

**U.S. Department of the Interior
Bureau of Land Management**

**Environmental Assessment
DOI-BLM-AZ-A010-2015-0018-EA**

Willow Spring Water Sampler Installation

MOHAVE COUNTY, ARIZONA

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**ENVIRONMENTAL ASSESSMENT
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Willow Spring Water Sampler Installation

ARIZONA STRIP FIELD OFFICE, MOHAVE COUNTY, ARIZONA

1.0 INTRODUCTION

1.1 Background

This Environmental Assessment (EA) has been prepared to disclose and analyze the environmental consequences of the proposal to install a temporary water sampler in Willow Spring. The proposed action would occur in the Kanab Creek Wilderness, on public lands administered by the Arizona Strip Field Office of the Bureau of Land Management (BLM) - see Appendix 1.

The EA is a site-specific analysis of potential impacts that could result from implementing one of the alternatives. The EA assists the BLM in project planning and ensuring compliance with the National Environmental Policy Act of 1969, as amended (NEPA), and in making a determination as to whether any “significant” impacts could result from the analyzed actions. “Significance” is defined by NEPA and is found in the regulations at 40 Code of Federal Regulations (CFR) 1508.27.

An EA provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a statement of Finding of No Significant Impact (FONSI). If the decision maker determines that this project has “significant” impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a Decision Record (DR) may be signed for the EA approving the selected alternative, whether the proposed action or another alternative. A DR, including a FONSI statement, documents the reasons why implementation of the selected alternative would not result in “significant” environmental impacts (effects) beyond those already addressed in the Arizona Strip Proposed Resource Management Plan (RMP) /Final EIS (BLM 2007).

1.2 Purpose and Need

The U.S. Geological Survey (USGS) proposes to install an automated water sampler at Willow Spring in Hack Canyon. The water sampler would provide the USGS with temporal data on background water chemistry (uranium and trace elements) of the spring, as well as possible uranium mine related impacts to water chemistry. The project would support the 15-year science plan that was developed to support the data gaps identified in the Northern Arizona Mineral Withdrawal Record of Decision (2012).

The proposed project would gather data to satisfy questions regarding impacts of uranium mining activity and naturally occurring uranium resources in the region. The project is needed to investigate potential health hazards for the public, livestock, wildlife and the environment.

The USGS proposes to install the water sampler device within the water trough containing the spring (see Figure 1). The device would be placed in a 5-gallon container and then hidden in the vegetation of the trough (consisting of cattails and sedges). The accompanying battery would be in a container placed just outside the trough on the left corner behind existing corral boards, rocks and vegetation. The water sampler collection device would be placed in such a manner that it does not interfere with livestock or wildlife use of the trough. The sampler is small (approximately 12-inches x 10 inches) and lightweight, so it would be transported along with the battery to the spring on foot. The sampler is designed to operate up to 6 months unattended and would be visited 2-3 times per year for inspection, maintenance and to retrieve water samples.

FIGURE 1. WILLOW SPRING



Willow Spring is located within the Kanab Creek Wilderness, so a Minimum Requirements Decision Guide (MRDG) and a Visual Contrast Rating Worksheet have been completed, along with this EA, to assist in identifying, analyzing, and selecting the management action that is the minimum necessary for administration of this wilderness area.

Arizona BLM's strategic goals (in part) direct assistance to other regulatory agencies to remediate health hazards at uranium mine sites. The project would provide data about whether uranium mining activity could affect the water chemistry in the drainages leading to the Colorado River or if the chemicals in the water are naturally occurring. The ultimate goal is to obtain more information on water chemistry in the area and find ways to eliminate, or at least greatly reduce, the hazard or potential hazards of uranium mining. The placing of water chemistry samplers to monitor the levels of uranium radioactivity that may be present would increase the information on the amount of uranium or trace/related elements in Willow Spring. This could increase the understanding on how the chemicals in water released by uranium mining, if any, could potentially affect water entering the Colorado River watershed and affect nearby resources.

1.3 Conformance with Land Use Plan

The alternatives described in Chapter 2 are in conformance with the Arizona Strip Field Office RMP (BLM 2008a). The alternatives are consistent with the following decisions contained within this plan.

DFC-SR-01 (page 2-128): Approved scientific research will contribute to management of natural and cultural resources and achieving desired future conditions.

MA-SR-01 (page 2-128): Permits will be required for approved scientific research to ensure compatibility and reporting of results.

MA-VR-03 (page 2-64): All new surface disturbing projects or activities, regardless of size or potential impact, will incorporate visual design considerations during project design as a reasonable attempt to meet the VRM class objectives for the area and minimize the visual impacts of the proposal. Visual design considerations will be incorporated by:

- Using the VRM contrast rating process (required for proposed projects in highly sensitive areas, high impact projects, or for other projects where it appears to be the most effective design or assessment tool), or by
- Providing a brief narrative visual assessment for all other projects that require an environmental assessment (EA) or environmental impact statement (EIS).
Measures to mitigate potential visual impacts include the use of natural materials, screening, painting, project design, location, or restoration (see Appendix I; BLM Handbook H-8431-1, Visual Resource Contrast Rating; or online at <http://www.blm.gov/nstc/VRM/8431.html>, for information about the contrast rating process).

MA-WM-01 (page 2-116, in part): The Minimum Requirement Decision Guide (Arthur Carhart National Wilderness Training Center, most recent version) will be used in all decisions, giving greatest weight to accomplishing objectives via natural processes and non-mechanized/non-motorized means.

It has also been determined that the alternatives would not conflict with other decisions contained within the RMP.

1.4 Relationship to Statutes, Regulations, or other Plans

This EA has been prepared in accordance with the requirements of NEPA and any additional Federal, state, and local laws that may be relevant to the alternatives, such as those cited below.

The alternatives are consistent with the Fundamentals of Rangeland Health (43 CFR 4180.1) and Arizona's Standards and Guidelines, which were developed through a collaborative process involving the Arizona Resource Advisory Council and the Arizona BLM Standards and Guidelines team. In April of 1997, the Secretary of the Interior approved the Standards and Guidelines. These standards and guidelines address watersheds, ecological condition, water quality, and habitat for special status species. These resources are addressed later in this document.

The project area is located in Mohave County, Arizona. The alternatives are consistent with the *Mohave County Comprehensive Plan* (adopted September 2010). While activities such as the proposed water sampler installation are not specifically addressed in the Mohave County Comprehensive Plan, the County Plan (page 41) does stress "Collaborative efforts with other agencies, organizations, and community groups [for] the safety of residents and visitors" (Mohave County 2010). The alternatives also do not conflict with decisions contained within this plan.

Executive Order 13186 requires the BLM and other Federal agencies to work with the U.S Fish and Wildlife Service (USFWS) to provide protection for migratory birds. Implementation of the alternatives is not likely to adversely affect any species of migratory bird known or suspected to occur in the area. No take of any such species is anticipated.

In addition, the alternatives would comply with the following laws, and is consistent with applicable federal, state, and local laws, regulations, and plans to the extent possible.

- Endangered Species Act of 1973 as amended
- Section 106 of the National Historic Preservation Act of 1966, as amended
- American Indian Religious Freedom Act of 1966, as amended
- Executive Order 13007, Indian Sacred Site

1.5 Identification of Issues

Identification of issues for this EA was accomplished by considering the resources that could be affected by implementation of one of the alternatives.

A BLM interdisciplinary scoping meeting was conducted on May 26, 2015, which included the identification of potentially relevant or affected resources, issues, and/or concerns; any additional feasible alternatives that could achieve the purpose and need; potentially interested or affected stakeholders; and required special status species, cultural, and other inventories. A scoping letter was sent out on June 2, 2015, to 104 interested parties. Two letters and one email were received in response to this scoping letter (see Chapter 5). The issue identified through this process, along with the rationale for analysis, is stated below.

- **Wilderness:** There could be short term impacts to wilderness naturalness and solitude from the proposed installation, operation, and maintenance of the water chemistry sampler.

2.0 DESCRIPTION OF THE ALTERNATIVES

2.1 Introduction

This EA focuses on the proposed action (Alternative A) and the no action (Alternative B) alternatives. The no action alternative is considered and analyzed to provide a baseline for comparing the impacts of the action alternatives. Other alternatives were considered but eliminated from analysis (see Section 2.4 of this EA).

2.2 Alternative A: Proposed Action – Install a water sampler in Willow Spring

The USGS proposes to install a ‘Chapin mini-sipper’ water sampler unit in the Willow Spring concrete water trough. Under this alternative, the BLM would approve the installation, operation, and maintenance of the water sampler. The unit is small (12” x 10”), and lightweight. It would be protected inside a 5-gallon bucket that would be camouflaged by use of a native rock color paint on the exterior of the bucket and either installed in the existing livestock water trough or hidden behind rock or vegetation in the area surrounding the site. It could be submerged up to 3 ft. deep (maximum) or less than 1 foot deep. It can collect up to 250 samples at 5 mL each (discrete or daily integrated). The samples are separated by inert gas bubbles, with less than a 5% carryover. The unit comes with a 12 volt battery which would be placed just outside the trough and hidden behind the existing water trough, rock and vegetation. The unit can operate up to 12 months and even under ice. There would be no ground disturbance with installation of the mini-sipper.

This type of water sampler is a low cost unit; it requires very few site visits. The unit and attached battery would be carried in to the spring by foot. The USGS would walk in to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery. The project site would be cleaned up at the end of each day the work is being conducted (e.g., trash removed, scrap materials picked up) to minimize the likelihood of condors or other raptors visiting the site.

The water sampler makes low click sounds when operating; however, the mechanical sound produced by the mini-sipper when it is collecting a sample is very quiet and cannot be heard at

a distance of more than 5 feet from the sampler (USGS 2015). This equipment is ideal for remote or difficult to access areas because it is small and lightweight, and can be easily camouflaged.

It is anticipated that the water sampler would be in place for approximately 1½ years in order to collect data over at least one full year. The water samples collected by the mini-sipper would be evaluated for all of the major ions and trace elements likely to be encountered in groundwater that potentially has been in contact with uranium ore bodies, including dissolved uranium, occurring either naturally or due to exposure by mining. With up to 250 discrete water samples available that are collected daily, it would be possible to evaluate potential daily, weekly, and seasonal patterns in the water chemistry of the spring. Because the sampler is capable of autonomous operation, the number of site visits for maintenance of the sampler and collection of water samples can be limited to 2-3 trips per year with just one or two people.

