

GREAT SALT LAKE

An Overview of Change

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THE U.S. BUREAU OF LAND MANAGEMENT'S ROLE IN RESOURCE MANAGEMENT OF THE BONNEVILLE SALT FLATS

by

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ABSTRACT

The Bonneville Salt Flats, which is famous for automobile land-speed records, unusual geology, stark contrasts, and unique scenery, is managed mainly by the U.S. Bureau of Land Management (BLM). BLM balances the administration of valid existing rights, such as mineral extraction from federal leases, with recreational and commercial uses that include: 1) land-speed racing, 2) competitive archery meets and rocket launches, and 3) commercial filming for motion pictures and magazine and television commercials.

To ensure the health of the land and help pay for administrative costs, BLM collects royalties, and usage and cost-recovery fees from these activities. Lease royalties and cost-recovery fees go to the General Treasury. However, as much as 85 percent of usage fees collected by BLM for land-speed racing, competitive archery meets, rocket launches, and commercial filming are returned to the BLM Salt Lake Field Office to help defray the costs of permit processing and resource monitoring for these activities. In the 2000 calendar year, Special Recreation Permit usage fees totaled \$8,775, and filming use fees totaled \$14,775. During the same time, an estimated 125,000 people visited the Salt Flats either as participants in some of the activities, or for purposes of general recreation. No fees are currently charged for casual or non-competitive, non-commercial uses such as sightseeing and general recreation.

In addition to managing and permitting a wide range of activities on the Bonneville Salt Flats, BLM is also responsible for implementing federal resource protections to preserve the unique character of the salt flats. Examples of these protections include two federal mineral withdrawals that protect specific areas of the salt flats from surface entry and mining, and two federal management plans (Bonneville Salt Flats Special Recreation Management Plan and Bonneville Salt Flats Area of Critical Environmental Concern). These management plans identify mineral management restrictions and compatible uses within 30,203 acres of the Salt Flats.

To help promote public and scientific knowledge of this unique area, BLM also participated in funding three major scientific studies of the Bonneville Salt Flats. These studies included two hydrologic investigations by the U.S. Geological Survey during the 1970s and 1990s, and an ongoing meteorologic study by Utah State University. In a coopera-

tive effort to preserve the character of the Bonneville Salt Flats, Reilly Industries, Inc. and BLM entered into an agreement to help replenish salt to the Salt Flats called the Salt Laydown Project. This five-year experimental program began delivering salt to the salt flats in 1997, and as of April 30, 2000 added 4.6 million tons of salt to the salt flats north of Interstate 80.

INTRODUCTION

The Bonneville Salt Flats is located in the western part of the Great Salt Lake Desert of northwestern Utah, and its western margin is approximately 4 miles east of the twin cities of Wendover, Utah and Wendover, Nevada. The salt flats are roughly divided into a north and south half by the east-west-trending Interstate Highway 80 (I-80). The north half, which includes the sites of the historic circular race track and 10- to 12-mile long International Track, is dominated by public land, while the south half is mainly private. Based on measurements from Landsat 5 imagery, areal extent of the salt flats north of I-80 was approximately 31 square miles (19,840 acres) in October 1999 (White, this volume). As the site of automobile land-speed records (figure 1), unusual geology, stark contrasts, and unique scenery, the Bonneville Salt Flats has become famous as an area of national and international interest.

Since the early 1900s, the federal government's management role in the Bonneville Salt Flats was custodial. Up until 1946, lands actions affecting the salt flats were performed by the General Land Office. When the BLM was established in 1946, its land management practices were also custodial and included issuing mineral patents, leases, and rights-of-way.

BLM's involvement in the management of the Bonneville Salt Flats was expanded with establishment of the first "Speed Week" which was held on the salt flats in 1949 and sponsored by Bonneville Nationals Inc. Subsequently, BLM was contacted by the Bonneville Speedway Association about continuing land-speed racing on the salt flats. As a result, BLM issued a special land-use permit to the Bonneville Speedway Association in 1953 for automobile racing. The special land-use permit was continued and reissued through 1969, technically making the Bonneville Speedway Association the manager of the salt flats. Their management



Figure 1. Record-setting 459-mph run of the wheel-driven "Team Vesco Turbinator" during Speed Week 2001 (photography by Ron Christensen - used with permission).

objective was to maintain the Bonneville Salt Flats for all types of racing events and protect the vast expanse of open space and hard salt. The Association was responsible for granting permission for all racing activities, and managed all promotion, publicity, and track maintenance. Additionally, they gave permission for commercial movie filming and photography (Morgan, 1985, p. 6).

