Appendix O

U.S. Fish and Wildlife Service
Biological Opinion

United States Department of the Interior

FISH AND WILDLIFE SERVICE
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August 28, 2001
File No. 1-5-00-F-518

Mr. Stephan Brocoum, Assistant Manager
Office of Licensing and Regulatory Compliance
U.S. Department of Energy
Post Office Box 30307
North Las Vegas, Nevada 89036-0307

Dear Mr. Brocoum:

Subject: Final Biological Opinion for the Effects of Construction, Operation and Monitoring, and Closure of a Geologic Repository at Yucca Mountain, Nye County, Nevada

This document transmits the U.S. Fish and Wildlife Service's (Service) final biological opinion based on our review of the proposed construction, operation and monitoring, and closure of a geologic repository at Yucca Mountain, Nye County, Nevada, and its effects on the federally-threatened Mojave desert tortoise (*Gopherus agassizii*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*). Your April 24, 2000, request for formal consultation was received on May 1, 2000.

This biological opinion is based on information provided in the April 2000 biological assessment (Department of Energy [DOE] 2000a); DOE correspondence to the Field Supervisor, Nevada Fish and Wildlife Office dated April 24, 2000, September 22, 2000, October 12, 2000, February 15, 2001 (DOE 2001a), April 5, 2001 (DOE 2001b), June 12, 2001, and August 22, 2001; DOE's August 2000 correspondence with the National Marine Fisheries Service; draft environmental impact statement (DEIS) dated July 1999 (DOE 1999); biological opinions for site characterization studies at Yucca Mountain (File Nos. 1-5-90-F-6 and 1-5-96-F-307R); meetings between a DOE representative and Service staff on September 11, 1998, and March 18, 1999; conversations with DOE and representative staff; and our files. A complete administrative record of this consultation is on file in the Southern Nevada Field Office.

Consultation History

On February 9, 1990, the Service issued a non-jeopardy biological opinion to DOE for site characterization studies at Yucca Mountain (File No. 1-5-90-F-6). In the biological opinion, the

Service required DOE to continue their 1989 desert tortoise monitoring program (DOE 1989) which included the following objectives: (1) Determine relative abundance and distribution of desert tortoises on the project site, (2) implement a long-term program to monitor the relative abundance of tortoises at Yucca Mountain and the effects of site characterization activities on the species, (3) monitor the presence of any disease in desert tortoises, (4) study the movements and habitat use of desert tortoises and develop a model of desert tortoise habitat, (5) conduct field studies to determine the efficacy of relocating tortoises to new areas, (6) conduct field studies to determine the efficacy of fences and underpasses along roads to prevent vehicles from killing tortoises, and (7) monitor populations of ravens and other desert tortoise predators. These studies were conducted by DOE and their contractors at the estimated cost of $4 million (DOE 2001b). A list of reports, publications, and abstracts provided by DOE in their April 5, 2001, letter (DOE 2001b) identifies the reference documents for these studies.

In the 1990 biological opinion, the Service determined that approximately 15 desert tortoises might be affected within the 450-acre project area. Subsequently, it became apparent that the estimated number of tortoises encountered at the project site was higher than anticipated in the previous biological opinion. On February 22, 1995, the Service requested that DOE request reinitiation of consultation for site characterization studies. By Service letter to DOE dated September 18, 1996, following the August 7, 1996, meeting among DOE and Service staff, it was mutually agreed between DOE and the Service that the continuation of project activities at Yucca Mountain would not result in DOE expenditures, studies, or monitoring in excess of those stipulated in the 1990 biological opinion (Service 1996). The Service reinitiated formal consultation on December 9, 1996, and issued a new biological opinion to DOE on July 23, 1997 (File No. 1-5-96-F-307R). This reinitiated biological opinion shall remain in effect until site characterization studies are completed.

On December 17, 1998, and February 4, 2000, DOE requested an updated species list for the project area, which was provided by the Service on January 21, 1999, (File No. 1-5-99-SP-059) and February 25, 2000 (File No. 1-5-00-SP-440), respectively.

In your April 24, 2000, letter, DOE determined that transportation of nuclear materials will involve routine transportation methods and routes and will insignificantly increase traffic volumes. Thus, DOE determined that transportation of nuclear materials from the 77 sites identified in the biological assessment will result in "no effect" to federally listed species.

DOE evaluated the potential effects to 47 federally-listed species from transportation of nuclear materials from various sites across the nation to Yucca Mountain which may involve the use of barges in the marine environment (DOE 2000b). In their DEIS, DOE showed that the likelihood of an accident involving spent nuclear fuel on a marine barge is extremely small, and the further

likelihood of an accident resulting in release of radioactivity is even smaller. Because the locations of accidents would be random, the likelihood that threatened and endangered species would be involved is reduced further. Based on these analyses, DOE concluded that the likelihood of these improbabilities resulting in an accident that may affect listed species or critical habitat, is so small that it can be considered discountable. Subsequently, on August 17, 2000, DOE determined that only the desert tortoise may be affected by the subject project (DOE 2000b).

The Service initiated formal consultation upon receipt of your request on May 1, 2000. On September 13, 2000, the Service requested a 60-day extension of the consultation period. DOE concurred with the request by letter dated September 22, 2000. Subsequently, DOE requested that the consultation period be extended to approximately November 15, 2000, to allow DOE time to refine the level of disturbance anticipated as a result of the proposed action. On February 22, 2001, the Service received DOE's modifications to the previous project description that would result in an additional 1,100 acres of disturbance of desert tortoise habitat (DOE 2001b). In response, the Service requested additional information on February 23, 2001, on the potential effects to desert tortoise that may result from the proposed modification. DOE provided that information by correspondence dated April 5, 2001 (DOE 2001a).

On May 8, 2001, the Service issued a draft biological opinion to DOE on the subject project and requested comments on the draft by May 18, 2001. On May 23, 2001, DOE requested that the deadline for comments be extended to June 15, 2001, and the opportunity to review the draft biological opinion before it is finalized. The Service concurred and received DOE's comments on the draft biological opinion on June 15, 2001. A second draft biological opinion was issued to DOE on July 26, 2001. On August 22, 2001, DOE submitted a letter to the Service stating that DOE has no further comments on the draft opinion and requested a final biological opinion on the subject project.

Description of the Proposed Action

The DOE proposes to construct, operate and monitor, and eventually close a geological repository on the Nevada Test Site (NTS) and surrounding lands at Yucca Mountain, Nevada, for the disposal of approximately 77,000 tons of commercial and DOE owned nuclear waste. The project site is located in a remote area of southern Nye County, Nevada, approximately 93 miles northwest of Las Vegas, Nevada Figure 1). Construction, operation and monitoring, and closure of the repository will require the active use of up to 1,643 acres of land, in addition to areas used during site characterization studies, and up to 430 acre-feet of groundwater per year. The nuclear waste would consist of spent nuclear fuel and high-level nuclear waste (HLW) presently stored at 72 commercial nuclear power generating facilities and 5 DOE facilities. These materials would

be transported to a repository at Yucca Mountain using a combination of methods including barges, legal-weight trucks, heavy haul trucks, and rail. *Legal-weight trucks* have a gross vehicle weight of less than 40 tons which is the loaded weight limit for commercial vehicles operated on public highways without special state-issued permits. *Heavy-haul trucks* are overweight, over-dimension vehicles that must have permits from state highway authorities to use public highways.

The project includes the repository site (Figure 2), potential corridors within Nevada and an approximately 6-mile-long segment in California where a branch rail line may be constructed (Figure 3), potential intermodal transfer station sites (Figure 4), and potential heavy-haul routes, including areas where necessary highway upgrades may occur (Figure 5). The specific method and route of transport has not been determined at this time, therefore, the potential effects to desert tortoise that may result from transportation of materials, including construction of transportation infrastructure, will be evaluated in future consultations under section 7 of the Act. Future Federal actions will be required for proposed transportation of materials associated with the subject project including issuance of right-of-way grants and/or acquisition and expenditure of Federal highway funds. The Service anticipates that DOE would comply with the terms and conditions of biological opinions issued to other Federal agencies, as appropriate, for future transportation projects associated with the repository.