2.3 Alternative B: No Action

Under this alternative, the water sampler would not be installed and the study would not be conducted at this location.

2.4 Alternatives considered but eliminated from analysis

Other alternatives were considered but eliminated from further analysis for the reason(s) listed.

- ***No water chemistry monitoring device installed – instead, weekly water samples would be collected from Willow Spring.*** This alternative would be to manually collect water samples from Willow Spring in order to collect the desired water chemistry data. However, this type of manual sample collection activity would require weekly trips into the spring site, and would therefore result in greater potential impacts to the solitude of that portion of the wilderness in and around the spring area.
- ***Drill a monitoring well outside of wilderness.*** – Most springs in the area are recharged from precipitation surface runoff. Drilling a monitoring well may not be in the same water flow pattern in the geologic formation of the uranium resource, so may not provide the desired information on the major ions and trace elements likely to be encountered in groundwater that potentially has been in contact with uranium ore bodies (including dissolved uranium) as well as determine if significant temporal trends (seasonal, storm related, etc.) occur at the spring. This alternative would also be very expensive (up to \$600,000 to drill a deep water well) compared to the scope of the project.

3.0 AFFECTED ENVIRONMENT

The purpose of this chapter is to describe the existing environment potentially affected by the alternatives. The affected environment of this EA was considered and analyzed by an interdisciplinary team. Table 1 (below) addresses the elements and resources of the human environment considered in the development of this EA. The resources discussed in this chapter include the relevant physical and biological conditions that may be impacted with implementation of one of the alternatives, and provides the baseline for comparison of impacts described in Chapter 4.

3.1 General Setting

Willow Spring is located in Hack Canyon (a major side drainage to Kanab Creek) approximately 200 yards east of (within) the wilderness boundary at the base of a north facing cliff. The reclaimed Hack Canyon uranium mine is located approximately 3.9 miles up the canyon to the northwest. Two active uranium mines are located above the canyon several miles away to the south and southwest. The Pinenut Mine is located about 4.3 miles south of the spring and the Arizona One Mine is located about 5.4 miles to the southwest. Geologic structures such as joints, fractures, faults and folds direct ground water movement to springs. The USGS wants to investigate whether periods of monsoonal or heavy precipitation events could have an impact on the water chemistry of the spring.

The climate at this locality is semiarid, with occasional monsoonal moisture, characterized by moderate daily and annual ranges in temperature. Winters are mild and summers are hot. Spring and fall weather is variable from year to year and may exhibit extended fair mild weather or rain and snow storms. The average annual temperature range is estimated to be around 55° F., and transitory extremes are about 105° F. and 20° F. Average annual precipitation is 10 to 11 inches.

3.2 Elements/Resources of the Human Environment

The BLM is required to consider many authorities when considering a Federal action. Those elements and resources of the human environment that are subject to the requirements specified in statute, regulation, or executive order and must be considered in all EAs (BLM 2008b) have been considered by BLM resource specialists to determine whether they would potentially be affected by the alternatives. These elements and resources are identified in Table 1, along with the rationale for determination of potential effects. If any element or resource was determined to be potentially impacted, it was carried forward for detailed analysis in this EA; if an element or resource is not present or would not be affected, it was not carried forward for detailed analysis.

Table 1. Elements/Resources of the Human Environment

RESOURCE	RATIONALE FOR DETERMINATION	DETERMINATION
Air Quality	Air quality in the general area is good, although windblown dust can be a minor source of pollution. The project area is within an attainment area for all National Ambient Air Quality Standards. The proposed action could result in temporary, localized deterioration of air quality as a result of dust generated from vehicles traveling to the Hack Canyon Trailhead, but this would be minimal.	Present but not affected
Area of Critical Environmental Concern	The proposed project area is not within an Area of Critical Environmental Concern.	Not present
Cultural Resources	The trough site is a cultural resource (historic) but is not considered eligible for the National Register of Historic Places due to its overall condition and relatively recent usage. The proposed installation of a water sampler would have no effect on its value as a historic site. Kanab Creek and its tributaries are important areas for the Paiute Tribe because of its use as a refuge area during Euro-american encroachment into southern Utah and northern Arizona during the 1800s. During consultation with the Kaibab Paiute Tribe, the closest Paiute Tribe to the area, no concerns about the project were expressed to the BLM.	Present but not affected
Environmental Justice	The focus of the Environmental Justice evaluation is to determine whether the alternatives result in an inequitable distribution of adverse effects to special population groups, as compared to adverse effects on other population groups. These special population groups include minority or otherwise special ethnicity or low-income neighborhoods. There are no known special population groups occurring near the project area.	Not Present
Farmlands (prime or unique)	Prime or unique farmlands are not present on or adjacent to the proposed project location.	Not present
Floodplains	Willow Spring is within a 100-year floodplain. It is also located within Zone A, areas of High hazard from the principle source of floods in the area, on the Federal Emergency Management Agency (FEMA) flood maps (FEMA 1982). A berm was built to protect the spring, but occurred before the area was designated as a wilderness area. The proposed installation of a water sampler in the trough would not affect the floodplain.	Present but not affected
Invasive, Non-native species	There are no known occurrences of noxious weeds within the proposed project area. Non-native invasive cheat grass may be present in the project area, but is not at a level to cause concern (i.e., at a level that would carry a fire), and would not be affected by implementation of either alternative.	Not present
Threatened, Endangered or Candidate plant species	There are no known threatened, endangered, or candidate plant species that occur within the project area.	Not present
Threatened, Endangered or Candidate animal species	The California condor, a Federally listed endangered species, is present throughout the Arizona Strip. Individuals that may occur at the project area are part of a non-essential experimental population under section 10(j) of the Endangered Species Act. Construction activities often result in the creation of micro-trash. Condors are attracted to micro-trash and may ingest it. Micro-trash includes bottle caps, pull tabs, broken glass, cigarette butts, small bits of plastic, bullets and casings, etc. During the breeding season the adults return to the nest where they then regurgitate this to feed the chicks. Because the chicks are unable to regurgitate, the micro trash accumulates in their stomachs and causes death. Micro-trash is the leading cause of condor chick mortality. However, implementing the best management practices listed in Section 2.2.1 would reduce the likelihood of this occurring. In addition, no condor nests are known to occur within 30 miles of the project area. The alternatives are therefore not expected to affect California condors.	Present but not affected
Wastes (hazardous or solid)	The proposed action does not include the use of waste, including petroleum products. Hazardous materials would therefore not be present in the project area.	Not present
Water quality (drinking/ground)	The proposed project would not affect ground water. The regional aquifer is more than 100 feet below Willow Spring. The proposed sampler is small and is specifically designed to measure water quality and therefore, is not expected to affect water quality.	Present but not affected

RESOURCE	RATIONALE FOR DETERMINATION	DETERMINATION
Wetlands/ Riparian Zones	<p>Federal policy defines wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and which, under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. BLM Technical Reference 1737, <i>Riparian-Wetland Area Management</i>, includes marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas as wetlands. BLM's manual further defines riparian areas as a form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas (BLM 1998).</p> <p>Willow Spring, where the proposed water chemistry monitor would be installed, is a developed spring that consists of a wooden trough that provides the main water source for livestock on the Hacks Allotment. While some riparian vegetation (primarily cattails, sedges and salt cedar) is present at the spring, it does not meet the criteria for priority riparian areas (as listed in the RMP) due to its small size. In addition, the Arizona Standards for Rangeland Health provide an exemption to Standard 2 (Riparian/Wetland Sites) for "water facilities constructed or placed at a location for the purpose of providing water for livestock ... and which have not been determined through local planning efforts to provide for riparian or wetland habitat." Willow Spring is developed for livestock watering. Thus, this area is not by definition a wetland/riparian area, so there are no wetlands/riparian areas in the project area.</p>	Not present
Wild and Scenic Rivers	There are no river segments classified as designated, eligible, or suitable under the Wild and Scenic Rivers Act within the project area.	Not present
Woodlands/ Forestry	No forests or woodlands are present on or adjacent to the proposed project area.	Not present
Recreation	Willow Spring is located within designated wilderness and within the Arizona Strip Extensive Recreation Management Area (ERMA). The ERMA receives custodial management regarding visitor health and safety, user conflict and resource protection. Management of recreation within the wilderness and ERMA emphasizes the opportunities for solitude and primitive and unconfined recreation. The installation of the water sampler would not affect these recreation activities, settings, or benefits because the spring and trough already exist and any of the identified recreation activities and benefits could still occur. A sign is present at the spring that states the water is not suitable for drinking.	Present but not affected
Livestock grazing	Willow Spring is within the active Hack Canyon grazing allotment. Due to the geographic location of the spring, sparseness of vegetation, and nature of the proposal, the AUM preference would not be affected by the proposed action. In addition, the water sampler would be placed to not impede livestock access to the water source.	Present but not affected
Soils	No soil would be disturbed or impacted during the water sampler installation and operation.	Present but not affected
Socioeconomic Conditions	The economic base of the Arizona Strip is mainly ranching with a few mining operations. Nearby communities are mostly supported by tourism (including outdoor recreation). The social aspect involves remote, unpopulated settings with moderate to high opportunities for solitude. The proposed action would consist of 1-2 people walking to Willow Spring and placing a small water chemistry monitor in the existing water trough, then visiting the site for maintenance of the sampler and collection of water samples 2-3 trips per year. The project is extremely limited in scope, and would therefore have no effect on the economy of the county or the region.	Present but not affected
Vegetation	The proposed project would consist of 1-2 people walking to Willow Spring and placing a small water chemistry monitor in the existing water trough at the spring. The device would be placed in a 5-gallon container and then hidden in the vegetation (cattails and sedges) within the trough. The accompanying battery would be in a container placed just outside the trough on the left corner behind existing corral boards, rocks and vegetation. No ground disturbance would occur from installation, operation and maintenance of the monitoring device. Thus, no impacts on vegetation at the site are anticipated.	Present but not affected
Visual resources	The project area is within a designated VRM Class I area. The objective of this VRM class is to preserve the existing character of the landscape; the level of change of the characteristic landscape should be very low and must not attract attention. VRM Class I provides for	Present but not affected

