

implementing regulations (40 Code of Federal Regulations Parts 1500 – 1508) and NOAA Administrative Order (NOA) 216-6A: *Compliance with the National Environmental Policy Act , Executive Orders 12114, Environmental Effects Abroad of Major Federal Actions; 11988 and 13690, Floodplain Management; and 11990 Protection of Wetlands.* (April 22, 2016).

Lowering the minimum scan angle of the KGSP, KCAE, KRAX WSR-88D would not require physical changes to the radar, vegetation removal, or ground disturbance. The proposed action would not result in significant effects in the following subject areas:

- Land Use and Coastal Zone Management
- Geology, Soils, and Seismic Hazards
- Drainage and Water Quality
- Transportation
- Air Quality
- Flood Hazards
- Wetlands
- Biological Resources / Protected Species
- Cultural and Historic Resources
- Environmental Justice Socioeconomic Impacts
- Farmlands
- Energy Consumption
- Visual Quality/ Light Emissions
- Solid and Hazardous Waste
- Wild and Scenic Rivers.

The proposed lower minimum scan angles would not result in the KGSP, KCAE, or the KRAX WSR-88D main beam impinging on the ground in the vicinity of the WSR-88D site. The nearest directly illuminated terrain near would range be at least 12,800 ft (2.4 miles) from the three radars. The proposed action would slightly increase RF exposure levels in the vicinity of the three radars. RF exposure levels at all locations and structures in the vicinity would continue to comply with safety standards for human exposure to RF developed by the Institute of Electrical and Electronic Engineers (IEEE) and the adopted by the American National Standards Institute (ANSI). RF levels would also comply with safety standards for exposure of the general public and workers established by the Federal Communications Commission (FCC) and the Occupational Safety and Health Administration (OSHA). Because the KGSP, KCAE, and KRAX WSR-88Ds operate in a frequency band dedicated to government radiolocation services and the main beam would not impinge on the ground surface in the radar vicinity, the proposed action would not cause radio interference with television, radio, cellular telephone, personal communications devices (PCDs), electro-explosive devices, fuel handling, or active implantable medical devices.

NWS may very infrequently operate the WSR-88Ds with a stationary antenna. During stationary antenna operation, RF levels within the WSR-88D main beam would exceed RF safety levels within 1,740 ft of the WSR-88D. KCAE WSR-88D RF emissions could exceed RF safety levels for exposure of the general public nearby water tower (1,700 ft north-northwest). To prevent RF exposure exceeding the safety standards, NWS would implement **Mitigation Measure 1**, which requires that the KCAE WSR-88D antenna be directed away from the water tower 1,700 ft to the north-northwest during stationary antenna operations.

The WSR-88D can cause harmful electromagnetic interference (EMI) with charge-couple devices (CCDs) which electronically record data collected by astronomical telescopes (NEXRAD JSPO 1993). The potential for harmful EMI would arise if the WSR-88D's main beam would directly impinge on an astronomical observatory during low angle scanning. NWS identified all astronomical observatories within 150 miles of each of the three WSR-88Ds, and the only observatory that could be affected by RF emissions from the proposed lower scan angles is Melton Memorial Observatory at the University of South Carolina in Columbia, SC. The main beam of the KCAE WSR-88D does not currently impinge on the Melton Memorial Observatory, but would impinge on the observatory if the minimum scan angle is lowered to +0.4 deg. To mitigate that potential impact, NWS would implement **Mitigation Measure 2** and would consult with Melton Memorial Observatory staff to determine the potential for electromagnetic interference with observatory operations if the WSR-88D minimum scan angle is lowered. If significant interference is expected, operational changes to the WSR-88D (e.g. spot blanking in the direction of the observatory at azimuth 60 deg) would be implemented.

### **Public and Agency Review of the Draft EA**

The NWS distributed the Draft EA to interested members of the public and government agencies for review and comment. To facilitate that review, NWS prepared a Notice of Availability (NOA) for the Draft EA and distributed it to interested parties. In addition, NWS posted the NOA and an electronic copy of the Draft EA to the public accessible web site maintained by the Radar Operations Center. Comments on the Draft EA were accepted by NWS during a 30-day comment period ending on March 15, 2019. NWS received three emails and one letter commenting on the Draft EA during the comment period. The North Carolina State Historic Preservation Office and the U.S. Fish and Wildlife Service (USFWS) South Carolina Ecological Services Field Office stated that they had no objections to the proposed action. The NWS NEPA coordinator recommended several text changes. The Final EA contains the recommended text changes. A private individual inquired about the pros and cons of the proposed actions. The Final EA contains NWS responses to all of these comments.