Bonneville Speedway Association disbanded in 1971, and the Utah Division of Parks and Recreation obtained the Association's special land-use permit from the BLM in 1971. The special land-use permit allowed Parks and Recreation to manage speed trials only. BLM managed all other activities on the Salt Flats. The purpose of the Utah Division of Parks and Recreation's involvement in the Salt Flats was to perpetuate land-speed racing and promote this famous Utah tourist attraction. In 1972, the acreage contained in the special land-use permit, along with 640 acres of private land purchased by the State of Utah became the Bonneville Salt Flats Outdoor Recreation Reserve. As part of its involvement in the Reserve, the State of Utah nominated the Bonneville Salt Flats Race Track to be listed on the National Register of Historic Places in 1973. However, by 1974, the Division of Parks and Recreation was unable to obtain the necessary funding to continue managing the Reserve, and they relinquished the special land-use permit to BLM. BLM has actively managed the salt flats since then (Morgan, 1985, p. 6-7).

With the passage of the National Environmental Policy Act in 1969 and the Federal Land Policy and Management

Act of 1976, BLM's land-management role has focused on multiple-use planning and management which provided environmental protection. Since 1974, BLM has completed four management plans related to the Bonneville Salt Flats. The first management plan was completed in 1977 and provided day-to-day guidance for activities affecting the salt flats. BLM's Tooele County Management Framework Plan was completed in 1984, and identified additional measures that were to be used to preserve the unique salt resource (Morgan, 1985, p. 7). In October 1985, BLM completed the Bonneville Salt Flats Recreation Area Management Plan which established criteria and standards for management of a Special Recreation Management Area (SRMA) and an Area of Critical Environmental Concern (ACEC) (Morgan, 1985). The Pony Express Resource Management Plan and Final Environmental Impact Statement was completed in September 1988, and carried forward decisions to continue managing 30,203 acres of the salt flats as an ACEC, and to continue the closure of 104,814 acres within the Bonneville Salt Flats Recreation Area to non-energy leasable minerals (U.S. Bureau of Land Management, 1988, p. 22, 35). Based on BLM recommendations derived from these management plans, the Secretary of Interior, through 43 CFR Public Land Order 6941, withdrew the 30,203 acres of the salt flats covered by the ACEC from surface entry and mining to protect the unique resources of the Bonneville Salt Flats.

In addition to formulating and implementing management plans that help protect and preserve the Bonneville Salt Flats, BLM joined with other federal and state agencies, as

well as private industry, in cooperative efforts to help understand and preserve the Bonneville Salt Flats. During the 1970s and 1990s, BLM participated in the funding of two U.S. Geological Survey (USGS) hydrologic studies of the salt flats (Lines, 1979; Mason and Kipp, 1998). BLM also continues to participate in a cooperative agreement with Utah State University's Office of the State Climatologist to conduct weather studies of the Bonneville Salt Flats. As part of the agreement, BLM helped fund the installation and maintenance of two weather stations located on, and adjacent to, the salt flats. In a unique cooperative effort between private industry and a federal government agency, Reilly Industries, Inc. and BLM entered into a salt laydown agreement to help replenish salt to the Bonneville Salt Flats. This experimental Salt Laydown Project began delivering salt to the salt flats in 1997 (White, this volume), and will continue through April 2002. During 2002, Reilly and BLM will review the progress made by the Salt Laydown Project, and mutually decide upon the feasibility and scheduling of an extension of the project.

The following discussion summarizes the major federal resource protections instituted for the Bonneville Salt Flats, both through BLM planning efforts, and from cooperative efforts of other state and federal agencies. Also summarized are some of the unique activities that are conducted on the salt flats through BLM's permitting process.

