

**National Park Service  
U.S. Department of the Interior  
Denver Service Center**



**Wind Cave National Park  
South Dakota**

## **Project to Replace the Deteriorated Cave Lighting System**

### **Finding of No Significant Impact**

**September 2005**

#### **BACKGROUND**

Wind Cave National Park was established in 1903 to protect Wind Cave and the underground resources of this unique site. Since the original designation, the purpose of the park has expanded from cave preservation alone to protection of both surface and subsurface resources. Wind Cave remains as one of the park's primary features and is recognized worldwide as a significant site. Approximately 110,000 visitors enter the visitor center each year, and about 89,000 participate in cave tours. The existing cave lighting system provides trail and feature illumination along approximately one mile of paved tour routes within the cave. It is an integral part of interpreting the unique geology of Wind Cave to park visitors.

The cave lighting system is deteriorating and approaching the end of its serviceable life. The system was originally installed in 1931, with rehabilitation occurring in 1955, 1980, and 1988. The basic design of the system is no longer consistent with professional standards for safety and poses health and safety risks to park employees and visitors. The primary power system distributes very high voltage (2400 volts) throughout the cave, and cables carrying this power lack proper physical protection. Due to the age of the system, lighting controls and switches have become unreliable, and many replacement parts are no longer available. The existing power, control panels, and light fixtures are not properly grounded and pose a hazard in the moist cave environment. The artificial light and heat introduced in Wind Cave by the existing lighting system, which primarily uses incandescent lamps, promotes algal growth in the cave and is not optimal for highlighting cave features. The use of the same types of fixtures and lamps also leads to difficulty in discerning features from hazards or narrow trail sections.

The National Park Service intends to remove the deteriorated lighting system and replace it with a new, energy-efficient lighting system that will eliminate health and safety risks, protect cave resources, enhance visitor appreciation of the unique geology of the cave, and improve park operational efficiency.

An environmental assessment was prepared to analyze the impacts of continuing current management (Alternative A, the no action alternative) and of implementing an alternative that replaces the deteriorated cave lighting system (Alternative B, the preferred alternative). The preferred alternative will protect public health and safety and cave resources, with few adverse effects to natural and cultural resources. The analysis was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (40 CFR 1508.9), the National Park Service

*Director's Order #12: Conservation Planning, Environmental Impact Analysis and Decision-making, and Section 106 of the National Historic Preservation Act of 1966, as amended.*

## **SELECTED ACTION**

Alternative B, the preferred alternative, is the selected action. The selected action will remove the existing deteriorated lighting system, including power lines, lighting control and distribution panels, and light fixtures, and replace it with a new, energy-efficient lighting system. The new lighting system will consist of a new power distribution system, including new primary and secondary conductors, conduit, and accessories, a new lighting control system, with distribution and control panels, disconnects, and transformers, and new lighting fixtures for trail and cave feature lighting. In addition, new communication and control wiring will be installed in an existing telephone conduit within the elevator shaft and in a common utility trench between the elevator building and visitor center.

The selected action will replace the existing 2400-volt power distribution system with a 480-volt system. The existing diesel generator will have enough capacity to provide backup power to the new, lower voltage lighting system when power failures occur. A new conduit will be installed in the elevator shaft to carry power into the cave, and the existing conduit that carries the 2400-volt wires will be left in place as a spare for future use. All primary and secondary cables within the cave will be replaced; the new cables will have adequate physical protection and be color-coordinated so that primary and secondary lines are distinguishable from one another. They will also be strategically placed to best protect them from future damage, to blend with the surroundings, and to avoid sensitive cave resources.