RESOURCE	RATIONALE FOR DETERMINATION	DETERMINATION
	natural ecological changes, but does not preclude very limited management activity The proposed action would be confined to a water sampler device in a 5-gallon bucket and a container holding a 12 volt battery. The bucket would be painted to blend with the natural surroundings and placed near the cliff base within the surrounding vegetation. The 12 volt battery unit would be positioned just outside the concrete berm and hidden behind rocks and vegetation. Since the proposed water sampler would be camouflaged, the level of change of the characteristic landscape would be low and it would not attract attention.	
Mineral Resources	Locatable mineral resources such as uranium are known to occur in the area, but because this is a designated wilderness (established in 1984), no claims can be filed. Salable and leasable mineral development, including oil and gas, is also precluded by the wilderness designation. Mineral resources would therefore not be affected by the action.	Present but not affected
Paleontology	No paleontological resources are known to occur within the area.	Not present
Lands/Access	Access to public lands would not be altered or impaired by implementation of the proposed action. No other lands issues have been identified in connection with the action.	Present but not affected
Wilderness characteristics	The proposed project does not occur within any area managed to maintain wilderness characteristics.	Not present
Wilderness	The proposed action would occur in the Kanab Creek Wilderness and could affect the wilderness values of opportunities for solitude and naturalness. This issue is therefore analyzed in detail in this EA.	Present and potentially affected
Wildlife, including sensitive species and migratory birds	The proposed action would consist of 1-2 people walking to Willow Spring and placing a small water chemistry monitor in the existing water trough, then visiting the site for maintenance of the sampler and collection of water samples 2-3 trips per year. The proposed action is very small in scope and any impacts to wildlife would be temporary and negligible.	Present but not affected

3.3 Resources Brought Forward for Analysis

3.3.1 Wilderness

Willow Spring is within the Kanab Creek Wilderness. The primary mandate of the Wilderness Act is to preserve wilderness character. Five qualities of wilderness character are mentioned in the definition of "wilderness" found in Section 2(c) of the Wilderness Act. These are:

Untrammeled – In wilderness, the "earth and its community of life" are essentially unhindered and free from modern human control or manipulation, "in contrast with those areas where man and his own works dominate the landscape."

Undeveloped – Wilderness retains its "primeval character and influence," and is essentially "without permanent improvements" or modern human occupation. Preserving this quality keeps areas free from "expanding settlement and growing mechanization" and "with the imprint of man's work substantially unnoticeable" as required by the Wilderness Act.

Natural – A wilderness area is to be "protected and managed so as to preserve its natural conditions." Wilderness ecological systems are substantially free from the effects of modern civilization. Preserving this quality ensures that indigenous species, patterns and ecological processes are protected and allows us to understand and learn from natural features.

Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation – The Wilderness Act defines wilderness as having “outstanding opportunities for solitude or a primitive and unconfined type of recreation.” This quality is about the *opportunity* for people to experience wilderness. The opportunities provided by wilderness include the chance to experience primitive recreation, natural sights and sounds, solitude, freedom, risk, the physical and mental challenges of self-discovery and self-reliance, and to use traditional skills free from the constraints of modern culture.

Other Features of Value -- In addition to the four qualities of wilderness character listed above, which are required of every wilderness, the Wilderness Act says these areas “may also contain ecological, geological, or other features of scientific, educational, scenic, or historical use” that reflect the character of this wilderness. Some of these features, such as the presence of important geological formations, cultural resources, or historical sites do not fit easily into one of the other four qualities. While many different types of features could be included, the intent is to include those that are significant or integral to the wilderness.

Kanab Creek is one of the major tributaries of the Colorado River, and is the largest tributary canyon system on the north side of the Grand Canyon. This wilderness area is known for its beauty and solitude, high limestone and sandstone cliff faces, steep and boulder-strewn slopes, rugged arroyos, side drainages into Kanab Creek and stark overall appearance. Kanab Creek and its feeder streams have cut a network of dramatic gorges with vertical walls deep into the Kanab and Kaibab Plateaus; in the creek bottom there are walls sculpted by wind and water into a maze of fins, knobs, and potholes, surrounded by riparian vegetation. The area is remote, natural and undeveloped, other than the historic wooden water trough at the spring and some allotment fences that existed before the wilderness designation in 1984. There are outstanding opportunities for solitude; mostly hiking occurs in this location because it is in such a remote location.

The Arizona Strip Field Office RMP (2008, page 2-115) has the following desired future conditions for designated wilderness:

- 1) The first and dominant goal will be to provide for the long-term protection and preservation of the areas' wilderness character under a principle of non-degradation. The areas' natural condition, opportunities for solitude, opportunities for primitive and unconfined types of recreation, and any ecological, geological, or other features of scientific, educational, scenic, or historical value present will be managed so that they remain unimpaired (DFC-WM-01);
- 2) The second goal will be to manage the wilderness areas for the use and enjoyment of visitors in a manner that leaves the areas unimpaired for future use and enjoyment as wilderness. The wilderness resource will be a dominant factor in all management decisions where a choice must be made between preservation of wilderness character and visitor use (DFC-WM-02);

- 3) The third goal will be to manage the areas using the minimum tools, equipment, and/or structures necessary to accomplish the objective successfully, safely, and economically. The chosen tools, equipment, or structures will be the ones that least degrade wilderness values temporarily or permanently. Management will seek to preserve spontaneity of use and as much freedom from regulation as possible (DFC-WM-03); and
- 4) The fourth goal will be to manage non-conforming but accepted uses permitted by the Wilderness Act and subsequent laws in a manner that will prevent unnecessary or undue degradation of the areas' wilderness character. Nonconforming uses are the exception rather than the rule; therefore, emphasis will be placed on maintaining wilderness character (DFC-WM-04).

No wilderness management plan has been written for this wilderness area. Kanab Creek Wilderness (68,396 acres) is jointly managed by the U.S. Forest Service and the BLM. A small portion, 6,804 acres or approximately 10%, is managed by the BLM.

4.0 ENVIRONMENTAL CONSEQUENCES

The potential consequences or effects of both alternatives are discussed in this section (including a description of the direct and indirect impacts, and cumulative effects if any). Impacts are defined as modifications to the existing condition of the environment and/or probable future condition that would be brought about by implementation of one of the alternatives. The intent is to provide the scientific and analytical basis for comparison of the effects of each alternative.

Impacts can be direct or indirect; direct impacts are those effects that are caused by the action or alternative and occur at the same time and place, while indirect effects are those effects that are caused by or would result from an alternative and are later in time or further removed in distance, but that are still reasonably certain to occur. Cumulative effects are generally assessed using the environmental impacts of past, present, or reasonably foreseeable future actions within the project area.

The impact analysis in the following section was based on knowledge of the resources and the project area, review of existing literature, information provided by experts and other agencies, and professional judgment.

4.1 Environmental Consequences of the Proposed Action (Alternative A)

4.1.1 Wilderness

A minimum requirement analysis was conducted for this project using the Minimum Requirements Decision Guide (MRDG) Worksheets (www.wilderness.net/MRDG) (see

Appendix Figure A-4). This provides the decision maker information on making the best decision in the Kanab Creek Wilderness to meet the minimum requirements for administering this area in the wilderness and preserving wilderness character. This analysis assisted the BLM in identifying the minimum tools necessary to protect the wilderness character while providing for the health and safety of the public

By following the minimum requirements recommendations from the MRDG (See Appendix 4), long term protection and preservation of the area's wilderness character, primarily naturalness and solitude, would continue. By using the following minimum tools and procedures, the objective could be accomplished successfully, safely, and economically without degradation or impairment of naturalness and opportunities for solitude. These minimum tools and procedures include:

- 1) Personnel (1-2 people) would travel by foot to and from the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.
- 2) A small, mechanical Chapin "mini-sipper" water chemistry monitoring device would be installed by hand and used to autonomously collect the water data. No tools would be necessary for this work.

The Wilderness Character Summary Rating from the MRDG was No Effect and included the wilderness characteristics of untrammled, undeveloped, natural, solitude and primitive and unconfined recreation.

The USGS mini-sipper water sampler was specifically developed to evaluate changing water chemistry at remote locations. The sampler is designed to operate autonomously for up to 6 months at a time, collecting and preserving up to 250 discrete water samples. The sampler is relatively small (no larger than a standard 5-gallon bucket), and 3-4 times smaller than the standard ISCO type water-quality sampler currently in use elsewhere. There would be no ground disturbance associated with installation, operation or maintenance of the mini-sipper, and it would be camouflaged by use of a native rock color paint on the exterior of the bucket and either installed in the existing livestock water trough or hidden behind rock or vegetation in the area surrounding the site. The mechanical sound produced by the mini-sipper when it is collecting a sample is very quiet and cannot be heard at distanced more than 5 feet from the sampler (USGS 2015). The water samples collected by the mini-sipper would be evaluated for all of the major ions and trace elements likely to be encountered in groundwater that potentially has been in contact with uranium ore bodies, including dissolved uranium, occurring either naturally or due to exposure by mining. With up to 250 discrete water samples available that are collected daily, it would be possible to evaluate potential daily, weekly, and seasonal patterns in the water chemistry of the spring. Because the sampler is capable of autonomous operation, the number of site visits for maintenance of the sampler and collection of water samples would be limited to 2-3 trips per year with just one or two people. All of these factors would help to preserve (i.e., not affect) the wilderness characteristics of untrammled, undeveloped, naturalness, solitude, outstanding opportunities for primitive and unconfined recreation, and other natural features.

4.2 Environmental Consequences of the No Action (Alternative B)

4.2.1 Wilderness

There would be no noise disturbance associated with the traverse of individuals to the spring to install and maintain the water sampler and associated equipment and periodic retrieval of data. The water sampler would not be installed at the Willow Spring site, and no water chemistry monitoring would occur. Thus, the wilderness characteristics of untrammled, undeveloped, naturalness, outstanding opportunities for solitude and other natural features (wilderness characteristics occurring in this portion of the wilderness) would remain unchanged under the No Action Alternative.

4.3 Cumulative Impacts

“Cumulative impacts” are those impacts resulting from the incremental impact of an action when added to other past, present, or reasonably foreseeable actions regardless of what agency or person undertakes such other actions. This EA attempts to qualify and quantify the impacts to the environment that would result from the incremental impact of the alternatives when added to other past, present, and reasonably foreseeable future actions. These impacts can result from individually minor but collectively important actions taking place over a period of time.