### **FINDING OF NO SIGNIFICANT IMPACT**

The CEQ Regulations state that the determination of significance using an analysis of effects

requires examination of both context and intensity, and lists ten criteria for intensity (40 CFR 1508.27). In addition, NAO 216-6A, Section 6.01(b) 1 – 11, provides eleven criteria, the same ten as the CEQ Regulations and one additional for determining whether the impacts of a proposed action are significant. Each criterion is discussed below with respect to the proposed action and considered individually as well as in combination with the others.

*1. Can the proposed action reasonably be expected to cause both beneficial and adverse impacts that overall may result in a significant effect, even if the effect will be beneficial?*

No. The EA report analyzes the potential for implementation of the proposed action to cause environmental consequences based on established standards and criteria. The proposed action would not require construction or vegetation removal and would not result in ground disturbance. The only environmental consequence would be a slight increase in RF power density in a small portion of the atmosphere. WSR-88D RF emissions would comply with national and international safety standards for human exposure.

*2. Can the proposed action be expected to significantly affect public health or safety?*

No. The lower minimum scan angle would not result in the main beams of the KGSP, KCAE, or KRAX WSR-88Ds main beam impinging on the ground or structures within 12,800 feet of the WSR-88D site. The proposed action would slightly increase RF exposure levels in the vicinity of the KGSP, KCAE, and KRAX WSR-88Ds. RF emissions from the KGSP and KRAX WSR-88Ds operating at the proposed minimum scan angles would conform to safety standards established by the American National standards Institute / Institute of Electrical and Electronics Engineers, Federal communications Commission (FCC), and Occupational Health and Safety Administration at all ground locations and structures in the vicinity of the WSR-88Ds. Lowering the minimum scan angle of the KCAE WSR-88D could result in RF exposure levels during infrequent stationary antenna operations exceeding safety standards at the existing water tower 1,700 ft NNW of the KCAE WSR-88D. This impact can be mitigated through limitations on KCAE WSR-88D operations described in Mitigation Measure 1 (see section 4.1 of the Final EA). RF emissions from all three WSR-88Ds would comply with RF exposure standards for implantable medical devices established by the FCC and the Association for Advancement of Medical Instrumentation and would not interfere with operation of those devices.

*3. Can the proposed action reasonably be expected to result in significant impacts to unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas?*

No. The proposed action's area of potential effect (APE) is defined as area within 2,060 feet of the three WSR-88Ds where here radiofrequency radiation levels within the WSR-88D main beam could exceed safety standards hazards during infrequent stationary antenna operation. The South Carolina and North Carolina State Historic Preservation Offices websites were searched

for historic places in the vicinity of the KGSP, KCAE, and KRAX WSR-88Ds. No historic places are within the APE and none would be affected by the proposed action. The Draft EA NOA was distributed to the North Carolina and South Carolina State Historic Preservation offices (SHPOS). The North Carolina SHPO submitted a comment letter stating that they had no objection to the proposed action.

*4. Are the proposed action's effects on the quality of the human environment likely to be highly controversial?*

No. The proposed action would not result in construction or ground disturbance and would comply with safety standards for human exposure to RF emission. The WSR-88D can cause harmful electromagnetic interference (EMI) with charge-couple devices (CCDs) which electronically record data collected by astronomical telescopes. The potential for harmful EMI would arise if the WSR-88D's main beam would directly impinge on an astronomical observatory during low angle scanning. NWS identified 18 astronomical observatories within 150 miles of the KGSP, KCAE, or KRAX WSR-88Ds. The WSR-88D main beam would not impinge on 16 of these observatories when operating at the proposed minimum scan angles.

The Charles E. Daniel Observatory in Greenville, SC is currently directly illuminated by the KGSP WSR-88D main beam operating at a minimum scan angle of +0.5 deg. It would continue to be directly illuminated at the proposed lower scan angle of +0.2 deg. Since there would be no change in RF levels from existing levels, no electromagnetic effects to operation of the Charles E. Daniel Observatory are expected.

The KCAE WSR-88D main beam at the proposed minimum scan angle of +0.4 deg would impinge on the Melton Memorial Observatory at the University of South Carolina, located about 6.5 miles east-northeast of the WSR-88D. This creates the potential for electromagnetic interference with observatory operations. To mitigate that potential impact, NWS would implement Mitigation Measure 2, under which NWS would consult with Melton Memorial Observatory staff to determine the potential for electromagnetic interference with observatory operations. If significant interference is expected, operational changes to the WSR-88D (e.g. spot blanking in the direction of the observatory) would be implemented.