The six existing transformers will be replaced with new, properly grounded transformers appropriate for the 480-volt system and with additional lightning/surge protection. The lighting control system will be replaced with a modern, energy-efficient system that will allow sections of the tour route to be lighted independently so that lights will not have to remain on all day. The lighting fixtures and lamps will be replaced with a combination of light-emitting diode (LED) and compact fluorescent fixtures and bulbs, which burn cooler (reducing algal growth), are more efficient, and have a longer lamp life than the existing incandescent lamps. The lamps will be reconfigured to highlight the complexity and unique formations of Wind Cave and to guide visitors to appropriate areas and away from sensitive cave resources. System components and material from the replaced system will be removed from the cave and appropriately disposed. The selected action will occur in incremental stages to minimize impacts on the visitor experience, with most construction or electrical work occurring in the low visitation season from Labor Day to Memorial Day. Replacement of the entire system is anticipated to take up to two years.

## **MITIGATION MEASURES OF THE SELECTED ACTION**

Mitigation measures or conditions are presented as part of the selected action and have been developed to lessen the adverse effects. The following mitigation measures will be implemented for the selected action:

### **Practices to Minimize Effects on Cave Resources**

Minimum-impact caving techniques developed by Wind Cave National Park staff will be applied during project activities. Sensitive cave features, which include, but are not limited to, speleothems, extensive or unique sediments, historical items, or items of biological interest, will be avoided by workers performing removal and installation activities.

All individuals working within the cave will undergo training, which will consist of minimum-impact caving techniques, cave resource protection, off trail caving policies, and NPS mandates and philosophy related to cave management and stewardship.

All project work, prior to implementation, will be approved by the Physical Sciences Specialist and Facility Manager.

All lighting equipment and project-related refuse will be removed from the cave, including such materials as electrical wires, light bulbs and fixtures, tape, etc.

Tools and materials used for the lighting project will be stored outside the cave when possible. For multi-day projects, equipment may be stored temporarily inside the cave if along the developed trail and subject to the approval of the Physical Science Specialist and Facility Manager.

All equipment and materials will be cleaned of excess dirt and debris prior to cave entry. Use of chemicals within the cave will be avoided and, if necessary, will only be used upon approval of the Physical Science Specialist.

All bolting, trenching, and digging within the cave must be approved by the Physical Science Specialist, Facility Manager and Park Superintendent.

If any paleontological or cultural artifacts or other features are encountered, all activities will cease and the appropriate personnel immediately contacted. Should historic or prehistoric archeological resources be discovered during project implementation, the park will work with an archeologist meeting the Secretary of the Interior's Standards to ensure that their location is properly documented, the resource protected, and procedures outlined in 36 CFR 800 implemented including contacting the South Dakota State Historic Preservation Office.

Samples of representative historic lighting cables, fixtures, and equipment have been collected and stored by park curatorial staff. If additional historic resources are identified during project activities, these will be collected and stored in a similar manner.

All workers within the cave will wear appropriate clothing to minimize shedding of lint or fibers. Adequate safety equipment will be used when necessary, including approved helmets, ankle-supporting tread shoes, and additional sources of light.

### **Practices to Minimize Effects on Natural Resources**

The common utility corridor where the communication and control wiring will be placed will be backfilled and revegetated with native plants following installation.

### **Practices to Minimize Effects on Public Health and Safety**

Park staff will monitor contractor activities to ensure compliance with safety standards.

For safety when working with electricity, only licensed, professional electricians who are experienced in applying professional standards will perform work on electrical equipment. All electricians working on the system will implement standard safety procedures, including processes for locking out and tagging out electrical equipment.

All trucks hauling lighting equipment, debris, and other loose materials out of the park will be covered or will maintain adequate freeboard.

The testing, storage, transport, and disposal of the existing oil filled transformer and fluorescent bulbs for the new system will comply with state and federal hazardous waste regulations. Mercury containing lamps will either be transported to a recycling facility or disposed at a permitted hazardous waste treatment, storage, and disposal facility (TSDF). The PCB-containing contactor will be disposed at a licensed hazardous waste disposal facility consistent with the handling and disposal requirements under the Toxic Substances Control Act.

## **Practices to Minimize Effects on Visitor Experience**

The removal and installation activities associated with the lighting system will not be implemented during high visitor use seasons. Activities will be sequenced to offer visitors access to certain portions of the cave.