Repository Construction

DOE proposes to construct and use above- and below-ground facilities. The construction phase would likely include new construction, modification, and maintenance of infrastructure (e.g., electrical and water lines); construction of roads, buildings, parking areas, sanitary waste lines and drain fields; borrow pits; evaporation ponds; topsoil and rock storage areas; storm water retention basins; a solid waste landfill; a surface aging area; ventilation shafts; a solar power system; and underground tunnels. These facilities would be required to support receipt and repackaging of spent nuclear fuel (SNF) and HLW into waste packages, placing waste packages underground, maintaining a capability to retrieve the waste packages if needed, monitoring, and closing the repository. Most facilities developed to process SNF and HLW, and support construction of the below-ground facilities would be located in the North Portal Operations Area, the South Portal Development Operations Area, the Emplacement Ventilation Shaft Area, and the Development Ventilation Shaft Area (Figure 2).

Excavated rock (muck) from the repository would be transported through the South Portal and moved to a muck storage area on or near Midway Valley or Jackass Flats using trucks or an overland conveyor system. Site water would come from NTS J-12, J-13, and C wells, south and southeast of the North Portal Operations Area. The wells and distribution piping to the

repository already exist, however additional infrastructure may be required and routine maintenance would be performed. Sanitary sewage would be routed to septic tank/leach field wastewater-treatment systems which would be established near the facilities using them.

DOE is considering constructing a 3-megawatt solar power generating facility to meet the energy requirements of the proposed repository. The solar facility would likely be located in Midway Valley, 1.2 to 2.5 miles east or northeast of the North Portal Operations Area (Figure 2). Approximately 25 acres would be disturbed during construction of the facility and access road. A power transmission line connecting the facility to the North Portal would likely be constructed within an existing, previously disturbed right-of-way. The solar facility would be built in phases of 500 kilowatts per year, starting in 2005, and would likely be connected to the site power distribution system.

It is possible that regulatory changes would allow up to 11,000 tons of SNF and HLW to be received before the start of underground emplacement of waste packages. In this case, a concrete pad, associated facilities, and infrastructure would be constructed in or near Midway Valley for temporary holding prior to being placed underground.

Construction of the repository facilities could begin only after receipt of construction authorization from the Nuclear Regulatory Commission. DOE estimates that construction may begin in 2005. The repository surface facilities, main drifts, ventilation system, and initial emplacement drifts would be built in approximately 5 years, from 2005 to 2010. Beginning in 2010, the older and cooler commercial spent nuclear fuel could be loaded into waste packages and emplaced into the repository. Construction of emplacement drifts would continue until approximately 2032.

Repository Operation and Monitoring

Above-ground facilities would be used to receive, prepare, and repackage SNF and HLW for placement into the below ground repository. Unloading, handling, and repackaging of material would occur in a radiologically-controlled area, and would be controlled remotely. Secondary wastes generated by repository operations would include low-level radioactive, hazardous, sanitary, and industrial solid wastes. Although unlikely, small amounts of low-level mixed radioactive waste could be generated. Some wastes could be processed and/or packaged onsite. All low-level and low-level mixed waste would be shipped offsite for disposal. Hazardous waste would be packaged and shipped offsite for treatment and disposal. Industrial waste would be disposed of either offsite or in a landfill developed in the Yucca Mountain area. Sanitary liquid waste would be processed through the sanitary waste water system. Ventilation exhaust from the

repository would be a mixture of hot air (approximately 310^0 F) from the closed emplacement drifts, and cooler air from the open drifts where waste packages would be emplaced.

Closure/Post Closure

Closure of the repository and facilities may include decommissioning buildings and equipment; removal of equipment and other materials from the site; backfilling of the main drifts, ramps, shafts and connecting openings; and final site reclamation. Reclamation may include recontouring disturbed areas, surface backfill, soil buildup and reconditioning, site vegetation, site water course configuration, and erosion control.

Heat generated from the emplaced SNF and HLW is expected to warm the surrounding rock and soil above the repository over 750 to 2,500 acres. Increases in soil temperature are expected to begin about 200 years after waste package emplacement in the repository, and to reach maximum levels in about 700 years. DOE estimates that the temperature increase would be approximately 0.7^0 F for wet soil and 5^0 F for dry soil. The repository is designed with the capability for closure as early as 50 years, or as late as 300 years, after the start of emplacement. The period to accomplish closure would range from 6 to 15 years.

Transportation Options

The national routes taken to transport SNF and HLW to the repository would occur on the existing national transportation infrastructure of waterways, highways, and railroads. The exceptions to this are the potential construction of a branch rail line in Nevada and approximately 6 miles in California (Jean rail corridor option), potential construction of an intermodal transfer station in Nevada for the transfer of rail shipments to heavy-haul trucks, and potential modification of existing highways within Nevada to allow travel of heavy-haul trucks. For transport within Nevada, three options were considered by DOE which include (1) mostly legal-weight trucks, (2) mostly heavy-haul trucks, and (3) mostly rail.

If the rail transport option within Nevada is chosen to transport SNF and HLW to the repository, construction of a branch rail system would be required to connect the mainline rail with Yucca Mountain. If heavy-haul trucks are used, an intermodal transfer facility would be constructed where shipments would be transferred from rail cars to heavy-haul trucks for final shipment to the repository at Yucca Mountain. Five branch rail line corridors, five potential heavy-haul routes, and three general sites for potential intermodal transfer facilities have been identified within Nevada (Figure 4). Two of the three transfer facilities occur within the range of the desert tortoise but outside any areas designated for recovery of the species. The use of legal-weight truck transportation would not require construction. Legal-weight trucks would enter Nevada on

Interstate 15 from either the north or south, travel through the Las Vegas area using beltways currently under construction, and travel north on a U.S. Highway to Yucca Mountain.

Rail branch or intermodal transfer facility construction, or highway modifications will require Federal authorization or funding and, therefore, will be subject to future consultation under section 7 of the Act with the appropriate Federal agency such as the Bureau of Land Management (BLM) or the Federal Highway Administration. At that time, potential effects to desert tortoise will be identified and evaluated under the appropriate consultation procedures.

As minimization measures, DOE (2000a, 2001b) proposes the following measures to minimize effects to desert tortoises from the proposed action, which include the following:

1. All DOE and contractor personnel working at Yucca Mountain and on transportation construction projects within the range of the desert tortoise will complete a desert tortoise education program. This program will explain the legal status of desert tortoises, the definition of "take," and penalties for violations of Federal and State laws regarding tortoises. The program will include information on the life history of the desert tortoise and general tortoise activity patterns, what to do if a tortoise is sighted (including how to safely move tortoises off roads), and an explanation of measures designed to protect tortoises (e.g., speed limits, prohibition of off-road driving, etc.).

2. Clearance surveys will be conducted prior to clearing of vegetation at previously undisturbed sites if new disturbances are larger than 5 acres. Most areas where disturbances will take place have a low abundance of tortoises and the likelihood of finding tortoises in sites less than 5 acres in size is small. In addition, most smaller disturbances would be distant from larger disturbances, be short in duration, and would involve minimal equipment.

3. A tortoise biologist or environmental monitor will be available during construction activities to help ensure that desert tortoises are not inadvertently harmed. Project activities that may endanger a tortoise will cease if a tortoise is found on a project site. Project activities will resume only after a biologist or environmental monitor ensures that the tortoise is not in danger or after the tortoise has moved to a safe area.

4. All vehicles will be driven at speeds within the posted speed limits on existing roads, and will not exceed 25 miles per hour on unposted roads. Vehicles will not be driven off existing roads in non-emergency situations unless authorized by DOE. During the tortoise activity season (February 16 through November 14) the proposed vehicle path will be cleared of tortoises immediately prior to off-road travel. During the tortoise

inactive season, the proposed vehicle path will be cleared of tortoises within 7 days prior to off-road travel.

5. A litter-control program will be implemented that will include the use of covered trash receptacles, disposal of edible trash in trash receptacles following the end of each work day, and disposal of trash in a designated sanitary landfill. Any material placed in a sanitary landfill operated by the Yucca Mountain project will be covered often enough to prevent scavengers and predators from feeding there.

6. All non-linear habitat disturbances larger than 2.5 acres at Yucca Mountain which have had vegetation removed but no longer being used will be revegetated in accordance with the *Reclamation Implementation Plan* (DOE 1995) and the *Reclamation Standards and Monitoring Plan* (RSMP) (DOE 1998). These plans may include specifications for contouring, relieving soil compaction, treating and/or spreading topsoil, seeding, and using transplants.