*5. Are the proposed action's effects on the human environment likely to be highly uncertain or involve unique or unknown risks?*

No. The proposed action would not increase the radar's power output, but would spread those emissions over a larger portion of the atmosphere. RF power densities at the newly covered area would be the same as at existing covered portions of the atmosphere. The EA contains detailed calculations of RF exposure levels and compares projected exposure levels to safety standards for RF exposure of the general public and workers, potentially RF sensitive activities (e.g. fuel handling, use or transport of electro-explosive devices), and active implantable medical

devices. The proposed action would comply with all safety standards. There is very little potential for unknown or uncertain impacts to result.

*6. Can the proposed action reasonably be expected to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?*

No. The proposed action is limited to lowering the minimum scan angle of the existing KGSP, KCAE, and KRAX WSR-88Ds. If the NWS were to consider lowering the minimum scan angle of another WSR-88D in the nationwide network, they will perform a site specific analysis of potential effects for that radar in compliance with NEPA and NAO 216-6A. No precedents would result for future actions with significant effects or a decision in principle about a future consideration.

*7. Is the proposed action related to other actions that when considered together will have individually insignificant but cumulatively significant impacts?*

No. The Final EA report evaluates the potential for the proposed action, in conjunction with past, present, and reasonably foreseeable future actions to cause significant environmental effects. The proposed action is not reliant upon or connected to other actions, nor is it relied upon for the occurrence of other actions. Therefore, the proposed action will not result in a significant cumulative impact to the human environment.

*8. Can the proposed action reasonably be expected to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources?*

No. As discussed in the answers to questions 3 and 4, no historic places occur with the proposed action's APE. The potential for electromagnetic effects to the Melton Memorial Observatory would be mitigated through application of Mitigation Measure 2, which requires NWS to consult with observatory staff to determine the potential for electromagnetic interference with observatory operations. If significant interference is expected, operational changes to the WSR-88D (e.g. spot blanking in the direction of the observatory) would be implemented.

*9. Can the proposed action reasonably be expected to have a significant impact on endangered or threatened species, or their critical habitat as defined under the Endangered Species Act of 1973?*

No. Based on information obtained from the U.S. Fish and Wildlife Service (USFWS), nine species listed under the Endangered Species Act could potentially occur in the vicinity of the three WSR-88Ds. The three radars are not located in designated critical habitat for any of these species. The proposed action does not include construction activities and would not result in ground disturbance or vegetation removal. Lowering the minimum scan angles of the WSR-88Ds would result in a thin sliver of the atmosphere, which is currently below the main beam coverage

area, being exposed to the main beam of the WSR-88D. The portion of this atmosphere directly above the newly exposed sliver of atmosphere is currently within the main beam and RF exposure levels would not change. The nearest ground to be directly illuminated by the lowered WSR-88D main beam would be at least 12,800 ft from the radar. At that distance, the WSR-88D main beam would comply with all safety standards for human RF exposure. Exposure to RF energy from the WSR-88D would not be harmful to wildlife in the vicinity. U.S. Fish and Wildlife Service (USFWS) South Carolina Ecological Services Field Office commented on the Draft EA, stating that they had no objection to the proposed action.

*10. Can the proposed action reasonably be expected to threaten a violation of Federal, state, or local law or requirements imposed for environmental protection?*

No. The effect of the proposed action on the human environment has been analyzed relative to applicable Federal, state and local environmental laws or regulations. No regulatory violations or other significant environmental effects are expected to result.

*11. Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?*

No. The proposed action has no potential to cause the transport, release, propagation or spread of non-indigenous species.

## DETERMINATION

After careful and thorough consideration of the Final EA report, the undersigned finds that lowering the minimum scan angle of the KGSP and KRAX WSR-88Ds serving the Greer, SC and Raleigh, NC, areas from the current +0.5 deg to +0.2 deg will not result in significant environmental effects. Lowering the minimum scan angle of the KCAE WSR-88D serving the Columbia, SC, area from the current +0.5 deg to +0.4 deg will not result in significant environmental effects if NWS implements Mitigation Measures 1 and 2 contained in the Final EA. The proposed action is consistent with existing national environmental policies and objectives set forth in sections 101(a) and 101(b) of NEPA and will not significantly affect the quality of the human environment or otherwise result in any condition requiring consultation pursuant to section 102(2) (c) of NEPA.

As described in section 5.03c of NOA 216-6A, a Finding of No Significant Impact is supported and appropriate for lowering the minimum scan angles of the KGSP, KCAE, and KRAX WSR-88Ds as analyzed in the EA report. Preparation of an environmental impact statement for this action is not necessary.

//signed 4/8/19// \_\_\_\_\_  
Jessica Schultz  
Radar Focal Point  
Radar Operations Center  
National Weather Service

\_\_\_\_\_ Date