Cave tours will be coordinated so that visitors will not encounter project activities. Materials for the project will be stored, to the extent possible, out of high visitor access areas to minimize visual intrusion.

## **OTHER ALTERNATIVES CONSIDERED**

The **no action alternative** would continue present management and conditions. It does not imply or direct discontinuing the present action or removing existing uses, development, or facilities. The no action alternative provided the basis for comparing the management direction and environmental consequences of the preferred alternative.

The no action alternative would leave in place the existing cave lighting system, without substantial changes to maintenance or operation of the system. No major efforts would be undertaken to minimize the safety hazards of the existing system. Ongoing minor repair and maintenance activities would continue on an “as needed” basis, including repair or replacement of failed or worn lighting control panels, switches, breakers, power transformers, primary and secondary cables and conduits, and lighting fixtures and bulbs.

### **Alternatives Considered and Dismissed**

**Replace the existing 2400-volt system with a new 2400-volt system.** This alternative would have replaced the existing system with a new, upgraded 2400-volt power system. The new system would replace the deteriorating system with very similar components, and there would be no substantial changes to the fundamental design of the system. In addition, this alternative would upgrade the current safety deficiencies to modern standards. This alternative was dismissed from further consideration because of the overall risk to health and safety and to cave resources by having such high voltage distributed throughout the cave.

**Replace the existing 2400-volt system with multiple 480-volt systems.** The park considered an alternative to replace the existing single power system with multiple 480-volt systems. This would increase reliability (a failure on any one 480-volt feeder would only result in a loss of lighting connected to that feeder) and address current health and safety risks. New service entrances to the cave and outdoor transformers in addition to the existing entrance and transformer would be necessary, depending on the number of systems the park desired. This alternative was dismissed because the surface disturbance and impacts on cave resources that would occur from adding one or more service entrances into the cave was not considered acceptable.

**Retire the existing cave lighting system and use flashlights and candles only.** The park considered the alternative of abandoning the deteriorating lighting system and running all tours with only flashlights and candles, similar to those currently conducted on the Candlelight Tour. This alternative was dismissed because of inherent safety concerns and it would minimize opportunities for interpretation of Wind Cave to many of the park’s visitors while increasing the risk from vandalism.

**Cancel all organized tours within the cave.** An alternative was discussed that would cancel organized tours within the cave to protect cave resources and protect public health and safety. This alternative was rejected because it would not allow public use, enjoyment, and interpretation of the unique geology and formations within Wind Cave.

**Use an alternative energy source to provide power for the cave lighting system.** An alternative was considered to use an alternative energy source, such as solar or wind power, to provide power for the cave lighting system. Black Hills Power and Light, the park's energy provider, currently produces electricity exclusively using coal-fired power plants. They do not have alternative energy sources as an option to customers. Black Hills Electric Cooperative, a member South Dakota Rural Electric Association, provides alternative wind energy to its customers; however, the park cannot access this grid. In addition, the park's energy demand would likely be higher than the cooperative could provide.

The park could possibly generate the power needed for the lighting system by using solar panels or windmills, but the amount of electricity needed to operate the cave lighting system would necessitate very large solar panel arrays or a series of windmills that would intrude on the visual landscape. Therefore, this alternative was dismissed because the level of impact on the cultural landscape of the park's Historic District and natural resources would be undesirable. In addition, surface disturbance and installation near the visitor center and administrative area would be required.

## **ENVIRONMENTALLY PREFERRED ALTERNATIVE**

The environmentally preferred alternative is the alternative that will best promote national environmental policy expressed in the National Environmental Policy Act. The environmentally preferred alternative would cause the least damage to the biological and physical environment, and would best protect, preserve, and enhance historical, cultural, and natural resources.

Section 101(b) of the National Environmental Policy Act identifies six criteria to help determine the environmentally preferred alternative. The act directs that federal plans should:

- Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
- Assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
- Attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
- Preserve important historical, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;
- Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
- Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.