FEDERAL RESOURCE PROTECTION

Although the Bonneville Salt Flats has been an area of scientific and commercial interest since the early 1900s, no formal protective measures were instituted until the 1950s. Beginning in 1952, the following federal resource protections for public lands contained within the north half of the Bonneville Salt Flats (the portion north of I-80) were established to help preserve the unique character of the salt flats (figure 2):

- 1952 - Public Land Order 852: Circular-track portion (8,927 acres) of the Bonneville Salt Flats designated as an automobile racing and testing ground.
- 1975 - National Register of Historic Places: 36,650 acres of Bonneville Salt Flats listed on the Register.
- 1985 - Bonneville Salt Flats Special Recreation Management Area: 30,203 acres of Bonneville Salt Flats identified as the most significant area of the salt flats to be managed.
- 1985 - Bonneville Salt Flats Area of Critical Environmental Concern: 30,203 acres of Bonneville Salt Flats designated.
- 1992 - Public Land Order 6941: 30,203 acres of Bonneville Salt Flats withdrawn from surface entry and mining location for a period of 20 years.

In addition to the traditional federal protective measures listed above, private industry and BLM entered into an historic cooperative agreement in 1995 to replenish salt to the Bonneville Salt Flats. Through the 1995 Salt-Laydown Agreement, Reilly Industries, Inc. and BLM initiated a joint

5-year experimental Salt Laydown Project which began in November of 1997.

Public Land Order 852

On May 26, 1952, 8,927 acres of public land on that portion of the Bonneville Salt Flats containing the historical circular track was withdrawn from mineral location, and reserved for administration as an automobile racing and testing ground. The withdrawal, which was subject to valid existing rights, prohibited mineral prospecting, location, or purchase under the mining laws.

Prior to 1949, the circular track was the most popular track on the salt; however, when the Bonneville Nationals annual racing event began in 1949, the straight or International Track became the track of choice. It is unclear as to why the International Track was not included in the PLO 852 withdrawal. The withdrawal expired in 1982 (Morgan, 1985, p. 6).

National Register of Historic Places

The Bonneville Salt Flats Race Track was nominated to be listed on the National Register of Historic Places by the Utah Governor's Historic and Cultural Sites Review Committee and the Utah State Preservation Officer in October 1973. At the time of its nomination, the Bonneville Salt Flats had earned international recognition as a raceway and site of all the major world land speed records. Additionally, because of its ideal racing conditions, the Bonneville Salt Flats was important to the history of automobile racing because: 1) the sport developed more rapidly than otherwise possible, and 2) the American automobile industry benefitted from mechanical innovations related to the salt flats racing (National Park Service, 1975).

On December 18, 1975, 36,650 acres of Bonneville Salt Flats were officially listed on the National Register of Historic Places. By virtue of this listing, the designated acreage was afforded two protections under the National Historic Preservation Act of 1966 (P.L. 89-665).

- An assessment of the effects of such a project on the listed site will be made, and
- The head of the involved federal agency or department shall afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the proposed project.

These two protections must be implemented prior to expending federal funds for a proposed federal or federally assisted project that could have potential to affect any district, site, building, structure, or object that is included in the National Register:

BLM Recreation Area Management Plan

The BLM Recreation Area Management Plan, completed in October 1985 (Morgan, 1985), established two entities, the SRMA and the ACEC. Both the SRMA and the ACEC address the protective management of the same 30,203 acres of "hard crusted salt" north of I-80 (Morgan, 1985, p. 18-27).