Status of the Species- Rangewide

The desert tortoise is a large, herbivorous reptile found in portions of California, Arizona, Nevada, and Utah. It also occurs in Sonora and Sinaloa, Mexico. The Mojave population of the desert tortoise includes those animals living north and west of the Colorado River in the Mojave Desert of California, Nevada, Arizona, southwestern Utah, and in the Colorado Desert in California. Desert tortoises reach 8 to 15 inches in carapace length. Adults have a domed carapace and relatively flat, unhinged plastron. Shell color is brownish, with yellow to tan scute centers. The forelimbs are flattened and adapted for digging and burrowing. Optimal habitat has been characterized as creosote bush scrub in which precipitation ranges from 2 to 8 inches, where a diversity of perennial plants is relatively high, and production of ephemerals is high (Luckenbach 1982, Turner 1982, Turner and Brown 1982). Soils must be friable enough for digging of burrows, but firm enough so that burrows do not collapse. Desert tortoises occur from below sea level to an elevation of 7,300 feet, but the most favorable habitat occurs at elevations of approximately 1,000 to 3,000 feet (Luckenbach 1982).

Desert tortoises are most active during the spring and early summer when annual plants are most common. Additional activity occurs during warmer fall months and occasionally after summer rain storms. Desert tortoises spend the remainder of the year in burrows, escaping the extreme conditions of the desert. The size of desert tortoise home ranges vary with respect to location and year. Females have long-term home ranges that are approximately half that of the average male, which range from 25 to 200 acres (Berry 1986). Over its lifetime, each desert tortoise may

require more than 1.5 square miles of habitat and make forays of more than 7 miles at a time (Berry 1986). In drought years, the ability of tortoises to drink while surface water is available following rains may be crucial for tortoise survival. During droughts, tortoises forage over larger areas, increasing the likelihood of encounters with sources of injury or mortality including humans and other predators. Desert tortoises possess a combination of life history and reproductive characteristics which affect the ability of populations to survive external threats. Tortoises may require 20 years to reach sexual maturity (Turner et al. 1984; Bury 1987).

The desert tortoise is most commonly found within the desert scrub vegetation type, primarily in creosote bush scrub. In addition, it is found in succulent scrub, cheesebush scrub, blackbrush scrub, hopsage scrub, shadscale scrub, microphyll woodland, Mojave saltbush-allscale scrub, and scrub-steppe vegetation types of the desert and semidesert grassland complex (Service 1994). Within these vegetation types, desert tortoises potentially can survive and reproduce where their basic habitat requirements are met. These requirements include a sufficient amount and quality of forage species; shelter sites for protection from predators and environmental extremes; suitable substrates for burrowing, nesting, and overwintering; various plants for shelter; and adequate area for movement, dispersal, and gene flow. Throughout most of the Mojave Region, tortoises occur most commonly on gently sloping terrain with soils ranging from sand to sandy-gravel and with scattered shrubs, and where there is abundant inter-shrub space for growth of herbaceous plants. Throughout their range, however, tortoises can be found in steeper, rockier areas. Further information on the range, biology, and ecology of the desert tortoise can be found in Berry and Burge (1984); Burge (1978); Burge and Bradley (1976); Bury et al. (1994); Germano et al. 1994; Hovik and Hardenbrook (1989); Karl (1981, 1983a, 1983b); Luckenbach (1982); Service (1994); and Weinstein et al. (1987).

On August 4, 1989, the Service published an emergency rule listing the Mojave population of the desert tortoise as endangered (54 FR 42270). On April 2, 1990, the Service determined the Mojave population of the desert tortoise to be threatened (55 FR 12178). Reasons for the determination included loss of habitat from construction projects such as roads, housing and energy developments, and conversion of native habitat to agriculture. Grazing and off-highway vehicle (OHV) activity have degraded additional habitat. Also cited as threatening the desert tortoise's continuing existence were illegal collection by humans for pets or consumption, upper respiratory tract disease (URTD), predation on juvenile desert tortoises by common ravens (*Corvus corax*) and kit foxes (*Vulpes macrotis*), and collisions with vehicles on paved and unpaved roads. Fire is an increasingly important threat to desert tortoise habitat. Over 500,000 acres of desert lands burned in the Mojave Desert in the 1980s. Fires in Mojave desert scrub degrade or eliminate habitat for desert tortoises (Appendix D of Service 1994).

On February 8, 1994, the Service designated approximately 6.4 million acres of critical habitat for the Mojave population of the desert tortoise in portions of California, Nevada, Arizona, and Utah (59 FR 5820), which became effective on March 10, 1994. Critical habitat is designated by the Service to identify the key biological and physical needs of the species and key areas for recovery, and focuses conservation actions on those areas. Critical habitat is composed of specific geographic areas that contain the primary constituent elements of critical habitat, consisting of the biological and physical attributes essential to the species' conservation within those areas, such as space, food, water, nutrition, cover, shelter, reproductive sites, and special habitats. The specific primary constituent elements of desert tortoise critical habitat are: Sufficient space to support viable populations within each of the six recovery units (RUs), and to provide for movement, dispersal, and gene flow; sufficient quality and quantity of forage species and the proper soil conditions to provide for the growth of these species; suitable substrates for burrowing, nesting, and overwintering; burrows, caliche caves, and other shelter sites; sufficient vegetation for shelter from temperature extremes and predators; and habitat protected from disturbance and human-caused mortality.

Approximately 1.2 million acres were designated as critical habitat in Nevada. Critical habitat units (CHUs) were based on recommendations for Desert Wildlife Management Areas (DWMAs) outlined in the *Draft Recovery Plan for the Desert Tortoise (Mojave Population)* (Service 1993). These DWMAs are also identified as "desert tortoise areas of critical environmental concern (ACECs)" by the BLM. Because the CHU boundaries were drawn to optimize reserve design, the CHU may contain both "suitable" and "unsuitable" habitat. Suitable habitat can be generally defined as areas that provide the primary constituent elements. The Yucca Mountain project area does not occur within desert tortoise critical habitat.

On June 28, 1994, the Service approved the final Desert Tortoise Recovery Plan (Service 1994). The Desert Tortoise Recovery Plan divides the range of the desert tortoise into 6 RUs and recommends establishment of 14 DWMAs throughout the RUs. Within each DWMA, the Desert Tortoise Recovery Plan recommends implementation of reserve-level protection of desert tortoise populations and habitat, while maintaining and protecting other sensitive species and ecosystem functions. The design of DWMAs should follow accepted concepts of reserve design. As part of the actions needed to accomplish recovery, the Desert Tortoise Recovery Plan recommends that land management within all DWMAs should restrict human activities that negatively impact desert tortoises (Service 1994). DWMAs have been designated by the BLM through development or modification of their land use plans in Nevada, Arizona, and Utah. Land-use planning activities are underway in California to designate DWMAs/ACECs. The regulation of activities within critical habitat through section 7 consultation is based on recommendations in the Desert Tortoise Recovery Plan. DWMAs/ACECs have been designated in Utah, Arizona, and Nevada. Similar designations are in progress in California for the Western

Mojave RU, and Northern and Eastern Colorado RUs. Yucca Mountain occurs within the Northeastern Mojave RU near the boundary with the Eastern Mojave RU, but not within a proposed DWMA.

The Northeastern Mojave RU occurs primarily in Nevada, but it also extends into California along the Ivanpah Valley and into extreme southwestern Utah and northwestern Arizona. Vegetation within this unit is characterized by creosote bush scrub, big galleta-scrub steppe, desert needlegrass scrub-steppe, and blackbrush scrub (in higher elevations). Topography is varied, with flats, valleys, alluvial fans, washes, and rocky slopes. Much of the northern portion of the RU is characterized as basin and range, with elevations from 2,500 to 12,000 feet. Desert tortoises typically eat summer and winter annuals, cacti, and perennial grasses. Desert tortoises in this RU, the northern portion of which represents the northernmost distribution of the species, are typically found in low densities (approximately 10 to 20 adults per square mile).

Recovery of the desert tortoise may occur at the recovery unit level which allows populations within each of the six recovery units to be recovered and delisted individually. Similarly, the jeopardy and adverse modification standards may be applied within or across recovery units. Thus, proposals to implement the Desert Tortoise Recovery Plan in portions of a recovery unit cannot be evaluated with regard to jeopardy or adverse modification in a section 7 consultation without an understanding of proposed or existing management prescriptions occurring elsewhere in the recovery unit.