Continuing the current conditions under Alternative A would not be effective in meeting these criteria. Without replacing the existing lighting system with a modern system that integrates the best professional safety standards, the National Park Service would not be providing the safest environment possible for visitors and park employees. Without upgrading the system, lighting along the tour routes would continue to remain on all day, and the rapid growth of algae would persist. Continued use of incandescent lighting would not provide the best use of electrical energy. Overall, the selected action will eliminate public health and safety risks and more efficiently use non-renewable energy sources.

Alternative B is preferred over the no action alternative. With implementation of this alternative, the National Park Service will better be able to:

- Provide visitors and park staff with safe, healthful surroundings by eliminating the health and safety risks associated with the high voltage system that is not up to current professional standards for safety,

- Protect sensitive cave resources by reducing algal growth within the cave and improving the NPS' ability to preserve important historical, cultural, and natural aspects of our national heritage, and
- Reduce the park's dependence on non-renewable energy from coal-fired electric power plants.

Therefore, Alternative B, the selected action, is the environmentally preferred alternative.

## **THE SELECTED ACTION AND SIGNIFICANCE CRITERIA**

As defined in 40 CFR §1508.27, significance is determined by examining the following criteria:

*Impacts that may have both beneficial and adverse aspects and which on balance may be beneficial, but that may still have significant adverse impacts which require analysis in an EIS.*

No long-term major adverse or beneficial impacts were identified that require analysis in an environmental impact statement.

Moderate, beneficial effects will result in the long term from eliminating the health and safety risks associated with the existing system, specifically from installing a lower voltage system, replacing deteriorated cabling, and having a more efficient system that experiences less blackouts. However, in the short term, adverse effects of negligible intensity are expected during installation activities due to the unique working conditions within the cave and the inherent risks associated with working with electricity.

Moderate, long-term, beneficial effects on cave resources will result from the overall reduced growth of algae, reduced potential for inadvertent visitor damage, and the reduced physical damage to cave formations from a reduction in maintenance visits.

Negligible, adverse effects will occur during construction activities due to the presence of increased traffic in the cave, which is associated with increased detrital input, heat, and carbon dioxide emissions. Because the project is helping to ensure the continued preservation of cave resources, ethnographic resources will also have beneficial effects of minor intensity.

Park operations will experience long-term, minor to moderate, beneficial effects from the reduction of labor demand as less maintenance and algae removal activities will be required. Energy use will also be dramatically reduced with the new system, which will be a moderate, beneficial effect, as a result of the integration of a more efficient lighting control system and light sources.

Visitor use and experience will benefit in the long term from the use of more appropriate lighting to highlight geologic features and a reduction in algae growth; however, short-term, adverse effects will occur during project activities from the re-routing of visitors to certain areas to avoid electrical work. These effects will range in intensity, as sometimes work may or may not be noticeable, and could range up to moderate if the cave ever needed to be closed for a short period to visitors.

*The degree to which the proposed action affects public health or safety*

Public health and safety was an important issue addressed during development of the preferred alternative. In the short term, the project will have a negligible, adverse effect on health and safety due to workers replacing the lighting system within the confined cave environment. This effect is of negligible intensity because the majority of the work within the cave, removal and placement of primary and secondary cables, will be conducted by experienced cavers and park staff because of their sensitivity to the resource. In addition, only professionally licensed electricians will be working on electrical components of the project.

In the long term, the selected action will have minor to moderate beneficial effects on public health and safety because safety risks associated with the high voltage and inadequate grounding and cable insulation

will be eliminated. In the event of power outages, there will also be backup power provided which eliminates the potential for slips and falls and visitors bumping into cave formations.

*Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas*

There are no prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas within the project area. However, as described in the environmental assessment, the biotic systems of caves are highly specialized, and impacts to these resources are considered long-term. Although the park's cave resources have not been designated as ecologically critical areas, the unique nature of their ecosystem warrants a high level of protection.