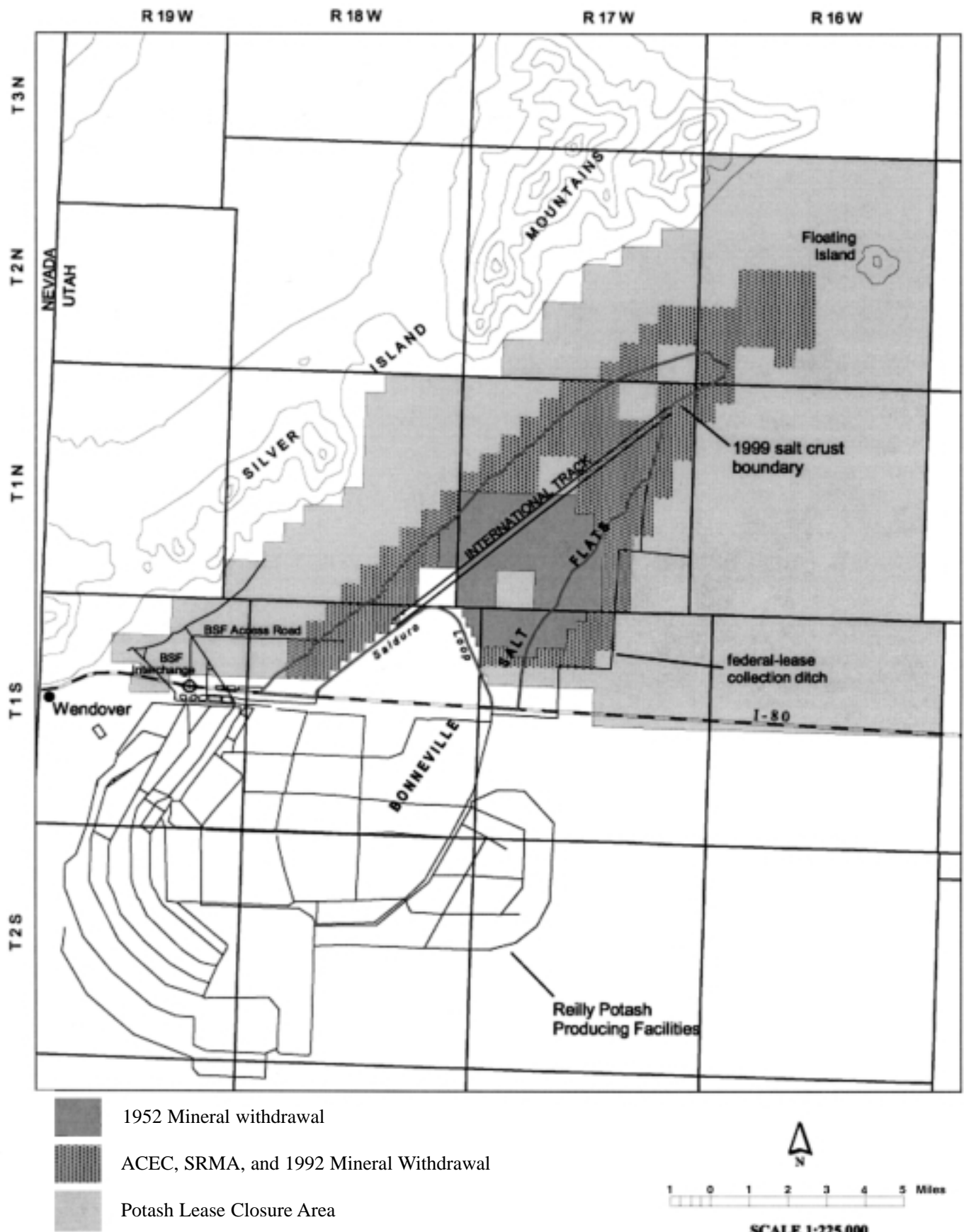


Figure 2. Index map of Bonneville Salt Flats and vicinity showing locations of five federal-resource protection actions. Note that the Area of Critical Environmental Concern (ACEC), the Special Recreation Management Area (SRMA), and the 1992 Mineral withdrawal each affect the same 30,203 acres, and are represented on the map by the same stippled pattern.

Bonneville Salt Flats Special Recreation Management Area (SRMA)

Some of the objectives in the SMRA plan are:

- The Bonneville Salt Flats will be managed and retained in public ownership by the BLM as a recreation resource of national and international significance.
- Recreation will be managed as a year-round activity, weather permitting.
- Land speed racing or filming groups which use the Bonneville Salt Flats speedway will contribute funds for track preparation and maintenance.
- Mineral extraction from the Bonneville Salt Flats will be managed to allow continued recreational use of the SRMA; to this end, several management decisions (subject to valid existing rights) were made to cover lands within, or adjacent to, the 30,203-acre SRMA.
- 18,529 acres of federal mineral estate shall be closed to further oil and gas leasing.
- 12,153 acres of federal mineral estate shall be open to oil and gas leasing, but with a provision to prohibit use of the surface.
- 104,814 acres of federal mineral estate surrounding the 30,203-acre SRMA/ACEC shall be closed to further mineral leasing for potash, salts, and other similar salines.

Bonneville Salt Flats Area of Critical Environmental Concern (ACEC)

Because of its unique racing history, stark and unusual landforms, and its complex hydrologic and geologic setting, the Bonneville Salt Flats qualified to be designated as an ACEC. Under the special-management protective umbrella of the ACEC, the following restrictions and compatible uses were identified:

Restrictions:

- Designate areas of the ACEC that will be closed or have specified limitations on locatable mineral exploration and development, oil and gas and geothermal leasing, and non-energy mineral leasing (for example, potash, halite and other similar saline minerals).
- Restrict placement of any permanent structure or facility on the salt crust.