Long-term monitoring of desert tortoise populations is a high priority recovery task as identified in the Desert Tortoise Recovery Plan. From 1995 to 1998, pilot field studies and workshops were conducted to develop a monitoring program for desert tortoise. In 1998, the Desert Tortoise Management Oversight Group chose line distance sampling as the appropriate method to determine rangewide desert tortoise population densities and trends. Monitoring of populations using this method is underway across the range of the desert tortoise and baseline population data will be forthcoming within the next year. Successful rangewide monitoring will enable managers to evaluate the overall effectiveness of recovery actions and population responses to these actions, thus guiding recovery of the Mojave desert tortoise.

Environmental Baseline

The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation process.

Yucca Mountain is located in Nye County, Nevada, approximately 93 miles northwest of Las Vegas and crosses the jurisdictional boundaries of DOE, the U.S. Air Force (USAF), and BLM. The areas managed by the DOE and USAF have been reserved for use by government agencies in support of national security needs, and have been restricted from public access and grazing since the early 1950s (DOE 1997).

Yucca Mountain occurs on the northern edge of the Mojave Desert along an ecotone between the Great Basin and Mojave deserts with a maximum elevation of 4,950 feet. The area is characterized by three vegetation associations (DOE 1997). An association dominated by shrubs including primarily creosotebush (*Larrea tridentata*), white bursage (*Ambrosia dumosa*), spiny hopsage (*Grayia spinosa*), and Mormon tea (*Ephedra nevadensis*) is found on alluvial slopes in the Mojave Desert zone below approximately 4,265 feet. Mormon tea, spiny hopsage, and wolfberry (*Lycium andersonii*) dominate the vegetation association in the transition zone on alluvial slopes above approximately 4,265 feet and on the upper slopes of Yucca Mountain. The third vegetation association occurs on upper alluvial slopes and relatively level ridges, between approximately 3,800 and 4,950 feet is dominated by blackbrush (*Coleogyne ramosissima*) (DOE 1997).

Status of the Species in the Action Area

Karl (1989) conducted desert tortoise surveys in the Yucca Mountain area between September 17 and 23, 1989. A total of 23 strip transects were walked to assess distribution, habitat associations, and relative abundances of tortoise. According to the surveys, tortoises preferred large alluvial fans in the eastern portion of the area. Karl estimated that the density of desert tortoises ranged from 10 to 50 tortoises per square mile. The steep ridge/drainage mosaic in the western portion of Yucca Mountain had the least sign, and was considered poor habitat. Existing disturbance as a result of DOE activities in the Yucca Mountain area consisted of approximately 641 acres as a result of drill holes, trenches and test pits, seismic surveys, monitoring stations, bladed use facilities, and roads and corridors. The area with greatest disturbance was located along Drill Hole Wash Road. Additional disturbance was observed as a result of trespass cattle grazing.

Biologists with EG&G/Energy Measurements (EG&G/EM) (1991) conducted 341 transects from 1981 through 1984 in the Yucca Mountain area, covering approximately 322 linear miles. During the transects, 0.17 tortoise sign was found per mile of transect walked, including nine tortoises. Sign was found between 3,280 and 5,250 feet in elevation. Between 1987 and 1990, EG&G/EM biologists conducted additional transects during tortoise population and impact monitoring studies on the NTS. During these surveys, 54 desert tortoises were found at Yucca Mountain during 1989-1990 (EG&G/EM 1991). Based on transects and studies conducted from

1981 through 1995, DOE concluded that desert tortoises are widespread throughout Yucca Mountain and occur in all three of the common vegetation associations at Yucca Mountain (DOE 1997). Observational data recorded in the Yucca Mountain area during field work conducted from 1989 through 1995 suggest that desert tortoise densities are within the range of 10 to 50 per square mile presented by Karl (1989).

Between July 1991 and September 1995, biologists under contract to DOE monitored 95 radio telemetered tortoises to determine their location and behavior. Data collected during this monitoring program indicated that tortoises were inactive November 15 through February 15. During this period, tortoises were in burrows during 4,102 of 4,119 observations (Rautenstrauch et al. 1997). Because Yucca Mountain is located at higher elevations than average (approximately 3,200 to 4,950 feet) and at the northernmost distribution of the range of desert tortoise, these data may be different from inactive periods in other parts of the range of the desert tortoise. Based on the information above, the Service determined the tortoise active season at Yucca Mountain to be November 15 through February 15.

Major Activities Authorized Under Sections 7 and 10(a)(1)(A) of the Act in the Action Area

On February 9, 1990, the Service issued a non-jeopardy biological opinion to DOE for site characterization studies at Yucca Mountain (File No. 1-5-90-F-6) which was reinitiated on December 9, 1996, and superceded by a new biological opinion on July 23, 1997 (File No. 1-5-96-F-307R). A total of 375 acres of desert tortoise habitat has been disturbed of the 450 acres that DOE anticipated to disturb as a result of site characterization activities (DOE 2000a). During the site characterization studies, a total of five (5) desert tortoises were killed or injured, all of which were within the incidental for the 450-acre project area. Four (4) of these mortalities were the result of tortoise encounters with project-related vehicles. The fifth tortoise was a hatchling which fell into a project trench and died. An additional 28 tortoises were moved out of harm's way. Two of the displaced tortoises subsequently died; however, it was not determined to be a direct result of project activities.

On August 26, 1994, the Service issued a recovery permit (PRT-781234) to EG&G/EM under section 10(a)(1)(A) of the Act to conduct studies on hatchling and adult desert tortoises in Nevada and California which was originally covered under EG&G's prior permit, PRT-683011. In their 1989 biological assessment for the site characterization studies at Yucca Mountain (DOE 1989), DOE proposed to continue a desert tortoise population monitoring program initiated in 1989 at Yucca Mountain, which was incorporated by reference in the terms and conditions of the 1990 biological opinion. These studies were conducted by EG&G/EM under PRT-781234 at

Yucca Mountain and elsewhere on the NTS. Between 1989 and 1995, a total of 555 tortoises were captured and marked; 308 of these tortoises were radio telemetered. Effective December 31, 1995, EG&G/EM ended their contract with DOE for the Yucca Mountain Project and the permit was not renewed.

Programmatic Biological Opinions Issued for Desert Tortoise in Nevada

File No. 1-5-91-F-112. On September 26, 1991, the Service issued a programmatic biological opinion to the BLM's Las Vegas District for implementation of their Management Framework Plan (MFP) within the boundaries of Clark County's incidental take permit in the Las Vegas Valley. As a result of the action, approximately 42,240 acres of BLM land were authorized for disposal by sale, exchange, mineral leases, rights-of-way leases, or recreation or public purpose leases. These lands could be developed for residential, industrial, commercial, and public infrastructure projects to accommodate rapid urban development. The biological opinion concluded that the proposed action to implement the BLM's MFP was not likely to jeopardize the continued existence of the Mojave population of the desert tortoise; no critical habitat would be destroyed or adversely modified. Under the 1991 programmatic biological opinion, the BLM disposed of 5,252 acres out of the 42,240 acres originally identified.

File No. 1-5-96-F-023R. In order to expand the programmatic boundary from 263,267 acres to 378,978 acres to accommodate the rapid urban development in the Las Vegas Valley and surrounding area, the BLM reinitiated consultation on their 1991 programmatic biological opinion described above. On April 11, 1996, the Service issued a programmatic biological opinion to the BLM's Las Vegas District for implementation of their MFP and the land exchange portion of their Stateline Resource Management Plan within the Las Vegas Valley. Implementation of these plans, when finalized, may result in disposal or development of approximately 125,000 acres of land administered by the BLM by sale, land exchange, or lease. As a result of urban expansion, most BLM lands within the Las Vegas Valley are highly fragmented and impacted by human activities, particularly a 4,000-acre "exclusionary" zone. The BLM delineated an exclusionary zone within the programmatic boundary which does not contain suitable desert tortoise habitat. Except for lands within the exclusionary zone, the BLM will collect a mitigation fee of $623 per acre, as indexed for inflation, to compensate for the loss of tortoise habitat within the programmatic boundary. The fees will be used to fund management actions which are expected to provide direct and indirect benefits to the desert tortoise over time, which will assist in its recovery. This opinion remains in effect.

