1.0 SUMMARY

Monitoring and surveillance on and around the Nevada Test Site (NTS) by U.S. Department of Energy (DOE) contractors and NTS user organizations during 1996 indicated that operations on the NTS were conducted in compliance with applicable DOE, state, and federal regulations and guidelines. All discharges of radioactive liquids remained onsite in containment ponds, and there was no indication of potential migration of radioactivity to the offsite area through groundwater. Surveillance around the NTS indicated that airborne radioactivity from diffusion, evaporation of liquid effluents, or resuspension of soil was not detectable offsite, and exposure above background to members of the offsite population was not measured by the offsite monitoring program. Using the U.S. Environmental Protection Agency's (EPA) Clean Air Package 1988 (CAP88)-PC model and NTS radionuclide emissions and environmental monitoring data, the calculated effective dose equivalent (EDE) to the maximally exposed individual offsite would have been 0.11 mrem. This value is less than 2 percent of the federal dose limit prescribed for radionuclide air emissions. Any person receiving this dose would also have received 144 mrem from natural background radiation. There were no nonradiological releases to the offsite area. Hazardous wastes were shipped offsite to approved disposal facilities. Compliance with the various regulations stemming from the National Environmental Policy Act (NEPA) is being achieved and, where mandated, permits for air and water effluents and waste management have been obtained from the appropriate agencies. Cooperation with other agencies has resulted in seven different consent orders and agreements.

Support facilities at off-NTS locations have complied with the requirements of air quality permits and state or local wastewater discharge and hazardous waste permits as mandated for each location.

1.1 ENVIRONMENTAL MANAGEMENT

The DOE Nevada Operations Office (DOE/NV) is committed to increasing the quality of its management of NTS environmental resources. This has been promoted by the establishment of an Environmental Protection Division within the Office of Technical Services and upgrading the Environmental Management activities to the Assistant Manager level to address those environmental issues that have arisen in the course of performing the original primary mission of the DOE/NV, underground testing of nuclear explosive devices. An environmental survey in 1987 and a Tiger Team assessment in 1989 identified numerous issues that had to be resolved before DOE/NV could be considered to be in full compliance with environmental laws and regulations. At the end of 1996, all of the 149 Tiger Team findings had been satisfied.

Operational releases of radioactivity are reported soon after their occurrence. This year, only liquid effluents have been reported for the NTS. In compliance with the National Emission Standards for Hazardous Air Pollutants (NESHAP), as set forth in Title 40 Code of Federal Regulations (C.F.R.) 61, the accumulated annual data from these reports are used each year as part of the input to the EPA's CAP88-PC software program to calculate potential EDEs to

people living beyond the boundaries of the NTS and the surrounding exclusion areas.

1.2 RADIOLOGICAL ENVIRONMENT

Radiological effluents in the form of air emissions and liquid discharges are normally released into the environment as a routine part of operations on the NTS. Radioactivity in liquid discharges released to onsite waste treatment or disposal systems (containment ponds) is monitored to assess the efficacy of treatment and control and to provide a quantitative and qualitative annual summary of released radioactivity. Air emissions are monitored for source characterization and operational safety as well as for environmental surveillance purposes.

Air emissions in 1996 consisted primarily of small amounts of tritium, radioactive noble gases, and plutonium released to the atmosphere that were attributed to:

- Diffusion of tritiated water (HTO) vapor in atmospheric moisture from evaporation of HTO from tunnel and characterization well containment ponds.
- Diffuse emissions calculated from the results of environmental surveillance activities.
- Resuspension of plutonium as measured with air sampling equipment or calculated by use of resuspension equations.
- Release of krypton-85 from tests under Pahute Mesa when atmospheric pressure changes occur. Such releases were statistically undetectable in 1996.

Diffuse emissions included HTO, only slightly above detection limits, from the Radioactive Waste Management Site in Area 5 (RWMS-5) and resuspended $^{239+240}Pu$ from areas on the NTS where it was deposited by atmospheric nuclear tests or device safety tests in earlier years. Table 1.1 shows the quantities of radionuclides released from all sources, including postulated loss of laboratory standards. None of the radioactive materials listed in this table were detected in the offsite area above ambient levels.

Onsite liquid discharges to containment ponds included approximately 271 Ci (10 TBq) of tritium. This was about the same as last year's tritium releases, because effluent from characterization wells drilled in Area 20 continued during most of the year. Evaporation of this material could have contributed HTO to the atmosphere, but the amounts were too small to be detected by the tritium monitors onsite. No liquid effluents were discharged to offsite areas.