Compatible (Non-Surface Disturbing) uses:

- Recreational uses include automobile and motorcycle racing, off-road vehicle exploration, photography, use monitoring, and site interpretation.
- Scientific uses include automobile testing, environmental study, and experimentation.
- Commercial uses include filming (still photography, commercials, and movies).

Public Land Order 6941

In August 1992, the 30,203 acres of public land contained in the Bonneville Salt Flats SRMA/ACEC were withdrawn from settlement, sale, location, or entry under the general land laws including the United States mining laws.

However, the withdrawal did not affect valid existing rights, or leasing under the mineral leasing laws. The objective of the withdrawal was to protect the unique geologic, recreational, and visual resources of the Bonneville Salt Flats. The withdrawal is scheduled to expire 20 years from the date of the order (August 6, 2012) unless extended by the Secretary of Interior.

Salt Laydown Project - Restoration of Salt to the Salt Flats

Reilly Industries, Inc. (Reilly) and BLM have been conducting a Salt Laydown Project to increase the salt-crust thickness of the Bonneville Salt Flats. Reilly funds the Salt Laydown Project's operation which includes capital costs of at least \$1,000,000, and operating costs of \$80,000 per year. In 1995, BLM joined Reilly in a Salt Laydown Agreement where Reilly and BLM agreed to jointly monitor the Salt Laydown Project's daily and monthly brine chemistry and flow rates.

The project began delivering sodium chloride (NaCl) brine to Bonneville Salt Flats in November 1997. The objective of the five-year experimental Salt-Laydown Project was to add up to 1.5 million tons of salt to the Bonneville Salt Flats during each year of the experiment. Three years of operation have demonstrated that annual salt-tonnage loss from the Bonneville Salt Flats can be replenished by the Laydown Project. From November 1997 through April 2000, a sodium chloride salt mass of about 4.6 million tons was delivered as a brine, through large-diameter pipes and ditches, to the Bonneville Salt Flats. The average annual addition of 1.5 million tons exceeded an estimated annual salt loss of 0.85 tons. The salt addition appears to be distributed between existing salt-crust, an expanded salt-crust area, and the shallow-brine aquifer. For technical details, see White this volume.

ACTIVITIES MANAGEMENT

An estimated 125,000 people visited the Salt Flats in 2000, either as participants and observers in organized activities, or for purposes of general recreation. Typical activities administered by the BLM for public use of the Bonneville Salt Flats fall into three general categories: commercial, competitive, and casual use (that is, general recreation). Examples of commercial uses include potash mineral extraction and filming. Competitive uses that require a Special Recreation Permit include land-speed racing, archery meets, and rocket launch contests. Examples of casual use or general recreation include sightseeing and off-road vehicle exploration. No use fees are currently charged for casual use. Use and cost-recovery fees are charged for commercial and competitive uses, and production royalties are collected from potash mineral leases.

Because potash mineral leases, Special Recreation Permits, filming permits, and casual use (i.e., general recreation) constitute the major Salt Flats activities administered by BLM, they are described in more detail in the following sections.

Potash Mineral Leases

Potash extraction was the first commercial use of the Bonneville Salt Flats, and development of potash processing from Salt Flat brines was started by the Utah Salduro Company in 1917. Most of the Salt Flats south of I-80 were patented between 1917 and 1927 when potash was a locatable mineral. Passage of the Potassium Act of 1927 initiated potash leasing (Stan Perkes, Mining Engineer, BLM Utah State Office, personal communication September 19, 2001). Utah Salduro Company closed its plant in 1921, and the plant was idle until 1936, when Bonneville Limited acquired the plant and patented property. Bonneville Limited began commercial potash operations in 1939, and production has continued to the present time. During 1963, 10 federal leases (including the collection ditches on the eastern margin of the Salt Flats north of I-80) were issued by BLM to Bonneville Limited. In 1964, Kaiser Aluminum and Chemical Corporation (Kaiser) acquired Bonneville Limited and its Bonneville Salt Flat holdings (Bingham, 1980, p. 230-231). Kaiser operated the privately held potash operations and federal leases until they were sold in 1988 to Reilly Industries, Inc., the current operator.