File No. 1-5-96-F-33. On August 22, 1996, the Service issued a biological opinion to the Department of Energy/Nevada Operations (DOE/NV) for programmatic activities on the NTS over the next 10 years, excluding the Yucca Mountain Project. The NTS occupies 1,350 square

miles in Nye County, approximately 65 miles northwest of Las Vegas. All land on the NTS is managed by DOE/NV, and access is strictly controlled. Between 3,000 and 4,000 people work at the NTS, with the majority residing in Mercury, Nevada. Although large parts of the NTS have been affected by human activities, the majority of the site remains relatively undisturbed. Most disturbances are concentrated in the bottom of Yucca, Frenchman, and Jackass Flats, and on parts of the Pahute and Rainer Mesas. In the biological opinion, the Service concluded that up to 13 desert tortoises may be taken per year (3 mortalities or injuries and 10 captures/displacements from harm's way) as a result of DOE/NV activities, and a total of 3,015 acres of desert tortoise habitat may be disturbed during project construction over the 10-year period.

File No. 1-5-97-F-251. On November 21, 1997, the Service issued a programmatic biological opinion to the BLM for implementation of multiple-use actions within their Las Vegas District, excluding desert tortoise critical habitat, proposed desert tortoise ACECs, and the area covered by the Las Vegas Valley programmatic consultation. The BLM proposes to authorize activities within the programmatic area that may result in loss of tortoises or their habitat through surface disturbance, land disposal, and fencing, for a period of 5 years. The total area covered by this programmatic biological opinion is approximately 2,636,600 acres, which includes approximately 263,900 acres of BLM-withdrawn lands in Clark County. This programmatic consultation is limited to activities which may affect up to 240 acres per project, and a cumulative total of 10,000 acres, of desert tortoise habitat excluding land exchanges and sales. Only land disposals by sale or exchange within Clark County may be covered under this consultation up to a cumulative total of 14,637 acres. Therefore, a maximum total of 24,637 acres of desert tortoise habitat may be affected by the proposed programmatic activities. The BLM collects a remuneration fee of $623 per acre of disturbance of desert tortoise habitat, as indexed for inflation.

File No. 1-5-98-F-053. On June 18, 1998, the Service issued a programmatic biological opinion to the BLM for implementation of the Las Vegas RMP. The BLM collects a remuneration fee of $623 per acre of disturbance of desert tortoise habitat, as indexed for inflation. The project area for this consultation covers all lands managed by the BLM's Las Vegas Field Office, including desert tortoise critical habitat, proposed desert tortoise ACECs, and BLM-withdrawn land. The Las Vegas Field Office designated approximately 648 square miles of tortoise habitat as desert tortoise ACEC in the Northeastern Mojave RU, and approximately 514 square miles of tortoise habitat as desert tortoise ACEC in the East Mojave RU, through the final RMP. As identified in the RMP, the BLM would manage 743,209 acres of desert tortoise habitat within four tortoise ACECs for desert tortoise recovery. To accomplish recovery of the desert tortoise in the Northeastern and Eastern Mojave RUs, the Las Vegas Field Office will implement appropriate management actions in desert tortoise ACECs through the RMP which includes:

1. Manage for zero wild horses and burros within desert tortoise ACECs.

2. Limit utility corridors to 3,000 feet in width, or less.

3. Do not authorize new landfills or military maneuvers.

4. Require reclamation for activities which result in loss or degradation of tortoise habitat, with habitat to be reclaimed so that pre-disturbance condition can be reached within a reasonable time frame.

5. Limit all motorized and mechanized vehicles to designated roads and trails within ACECs and existing roads, trails, and defined dry washes outside ACECs.

6. Allow non-speed OHV events within ACECs, subject to restrictions and monitoring determinations.

7. Prohibit OHV speed events, mountain bike races, horse endurance rides, four-wheel hill climbs, mini-events, publicity rides, high-speed testing, and similar speed based events.

8. Within ACECs, do not allow commercial collection of flora. Only allow commercial collection of fauna within ACECs upon completion of a scientifically credible study that demonstrates commercial collection of fauna does not adversely impact affected species or their habitat. This action will not affect hunting or trapping, and casual collection as permitted by the State.

File No. 1-5-99-F-450. On March 3, 2000, the Service issued a programmatic biological opinion to the Bureau for implementation of the Caliente Management Framework Plan (CMFP). The Bureau collects a remuneration fee of $623 per acre of disturbance of desert tortoise habitat, as indexed for inflation. The planning area for this consultation covers all desert tortoise habitat managed by the Bureau's Ely Field Office and Caliente Field Station within the Ely District. The planning area comprises approximately 754,600 acres of desert tortoise habitat, including 244,900 acres of designated desert tortoise critical habitat. The Bureau's Ely Field Office will implement management actions described in the biological opinion including multiple-use activities. The CMFP was developed to assist in the recovery and delisting of the Mojave population of desert tortoise in the NEMRU. The CMFP designated three ACECs with a total acreage of approximately 212,500 acres (332 square miles) to be managed primarily for recovery of the desert tortoise.

Implementation of actions by the Ely Field Office which may affect desert tortoise include: Livestock grazing; wild horse and burro management; land disposal and acquisition; rights-of-way management; management of recreational activities including OHV use; minerals management; fire management; and public transportation and access. These actions may result in loss of tortoises or their habitat through programmatic activities over a 10-year period.

Habitat Conservation Plans Completed in Nevada

On May 23, 1991, the Service issued a biological opinion on the issuance of incidental take permit PRT-756260 (File No. 1-5-91-FW-40) under section 10(a)(1)(B) of the Act. The Service concluded that incidental take of 3,710 desert tortoises on up to 22,352 acres of habitat within the Las Vegas Valley and Boulder City in Clark County, Nevada, was not likely to jeopardize the continued existence of the desert tortoise. The permit application was accompanied by the *Short-Term Habitat Conservation Plan for the Desert Tortoise in the Las Vegas Valley, Clark County, Nevada* (Regional Environmental Consultants 1991) (short-term HCP) and an implementation agreement that identified specific measures to minimize and mitigate the effects of the action on desert tortoises.

On July 29, 1994, the Service issued a non-jeopardy biological opinion on the issuance of an amendment to incidental take permit PRT-756260 (File No. 1-5-94-FW-237) to extend the expiration date of the existing permit by 1 year (to July 31, 1995) and include an additional disturbance of 8,000 acres of desert tortoise habitat within the existing permit area. The amendment did not authorize an increase in the number of desert tortoises allowed to be taken under the existing permit. Additional measures to minimize and mitigate the effects of the amendment were also identified. Approximately 1,300 desert tortoises were taken under the authority of PRT-756260, as amended. In addition, during the short-term HCP, as amended, approximately 541,000 acres of desert tortoise habitat have been conserved in Clark County on lands administered by the BLM and the National Park Service.

On February 10, 1995, the Service issued an incidental take permit (PRT-776604) to Nye County for development and operation of a landfill near Pahrump, Nevada. The permit authorized take of 20 desert tortoises and loss of 80 acres of tortoise habitat as a result of the landfill for the next 30 years. Over the term of the permit, Nye County shall transfer up to a total of $25,920 into a desert tortoise trust fund as mitigation for the alteration of up to 80 acres of suitable desert tortoise habitat in the project area. These funds shall be used for the purchase, installation, and maintenance of cautionary tortoise road signs. Surplus funds will be used for public education on the Mojave desert and its inhabitants, including the desert tortoise.

On July 11, 1995, the Service issued an incidental take permit (PRT-801045) to Clark County, Nevada, including cities within the county and the Nevada Department of Transportation (NDOT), under the authority of section 10(a)(1)(B) of the Act. The permit became effective August 1, 1995, and allowed the "incidental take" of desert tortoises for a period of 30 years on 111,000 acres of non-Federal land in Clark County, and approximately 2,900 acres associated with NDOT activities in Clark, Lincoln, Esmeralda, Mineral, and Nye Counties, Nevada. The *Clark County Desert Conservation Plan* (CCDCP) (Regional Environmental Consultants 1995), served as the permitees' habitat conservation plan and detailed their proposed measures to minimize, monitor, and mitigate the effects of the proposed take on the desert tortoise. The permittees imposed, and NDOT paid, a fee of $550 per acre of habitat disturbance to fund these measures. The permittees expended approximately $1.65 million per year to minimize and mitigate the potential loss of desert tortoise habitat. The majority of these funds were used to implement minimization and mitigation measures, such as increased law enforcement; construction of highway barriers; road designation, signing, closure, and rehabilitation; and tortoise inventory and monitoring within the lands initially conserved during the short-term HCP and other areas being managed for tortoise recovery (e.g., ACECs or DWMAs). The benefit to the species, as provided by the CCDCP, substantially minimized and mitigated those effects which occurred through development within the permit area and aided in recovery of the desert tortoise.

