

MEMORANDUM FOR:	Matthew M. Kuzemchak, NWS NEPA Coordinator
FROM:	Jessica Schultz, Deputy Director, National Weather Service Radar Operations Center
SUBJECT:	Finding of No Significant Impact for Lowering the Minimum Scan Angle of the KFSX Weather Surveillance Radar - Model 1988 Doppler (WSR-88D) serving the Flagstaff, AZ, area – 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 10/8/19// \_\_\_\_\_ 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 KFSX Weather Surveillance Radar - Model 1988 Doppler (WSR-88D) serving the Flagstaff, AZ, area

**LOCATION:** Coconino National Forest (NF), Coconino County, AZ

**SUMMARY:** The National Weather Service (NWS) owns and operates the existing WSR-88D serving the Flagstaff, AZ, area. The radar identifier is KFSX and the radar is located at Blue Ridge in Coconino NF, Coconino County, AZ. The radar facility is about 48 miles southeast of downtown Flagstaff, AZ. The KFSX WSR-88D was commissioned in May 1996 and is one of 159 WSR-88Ds in the nationwide network.

The KFSX WSR-88D antenna transmits 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 KFSX WSR-88D operates at a minimum of scan angle of +0.5 degrees (deg) above the horizon. NWS proposes to lower the minimum scan angle of the KFSX WSR-88D from the current minimum of +0.5 deg to -0.2 deg (the proposed action). Lowering the minimum scan angle would provide enhanced coverage of the lower portions of the atmosphere. No construction activities or physical modification of the KFSX WSR-88D would be required to implement the proposed action; the only change would be to the radar's operating software.

**RESPONSIBLE OFFICIAL:** Jessica Schultz, Deputy Director, National Weather Service Radar Operations Center, 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 **November 15, 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 RADAR-MODEL 1988, DOPPLER (WSR-88D) SERVING THE FLAGSTAFF, ARIZONA AREA**

#### **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 Flagstaff, AZ, area has radio call letters KFSX and is located on Blue Ridge in Coconino National Forest (NF), about 48 miles southeast of downtown Flagstaff, AZ. The Flagstaff, AZ, Weather Forecast Office (WFO) is the primary recipient of data from the KFSX WSR-88D and serves central and northeastern AZ.

Operating the KFSX WSR-88D at lower scan angles would increase the area of radar coverage, providing additional data on atmospheric conditions to NWS forecasters and other data users. The area covered at 2,000 feet above site level (ASL) would increase by 174.6%. The four corners area (i.e. where AZ, Colorado, New Mexico, and Utah meet) is about 204 miles northeast of the KFSX WSR-88D. The proposed action would also reduce the minimum height of radar coverage (i.e. radar coverage floor) over the four corners area from 23,500 ft to 12,200 ft above ground level (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 KFSX WSR-88D is an S-band Doppler, dual polarized weather radar, which NWS uses to collect meteorological data to support weather forecasts and severe weather warnings for central and northeastern Arizona. The KFSX WSR-88D antenna transmits 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 KFSX 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 angle of the KFSX WSR-88D from the current minimum of +0.5 deg to -0.2 deg, which is 0.7 deg lower than the current minimum scan angle (the proposed action). Lowering the minimum scan angle would provide enhanced coverage of the lower portions of the atmosphere which would be 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 KFSX 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 KFSX WSR-88D to each angle between +0.4 and -0.2 deg in 0.1 degree increments. That analysis found that a minimum scan angle of -0.2 deg would result in improvement of radar coverage while not causing significant environmental impacts. Based on this information, NWS selected a minimum scan angle of -0.2 deg as the proposed action.

Operating the KFSX WSR-88D at minimum scan angles between +0.4 deg and -0.2 deg other than the proposed -0.2 deg would result in similar environmental effects as the proposed action. Like the proposed action, significant environmental effects would not result. A minimum scan angle between +0.4 and -0.1 deg would increase the radar's coverage area, but by less than the proposed action (i.e. minimum scan angle of -0.2) deg. Because a minimum scan angle of -0.2 deg would result in the greatest improvement in radar coverage area while avoiding significant environmental impacts NWS rejected the alternatives of operating the KFSX WSR-88D at minimum scan angles of +0.4 to -0.1 deg.

### **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 KFSX 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.

At a scan angle of -0.2 deg, no terrain or structures within 1.7 miles of the WSR-88D would be affected by the WSR-88D main beam. During operation of the KFSX WSR-88D, radiofrequency radiation levels at all ground locations and structures in the vicinity of the WSR-88D would comply with safety standards for RF exposure of the general public and occupational exposure of workers and risks to human health would not result. Because the KFSX WSR-88D operates 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.

WSR-88D RF emissions have the potential to cause electromagnetic interference (EMI) with sensitive equipment used at astronomical observatories. Six astronomical observatories are located within 150 miles of the KFSX WSR-88D. A minimum scan angle of -0.2 deg would not result in the WSR-88D main beam impinging on any of those observatories.

