U.S. Department of Energy
Categorical Exclusion Determination Form

Proposed Action Title: Small unmanned aircraft system (sUAS) aerial survey of the Moab and Crescent Junction Uranium Mill Tailings Remedial Action Sites

Program or Field Office: Grand Junction, Colorado

Location(s) (City/County/State): Moab and Crescent Junction, Grand County, Utah

Proposed Action Description:

A small unmanned aircraft system (sUAS) will be used to conduct aerial surveys of the Moab and Crescent Junction sites collecting point cloud and thermal imaging data. The UAS will be launched from locations outside of the controlled contamination areas but within site boundaries. Several ground markers for location control will be placed and removed at the conclusion of the surveys. The sUAS will not interfere with public or project activities, flying at heights not to exceed 400 ft above ground surface (AGS). Utilizing UAS will allow more accurate and efficient data collection than previous higher altitude flyovers with traditional manned aircraft. Planned activities include a one-time survey of the portion of the Moab site along the Colorado River to assess evapotranspiration potential. A second potentially reoccurring assessment is to monitor topographic changes associated with relocation of the tailings pile and monitoring soil moisture conditions that represent ground water discharge points and potential slope instability. This activity will encompass the entire Moab and Crescent Junction sites. Each proposed activity is described in more detail as follows:

Evapotranspiration Study:
The U.S. Geological Survey (USGS), DOE, and University of Arizona proposed use of sUAS to acquire high-resolution spectral data needed to estimate spatial and temporal variability in evapotranspiration in southwestern riparian ecosystems that are dominated by tamarisk (Tamarix spp.) to acquire the high resolution needed to monitor defoliation and other subtle changes in tamarisk populations. Evapotranspiration includes both evaporation and plant transpiration from the surface to the atmosphere. It is used to account for the movement of water to the air from a variety of sources.

UAS have emerged as a new tool with capabilities to carry remote sensing instruments with high resolution to perform research and monitoring of various natural resources. The USGS Flagstaff Science Campus (FSC) Remote Sensing Science Consortium (FRSSC) will provide the platform to apply this new technology with the collaboration of scientists located at the FSC. FRSSC scientists and other professionals at the FSC apply remote sensing techniques and methods in support of science priorities and societal needs identified by the USGS ecosystems, climate and Land use change, water, natural hazards, and core science systems mission areas. The vision of FRSSC is to provide the leadership in FSC remote sensing research and encourage interdisciplinary collaboration among FSC scientists. The FRSSC aims to be the principal hub of USGS remote sensing expertise in the western United States and complement and enhance the synergy with the Earth Resources Observation and Science (EROS) Center and several NASA (National Aeronautics and Space Administration) Research and Space Flight Centers. The consortium of scientists at FRSSC have collectively identified UAS as a high research need, and the FSC is well-positioned to employ UAS for research applications because of its research focus, personnel, equipment, and ties to Northern Arizona University and other partners.

The USGS, DOE, and UA propose use of sUAS to acquire high-resolution spectral data needed to estimate spatial and temporal variability in evapotranspiration in southwestern riparian ecosystems dominated by tamarisk. Tamarisk is a non-native tree that competes with native species for water in riparian corridors of the southwestern United States. USGS and DOE need similar data to address different scientific problems and will share the data that is collected.

The USGS Southwest Biological Science Center (SBSC) and UA have been studying changes in tamarisk growth and evapotranspiration using satellite imagery and phenocams. These organizations are particularly interested in how the northern tamarisk beetle—Diorhabda carinulata, which was released as a biocontrol agent—may be affecting tamarisk health. After several years of defoliation, tamarisk is now coming back along many rivers because of dwindling beetle numbers. Existing methods to document changes in riparian evapotranspiration use ground information and/or evapotranspiration data from eddy covariance towers to scale to the wider area landscape with multiband imagery from Landsat and MODIS scanners. However, these methods lack the resolution needed to detect patchy regrowth of tamarisk in the southwestern United States. The SBSC, DOE, and UA propose using UAS imagery to acquire the high resolution needed to monitor defoliation and other subtle changes in tamarisk populations. The SBSC also needs DOE's groundwater flow and soil-water balance data to evaluate effects of variability in evapotranspiration on southwestern U.S. water resources in response to tamarisk defoliation and regrowth.