Federal potash leases are issued for an indeterminate time period, and are subject to readjustment at the end of each 20-year period. The federal leases held by Reilly are due for readjustment in January 2003, and BLM is responsible for performing the readjustment. Although two protective mineral withdrawals and several closures to specific mineral-leasing activities have been initiated within the Bonneville Salt Flats ACEC (see previous section on Resource Protection), Reilly's federal leases are pre-existing rights and are exempted from the restrictions contained in the withdrawals and lease closures. However, during the 2003 lease adjustment process, BLM will determine any changes or additions to the current lease stipulations.

Federal Mineral-Lease Royalties

Lessees of non-energy federal minerals such as potash pay the federal government royalties based on production. For example, the royalty on potash is 3 percent of sales value. Rather than being paid to BLM, these royalty payments are collected by the Minerals Management Service (MMS). MMS distributes the royalty payments as follows: 50 percent of the funds are distributed to the state of origin, 40 percent are placed in the Reclamation Fund, and 10 percent are directed to the General Fund of the U.S. Treasury (Minerals Management Service, 1999, p. 2).

Special Recreation Permits

Each year, BLM issues an average of five Special Recreation Permits for scheduled activities/events on the Bonneville Salt Flats. Depending upon weather conditions, these activities/events

are typically scheduled from the beginning of August through the end of October. Land-speed racing and competitive archery matches and rocket launches are examples of these permitted activities.

Land-Speed Racing

Permitted land-speed racing events include Speed Week (August), World of Speed (September), and World Finals (October). Land-speed racers do not compete against each other in a multiple-vehicle race, but rather each competitor races individually over a specified distance against the clock in an attempt to set the land-speed record for his or her particular vehicle category (figure 3). Speed Week, for example, has four different vehicle categories: Special Construction, Vintage (pre-1948 automobiles), Modified, and Diesel Truck. The events all use straight courses which allow ample space for acceleration as well as deceleration. The longest course in 2001 was about 11 miles. As salt is added from the Salt Laydown project, it may be possible to have an even longer course in the future. The course is seasonably obliterated each winter by rising ground waters.

Speed Week, World of Speed, and World Finals are sponsored respectively by Southern California Timing Association (SCTA) and Bonneville Nationals Inc. (BNI), Utah Salt Flats Racing Association (USFRA), and SCTA and BNI. All three events are well attended by U.S. and international racing enthusiasts. For example, the number of people attending the 2000 racing events were:

- Speed Week - 6,316
- World of Speed - 864
- World Finals - cancelled due to rain

Competitive Archery Matches and Rocket Launches

Non-racing events include annual activities such as competitive archery matches and rocket launches sponsored by the United States National Archery Association and the Utah



Figure 3. Preparation for land-speed racing on the Bonneville Salt Flats during the 2001 "World of Speed" sponsored by the Utah Salt Flats Racing Association (photography by Larry Volk, chairman, Save the Salt - used with permission of the photographer).

Rocket Club. The National Archery Association has been conducting archery matches at the Bonneville Salt Flats since 1961 (figure 4); participants include U.S. archers, as well as international archers from Federation International' de Tir à l'Arc (FITA) (Rulon Hancock, U.S. National Archery Association, personal communication, September 18, 2001). Utah Rocket Club, which is the local section of the National Association of Rocketry has been sponsoring rocket launches at Bonneville Salt Flats since 1992 (figure 5); participants are typically from U.S., Canada, Great Britain, and Australia (Neal Baker, President, Utah Rocket Club, personal communication, October 19, 2001).

Respective objectives of the archery and rocket events are to set distance and altitude records by individual classes. For example, archery classes include conventional, compound, recurve field and target, modern longbow, and primitive (that is, wooden arrow shafts with sinew-attached points) categories. Rocketry types are divided into two classes, model rockets and high-power rockets. Model rock-



Figure 4. Shooting for distance records during a competitive archery match sponsored by the U.S. National Archery Association (photography by Rulon I. Hancock, U.S. National Archery Association - used with permission of the photographer).



Figure 5. Rocket launching during the Utah Rocket Club's "Hellfire 6" activity in September 2000 (photography by mark Hamilton, Utah Rocket Club - used with permission from the Utah Rocket Club).

ets are typically under 3 pounds and may reach heights of 50 to 3,000 feet above ground level (AGL). High-power rockets range from 3 to 100 pounds and may achieve heights of 500 to 25,000 feet AGL. High-power rocket flights are subject to Federal Aviation Administration (FAA) air-traffic regulations.