4.3.1 Past and Present Actions

There are a wide variety of activities occurring on the lands in the vicinity of the project area, including livestock grazing, hiking and other recreational activities. Specific actions that are occurring, or are likely to occur in the reasonably foreseeable future, are:

- *Livestock Grazing* – Willow Spring is within the Hacks Grazing Allotment, an active grazing allotment. This spring is a base water, owned and controlled by the permittee Territorial Livestock Co. Season-of-use is from November 16 to May 31 (seasonal grazing). There are 38 head of cattle, and 247 Active AUMs. This allotment is managed under a grazing system that is documented and described in an allotment management plan. BLM administered lands in the area are also within active grazing allotments. The U.S. Forest Service portion of the Kanab Creek Wilderness is not grazed by livestock. Livestock grazing has occurred in the area for over 150 years.
- *Recreation* – Recreation activities occurring in the vicinity of the project area involve a broad spectrum of pursuits ranging from dispersed and casual recreation to organized, BLM-permitted group uses. Typical recreation in the region includes off highway vehicle driving, scenic driving, hiking, wildlife viewing, horseback riding, camping, picnicking, night-sky viewing, and photography. The Arizona Strip is known for its large-scale undeveloped areas and remoteness. The Kanab Creek Wilderness provides an array of recreational opportunities for users who wish to

experience primitive and undeveloped recreation. The Arizona Strip Field Office also provides opportunities for those seeking more organized or packaged recreation experiences. However, at the specific spring location, minimal recreation typically occurs and this is usually hiking by individuals or small groups. Wildlife viewing, horseback riding, camping, picnicking, night-sky viewing and photography typically do not occur at this remote and isolated location; motorized recreation does not occur at the site due to its location within designated wilderness.

4.3.2 Cumulative Impacts Analysis

4.3.2.1 Wilderness

Wilderness character (i.e., solitude, naturalness, and primitive/unconfined recreation) is primarily influenced by the proximity of motorized travel corridors and the volume and type of recreational uses. As communities around the Arizona Strip expand and use of the area increases, recreation use is expected to increase. This increased recreational use can cause impacts to wilderness characteristics. However, motorized use is prohibited and Hack Canyon (where Willow Spring is located) is not in close proximity to any community so substantial increases in visitation (and thus the potential to impact solitude) are not expected.

It is therefore not anticipated that either alternative would result in cumulative impacts to wilderness when added to other past, present, and reasonably foreseeable activities in the project area or surrounding areas.

5.0 CONSULTATION AND COORDINATION

5.1 Public Participation

On June 1, 2015, a scoping letter was sent to 104 parties of interest on the Arizona Strip District mailing list. This scoping letter invited public participation in identifying issues that should be considered in the EA and encouraged written comments on the scope of the analysis and on the specific issues and potential alternatives the analysis should address. Comments were accepted until July 2. Three comment letters and one email were received. All comments are summarized in Table 2, along with a response to each comment.

Table 2. Summary of Comments and Responses

COMMENTER	COMMENT	RESPONSE
SCOPING COMMENTS		
Sierra Club	It is imperative to ensure that all actions be consistent with direction contained in the Wilderness Act. At a minimum, an EA must be prepared, and a Minimum Requirements Decision Guide must be completed.	Noted. An EA and MRDG have been prepared. The EA analyzes potential impacts to wilderness. This analysis was based upon the results of the MRDG that was conducted for the proposed action and alternatives.

Sierra Club	Please make it clear in the EA why the requested action is necessary – it is important that the sampler would have a high probability of producing useful results.	Springs located in the Grand Canyon watershed (in the Northern Arizona Withdrawal area) are among the only data points accessible for the collection of water quality data to evaluate naturally occurring baseline groundwater chemistry and changes in baseline groundwater chemistry related to historical and current mining activity. Periodic collection of water samples on an annual basis does not provide enough information to determine if there are significant temporal trends (seasonal, storm related, etc.). The USGS mini-sipper water sampler was specifically developed to evaluate changing water chemistry in mine and mine outflow environments. The sampler is designed to operate autonomously for up to 6 months at a time, collecting and preserving up to 250 discrete water samples. The sampler is no larger than a standard 5-gallon bucket, and 3-4 times smaller than the standard ISCO type water-quality sampler currently in use nationally. There would be no ground disturbance associated with installation, operation or maintenance of the mini-sipper, and it would be camouflaged by use of a native rock color paint on the exterior of the bucket and either installed in the existing livestock water trough or hidden behind rock or vegetation in the area surrounding the site. The mechanical sound produced by the mini-sipper when it is collecting a sample is very quiet and cannot be heard at distanced more than 5 feet from the sampler (USGS 2015). The water samples collected by the mini-sipper would be evaluated for all of the major ions and trace elements likely to be encountered in groundwater that potentially has been in contact with uranium ore bodies, including dissolved uranium, occurring either naturally or due to exposure by mining. With up to 250 discrete water samples available that are collected daily, it would be possible to evaluate potential daily, weekly, and seasonal patterns in the water chemistry of the spring. Because the sampler is capable of autonomous operation, the number of site visits for maintenance of the sampler and collection of water samples would be limited to 2-3 trips per year with just one or two people. Without the mini-sipper it would be necessary to schedule monthly if not weekly trips to the spring throughout the year with at least two people to collect comparable data. This type of manual sample collection activity would result in greater potential impacts to the solitude of that portion of the wilderness in and around the spring area (USGS 2015).
Sierra Club	If the sampler is not the least intrusive or the most efficient means to acquire the necessary data, then the environment will be unnecessarily disturbed.	According to the USGS (who regularly conducts this type of water sampling at remote location), the mini-sipper sampler is the least intrusive and most efficient means to acquire the necessary data (USGS 2015). The location, method of placement and color of the mini-sipper and accouterments have been designed to be minimally intrusive and disruptive.
Sierra Club	BLM should explain the hydrological connectivity of Willow Spring to nearby uranium mines, the current knowledge on baseline conditions, the types of analysis BLM or USGS intends to perform on the samples, and the information that those analyses can provide. Testing should include analyses that will specifically determine whether chemicals in the water are derived from mining processes or naturally occurring. The residence time of groundwater emerging at the spring should be identified, and the spring should be monitored to determine if seasonal precipitation or runoff affects water chemistry.	The hydrogeology of the Kanab Creek drainage is poorly understood at best. Data to infer the occurrence and movement of ground water is limited to springs and just a few supply wells that are accessible for data collection purposes. This limited data indicates that there are a number of perched water-bearing zones in the Moenkopi Formation, Kaibab Formation, Coconino Sandstone, and sandstones in the Hermit Shale and Supai Group that overlie the regional aquifer in the Redwall and Muav limestones. Owing to the lack of data, the occurrence and movement of groundwater in all of these units is inferred and poorly understood. What is known from historical mining records is that groundwater in perched water-bearing zones can and does come into contact with ore bodies in breccia pipes (Orphan mine, Pinenut mine, Hermit Mine, etc.). Because of the fractured nature of the rock regionally and in proximity to the uranium bearing ore bodies (ring fractures), it is inferred that groundwater that has

		<p>been in contact with an ore body can migrate laterally to points of discharge as well as deeper into the subsurface. One way of testing this hypothesis is by collecting water samples from springs in proximity to historical and current mining activity and evaluating the water chemistry for natural chemical tracers and indicators of changing water chemistry related to uranium ore bodies. The USGS has been actively collecting water samples from springs located in both perched water-bearing zones and the regional Redwall-Muav aquifer in areas not influenced by the occurrence of mineralized breccia pipes as well as in areas where suspected impacts can and have occurred. With this data we are beginning to develop an understanding of what baseline water chemistry looks like in the perched water-bearing zones and the Redwall-Muav aquifer. However, since USGS is only collecting periodic annual water samples the picture is far from complete. One C-14 analysis suggests the average age (some younger, some older) of the water in Willow Spring is about 3,000 years. Three Tritium analysis suggest there is a component of young (post 1950s) water at this spring as well.</p> <p>The USGS mini-sipper sampler would allow the USGS to collect daily samples to evaluate potential daily, weekly, and seasonal patterns in the water chemistry of the spring. The water sample collected by the mini-sipper can be evaluated for all of the major ions and trace elements likely to be encountered in groundwater that potentially has been in contact with uranium ore bodies, including dissolved uranium. Analysis of the daily water samples would make it possible to determine if significant temporal trends (seasonal, storm related, etc.) occur at the spring. Evaluation of changes in the trace element water chemistry could result in determining if a causal relationship is present at this spring in relation to historical mining in Hack Canyon and/or related to current mining activity.</p>
Sierra Club	<p>If it is determined that the water sampler will yield adequately useful results, we suggest considering taking samples from the soils and flora and fauna in the area, including livestock that use the trough and invertebrates that live within the water and provide a food base to other wildlife. Taking samples from the flora and fauna in the area would be useful to determine the rate of consumption of contaminated water by local plants and animals. This would supplement the study of water contamination and provide a more complete scope of any contamination and its impacts.</p>	<p>The USGS Columbia Environmental Research Center (Ohio) and USGS Toxics Group from Denver, Colorado are already monitoring soils, flora, and fauna in and around mines sites for pre, during, and post mining conditions. The USGS research plan for Grand Canyon Uranium studies also includes evaluation and monitoring for changes in selected spring environments that may be impacted.</p>
Sierra Club	<p>The EA should evaluate whether the placement of the water sampler in the wilderness is the best location for it. The EA should indicate why this location is optimum, what data will be gathered, and how those data will be utilized.</p>	<p>There are only two spring locations that are close enough to historical and current mining activity in the Kanab Creek drainage to evaluate for potential impacts: Pigeon Spring (on National Forest System lands near the reclaimed Pigeon Mine) and Willow Spring (in Hack Canyon downstream of the reclaimed Hack Canyon Mines and near the active Arizona 1 and Pinenut mines). Both of these sites are in the wilderness area and both have limited historical water-chemistry data that suggests the potential for impacts. The USGS is requesting permission from the BLM to install a mini-sipper sampler at the spring located on BLM-administered land (Willow Spring). The mini-sipper would collect daily water samples for up to a 6-month period that would be analyzed for major ions and trace elements to evaluate changing water chemistry, and daily, weekly, and monthly trends.</p>