The DOE Offices of Legacy Management (LM) and Environmental Management (EM) are responsible for remediation and monitoring of groundwater (GW) contaminated by uranium milling during the Cold War at several sites adjacent to southwestern U.S. rivers and streams. At the conclusion of surface remediation the Moab site will be transferred to LM for long term surveillance. LM, UA, and SBSC have collaborated on landscape-scale estimation of effects of evapotranspiration on GW recharge and discharge and GW phytoremediation at uranium mill sites in the southwestern United States using moderate resolution imaging spectroradiometer sensors (30-meter Landsat and 250-meter MODIS). LM has applied this research to model GW flow and contaminant transport and to develop GW remediation strategies in compliance with the Uranium

Mill Tailings Radiation Control Act of 1978 (UMTRCA) and U.S. Environmental Protection Agency (EPA) GW quality standards. LM and EM also have hundreds of GW wells and decades of GW monitoring data in the southwestern United States. At some sites, GW elevation, flow, and contaminant transport appear to vary seasonally and annually in response to changes in riparian ecosystems dominated by tamarisk. Therefore, effects of tamarisk and beetle interactions on evapotranspiration are particularly relevant at these sites. LM and EM need USGS's high-resolution and timely UAS imagery to test hypotheses related to these GW observations.

The methods used to estimate the effects of changes in tamarisk populations on water use, GW flow, and contaminant transport at Cold War legacy waste sites would be enhanced by the acquisition of multi-band or full color imagery acquired using a UAS. The high-resolution UAS imagery would allow the monitoring of changes in tamarisk phenology, fractional greenness, evapotranspiration, and effects on water resources at these UMTRCA sites. Ground information would be correlated with leaf area index and possibly sap-flow data; the acquisition of this data could be timed with the Landsat overpass to assist with spatiotemporal scaling techniques. The project goal is to scale plant water use acquired from UAS imagery to Landsat and/or MODIS to provide a time-series for documenting long-term trends of evapotranspiration, soil-water balance, GW flow, and contaminant transport.

The project is expected to lead to long-term benefits for DOE, including improved GW modeling and remediation. Benefits expected for USGS and UA researchers would be the development of an evapotranspiration algorithm specific to the requirements for site monitoring and an empirical approach for estimating effects of changes in tamarisk populations on water resources. Such a specifically developed evapotranspiration algorithm is only possible at sites flown with a UAS, which would provide the ground-based fractional vegetation cover and leaf area index data needed for evaluating the impacts of tamarisk water use on GW elevation.

This comparison of multi-band, full-color data from satellite and UAS technologies would test the hypothesis that observed changes in GW are a response to changes in tamarisk evapotranspiration. Band requirements include red, green, blue, and near infrared, which will be combined into common vegetation indices to discriminate between green and defoliated tamarisks and to calculate evapotranspiration with algorithms tailored to UAS products. LM and UA would contribute exceptional GW monitoring data and GIS information to the project; USGS would contribute UAS imagery for estimates of evapotranspiration and scaling algorithms using Landsat and MODIS for longer term monitoring of evapotranspiration.

Depending on the UAS platform and weight of instruments, the proposed research could also benefit from hyperspectral shortwave infrared wavelength data, such as that provided by the cellulose and lignose absorption bands of about 2.0−2.2 microns on a hyperspectral instrument. These bands have proven useful in discriminating organic litter from background soils and green vegetation in an algorithm called the cellulose absorption index (CAI). If such an instrument could be flown on a UAS over the Legacy sites, it is possible that it can be used to discriminate between living and dead tamarisk from the background scene composition. This would improve current technology and inform decisions concerning tamarisk management in southwestern riparian areas.

Topographic and Seepage Survey:
The assessment of the Moab and Crescent Junctions sites will provide (1) oblique aerial photographs and video, (2) high resolution imaging, (3) 1-ft topographic contours in a digital format. Oblique aerial photographs and video are for use by site managers and staff in construction projects, planning site work, and progress reporting. Topographic contours are for use in project documents such as site drawings and will be compared with previous surveys to determine changes in volume over time. Full thermal imaging of both sites is proposed to locate potential seeps/hydrological features within the scope area.

Summary of Potential Impact of the Proposed Action:
Environmental and human health considerations were assessed as part of impact analysis and it was determined that there was not a potential for significant impacts for the proposed actions. Impacts to the following resource areas were considered during the review: air, noise, soil, water, human health, waste management, environmental, ecological, natural/cultural resources and floodplain/wetlands.

Categorical Exclusion(s) Applied:

B3.1 - Site characterization and environmental monitoring

B3.2 - Aviation activities

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of 10 CFR Part 1021.

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

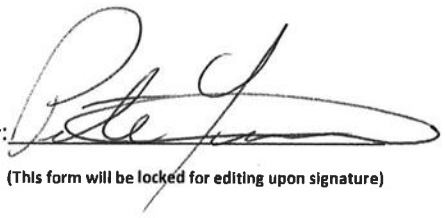
☑ The proposal fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D.

To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

☑ There are no extraordinary circumstances related to the proposal that may affect the significance of the environmental effects of the proposal.

☑ The proposal has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

NEPA Compliance Officer: 

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Date Determined: 8-8-16