The recorded number of people attending the 2000 archery match and rocket launch competitions were:

- United States National Archery Association - 20;
- Utah Rocket Club - 666.

Special Recreation Usage Fees

Competitive events such as land-speed racing, archery matches, and rocket launches are subject to BLM competitive-use fees. Competitive-use fees are \$4.00 per person per day for participants and spectators, or 3 percent of gross receipts, whichever is greater. The fees generated by these events have been distributed as follows: 15 percent - General Treasury, and 85 percent - BLM Salt Lake Field Office recreation program. The portion of the competitive use fee returned to BLM is used to help defray costs of staff time spent on processing event/activity permits, preparing associated environmental documentation, and providing Salt Flat interpretative studies. Competitive use fees collected by BLM during FY 2000 totaled \$8,775.

Filming Permits

The unique scenery of the Bonneville Salt Flats makes an ideal backdrop for movies, television commercials, artistic videos, and still photography. The film industry is attracted to the Salt Flats because the unusual nature of its scenery is accentuated by seasonal change. For example, during the summer months, stark white expanses of salt crust stretch to a horizon made up of rugged desert mountain ranges. Conversely, during the winter and spring months, a shallow inland sea covers the salt crust and provides mirror-like reflections of the distant mountains. This unusual scenery has been the backdrop for segments of major motion pictures such as *Independence Day*, *Mulholland Falls*, and *Con-Air*. Additionally, the Salt Flats have been the site of eye-catching television and magazine commercials for Nissan, Daimler/Chrysler, and Harpers Magazine (figures 6 and 7).

BLM usually allows commercial filming on the Bonneville Salt Flats from late May into late October. This is accomplished through a formal permitting process that includes use and cost-recovery fees, and reclamation bonds. Use fees are retained by the BLM Salt Lake Field Office, and the cost-recovery fees are deposited with the General Treasury. The amount charged for use fees varies between video and still photography. Use fees depend on size of the crew, and range from \$250/day to \$600 a day for video, and \$100/day to \$500/day for still. Cost-recovery fees range from \$375 to \$1175 depending on complexity of production and monitoring requirements by BLM personnel. Bonding for aerial filming is \$10,000. Reclamation cash bonds are also required at BLM discretion. These bonds are all refundable if the



Figure 6. Preparation for filming an automobile commercial on the Bonneville Salt Flats (photography by Anita Jones, Land Law Examiner, BLM Salt Lake Field Office).



Figure 7. Filming of an automobile commercial on the Bonneville Salt Flats (photography by Anita Jones, Land Law Examiner, BLM Salt Lake Field Office).

permitted activity results in no damage to the Bonneville Salt Flats. Film-related use and cost-recovery fees collected by BLM during FY 2000 totaled \$14,775.

Casual Use - General Recreation

Casual use or general recreation on the Bonneville Salt Flats includes activities such as sightseeing and the pursuit of solitude in an area of stark contrasts and extensive vistas. The Bonneville Salt Flats north of I-80 is one of the few land forms that exhibits a naturally flat surface covering an area of more than 30 square miles. Because of its smooth surface and large areal extent, the curvature of the earth is actually observable from the salt flats. An example of this can be

seen when viewing down the axis of one of several telephone pole lines that extend across portions of the salt flats; the pole line gradually grows smaller and eventually disappears below the horizon at distances of about 10 miles from the observer. Additionally, optical illusions of "floating" mountain ranges result from the mirage effect that is accentuated by the extensive flat surface of the salt flats. This mirage effect is most notable during the summer heat and makes landmarks such as Floating Island (see figure 2) appear to be floating just above the horizon of the salt flats on a thin, shimmering cushion of air.

BLM encourages the public to enjoy the Bonneville Salt Flats as part of their public lands heritage. Additionally, when the public is engaged in casual use of the Salt Flats, no use fees are charged. Although visitation to the area is welcomed during most of the year, some precautions are necessary, and the public should be prepared for the extreme conditions that are unique to the salt flats. The following are examples: 1) temperatures can range from freezing during the winter to more than 100 degrees F during the summer; 2) while the salt crust is thickest along the axis of the International Track (see figure 2), it thins to a feather edge on its western and eastern margins; the unwary who attempt to drive their vehicles to the edge of the salt crust run the risk of being entrapped in the mud flat that surrounds the salt flats; 3) distances are deceiving - it is 5 miles to the nearest telephone and help from the end of the Bonneville Salt Flats access road to the truck stop at the junction of the access-road off ramp at I-80 (see figure 2).