On November 22, 2000, the Service issued an incidental take permit (TE-034927-0) to Clark County, Nevada, including cities within the county and the NDOT, under the authority of section 10(a)(1)(B) of the Act. The permit supercedes the incidental take permit for the CCDCP. The new permit allows the "incidental take" of the federally threatened desert tortoise, the federally endangered southwestern willow flycatcher (*Empidonax traillii extimus*), and 76 currently unlisted species for a period of 30 years on 145,000 acres of non-Federal land in Clark County, and within NDOT rights-of-way, south of the 38th parallel in Nevada. The *Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement* (MSHCP) (Clark County and Service 2000), serves as the permitees' habitat conservation plan and details their proposed measures to minimize, monitor, and mitigate the effects covered activities on the 78 species. In addition to measures specified in the MSHCP and its implementing agreement, the permittees shall comply with the special terms and conditions of the permit and measures stated in sections 3C and 3D of the CCDCP, which were incorporated by reference into the MSHCP and incidental take permit.

Yucca Mountain does not include private land and occurs in Nye County, therefore the project area occurs outside Clark County's incidental take permit areas for the CCDCP and MSHCP.

Effects of the Proposed Action on the Listed Species

Implementation of the proposed action would result in the loss of up to 1,643 acres of low-density desert tortoise habitat. Increased human use and development of the desert often result in more human interactions with the desert tortoise and its habitat. Extensive disturbance may result in dispersal of tortoises into surrounding areas which are poor to very poor habitat (Karl 1989). Overall, desert tortoise habitats most susceptible to negative impacts are those at the interfaces between developed lands and open desert. Habitat fragmentation associated with development is a major contributor to population declines throughout the range of the tortoise (Berry and Burge 1984). Even near small settlements (e.g., Mercury) and isolated residences the same factors are present, and the cumulative impacts can spread in a radius of several miles from such areas. For example, domestic dogs can be found digging up and killing desert tortoises several miles from home (Service 1994).

Disturbance of desert tortoise habitat during construction of facilities, excavation of trenches, and creation of drill pads are the most obvious effects to desert tortoise. Desert tortoises may be buried in their burrows as a result of road construction and maintenance, killed or injured by project vehicles, drowned by water discharges into washes, trapped or injured by falling into open holes or trenches, or captured and displaced out of harm's way. Additional harassment may occur from increased levels of human activity, noise, and ground vibrations produced by vehicles and heavy equipment (Bondello 1976; Bondello et al. 1979). Desert tortoises may be captured by workers for use as pets. Ground vibrations can cause desert tortoises to emerge from their burrows; slapping the ground several times within a few feet of a desert tortoise burrow entrance will often cause a desert tortoise to emerge (Medica et al. 1986). The measures proposed by DOE to implement a tortoise education program, conduct preactivity and clearance surveys, impose speed limits, and cease activities that threaten a tortoise until the tortoise moves or is moved out of harm's way should minimize these effects.

Yucca Mountain occurs within a restricted access area which prevents tortoises from being collected or harassed by the public. The release of captive animals which are ill may contribute to the spread of URTD or other diseases in wild populations (Jacobson et al. 1995; Jacobson and Gaskin 1990). Because Yucca Mountain is an isolated and restricted access area, the potential introduction of disease to tortoises in the area through release of captive desert tortoises by the public is unlikely.

A survey of approximately 54 miles of electrical transmission lines in southern Nevada produced the remains of 78 juvenile tortoises which were found beneath 23 towers (McCullough Ecological Systems 1995). Ravens use power transmission towers and other man-made structures for perches to locate small, slow-moving hatchling and juvenile tortoises. Natural

predation in undisturbed, healthy ecosystems is generally not an issue of concern. However, predation rates may be altered when natural habitats are disturbed or modified. Construction of artificial raven perch and nest sites (e.g., power transmission lines) may increase raven predation of desert tortoises. Roads may provide linear open areas that make tortoises more visible to avian predators. Common raven populations in the California deserts have increased ten-fold from 1968 to 1992 in response to expanding human use of the desert (Boarman and Berry 1995). Because ravens make frequent use of food, water, and nest site subsidies provided by humans, their population increases can be tied to this increase in food and water sources, such as landfills and septic ponds (Boarman 1992; Service 1994). Ravens may be attracted to landfills or project sites if trash is accessible by scavengers (Berry 1985; BLM 1990). Considering that ravens were very scarce in this area prior to 1940, it is assumed that the current level of raven predation on juvenile desert tortoises is an unnatural occurrence (BLM 1990).

Beginning in August 1991 and continuing for 32 months, DOE initiated a raven abundance and monitoring program. During the program, project biologists determined that there was no change in the difference between the number of ravens observed between pre- and post-disturbance (Holt and Mueller 1994). No tortoise carcasses were observed under utility poles or raven nest sites. Because ravens occur at Yucca Mountain and potentially may prey on small tortoises, DOE proposes to continue to implement a litter-control program and manage landfills in a manner which minimizes potential attraction of ravens to the Yucca Mountain.

Desert tortoises will continue to be threatened by roads and vehicles on the project site and access roads. Data from permanent study plots in California show that tortoise densities decreased significantly with increasing mileage of linear disturbances (e.g., roads), increasing numbers of human visitors, and increasing percentages of introduced annual plants (Berry 1992). The density of roads, routes, trails, and ways in desert tortoise habitat has a direct effect on mortality rates and losses of tortoises. Access allows people to penetrate into remote, undisturbed parts of the desert, which contributes to tortoise mortality and habitat loss or degradation (Service 1994). During 1991-1996, four (4) tortoises were reported killed on NTS roads. Movement of tortoises out of imminent danger on roads as authorized by previous biological opinions for the project site and NTS should minimize injury and mortality of tortoises.

Implementation of activities as described in the Plan may result in the long-term disturbance of an additional 1,643 acres of desert tortoise habitat beyond prior project activities. The Service believes that no more than fifteen (15) desert tortoises may be incidentally killed or injured during the proposed action, and up to sixty (60) tortoises captured/displaced as a result of the proposed project.

The Service has determined that the level of effect described herein will not reduce appreciably the likelihood of survival and recovery of the Mojave population of the desert tortoise in the wild or diminish the value of critical habitat both for survival and recovery of the desert tortoise because:

(1) The proposed project area does not occur within any areas recommended for recovery of the desert tortoise or areas designated as critical habitat;

(2) rehabilitation and revegetation of disturbed sites will minimize many of the long-term effects of the proposed project on the desert tortoise;

(3) DOE has made a substantial investment of resources to conserve the desert tortoise at Yucca Mountain. With proper management and continued conservation, desert tortoise populations at Yucca Mountain will remain viable; and;

(4) the project area occurs within the Northeastern RU in Nye County, Nevada. Project activities should not result in a substantial loss of the tortoises within this RU when total desert tortoise population numbers and geographical extent are considered.

Cumulative Effects

Cumulative effects are those effects of future non-Federal (State, local government, or private) activities that are reasonably certain to occur in the project area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The project area occurs on public land with access restrictions in Nye County. Any future actions on these lands, including Federal transportation rights-of-way and funding in support of the proposed project, will be subject to consultation under section 7 of the Act.

Conclusion

After reviewing the current status of the desert tortoise, the environmental baseline for the project area, the effects of the proposed action and the cumulative effects, it is the Service's biological opinion that construction, operation and monitoring, and closure of a geologic repository at Yucca Mountain is not likely to jeopardize the continued existence of the threatened Mojave

population of the desert tortoise. These actions do not affect any area designated as critical habitat; therefore, no destruction or adverse modification of that habitat is anticipated.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, as amended, prohibits take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. "Harm" is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering (50 CFR § 17.3). "Harass" is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the Act, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service hereby incorporates by reference DOE's six proposed measures from the *Description of the Proposed Action* into this incidental take statement as part of these terms and conditions. The following terms and conditions: (1) Restate measures proposed by DOE, (2) modify the measures proposed by DOE, or (3) specify additional measures considered necessary by the Service. Where these terms and conditions vary from or contradict the measures proposed under the *Description of the Proposed Action*, specifications in these terms and conditions shall apply. The measures described below are nondiscretionary and must be implemented by DOE so that they become binding conditions of any project, contract, grant, or permit issued by DOE, as appropriate, in order for the exemption in section 7(o)(2) to apply.