Sierra Club	The EA should identify all springs that hold the potential of being hydrologically connected to active or previous uranium mines in the area, examine the logistics of sampling in those springs, and determine which springs are most likely to yield valuable information.	There are dozens of springs north and south of the Colorado River that could potentially be impacted by either naturally occurring, and historical and/or currently mined uranium ore deposits. The USGS as part of its Grand Canyon watershed/Northern Arizona Mineral Withdrawal uranium studies is in the process of inventorying and collecting water samples from as many of these springs as is logistically possible. The data collected is helping the USGS to develop a baseline of water-chemistry data for springs in the Grand Canyon region that will be valuable for evaluating data anomalies and/or trends. An initial inventory of sites such as the one in progress by the USGS will allow determination and classification of springs that are useful for continuing monitoring and analysis and those that are not.
Sierra Club	Why was Willow Spring chosen?	Willow Spring is located in close proximity to the reclaimed Hack Canyon mines, and the active Arizona 1 and Pinenut Mines. Willow Spring discharges water from a perched water-bearing zone (the Kaibab and Hermit Formations) that, based on mine logs of the Arizona 1 and Pinenut mines, could have been in contact with a uranium ore body. Concentrations of dissolved uranium for limited water samples from Willow Spring indicate a range of values from 20 to 25 micrograms per liters. These values are 4 to 5 times greater than the typical estimated background value for dissolved uranium of 5.0 micrograms per liter (MCL). They are also still below the MCL for dissolved uranium of 30.0 micrograms per liter. Other trace elements (arsenic, molybdenum, selenium, etc.) associated with uranium ore bodies are also present in this spring at higher than normal concentrations. Logistically, the Willow Spring site is close enough to the wilderness boundary to facilitate installation and maintenance of a mini-sipper sampler with minimal disturbance. The Willow Spring site has already been disturbed by the presence of a concrete water trough.
Sierra Club	How far is Willow Spring from nearby mine sites and what is the residence time of groundwater emerging from that spring?	Willow Spring is about 3.7 miles downstream from the reclaimed Hack Canyon mines, about 5.6 miles northeast of the Arizona 1 Mine, and about 4.4 miles north of the Pinenut Mine. As indicated earlier, based on one C-14 analysis and three tritium analysis the average age of the water at Willow Spring is about 3,000 years. Tritium analysis indicated that there is a component of recent water in the spring that postdates the 1950s.
Sierra Club	Are there other springs that are more likely to be impacted by mining contamination, for example from groundwater connected to recent inundation at Pine Nut Mine?	No. Most other springs in the area are 10 miles or more from the Pinenut Mine with potentially longer groundwater residence times and lesser impact potential. All of these other spring sites are located either in the wilderness area or Grand Canyon National Park.
Sierra Club	Are there springs that are outside of designated wilderness areas that might also be hydrologically connected to mining activity?	Yes. However, other springs in the area are 10 miles or more from the Pinenut Mine with potentially longer groundwater residence times and less potential for mining-related impacts. These other spring sites are located within Grand Canyon National Park.
Sierra Club	Samples should also be taken from Kanab Creek upstream and downstream from the location of the confluence of Hack Canyon and Kanab Creek to determine the possible addition into Kanab Creek of uranium from Hack Canyon.	Soil and sediment samples have been collected by the USGS along Hack Canyon from the reclaimed mine site to the confluence with Kanab Creek, and both upstream of the confluence and downstream of the confluence to the mouth of Kanab Creek at the Colorado River. These samples are currently being evaluated. The USGS has had an automatic ISCO model water sampler installed at the mouth of Kanab Creek since 2010. A mini-sipper (the type of sampler proposed for Willow Spring) is being tested at the mouth of Kanab Creek (since 2014). Results from the Isco sampler is limited due to limited funds for analysis. However, limited results from samples collected in 2010 and 2011 indicate that runoff events as sampled at the mouth of Kanab Creek have total uranium concentrations in the 3-5 microgram per

		liter range. One sampled runoff event from a flood that occurred mostly in Hack Canyon in 2011 had a concentration at the mouth of Kanab Creek for total uranium of 11.0 micrograms per liter. The Mini-sipper installed at the mouth of Kanab Creek is still in test mode to determine how best to handle the high sediment loads.
Mohave County	Opposed to the water monitor installation because of potentially misleading information that could affect future mining.	Noted. However, please be aware that the Record of Decision which approved the Northern Arizona Mineral Withdrawal directed that “the impacts associated with uranium mining on the Grand Canyon watershed will continue to be monitored and studied.” This proposed water monitoring would contribute toward fulfilling that mandate. USGS is a science organization that provides impartial information on the health of ecosystems and environment, natural hazards, and natural resources.
Washington County	Opposed to the water monitor installation because of potentially misleading information that could affect future mining.	See above response.
The Hopi Tribe	The Hopi Tribe supports identification and avoidance of prehistoric archaeological sites. Prehistoric archaeological sites are considered Traditional Cultural Properties by the Hopi Tribe.	Noted. As described in Table 1 of this EA, the trough where the proposed water sampler would be placed is an historic resource. However, it is not considered eligible for the National Register of Historic Places due to its overall condition and relatively recent usage. No prehistoric archaeological sites are within the project area, or would be affected by the project.
The Hopi Tribe	The Hopi Tribe understands that the automated water sampler would provide temporal data on water chemistry including possible uranium related impacts. We support this proposal pursuant to the 15-year science plan of the Northern Arizona Mineral Withdrawal and request consultation including being provided with copies of the draft environmental analysis for review and comment.	Noted. Consultation with the Hopi Tribe will continue, including providing a copy of the preliminary EA once it is prepared.

5.2 List of Preparers and Reviewers

Table 3. BLM Preparers and Reviewers

NAME	TITLE	RESPONSIBILITIES
Richard Spotts	Environmental Coordinator	NEPA Oversight
Rody Cox	Geologist	Geology, Minerals
Laurie Ford	Team Lead, Lands & Realty/Minerals/Hazmat	Lands & Realty
John Herron	Archaeologist	Cultural Resources
Jace Lambeth	Rangeland Management Specialist	Special Status Plants
Gloria Benson	Tribal Liaison	Native American Religious Concerns
Diana Hawks	Team Lead, Recreation/Wilderness/Archaeology	Recreation, Wilderness, and VRM
Jon Jasper	Outdoor Recreation Planner	Visual Resources, Wilderness
Ken Shurtz	Surface Protection Specialist	Project Lead
John Sims	Supervisory Law Enforcement	Law Enforcement
Whit Bunting	Team Lead, Rangeland Management	Range/Vegetation/Weeds
Lorraine Christian	Arizona Strip FO Manager	NEPA Compliance, Project Oversight
Shawn Langston	Wildlife and Special Status Animals	Wildlife, Special Status Wildlife Species

Table 4. Non-BLM Reviewers

NAME	AGENCY/ORGANIZATION	TITLE
Sarah Reif	Habitat Specialist, AGFD	Special Status Species, Wildlife
Daniel Bullets	Kaibab Paiute Tribe	Tribal and Native American Coordination
Luke Thompson	Supervisor, Arizona Game and Fish Department	Special Status Wildlife Species
Peter Bungart	Hualapai Tribe	Cultural Staff
Dawn Hubbs	Hualapai Tribe	Cultural Staff
Steve Rosenstock	Arizona Game and Fish Department	Wildlife

6.0 REFERENCES AND ACRONYMS

6.1 References Cited

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Federal Emergency Management Agency flood maps. 1982

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6.2 List of Acronyms Used in this EA

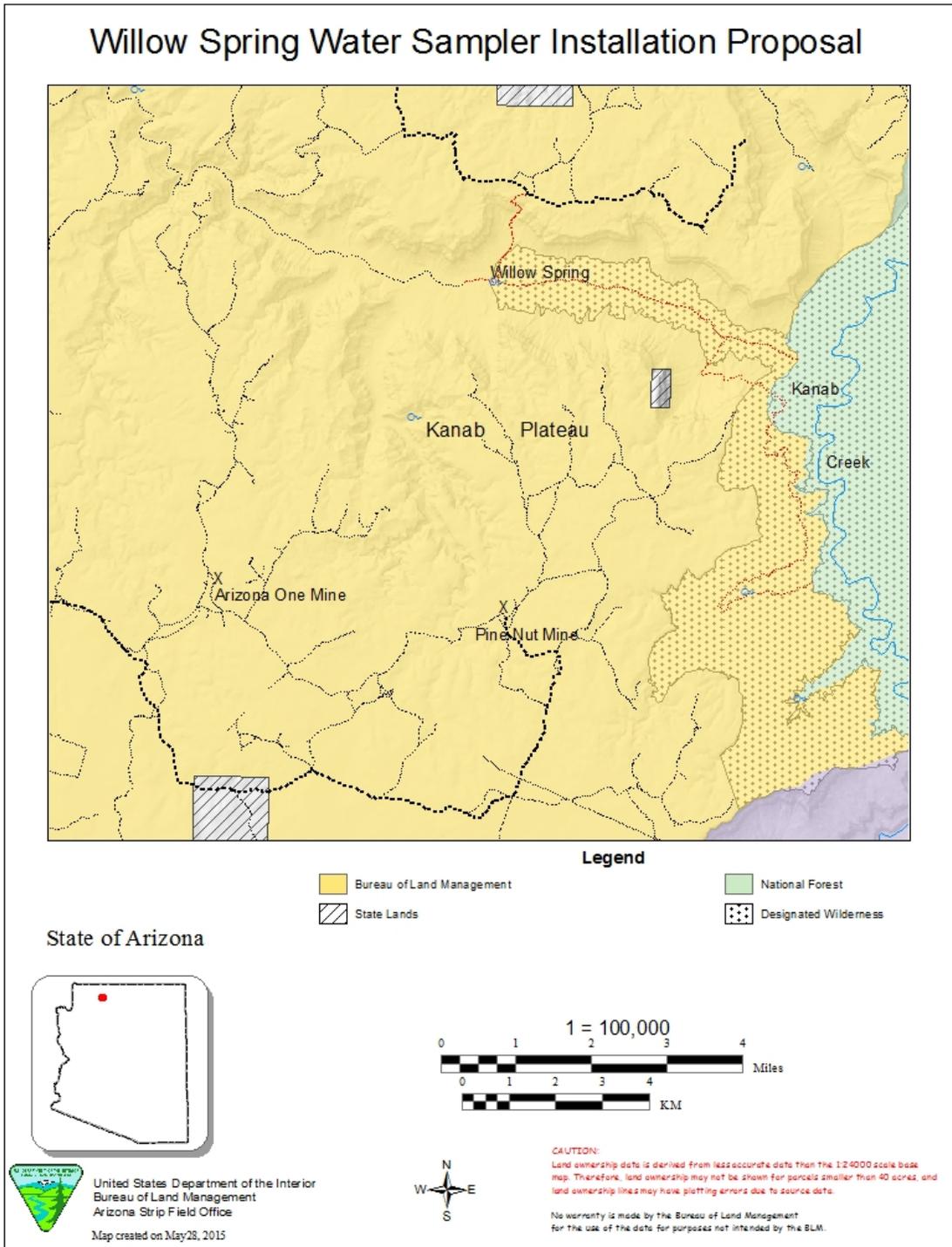
Table 5. Acronyms and Abbreviations

ACRONYM OR ABBREVIATION	
AGFD	Arizona Game and Fish Department
ATV	All-Terrain Vehicle
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
DR	Decision Record
EA	Environmental Assessment
EIS	Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
MCL	Micrograms per Liter
MRDG	Minimum Requirement Decision Guide
NEPA	National Environmental Policy Act
RMP	Resource Management Plan
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management
USGS	United States Geological Survey