Wind Cave has also long been valued by American Indian tribes associated with the park, and there are many traditional stories about holes in the Black Hills that blow wind and that are associated with tribal origins. The Black Hills occupy a very special place in the history, creation stories, and religious beliefs of these groups. Centuries-old American Indian legends tell of a "hole that breathes cool air" near the Buffalo Gap. This "Wind" cave was regarded by Lakota peoples as the site of their origin, and they have many legends about the role the cave played in their culture.

The selected action will have minor to moderate, long-term, beneficial effects on cave resources at Wind Cave from the overall reduced growth of algae, reduced potential for inadvertent visitor damage, and the reduced physical damage to cave formations resulting from the reduction in maintenance visits.

This project lies within the Wind Cave National Park Administrative and Utility Area Historic District, an area that contains 25 structures considered eligible for the National Register of Historic Places. The elevator building is one of the park's historic structures considered eligible for the National Register and is contributing to the Administrative and Utility Area Historic District. The National Park Service determined, with concurrence from the South Dakota State Historic Preservation Officer, that the selected action will have an effect to historic properties either listed on or eligible for listing on the National Register of Historic Places, but that this effect will not be adverse.

*The degree to which the effects on the quality of the human environment is likely to be highly controversial*

There were no highly controversial effects identified during the preparation of the environmental assessment or during the two month public review period which ended July 1, 2005.

*Degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risks*

There were no highly uncertain, unique or unknown risks identified during either preparation of the environmental assessment or during the two month public review period which ended July 1, 2005.

*Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration*

The selected action neither establishes a National Park Service precedent for future actions with significant effects nor will it represent a decision in principle about a future consideration.

*Whether the action is related to other actions with individually insignificant but cumulatively significant impacts*

Projects that were considered in conjunction with the selected action for their cumulative effects include relocation of the park's wastewater treatment facility; construction of a new visitor center parking lot and associated stormwater management; and the development of a cave and karst management plan. Short-

term, adverse effects will occur to public health and safety and visitor experience from implementation of the selected action; however, no other past, present, and reasonably foreseeable future actions are expected to contribute adverse effects. The long-term effects of the selected action on public health and safety, cave resources, ethnographic resources, visitor use and experience, park operations, and energy requirements and conservation potential will be beneficial and range from minor to moderate in intensity. These long-term effects, in conjunction with the beneficial effects from the relocation of the wastewater treatment facility, construction of a new parking lot, and development of a cave and karst management plan, will produce long-term, moderate, beneficial cumulative effects.

*Degree to which the action may adversely affect districts, sites, highways, structures, or objects listed on National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources*

The National Park Service determined, and the South Dakota State Historic Preservation Officer concurred on June 10, 2005, that there will be an effect to historic properties either listed on or eligible for listing on the National Register of Historic Places, but that this effect will not be adverse.

*Degree to which the action may adversely affect an endangered or threatened species or its critical habitat*

There will be no effect to threatened or endangered species as a result of implementation of the selected action because no federally listed species occur in the project area. The U.S. Fish and Wildlife Service was contacted regarding this project, and the Service agreed on March 31, 2004 with the park's finding of no effect on threatened and endangered species.

*Whether the action threatens a violation of Federal, state or local environmental protection law*

The selected action will not violate any federal, state, or local environmental protection laws.

## **IMPAIRMENT**

In addition to reviewing the list of significant criteria, the National Park Service has determined that implementation of the selected action will not constitute an impairment to Wind Cave National Park resources and values. This conclusion is based on a thorough analysis of the environmental impacts described in the project's environmental assessment, relevant scientific studies, and the professional judgment of the decision-maker guided by the direction in National Park Service Management Policies 2001. As described in the environmental assessment, implementation of the selected action will not result in major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Wind Cave National Park, (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning document.

Although implementation of the project will cause short- and long-term, localized adverse effects, in all cases these result from actions taken to preserve vital park resources. Overall, implementation of the selected action will result in benefits to cave resources, public health and safety, park operations and energy efficiency, and visitor use and experience.