DOE has a continuing duty to regulate the activity that is covered by this incidental take statement. If DOE fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

Amount of Take

Based on the analysis of impacts provided above, measures proposed by DOE, and anticipated project duration, the Service anticipates that the following take could occur as a result of the proposed action:

1. Fifteen (15) desert tortoises may be accidentally injured or killed onsite during project-related activities as a result of the proposed action. An unknown number of desert tortoises may be killed or injured on project-related roads, however the Service anticipates that fewer than five tortoises per year would be killed on injured on these roads.

2. All desert tortoises encountered within the project area or roads associated with the project may be taken by capture and movement out of harm's way; the Service estimates that no more than sixty (60) desert tortoise will we captured and moved during the project.

3. An unknown number of desert tortoises may be taken in the form of indirect mortality through predation by ravens drawn to the project area.

4. An unknown number of desert tortoise eggs and non-emerged hatchlings may be moved or incidentally destroyed as a result of the project activities.

5. An unknown number of desert tortoises may be taken indirectly in the form of harm or harassment through increased noise associated with operation of heavy equipment.

A total of 1,643 acres of desert tortoise habitat may be destroyed as a result of the proposed action, in addition to the 375 acres disturbed under the previous biological opinions (File Nos. 1-5-90-F-6 and 1-5-96-F-307R).

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of desert tortoise:

1. Measures shall be taken to minimize take of desert tortoises due to project-related activities and operation of heavy equipment.

2. Measures shall be taken to minimize entrapment of desert tortoises in open trenches.

3. Measures shall be taken to minimize predation on tortoises by ravens drawn to project areas.

4. Measures shall be taken to minimize destruction of desert tortoise habitat, such as soil compaction, erosion, or crushed vegetation, due to project-related activities.

5. Measures shall be taken to ensure compliance with the reasonable and prudent measures, terms and conditions, reporting requirements, and reinitiation requirements contained in this biological opinion.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, DOE must fully comply with the following terms and conditions, which implement the reasonable and prudent measures described above.

1. To implement Reasonable and Prudent Measure Number 1, DOE shall fully implement the following measures:

    a. Clearance surveys will be conducted by qualified biologists prior to clearing of vegetation at previously undisturbed sites if new disturbances are larger than 5 acres or records indicate tortoises may occur in the area to be disturbed. If the project activity can occur in an adjacent area where no tortoises or sign are present, the proposed activity shall be moved. If no suitable site is totally free of tortoises or tortoise sign, the qualified biologist shall determine which site would cause the least impact to tortoises and their habitat.

In accordance with *Procedures for Endangered Species Act Compliance for the Mojave Desert Tortoise* (Service 1992), a qualified desert tortoise biologist shall possess a bachelor's degree in biology, ecology, wildlife biology, herpetology, or closely related fields. The biologist must have demonstrated prior field experience using accepted resource agency techniques to survey for desert tortoises and tortoise sign. In addition, the biologist shall have the ability to recognize and accurately record survey results.

b. Clearance surveys will be conducted either the day prior to, or the day of, any surface-disturbing activity during the tortoise activity season (February 16 through November 14). Based on the results of the hibernation study conducted at the Yucca Mountain Site Characterization Project (Rautenstrauch et al. 1997), the Service anticipates that most tortoises will be in hibernacula during the inactive season and will remain there during a 7-day period between survey and activity. Therefore, clearance surveys will be conducted within 7 days prior to any surface-disturbing activity during the hibernation period (November 15 through February 15). Qualified desert tortoise biologists will search areas to be cleared using techniques providing 100-percent coverage of all areas to be disturbed, as described in Term and Condition 1.a. above. If tortoises or eggs are found during clearance surveys, they will be moved out of harm's way following Service guidelines (Desert Tortoise Council 1994, revised 1999). All tortoise burrows, and other animal burrows that may be used by tortoises, that are found during clearance surveys will be conspicuously flagged and avoided by at least 30 feet.

c. If a burrow cannot be avoided, it will be inspected to determine the presence of tortoises or tortoise nests. If unoccupied, the burrow will be collapsed to prevent tortoise entry. All unavoidable burrows containing tortoise eggs or tortoises will be excavated by hand to remove the tortoise and/or eggs. Tortoise eggs and tortoises in harm's way will be removed and relocated by qualified biologists and handled according to desert tortoise handling procedures approved by the Service. (Currently, the approved procedures are in: Desert Tortoise Council 1994, revised 1999).

d. If removed from a burrow, the tortoise will be placed in the shade of a shrub or in an existing, similar, unoccupied tortoise burrow that is approximately the same size, depth, and orientation as the original burrow. Desert tortoises moved during the tortoise inactive season (i.e., November 15 through February 15), or those considered by the qualified desert tortoise biologist to be in estivation or

brumation, regardless of date, must be placed into an adequate burrow. If suitable, unoccupied burrow (i.e., similar in size, depth, and orientation as the original burrow) is not available, one will be constructed utilizing the protocol for burrow construction in section B.5.f of the Service-approved guidelines (Desert Tortoise Council 1994, revised 1999).

e. Project activities that may endanger a tortoise will cease if a tortoise is found on a project site. Project activities will resume after the biologist removes the tortoise from danger or after the tortoise has moved to a safe area.

f. A tortoise biologist or environmental monitor (in place of a desert tortoise biologist) will be onsite during all phases of each construction activity to ensure construction activities are in compliance with this biological opinion and that desert tortoises are not inadvertently harmed.

The environmental monitor may be the project foreman or supervisor who will be responsible for: (1) Enforcing the litter-control program; (2) ensuring that tortoise-proof fences are maintained where applicable; (3) ensuring that desert tortoise habitat disturbance is restricted to authorized areas; (4) ensuring that all equipment and materials are stored within the boundaries of the construction zone or within the boundaries of previously disturbed areas; (5) ensuring that all vehicles associated with construction activities are using existing graded or paved roads or are within the proposed construction zones; (6) ensuring that open trenches or other excavations are inspected in accordance with term and condition 2 of this biological opinion; (7) ensuring that speed limits are observed; and (8) ensuring compliance with the terms and conditions of this biological opinion. An environmental monitor is not authorized to handle tortoises, which will only be done by a qualified desert tortoise biologist.

g. Vehicles will not be driven off existing roads in non-emergency situations unless authorized by DOE. During the tortoise active season (February 15 through November 15) the proposed vehicle path will be cleared of tortoises immediately prior to off-road travel. During the tortoise inactive season, the proposed vehicle path will be flagged and cleared of tortoises within 7 days prior to off-road travel.

h. All vehicles will be driven at speeds within the posted speed limits on existing roads, and will not exceed 25 miles per hour on unposted roads.

I. DOE will continue to present a tortoise education program to all workers and employees working on the project site. This will include information on the life history of the desert tortoise, legal protection for desert tortoises, penalties for violations of Federal and State laws, general tortoise activity patterns, reporting requirements, measures to protect tortoises, and personal measures employees can take to promote the conservation of desert tortoises. The definition of "take" will also be explained. All questions on desert tortoises or actions which may affect tortoise will be answered accurately by the instructor or a qualified tortoise biologist. All DOE and contractor personnel working on the project at Yucca Mountain will complete the DOE tortoise education program.

The education program shall instruct attendees that the definition of "take" includes capture. Therefore, any unauthorized person who picks up a desert tortoise or restricts the animal's ability to move freely, could be found guilty of illegal "take" unless done in accordance with this biological opinion. The same applies for any individual if the authorized level of incidental take has been reached or exceeded. Any action taken to harm, harass, pursue, hunt, shoot, wound, kill, collect, capture, or trap a tortoise, or attempt to conduct any of these activities constitutes take.

Incidental take occurring which is consistent with the *Incidental Take Statement* of this biological opinion would be legal; for example, moving a tortoise out of the path of an approaching vehicle if the tortoise is observed in the road within the project area. However, the tortoise may not be moved if it is not in imminent danger and will leave the road of its own accord. If a tortoise must be moved off a road to avoid imminent injury or mortality, the tortoise must be moved in the same direction of travel. The tortoise shall be picked up gently with two hands, kept level, and carried close to the ground. The tortoise shall be placed in the shade of a shrub approximately 25 feet from the road edge.

j. Marking or radiotelemetry of desert tortoises is not authorized under this biological opinion. Tortoises shall be purposefully moved only by qualified tortoise biologists, solely for the purpose of moving them out of harm's way, with the exception identified in 1.i. above.