LIST OF APPENDICES

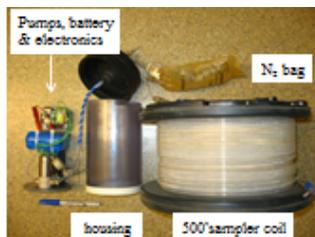
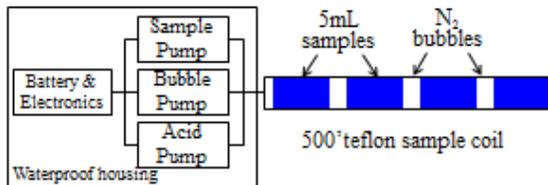
- Appendix 1: Location Map
- Appendix 2: Mini-Sipper Details
- Appendix 3: Overview and Close up of Willow Spring
- Appendix 4: Minimum Requirements Decision Guide
- Appendix 5: Visual Contrast Rating Worksheet

APPENDIX 1: LOCATION MAP

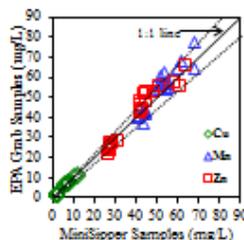


APPENDIX 2: MINI-SIPPER DETAILS

MiniSipper (mini segmented water sampler)



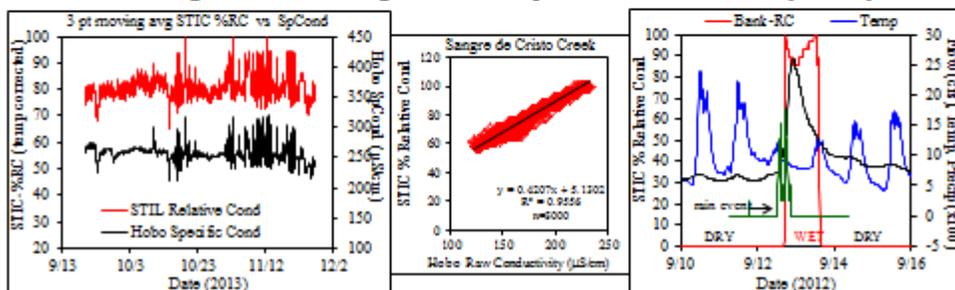
- Small (12" x 10"), lightweight, submerged (3' max),
- ~250 5 mL samples (discrete or daily integrated)
- Samples separated by inert gas bubble, <5% carryover
- Multi-element methods (ICP-MS)
- Up to 12 month deployments (operates under ice)
- Low cost (~\$2500), fewer site visits, lower field costs
- Online acidification, replicates, standards possible
- 10 µm filtration, tracks the 0.45 µm dissolved
- Discrete or integrated sample (hourly subsamples composited to daily integrated)
- Event Response MiniSipper, pre-deploy for flood or hurricane sampling
- Excellent agreement grab samples (within 10%)
- Ideal for remote or difficult to access areas



Thomas Chapin
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 303-236-5795

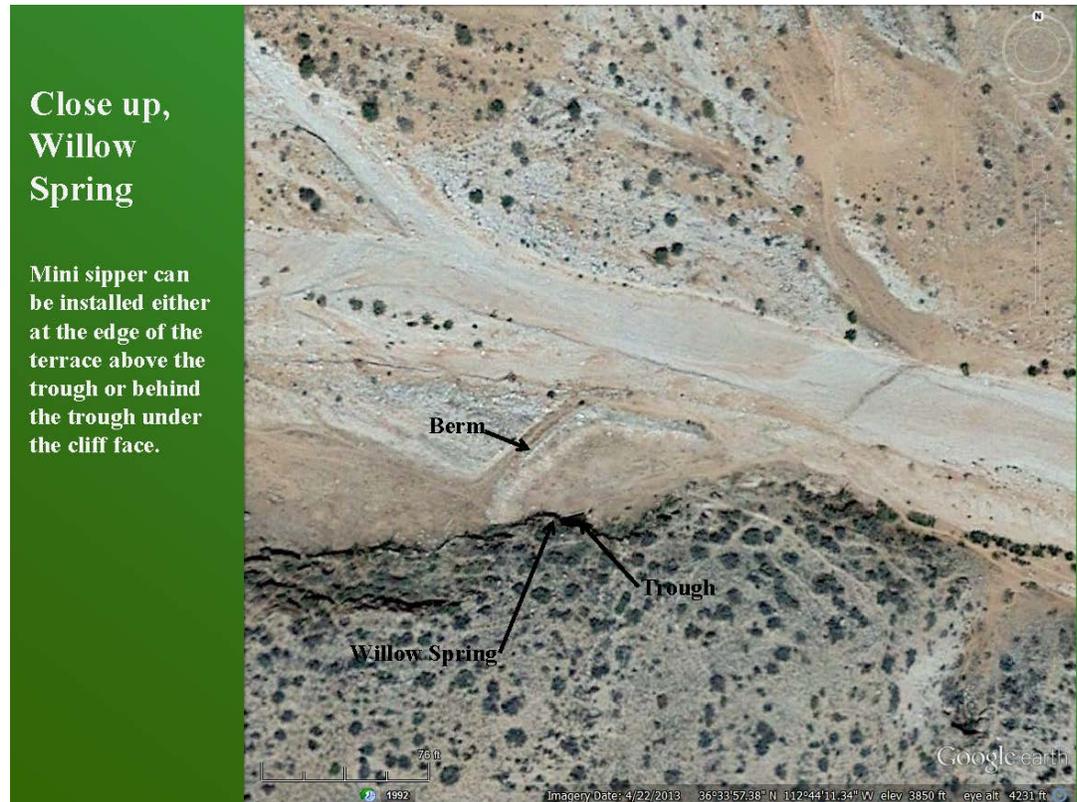
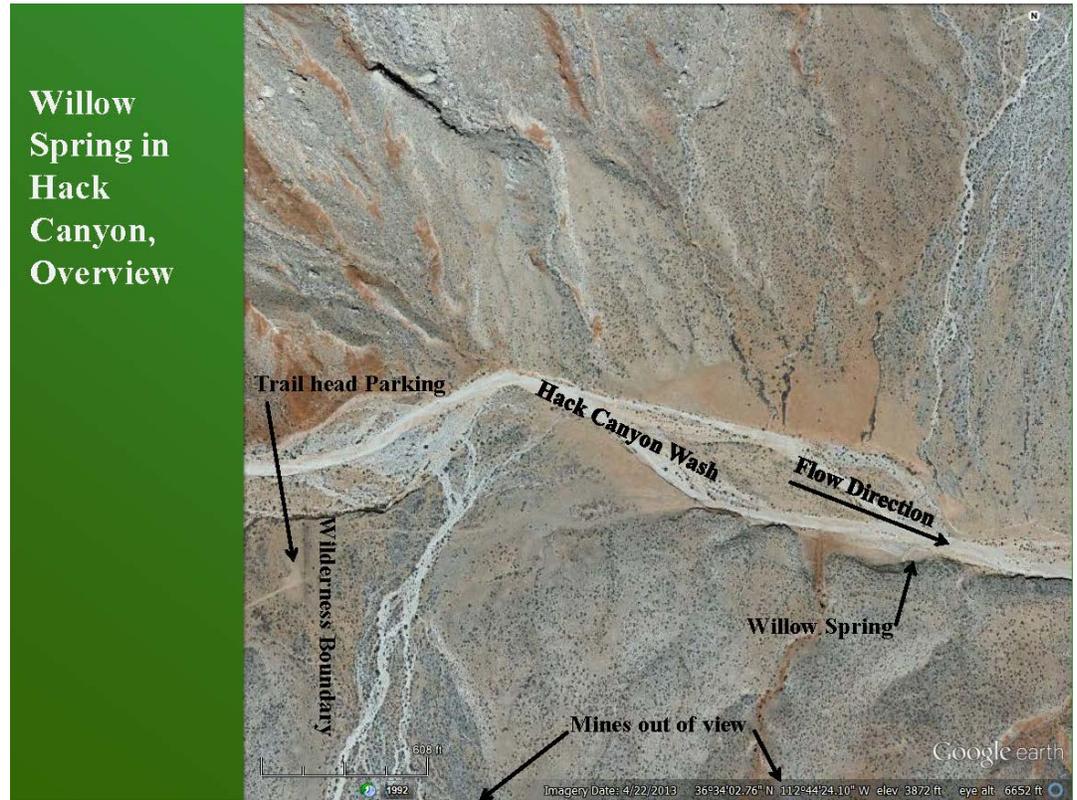
STIC: Stream Temperature Intermittency & Conductivity Logger

- Low cost (\$60+parts), easy to build, small (2.5" x 2"), easily deployed & concealed
- Simple operation, uses Onset Hoboware for instrument control
- Temperature and wet/dry indicator for intermittent flow monitoring
- Data every 15 minutes for 10 months, over-winter operation
- Reliable: >250 deployments with 100% data recovery (so far)
- Rugged (survives debris flows and frozen streams)
- Low-cost **temperature**, **intermittency** and **relative conductivity**:
 - Noisy, low resolution signal but tracks true conductivity ($R^2 > 0.95$)
 - Linear relative conductivity response at low SpCond levels
 - Need multi-point calibration if you want quasi specific conductivity
 - Low cost, high-resolution, long-duration temp & relative conductivity surveys



Contact: Thomas Chapin, tchapin@usgs.gov, 303-236-5795

APPENDIX 3: OVERVIEW AND CLOSE UP OF WILLOW SPRING



APPENDIX 4: MINIMUM REQUIREMENTS DECISION GUIDE



ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"...except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act..."

-- The Wilderness Act of 1964

Project Title: **Willow Spring Water Sampler Installation**

MRDG Step 1: Determination

Determine if Administrative Action is Necessary

Description of the Situation

What is the situation that may prompt administrative action?