## **PUBLIC INVOLVEMENT AND CONSULTATION**

National Park Service internal discussions led to identification of the main issues and impact topics addressed in the environmental assessment. The primary goals of the project are to protect public health and safety, protect cave resources, improve visitor understanding and appreciation of the unique geology of Wind Cave, and to improve the operational efficiency associated with the lighting system.

The environmental assessment process under NEPA requires agencies to seek outside suggestions and other input about what should be considered in the environmental assessment. This process, called “scoping,” involves contacting other federal, state, and local agencies that might have an interest in the proposed action.

The U.S. Fish & Wildlife Service was contacted on March 26, 2004. In a response letter dated March 31, 2004, the agency concurred with the park’s finding that no federally listed threatened or endangered species will be affected by the project.

During development of the environmental assessment, the park contacted the South Dakota State Historic Preservation Officer (SHPO). The environmental assessment was sent to the South Dakota SHPO for review and comment. In a letter dated June 10, 2005, the SHPO concurred with the park’s determination that no historic properties would be affected under Alternative B, the preferred alternative.

Several Native American Tribes have demonstrated interest in the areas within Wind Cave National Park. The following tribes and tribal representatives received copies of the environmental assessment for review and comment.

|                                            |                                                    |
|--------------------------------------------|----------------------------------------------------|
| Apache Tribe of Oklahoma                   | Oglala Sioux Tribal Council                        |
| Arapaho Business Committee                 | Ponca Tribe of Nebraska                            |
| Cheyenne River Sioux Tribe                 | Ponca Tribe of Oklahoma                            |
| Cheyenne-Arapaho Tribes of Oklahoma        | Rosebud Sioux Tribal Council                       |
| Crow Creek Sioux Tribal Council            | Santee Sioux Tribal Council                        |
| Flandreau Santee Sioux Executive Committee | Sisseton-Wahpeton Sioux Tribal Council             |
| Fort Belknap Community Council             | Standing Rock Sioux Tribal Council                 |
| Fort Peck Tribal Executive Board           | Three Affiliated Tribes Business Council           |
| Lower Brule Sioux Tribal Council           | Yankton Sioux Tribal Business and Claims Committee |
| Northern Cheyenne Tribal Council           |                                                    |

No comments on the environmental assessment were received from the contacted tribes during the two month comment and review period ending July 1, 2005.

The public was invited to comment on the project in a press release issued on April 6, 2004, and posted the same day on the park’s website at [www.nps.gov/wica](http://www.nps.gov/wica). No new issues were identified by the public as a result of the request for public input. The environmental assessment was made available for public review and comment from May 1 to July 1, 2005 (a period of 60 days). The National Park Service also sent copies of the environmental assessment to various local organizations, interested parties, and government agencies for their review and comment.

A total of two public comment letters were received. None opposed the preferred alternative and no substantive comments were received. Therefore, no National Park Service responses to comments are required.

This FONSI, attached to the public review EA, presents the National Park Service decision. The entire public review EA will not be reprinted.

## CONCLUSION

The selected action will not constitute an action that normally requires preparation of an environmental impact statement (EIS). The selected action will not have a significant effect on the human environment. Negative environmental impacts that could occur are short- or long-term and of negligible to moderate intensity. There will be no significant impacts on public health, public safety, threatened or endangered species, or other unique characteristics of the region. There are no unmitigated adverse impacts on sites or districts listed in or eligible for listing in the National Register of Historic Places. No uncertain or controversial impacts, unique risks, significant cumulative effects, or elements of precedence were identified. Implementation of the action will not violate any federal, state, or local environmental protection law nor result in the impairment of park resources or values.

Based on the foregoing, it has been determined that an EIS is not required for this project and thus will not be prepared.

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|--------------|---------------------------|----------------|
| Recommended: | <u>/s/ Linda L. Stoll</u> | <u>9/16/05</u> |
|              | Superintendent            | Date           |

|           |                            |                |
|-----------|----------------------------|----------------|
| Approved: | <u>/s/ Ernest Quintana</u> | <u>9/22/05</u> |
|           | Midwest Regional Director  | Date           |