2. To implement Reasonable and Prudent Measure Number 2, DOE shall fully implement the following measures:

a. During the tortoise active season (February 16 through November 14), all trenches and other excavations with side slopes steeper than 1-foot rise to 3-foot length shall be immediately backfilled prior to being left unattended, or: (1) Fenced with tortoise-proof fencing; (2) covered with tortoise-proof fencing; (3) covered with plywood or similar material; or (4) constructed with escape ramps at each end of the trench and every 1,000 feet, at a minimum. All coverings and fences shall have zero ground clearance. If alternative 4 is selected, the trench or other excavation will be inspected periodically and following periods of substantial rainfall to ensure structural integrity and that escape ramps are functional.

b. An open trench or other excavation as described in 2.a. shall be inspected for entrapped animals immediately prior to backfilling.

c. If at any time a tortoise is discovered within a trench, all activity associated with that trench shall cease until a qualified biologist has removed the tortoise in accordance with Service-approved guidelines (Desert Tortoise Council 1994, revised 1999).

3. To implement Reasonable and Prudent Measure Number 3, DOE shall fully implement the following measure:

DOE will implement a litter-control program that will include the use of covered, raven-proof trash receptacles; disposal of edible trash in trash receptacles following the end of each work day; and disposal of trash in a designated sanitary landfill at the end of each week or when nearly full. Material placed in a sanitary landfill will be covered often enough to prevent ravens and other predators from feeding in the area.

4. To implement Reasonable and Prudent Measure Number 4, DOE shall fully implement the following measure:

Project areas no longer required by the project will be revegetated in accordance with the *Reclamation Implementation Plan* (Reclamation Plan) (DOE 2001c), RSMP (DOE 1998) developed for the Yucca Mountain Site Characterization Project, and recommendations made by Rakestraw et al. (1995). Site-specific plans will be developed for each site to be rehabilitated and shall conform with the Reclamation Plan and RSMP. Only native perennial vegetation and annual plants, including forage species of desert tortoises will be used on the project site. DOE shall conduct a field survey at each site and develop site-specific reclamation

plans for surface-disturbing projects within desert tortoise habitat. These plans may include specifications for contouring, relieving soil compaction, treating and/or spreading topsoil, and planting. In addition, these plans will describe in specific detail how disturbed sites will be rehabilitated using reasonable state-of-the-art techniques.

5. To implement Reasonable and Prudent Measure Number 5, DOE shall fully implement the following measures:

   a. Prior to handling any desert tortoise, carcass, or egg, appropriate State permits will be acquired from the Nevada Division of Wildlife.

   b. DOE will designate a field contact representative for each project, which may also serve as the environmental monitor, if appropriate. The field representative will be responsible for overseeing compliance with protective stipulations for the desert tortoise and for coordinating compliance with the terms and conditions of this biological opinion. The field representative will have the authority to halt activities of construction equipment which may be in violation of the stipulations.

   c. DOE will keep an up-to-date log of all actions taken under this consultation, including acreage affected, habitat rehabilitation actions completed, number of desert tortoises taken and by what means (e.g., injured, killed, captured and displaced, or found in trenches or pits). DOE will provide the above information to the Service's Las Vegas Office on February 28 of every year during which activities occur under this biological opinion. The first annual report will be due February 28, 2002. Information provided in the report shall state cumulative totals, as well as totals for the report year.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the anticipated incidental take that may result from the proposed action. With implementation of these measures, the Service believes that no more than fifteen (15) desert tortoises may be incidentally killed or injured, and up to sixty (60) desert tortoises captured and displaced during the proposed project. An additional 1,643 acres of desert tortoise habitat may be disturbed as a result of project activities.

If, during the course of the action, the level of incidental take or loss of habitat identified is exceeded, reinitiation of consultation will be required. DOE must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Reporting Requirements

Upon locating a dead or injured endangered or threatened species, initial notification must be made to the Service's Division of Law Enforcement in Las Vegas, Nevada, at (702) 388-6380. Care should be taken in handling sick or injured desert tortoises to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured desert tortoises or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by the Service's Division of Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed. All deaths, injuries, and illnesses of desert tortoises, whether associated with project activities or not, will be summarized in the annual report.

The following actions should be taken for injured or dead tortoises if directed by the Service's Division of Law Enforcement:

> Injured desert tortoises shall be delivered to any qualified veterinarian for appropriate treatment or disposal. Dead desert tortoises suitable for preparation as museum specimens shall be frozen immediately and provided to an institution holding appropriate Federal and State permits per their instructions. Should no institutions want the desert tortoise specimens, or if it is determined that they are too damaged (crushed, spoiled, etc.) for preparation as a museum specimen, then they may be buried away from the project area or cremated, upon authorization by the Service's Division of Law Enforcement. DOE, or the project proponent, shall bear the cost of any required treatment of injured desert tortoises, euthanasia of sick desert tortoises, or cremation of dead desert tortoises. Should sick or injured desert tortoises be treated by a veterinarian and survive, they may be transferred as directed by the Service.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

> *The Service recommends that DOE continue to consider important desert tortoise habitat at Yucca Mountain during the development and transportation phases of the project.*

In order for the Service to be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

Reinitiation Notice

This concludes formal consultation on the actions outlined in your April 24, 2000, request. As required by 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) The amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion (e.g., a substantial number of tortoises are killed or injured on established access roads, particularly along a specific road section); (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If we can be of any further assistance, please contact Michael Burroughs, in the Southern Nevada Field Office, at (702) 647-5230.

Sincerely,

Robert D. Williams
/s/ Field Supervisor

cc:
Administrator, Nevada Division of Wildlife, Reno, Nevada
Manager, Nevada Division of Wildlife, Las Vegas, Nevada
Deputy Director, Environmental Management, Department of the Air Force, Nellis AFB, Nevada
Deputy State Director, Resources, Land Use and Planning, Bureau of Land Management, Reno, Nevada
Project Leader, Desert National Wildlife Refuge Complex, Fish and Wildlife Service, Las Vegas, Nevada
Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Portland, Oregon
Senior Resident Agent, Division of Law Enforcement, Fish and Wildlife Service, Boise, Idaho

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CONVERSIONS

METRIC TO ENGLISH			ENGLISH TO METRIC		
Multiply	**by**	**To get**	**Multiply**	**by**	**To get**
Area					
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Concentration					
Kilograms/sq. meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/sq. meter
Milligrams/liter	1[a]	Parts/million	Parts/million	1[a]	Milligrams/liter
Micrograms/liter	1[a]	Parts/billion	Parts/billion	1[a]	Micrograms/liter
Micrograms/cu. meter	1[a]	Parts/trillion	Parts/trillion	1[a]	Micrograms/cu. meter
Density					
Grams/cu. cm	62.428	Pounds/cu. ft.	Pounds/cu. ft.	0.016018	Grams/cu. cm
Grams/cu. meter	0.0000624	Pounds/cu. ft.	Pounds/cu. ft.	16,025.6	Grams/cu. meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Temperature					
Absolute					
Degrees C + 17.78	1.8	Degrees F	Degrees F – 32	0.55556	Degrees C
Relative					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cu. meters/second	2118.9	Cu. feet/minute	Cu. feet/minute	0.00047195	Cu. meters/second
Grams/second	7.9366	Pounds/hour	Pounds/hour	0.126	Grams/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Liters	0.26418	Gallons	Gallons	3.78533	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.314	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1233.49	Cubic meters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
ENGLISH TO ENGLISH					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

a. This conversion is only valid for concentrations of contaminants (or other materials) in water.

METRIC PREFIXES

Prefix	Symbol	Multiplication factor	
exa-	E	1,000,000,000,000,000,000	= 10^{18}
peta-	P	1,000,000,000,000,000	= 10^{15}
tera-	T	1,000,000,000,000	= 10^{12}
giga-	G	1,000,000,000	= 10^{9}
mega-	M	1,000,000	= 10^{6}
kilo-	k	1,000	= 10^{3}
deca-	D	10	= 10^{1}
deci-	d	0.1	= 10^{-1}
centi-	c	0.01	= 10^{-2}
milli-	m	0.001	= 10^{-3}
micro-	µ	0.000 001	= 10^{-6}
nano-	n	0.000 000 001	= 10^{-9}
pico-	p	0.000 000 000 001	= 10^{-12}