The U.S. Geological Survey (USGS) has proposed to install an automated water sampler at Willow Spring, in Hack Canyon, within the Kanab Creek Wilderness. The water sampler would provide USGS with temporal data on background water chemistry (uranium and trace elements) of the spring, as well as possible uranium mine related impacts to water chemistry. The project would support the 15-year science plan that was developed to support the data gaps identified in the 2012 Northern Arizona Mineral Withdrawal Record of Decision.

The proposed project would gather data to satisfy questions regarding impacts of uranium mining activity and naturally occurring uranium resources in the region. The project is therefore needed to investigate potential health hazards for the public, livestock, wildlife and the environment.

The USGS proposes to install the water sampler device within the water trough containing the spring. The device would be placed in a 5-gallon container and then hidden in the vegetation of the trough

consisting of cattails and sedges. The accompanying battery would be in a container placed just outside the trough on the left corner behind existing corral boards, rocks and vegetation. The water sample collection device would be placed in such a manner that it does not interfere with livestock or wildlife use of the trough. The sampler is small (approximately 12-inches x 10 inches) and lightweight, so would be transported with the battery to the spring on foot. The sampler is designed to operate up to 6 months unattended, and would be visited 2-3 times per year for inspection, maintenance and to retrieve water samples.

Arizona BLM's strategic goals (in part) direct assistance to other regulatory agencies to remediate health hazards at its uranium mine sites. The project would therefore attempt to learn if uranium mining activity could affect the water chemistry in the drainages leading to the Colorado River or if the chemicals in the water are naturally occurring. The ultimate goal is to find out more information on this matter and then find ways to eliminate, or at least greatly reduce, the hazard or potential hazards of uranium mining. The placing of water chemistry samplers to monitor the levels of uranium radioactivity that may be present would increase the information on the amount of uranium or trace/related elements in Willow Spring. This could increase the understanding as to how the chemicals in water released by uranium mining, if any, could potentially affect the waters entering the Colorado River watershed and affect nearby resources.

Options Outside of Wilderness

Can action be taken outside of wilderness that adequately addresses the situation?

YES

STOP – DO NOT TAKE ACTION IN WILDERNESS

NO

EXPLAIN AND COMPLETE STEP 1 OF THE MRDG

Explain:

There are only two spring locations that are close enough to historical and current mining activity in the Kanab Creek drainage to evaluate for potential impacts: Pigeon Spring (on National Forest System lands near the reclaimed Pigeon Mine) and Willow Spring (in Hack Canyon downstream of the reclaimed Hack Canyon Mines and near the active Arizona 1 and Pinenut mines). Both of these sites are in the wilderness and both have limited historical water-chemistry data that suggests the potential for impacts. The USGS is requesting permission from the BLM to install a mini-sipper sampler at the spring located on BLM-administered land (Willow Spring). The mini-sipper would collect daily water samples for up to a 6-month period that would be analyzed for major ions and trace elements to evaluate changing water chemistry, and daily, weekly, and monthly trends.

Criteria for Determining Necessity

Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

YES NO

Explain:

None known.

B. Requirements of Other Legislation

Is action necessary to meet the requirements of other federal laws? Cite law and section.

YES NO

Explain:

None.

C. Wilderness Character

Is action necessary to preserve one or more of the qualities of wilderness character, including: Untrammeled, Undeveloped, Natural, Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation, or Other Features of Value?

UNTRAMMELED

YES NO

Explain:

The action is not necessary to preserve this characteristic, and would not trammel the wilderness character.

UNDEVELOPED

YES NO

Explain:

The action is not necessary to preserve this characteristic, and would not add any noticeable development. The action adds a small water chemistry monitor, which would be encased within a cooler plus a battery to power the device. Due to its small size, it should be “substantially unnoticeable” within the vegetation inside the existing water trough at Willow Spring.

NATURAL

YES NO

Explain:

The action is not necessary to preserve this characteristic, and would not impact the area's naturalness. The action adds a small water chemistry monitor, which would be encased within a cooler plus a battery to power the device. Due to its small size, it should be "substantially unnoticeable" within the vegetation inside the existing water trough at Willow Spring.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

YES NO

Explain:

The action is not necessary to preserve this characteristic, and would not add a noticeable amount of visitation to the area. Because the sampler is capable of autonomous operation, the number of site visits for maintenance of the sampler and collection of water samples can be limited to 2-3 trips per year with just one or two people. The action would have no effect on primitive and unconfined recreation.

OTHER FEATURES OF VALUE

YES NO

Explain:

There are no "other features of value" that are specifically mentioned in the Arizona Wilderness Act of 1984, which designated this wilderness area. However, Kanab Creek is one of the major tributaries of the Colorado River, and is the largest tributary canyon system on the north side of the Grand Canyon. Kanab Creek and its feeder streams have cut a network of dramatic gorges with vertical walls deep into the Kanab and Kaibab Plateaus; in the creek bottom there are walls sculpted by wind and water into a maze of fins, knobs, and potholes, surrounded by riparian vegetation. The action is not necessary to preserve this characteristic, and would not affect these features.

Step 1 Decision

Is administrative action necessary in wilderness?

Decision Criteria

- | | | |
|--|------------------------------|--|
| A. Existing Rights or Special Provisions | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| B. Requirements of Other Legislation | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| C. Wilderness Character | | |
| Untrammeled | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |
| Undeveloped | <input type="checkbox"/> YES | <input checked="" type="checkbox"/> NO |

Natural

YES NO

Outstanding Opportunities

YES NO

Other Features of Value

YES NO

Is administrative action necessary in wilderness?

YES

EXPLAIN AND PROCEED TO STEP 2 OF THE MRDG

NO

STOP – DO NOT TAKE ACTION IN WILDERNESS

Explain:

There are only two spring locations that are close enough to historical and current mining activity in the Kanab Creek drainage to evaluate for potential impacts: Pigeon Spring (on National Forest System lands near the reclaimed Pigeon Mine) and Willow Spring (in Hack Canyon downstream of the reclaimed Hack Canyon Mines and near the active Arizona 1 and Pinenut mines). Both of these sites are in the wilderness area and both have limited historical water-chemistry data that suggests the potential for impacts from mining.

Willow Spring was chosen as a site to monitor water chemistry because it is located in close proximity to the reclaimed Hack Canyon mines, and the active Arizona 1 and Pinenut Mines. Willow Spring discharges water from a perched water-bearing zone (the Kaibab and Hermit Formations) that, based on mine logs of the Arizona 1 and Pinenut mines, could have been in contact with a uranium ore body. Concentrations of dissolved uranium for limited water samples from Willow Spring indicate a range of values from 20 to 25 micrograms per liters. These values are 4 to 5 times greater than the typical estimated background value for dissolved uranium of 5.0 micrograms per liter (MCL). They are also still below the MCL for dissolved uranium of 30.0 micrograms per liter. Other trace elements (arsenic, molybdenum, selenium, etc.) associated with uranium ore bodies are also present in this spring at higher than normal concentrations.

MRDG Step 2

Determine the Minimum Activity

Other Direction

Is there “special provisions” language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

YES

DESCRIBE OTHER DIRECTION BELOW

NO

SKIP AHEAD TO TIME CONSTRAINTS BELOW

Describe Other Direction:

None known.

Time Constraints

What, if any, are the time constraints that may affect the action?

None known.

Components of the Action

What are the discrete components or phases of the action?

Component X: *Example: Transportation of personnel to the project site*

Component 1: Transport personnel (1-2 people) and equipment to site.

Component 2: Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.

Component 3: Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.

Component 4: Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.

Component 5: Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.

Component 6: Transport personnel (1-2 people) and equipment from site.

Component 7:

Component 8:

Component 9:

Proceed to the alternatives.

Refer to the [MRDG Instructions](#) regarding alternatives and the effects to each of the comparison criteria.

MRDG Step 2: Alternatives

Alternative 1: Proposed Action – Install Chapin mini-Sipper

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Component Activities

How will each of the components of the action be performed under this alternative?

<u>Component of the Action</u>		Activity for this Alternative
X	<i>Example: Transportation of personnel to the project site</i>	<i>Example: Personnel will travel by horseback</i>
1	Transport personnel (1-2 people) and equipment to site.	Personnel would travel to site on foot.
2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	Sampler and battery would be installed by hand – no tools are necessary to perform this work.
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	A small, mechanical Chapin “mini-sipper” water chemistry monitoring device would be used to autonomously collect the water data.
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	Personnel would travel to/from site on foot; no tools would be necessary to perform this component of the action.
5	Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.	Sampler and battery would be removed by hand – no tools are necessary to perform this work.
6	Transport personnel (1-2 people) and equipment from site by foot.	Personnel would travel to/from site on foot.
7		
8		
9		

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Transport personnel (1-2 people) and equipment to site.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Transport personnel (1-2 people) and equipment from site by foot.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects		0	0	NE
<u>Untrammeled Total Rating</u>		NE		

Explain:

UNDEVELOPED

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Transport personnel (1-2 people) and equipment to site.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Transport personnel (1-2 people) and equipment from site by foot.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects		0	0	NE
<u>Undeveloped Total Rating</u>		NE		

Explain:

NATURAL

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Transport personnel (1-2 people) and equipment to site.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

6	Transport personnel (1-2 people) and equipment from site by foot.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects		1	0	NE
<u>Natural Total Rating</u>		+1		

Explain:

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Transport personnel (1-2 people) and equipment to site.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Transport personnel (1-2 people) and equipment from site by foot.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects		0	0	NE
<u>Solitude or Primitive & Unconfined Rec. Total Rating</u>		NE		

Explain:

OTHER FEATURES OF VALUE

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Transport personnel (1-2 people) and equipment to site.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Transport personnel (1-2 people) and equipment from site by foot.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects		+1	0	NE
<u>Other Features of Value Total Rating</u>		NE		

Explain:

<p>Traditional Skills <i>What is the effect of each component activity on traditional skills?</i></p>

TRADITIONAL SKILLS

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	Transport personnel (1-2 people) and equipment to site.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	Remove water chemistry sampler and 12-volt battery from spring site (by hand – no tools necessary) at the end of the research period.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	Transport personnel (1-2 people) and equipment from site by foot.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects				NE
<u>Traditional Skills Total Rating</u>		NE		

Explain:

Economics

What is the estimated cost of each component activity?