ONSITE ENVIRONMENTAL SURVEILLANCE

Environmental surveillance on the 3500 - km^2 (1350 - mi^2) NTS is designed to cover the entire area with some emphasis on areas of past nuclear testing and present operational activities. In 1996, samplers were operated at 49 locations to collect air particulate samples, at 16 locations to collect HTO in atmospheric moisture, and at 3 locations to collect air for analysis of noble gas content. Grab samples were collected frequently from water supply wells, water taps, springs, open reservoirs, containment ponds, and sewage lagoons. Thermoluminescent dosimeters (TLDs) were placed at 169 locations on the NTS to measure ambient gamma exposures.

Data from these networks are summarized as annual averages for each monitored location. Those locations with concentrations above the NTS average are assumed to reflect onsite emissions. These emissions arise from diffuse (areal) sources and from particular operational activities (e.g., radioactivity buried in the low-level waste [LLW] site).

Approximately 2,500 air samples were analyzed by gamma spectroscopy. All isotopes detected by gamma spectroscopy were naturally occurring in the environment (^{40}K, ^{7}Be, and members of the uranium and thorium series), except for a few instances where very low levels of ^{137}Cs were detected. Gross beta analysis of the air samples yielded an annual average for the network of 1.8×10^{-14} µCi/mL (0.74 mBq/m^3). Plutonium analyses of monthly or quarterly composited air filters indicated an annual arithmetic average below 10^{-16} µCi/mL (4 µBq/m^3) of $^{239+240}$Pu and below 10^{-17} µCi/mL (0.4 µBq/m^3) of ^{238}Pu for all locations during 1996, with the majority of results for both isotopes being on the order of 10^{-18} µCi/mL (0.04 µBq/m^3). A slightly higher average was found in samples in certain areas, but that level was calculated to be only 0.01 percent of the Derived Concentration Guide (DCG) for exposure to the public. Higher than background levels of plutonium are to be expected in some air samples because atmospheric testing in the 1950s, and nuclear safety tests dispersed plutonium over a small portion of the surface of the NTS.

The annual average concentration of ^{85}Kr from the three noble gas monitoring stations was 25×10^{-12} µCi/mL (1 Bq/m^3). This concentration is similar to that reported in previous years and is attributed to worldwide distribution of ^{85}Kr from the use of nuclear technology.

Throughout the year atmospheric moisture was collected for two-week periods at 15 locations on the NTS and analyzed for HTO content. The annual arithmetic average of $(3.5 \pm 5.0) \times 10^{-6}$ pCi/mL (0.13 ± 0.18 Bq/m^3) was similar to last year's average. The highest annual average concentrations were at the E Tunnel pond, the SEDAN crater, and RWMS-5 locations, in that order. The primary radioactive liquid discharge to the onsite environment in 1996 was 120 Ci (4.4 Tbq) of tritium (as HTO) in effluent produced during drilling of characterization wells in Area 20. Seepage from E Tunnel in Rainier Mesa (Area 12) contributed 20 million liters of water containing about 11 Ci (0.41 Tbq) of tritium to containment ponds near the tunnels. For dose calculations, all of the HTO was assumed to have evaporated.

Surface water sampling was conducted quarterly at eight open reservoirs, seven springs, eight containment ponds, and an effluent and eight sewage lagoons. A grab sample was taken from each of these surface water sites for analysis of gross beta, tritium, gamma-emitters, and plutonium isotopes. Strontium-90 was analyzed once per year for each location. Water samples from the springs, reservoirs, and lagoons contained background levels of gross beta, tritium, plutonium, and strontium. Samples collected from the tunnel containment pond and characterization well effluent ponds contained detectable levels of radioactivity as would be expected.

Water from onsite supply wells and drinking water distribution systems was sampled and analyzed for radionuclides. The supply well average gross beta activity of 7.2×10^{-9} µCi/mL (0.27Bq/L) was 3 percent of the DCG for ^{40}K (used for comparison purposes); gross alpha was 6.2×10^{-9} µCi/mL (0.23 Bq/L), which was about 40 percent of the drinking water standard; the maximum ^{90}Sr measured was 0.26×10^{-10} µCi/mL (0.9 Bq/L), about 1 percent of the DCG; ^{3}H concentrations averaged about 1.9×10^{-9} µCi/mL (70 mBq/L), less than 0.002 percent of the DCG; $^{239+240}$Pu and ^{238}Pu were both below their minimum detectable levels of about 2×10^{-11} µCi/mL (0.074 mBq/L).

Analysis of the TLD network showed that the 16 boundary station locations had an annual average exposure of 120 mR, and the 9 control stations annual average was 91 mR, both within the range of values previously reported.

OFFSITE ENVIRONMENTAL SURVEILLANCE

The offsite radiological monitoring program is conducted around the NTS by the EPA's

Radiation & Indoor Environments National Laboratory-Las Vegas (R&IE-LV), under an Interagency Agreement with DOE. This program consists of several environmental sampling, radiation detection, and dosimetry networks that are described below. These networks operated continuously during 1996.