#### **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 sites maintained by the Radar Operations Center and the Flagstaff, AZ, WFO. Comments on the Draft EA were accepted by NWS during a 30-day comment period ending on August 5, 2019. The NWS received an email from the State Historic Preservation office (SHPO) commenting on the Draft EA. SHPO recommended that NWS consult with Coconino NF staff to determine if historic sites are located within the proposed action's area of potential effect (APE). The District Archaeologist was contacted and confirmed that no historic properties are located within the APE and the proposed action does not have the potential to impact historic properties.

### **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 KFSX WSR-88D main beam impinging on the ground within 1.7 miles of the WSR-88D site. The proposed action would slightly increase RF exposure levels at elevated locations above the ground in the vicinity of the KFSX WSR-88D. During normal operations with a rotating WSR-88D antenna, RF exposure levels at all locations would comply with the safety standards developed by the Institute of Electrical and Electronic Engineers (IEEE) and the adopted by the American National Standards Institute (ANSI) for the general public and workers. Federal Communications Commission (FCC) and Occupational Safety and Health Administration (OSHA) safety levels would also be met at all locations.

During infrequent stationary antenna operation, RF exposure levels within the WSR-88D main beam would exceed ANSI/IEEE and FCC safety levels for exposure of the general public within 1,740 ft of the WSR-88D antenna. The WSR-88D main beam would not impinge on the ground or any structures within that distance.

RF emissions from the WSR-88D would also 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 1,740 feet of the WSR-88D where here radiofrequency radiation levels within the WSR-88D main beam could exceed safety standards hazards during infrequent stationary antenna operation. The AZSITE web site was searched to identify places listed on National Register of Historic Places or the Arizona Register of Historic Places in the vicinity of the KFSX WSR-88D. No listings for historic resources were found within the APE. Additionally, NWS consulted with District

Archaeologist of the Coconino NF Mogollon Rim Ranger District, who confirmed that the proposed action does not have the potential to impact historic properties.

The proposed action would not impact parks, prime farmland, wetlands, or wild and scenic areas. The KFSX site and vicinity have been designated as critical habitat for the Mexican spotted owl (*Strix occidentalis lucida*), which is designated as threatened under the Endangered Species Act. The proposed action would not result in vegetation removal or other physical changes to the critical habitat for the Mexican spotted owl.

*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 six astronomical observatories within 150 miles of the KFSX WSR-88D. The WSR-88D main beam would not impinge on any of those observatories when operating at the proposed minimum scan angle of -0.2 deg. No interference with observatory operations would result.

*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 KFSX WSR-88D serving the Flagstaff, AZ, area, and the EA analysis is specific to that radar. 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 within the proposed action's APE and no electromagnetic effects would result to astronomical observatories.

*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), five species listed under the Endangered Species Act could potentially occur in the vicinity of the KFSX WSR-88D. The KFSX site and vicinity have been designated as critical habitat for the Mexican spotted owl (*Strix occidentalis lucida*), which is designated as threatened under the Endangered Species Act. Four other listed species listed as threatened may occur in the general vicinity the radar: Yellow billed cuckoo (*Coccyzus ameicanus*), Northern Mexican garter snake (*Thamnophis eques megalops*), Chiricahua leopard frog (*Rana chriricahuensis*), and Little Colorado spinedance (*Lepidomeda vittata*). The yellow-billed cuckoo and Northern Mexican garter snake inhabit riparian corridors along major rivers. The Chiricahua leopard frog and Little Colorado spinedance (a fish) depend on aquatic habitat.

The proposed action would not result in vegetation removal or other physical changes to the critical habitat for the Mexican spotted owl. Similarly, no impacts to riparian corridors or aquatic habitat would result. Lowering the minimum scan angle to -0.2 deg from the current +0.5 deg 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 sliver of the atmosphere where new main beam coverage would result in increased RF exposure levels would be very small in close proximity to the WSR-88D: 11 ft thick at a distance of 900 ft from the WSR-88D and increasing in thickness with distance from the radar. Birds or bats flying within the newly covered sliver of the atmosphere would be exposed to RF emissions from the WSR-88D. The RF levels in the sliver of airspace would be no greater than in RF levels in the existing covered airspace, which occurs just above the newly exposed air space. At a distance of 900 ft, RF exposure levels would be 100 times less than safety standards for human exposure.

Elevated RF exposure could result if birds fly in a path that keeps it within the WSR-88D main beam for extended periods of time. However, during normal operation the WSR-88D main beam is continuously moving. At a distance of 1,000 ft the WSR-88D main beam is moving at an effective speed of about 89 miles per hour and it is very unlikely that a bird could fly within the WSR-88D main beam for any length of time. Exposure to RF energy from the WSR-88D would not be harmful to the Mexican spotted owl or other birds.

*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 KFSX WSR-88D serving the Flagstaff, AZ, area from the current +0.5 deg to -0.2 deg 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 angle of the KFSX WSR-88D from the current +0.5 deg to -0.2 deg. as analyzed in the EA report. Preparation of an environmental impact statement for this action is not necessary.

//signed 9/30/19// \_\_\_\_\_  
Jessica Schultz  
Deputy Director  
Radar Operations Center  
National Weather Service

\_\_\_\_\_  
Date