COST

<u>Component Activity for this Alternative</u>		Estimated Cost
X	<i>Example: Personnel will travel by horseback</i>	\$1,900
1	Transport personnel (1-2 people) and equipment to site.	
2	Install water chemistry sampler and 12-volt battery by hand (no tools necessary) in/near existing wooden water trough at spring.	
3	Sampling device with one 12-volt battery would be left at the spring for up to 1½ years.	\$2,500
4	Personnel (1-2 people) would walk to the spring up to 3 times per year to retrieve data, maintain or replace the sample unit and/or battery.	
5	Remove water chemistry sampler and 12-volt battery from spring site	

	(by hand – no tools necessary) at the end of the research period.	
6	Transport personnel (1-2 people) and equipment from site by foot.	
7		
8		
9		
Total Estimated Cost		\$2,500

Explain:

Safety of Visitors & Workers
What is the risk of this alternative to the safety of visitors and workers? What mitigation measures will be taken?

RISK ASSESSMENT Severity of Accident	Probability of Accident				
	Frequent	Likely	Common	Unlikely	Rare
Catastrophic: Death or permanent disability	1 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
Critical: Permanent partial disability or temporary total disability	1 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>
Marginal: Compensable injury or illness, treatment, lost work	2 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>
Negligible: Superficial injury or illness, first aid only, no lost work	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>
Risk Assessment	Low Risk				

Risk Assessment Code

1 = Extremely High Risk	2 = High Risk	3 = Moderate Risk	4 = Low Risk
-------------------------	---------------	-------------------	--------------

Explain:

Summary Ratings for Alternative 1

Wilderness Character	
<u>Untrammeled</u>	NE

Undeveloped	NE
Natural	NE
Solitude or Primitive & Unconfined Recreation	NE
Other Features of Value	NE
Wilderness Character Summary Rating	NE

Traditional Skills	
Traditional Skills	NE

Economics	
Cost	\$2,500

Safety	
Risk Assessment	Low Risk

MRDG Step 2: Alternatives

Alternative 2: No Action

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

No activity would occur (i.e., no water chemistry sampler would be installed).

Component Activities

How will each of the components of the action be performed under this alternative?

<u>Component of the Action</u>		Activity for this Alternative
X	<i>Example: Transportation of personnel to the project site</i>	<i>Example: Personnel will travel by horseback</i>
1		
2		
3		
4		
5		
6		
7		
8		
9		

Wilderness Character

What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

1	No Activity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects				NE
<u>Untrammed Total Rating</u>		NE		

Explain:

UNDEVELOPED

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No Activity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects				NE
<u>Undeveloped Total Rating</u>		NE		

Explain:

NATURAL

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No Activity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects				NE
<u>Natural Total Rating</u>		NE		

Explain:

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No Activity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects				NE
<u>Solitude or Primitive & Unconfined Rec. Total Rating</u>		NE		

Explain:

OTHER FEATURES OF VALUE

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No Activity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects				NE
<u>Other Features of Value Total Rating</u>		NE		

Explain:

Traditional Skills

What is the effect of each component activity on traditional skills?

TRADITIONAL SKILLS

<u>Component Activity for this Alternative</u>		Positive	Negative	No Effect
X	<i>Example: Personnel will travel by horseback</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
1	No Activity	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

2		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Total Number of Effects				NE
<u>Traditional Skills Total Rating</u>		NE		

Explain:

Economics
What is the estimated cost of each component activity?

COST

<u>Component Activity for this Alternative</u>		Estimated Cost
X	<i>Example: Personnel will travel by horseback</i>	\$1,900
1	No Activity	\$0
2		
3		
4		
5		
6		
7		
8		
9		
<u>Total Estimated Cost</u>		\$0

Explain:

Safety of Visitors & Workers

What is the risk of this alternative to the safety of visitors and workers? What mitigation measures will be taken?

RISK ASSESSMENT Severity of Accident	Probability of Accident				
	Frequent	Likely	Common	Unlikely	Rare
Catastrophic: Death or permanent disability	1 <input type="checkbox"/>	1 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
Critical: Permanent partial disability or temporary total disability	1 <input type="checkbox"/>	2 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>
Marginal: Compensable injury or illness, treatment, lost work	2 <input type="checkbox"/>	3 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>
Negligible: Superficial injury or illness, first aid only, no lost work	3 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>
<u>Risk Assessment</u>	Low Risk				

Risk Assessment Code

1 = Extremely High Risk	2 = High Risk	3 = Moderate Risk	4 = Low Risk
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Explain:

No activity, so no possibility of risk to the safety of visitors and workers.

Summary Ratings for Alternative 2

Wilderness Character	
Untrammeled	NE
Undeveloped	NE
Natural	NE
Solitude or Primitive & Unconfined Recreation	NE
Other Features of Value	NE
Wilderness Character Summary Rating	NE
Traditional Skills	
Traditional Skills	NE

Economics	
Cost	\$0
Safety	
Risk Assessment	Low Risk

MRDG Step 2: Alternatives Not Analyzed

Alternatives Not Analyzed

What alternatives were considered but not analyzed? Why were they not analyzed?

1) Having someone walk in each week to collect water samples.

This alternative would be to manually collect water samples from Willow Spring in order to collect the desired water chemistry data. However, this type of manual sample collection activity would require weekly trips into the spring site, and would therefore result in greater potential impacts to the solitude of that portion of the wilderness in and around the spring area.

2) Drilling a monitoring well outside of wilderness to collect water samples.

This also seemed like an unreasonable expense compared to the scope of the project. This approach also assumes the well would hit the natural water flow.

MRDG Step 2: Alternative Comparison

Alternative 1:	Installing a MiniSipper
Alternative 2:	No Action
Alternative 3:	
Alternative 4:	

Wilderness Character	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	+	-	+	-	+	-	+	-
Untrammeled								
Undeveloped								
Natural								
Solitude/Primitive/Unconfined								
Other Features of Value								
Total Number of Effects								
Wilderness Character Rating	0		0					

Traditional Skills	Alternative 1		Alternative 2		Alternative 3		Alternative 4	
	+	-	+	-	+	-	+	-
Traditional Skills								
Traditional Skills Rating	0		0					

Economics	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Cost	\$2,500	0		

Safety of Visitors & Workers	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Risk Assessment	Low Risk	Low Risk		

MRDG Step 2: Determination

Refer to the [MRDG Instructions](#) before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative

<input checked="" type="checkbox"/>	Alternative 1:	Install a water chemistry monitoring device in the water trough at Willow Spring
<input type="checkbox"/>	Alternative 2:	
<input type="checkbox"/>	Alternative 3:	

Explain Rationale for Selection:

The installation of a “mini-sipper” water monitor will allow long-term water monitoring without significant effects to the existing wilderness characteristics (naturalness, solitude and primitive and unconfined recreation).

Describe Monitoring & Reporting Requirements:

Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

<u>Prohibited Use</u>	<u>Quantity</u>
<input type="checkbox"/> Mechanical Transport:	
<input type="checkbox"/> Motorized Equipment:	
<input type="checkbox"/> Motor Vehicles:	
<input type="checkbox"/> Motorboats:	
<input type="checkbox"/> Landing of Aircraft:	
<input type="checkbox"/> Temporary Roads:	
<input type="checkbox"/> Structures:	
<input checked="" type="checkbox"/> Installations:	Install a “mini-sipper” water chemistry monitor. The unit is small (12” x 10”) and would be protected inside a 5 gallon bucket that would be camouflaged by use of a native rock color paint on the

exterior of the bucket and either installed in the existing livestock water trough (submerged in water up to 3 feet deep) or hidden behind rock or vegetation in the area surrounding the site. The unit comes with a 12 volt battery which would be placed just outside the trough and hidden behind the existing water trough, rock and vegetation.

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following review and decision authorities:

Prepared	Name	Position
	Jon Jasper	Outdoor Recreation Planner
	Signature	Date

Recommended	Name	Position
	Diana Hawks	Recreation and Cultural Team Lead
	Signature	Date

Recommended	Name	Position
	Signature	Date

Approved	Name	Position
	Lorraine M. Christian	Arizona Strip Field Manager
	Signature	Date

APPENDIX 5: VISUAL CONTRAST RATING SHEET

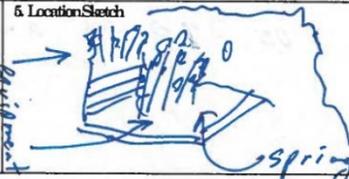
Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date 7/17/2015
District Arizona Strip
Resource Area Arizona Strip FO
Activity (program) Lands

SECTION A. PROJECT INFORMATION

1. Project Name <u>Willow Spring Sippee</u>	4. Location Township <u>T37N</u> Range <u>R4W</u> Section <u>33</u>	5. Location Sketch 
2. Key Observation Point <u>Looking at Willow Spr.</u>		
3. VRM Class <u>Class 1</u>		

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	<u>Spring in wide canyon bottom</u>	<u>cluster of low desert vegetation</u>	<u>trough surrounding spring. sign boards, posts.</u>
LINE	<u>Horizontal line from rock bedding. Vertical cliffs</u>	<u>horizontal lines from canyon bottom</u>	<u>horizontal from trough vertical from sign and post</u>
COLOR	<u>White, grey, red.</u>	<u>green, tan, brown</u>	<u>white, grey, brown</u>
TEXTURE	<u>Rough texture around spring. Medium landscape.</u>	<u>medium in foreground fine in background.</u>	<u>mostly smooth textures.</u>

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LANDWATER	2. VEGETATION	3. STRUCTURES
FORM	<u>5-gallon bucket plus car battery</u>	<u>will be placed in vegetation with little or no change</u>	<u>none</u>
LINE	<u>subtle vertical lines from bucket</u>	<u>no change</u>	<u>none</u>
COLOR	<u>will be color matched</u>	<u>low to no change should blend in</u>	<u>none</u>
TEXTURE	<u>smooth</u>	<u>will be masked by vegetation - smooth</u>	<u>none</u>

SECTION D. CONTRAST RATING SHORT TERM LONG TERM

ELEMENTS	DEGREE OF CONTRAST	FEATURES												2. Does project design meet visual resource management objectives? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side)	
		LANDWATER BODY (1)				VEGETATION (2)				STRUCTURES (3)					
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None		
Form															3. Additional mitigating measures recommended? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No (Explain on reverse side) Evaluator's Names _____ Date _____ <u>Jon Jas per 7/17/2015</u>
Line				X								X			
Color				X								X			
Texture				X				X				X			

SECTION D. (Continued)

Comments from item 2.

* The equipment could be placed within vegetation in spring. or more preferred within the nearby vegetation. (maybe up to 05 - 20 ft. away).

Additional Mitigating Measures (See item 3)

All items will be either painted or covered with to match surroundings.
The equipment should be well placed within surrounding vegetation to be well hidden.
Tubes will be lightly buried or covered.