The Air Surveillance Network (ASN) was made up of 20 continuously operating sampling locations surrounding the NTS. The ASN stations included 15 located at Community Technical Liaison Program (CTLP) stations, described below. During 1996, no airborne radioactivity related to current activities at the NTS was detected on any sample from the ASN. Other than naturally occurring ^{7}Be, the only specific radionuclide possibly detected by this network was ^{238}Pu or $^{239+240}$Pu on a few high-volume air-filter samples.

The Milk Surveillance Network consisted of 11 sampling locations within 300 km (186 mi) of the NTS, but samples were collected only from 10. Tritium, ^{89}Sr, and ^{90}Sr are rarely detected in milk samples at present. The levels in the milk network have decreased over time since reaching a maximum in 1964. The results from this network are consistent with previous data and indicate little or no change.

Other foods that have been analyzed regularly included meat from domestic or game animals collected on and around the NTS and fruit and vegetables from local gardens. None of these samples were collected this year.

In 1996, external exposure was monitored by a network of 51 TLDs and 27 pressurized ion chambers (PICs) located in towns and communities around the NTS. Also, there was a PIC located at the SALMON site near Baxterville, Mississippi. The PIC network in the communities surrounding the NTS indicated background exposures, ranging from 71 to 156 mR/yr, that were consistent with previous data and well within the range of background data in other areas of the United States. The exposures measured by the TLDs were slightly less as has been true in the past.

Sampling of Long-Term Hydrological Monitoring Program (LTHMP) wells and surface waters around the NTS showed only background radionuclide concentrations. The LTHMP also included groundwater and surface water monitoring at locations in Colorado, Mississippi, New Mexico, and Nevada where underground tests were conducted. The results obtained from analysis of samples collected at those locations were consistent with previous data except for a sample from a deep well at Project GASBUGGY where the ^{3}H and ^{137}Cs has been detected the last few years. No concentrations of radioactivity that were detected in air, water, milk, or animal samples posed any significant health risk to nearby residents.

A network of 15 CTLP stations was operated by local residents. Each station was an integral part of the ASN and TLD networks. In addition, they were equipped with a PIC connected to a gamma-rate recorder. Each station also had satellite telemetry transmitting equipment so that gamma exposure measurements acquired by the PICs are transmitted via the Geostationary Operational Environmental Satellite to the NTS and from there to the R&IE-LV by dedicated telephone line. Samples and data from these CTLP stations were analyzed and reported by R&IE-LV and interpreted and reported by the Desert Research Institute, University of Nevada System. All measurements for 1996 were consistent with previous years and were within the normal background range for the United States.

Although no radioactivity attributable to current NTS operations was detected by any of the offsite monitoring networks, based on the NTS releases reported in Table 1.1, an atmospheric dispersion model calculation (CAP88-PC) indicated that the maximum potential EDE to any offsite individual would

have been 0.11 mrem (1.1×10^{-3} mSv), and the dose to the population within 80 km of the several emission sites on the NTS would have been 0.34 person-rem (3.4×10^{-3} person-Sv), both of which were less than last year. The hypothetical person receiving this dose would also have been exposed to 144 mrem from natural background radiation. A summary of the potential EDEs due to operations at the NTS is presented in Table 1.2.

ECOLOGICAL STUDIES

The Basic Environmental Compliance and Monitoring Program was redesigned to address changes in DOE/NV missions and commitment to manage land and facility resources based on the principles of ecosystem management and sustainable development. A comprehensive and adaptable guidance document for ecological monitoring was completed in May. The new program is designated as Environmental Monitoring and Compliance. The ecological monitoring tasks which were selected for 1996 included vegetation mapping within the range of the desert tortoise, characterizing the natural springs on the NTS, conducting a census of horse and chukar populations, and periodically monitoring man-made water sources to assess their affects on wildlife. The Environmental Assessment for the Hazardous Materials Spill Center (HSC) (formerly Liquefied Gaseous Fuels Spill Facility) calls for ecological monitoring of certain spill tests, and a monitoring plan was developed and implemented in 1996.

Field surveys were conducted from June through December to identify those natural NTS springs, seeps, tanks, and playas which could be designated by the U.S. Army Corps of Engineers as jurisdictional wetlands. A summary report of the survey findings is being prepared.

In January, a topical report titled, "Current Distribution, Habitat, and Status of Category 2 Candidate Plant Species on and near the U.S. Department of Energy's Nevada Test Site," was published. This report represents the culmination of several years of intensive field surveys and literature reviews on 11 Category 2 candidate plant species. The results of these surveys and a previous report on the Category 1 species, Beatley's milkvetch (*Astragalus beatleyae*), contributed to the removal of these species from the U.S. Fish and Wildlife Service (USFWS) candidate list.