Visitors are discouraged from driving off the access road onto the salt flats during the winter months for their own protection, and for protection of the Bonneville Salt Flats. This is because a shallow transient pond of salt water covers most of the salt crust area during the winter. Additionally, the Salt Laydown Project, which operates from November 1 through April 30, also contributes salt water to the transient pond as part of its replenishment of salt to the salt flats. Visitors who attempt to drive onto the flooded salt flats may accidentally spray salt water on critical electrical components of their engines which could result in electrical shorting and consequent disabling of their vehicle.

While the public should be aware of the potentially harsh nature of the Bonneville Salt Flats environment, the rewards from visiting this unique resource (even if one only goes to the end of the access road) include unusual geology, stark contrasts, and surreal scenery.

SUMMARY

- BLM is responsible for implementing formal protections that have been instituted to preserve the unique character of the salt flats. Examples of these protections include:

- Declaration of two federal mineral withdrawals that protect specific areas of the salt flats from surface entry and mining.
- Placement of 36,650 acres of Bonneville Salt Flats on the National Register of Historic Places.
- Preparation of a plan for the SRMA and ACEC

that identifies mineral-leasing restrictions and compatible uses within 30,203 acres of the salt flats.

- Potash mineral leases, Special Recreation Permits, and filming permits are the main categories of activity administered by the BLM for public use of the Bonneville Salt Flats:

- The royalty paid by Reilly on its federal potash leases is 3 percent of sales value; 50 percent of the royalties are distributed to the state of origin, 40 percent are placed in the Reclamation Fund, and 10 percent are directed to the General Fund of the U.S. Treasury.
- As much as 85 percent of usage fees collected by BLM for land-speed racing, competitive archery meets and rocket launches, and commercial filming are returned to the BLM to help defray the costs of permit processing and resource monitoring for these activities.
- During the 2000 calendar year, special recreation usage fees totaled \$8,775, and filming use fees totaled \$14,775.
- To help promote scientific and public knowledge of this unique area, BLM has also participated in funding three major scientific studies of the Bonneville Salt Flats. These studies included:
 - Two hydrologic investigations by the U.S. Geological Survey during the 1970s and 1990s.
 - An ongoing meteorologic study by Utah State University.
- In a cooperative effort to preserve the character of the Bonneville Salt Flats, Reilly Industries Inc, and BLM entered into a Salt Laydown agreement to help replenish salt to the salt flats. This five-year experimental program began delivering salt to the salt flats in 1997 and, as of April 30, 2000, has added about 4.6 million tons of salt.
- The public is encouraged to enjoy this unique resource but should be prepared for the extreme conditions that are unique to the salt flats. No fees are currently charged for casual or non-competitive, non-commercial uses such as sightseeing and general recreation.

ACKNOWLEDGMENTS

The following Salt Lake Field Office staff contributed significantly to the preparation and review of this paper: Grace Jensen, Realty Specialist; Cheryl Johnson, GIS Coordinator; Britta Laub, Outdoor Recreation Planner; Michael Nelson, Realty Specialist; and William White, Physical Scientist. Additionally, Larry Volk, Chairman, Save-The-Salt, Ron Christensen, Utah Salt Flats Racing Association, Rulon Hancock, U.S. National Archery Association, Neal Baker, President, Utah Rocket Club, and Mark Hamilton, Utah Rocket Club, contributed to descriptions of their respective activities and provided some of the photographs. Editorial and peer reviews were performed by Stan Perkes, Mining Engineer, and James Kohler, Branch Chief Solid Minerals, BLM Utah State Office, and J. Wallace Gwynn, Ph.D. and staff from the Utah Geological Survey; their comments and suggestions helped enhance the quality and organization of the paper.

DEDICATION

This paper is dedicated to the memory of Lewis William Kirkman, Jr., Outdoor Recreation Planner, BLM Salt Lake Field Office. Lew will be remembered for his uncompromising devotion to the protection of the public lands, and his service and friendship to the organizers and participants of the many activities conducted on the Bonneville Salt Flats.



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