LOW-LEVEL WASTE DISPOSAL

Environmental monitoring at the Radioactive Waste Management Site, Area 3 (RWMS-3) has detected plutonium in air samples. However, plutonium was detected in other air samples from Area 3 indicating that the source is resuspended plutonium. Elevated levels of plutonium have been detected in air samples from several areas on the NTS where operational activities and vehicular traffic resuspend plutonium for detection by air sampling. The presence of plutonium on the NTS is primarily due to atmospheric and safety tests conducted in the 1950s and 1960s. These tests spread plutonium in the eastern and northeastern areas of the NTS (see Chapter 2, Figure 2.3 for these locations).

Environmental monitoring at and around RWMS-5 indicated that radioactivity was just detectable at, but not beyond, the waste site boundaries. This monitoring included air sampling, water sampling, and external gamma exposure measurement. Vadose zone monitoring for hazardous constituents has been installed in the mixed waste disposal pit (Pit 3) in RWMS-5 as a method of detecting any downward migration of mixed waste. Also, one upgradient and two downgradient wells, installed to satisfy Resource Conservation and Recovery Act (RCRA) requirements for a mixed-waste disposal operation, have not yet detected migration of hazardous materials.

RADIOLOGICAL MONITORING AT OFFSITE SUPPORT FACILITIES

Fence line monitoring, using Panasonic UD-814 TLDs, was conducted at offsite DOE/NV

support facilities in North Las Vegas, at Nellis Air Force Range Complex, and in Santa Barbara, California. The 1996 results indicated that only background radiation was detected at the fence line. In 1995, a small amount of tritium was accidently released from a calibration range building in North Las Vegas that was still detectable this year in the room where the release occurred. Monitoring of the release provided data for input into the CAP88-PC program for calculating offsite exposures. The maximum offsite exposure was calculated to be only 0.00025 mrem, which is less than last year and far below the EPA permissible limit of 10 mrem.

1.3 NONRADIOLOGICAL MONITORING

Nonradiological environmental monitoring of NTS operations involved only onsite monitoring because there were no discharges offsite that involved nonradiological hazardous materials. The primary environmental permit areas for the NTS were monitored to verify compliance with ambient air quality and the RCRA requirements. Air emissions sources common to the NTS included particulates from construction, aggregate production, and surface disturbances, fugitive dust from unpaved roads, fuel burning equipment, open burning, and fuel storage facilities. NTS environmental permits active during 1996, which were issued by the state of Nevada or by federal agencies, included 17 air quality permits involving emissions from construction of facilities, boilers, storage tanks, and open burning; 8 permits for onsite drinking water distribution systems; 1 permit for sewage discharges to lagoon collection systems; 7 permits for septage hauling; 1 incidental take permit for the threatened desert tortoise; and 1 permit for the collection and study of various species on the NTS. A RCRA permit has been obtained for general NTS operations and for two specific facilities on the NTS.

Permits at non-NTS operations included 16 air pollution control permits, 4 sewage discharge permits, and 4 hazardous material storage permits. Five EPA Generator Identification numbers were issued to the seven off-NTS operations, and three local RCRA-related permits were required at two of those operations.

The only nonradiological air emission of regulatory concern under the Clean Air Act (CAA) has been due to asbestos removal during building renovation projects and from insulated piping at various locations on the NTS. During 1996, there were no projects that required state of Nevada notifications. The annual estimate for non-scheduled asbestos demolition/renovation for fiscal year 1997 was sent to EPA Region 9 in December 1996.

RCRA requirements were met through an operating permit for hazardous waste storage, mixed waste storage, and explosive ordnance disposal operations. A Federal Facilities Agreement and Consent Order (FFACO) has been signed with the state that exempts the NTS from potential enforcement action related to mixed waste storage prohibition under RCRA.

The state conducted an annual Compliance Evaluation Inspection during 1996 and found only minor potential violations but will take no action on them.

As there are no liquid discharges to navigable waters, offsite surface water drainage systems, or publicly owned treatment works, no Clean Water Act (CWA), National Pollution Discharge Elimination System (NPDES) permits were required for NTS operations. Under the conditions of the state of Nevada operating permits, liquid discharges to onsite sewage lagoons are regularly tested for biochemical oxygen demand, pH, and total suspended solids. In addition to the state-required monitoring, these influents were also tested for RCRA-related constituents as an internal initiative to further protect the NTS environment.

In compliance with the Safe Drinking Water Act (SDWA) and eight state of Nevada drinking water supply system permits for

onsite distribution systems supplied by onsite wells, drinking water systems are sampled monthly for residual chlorine, pH, bacteria, and, less frequently, for other water quality parameters. No exceedances have been found.

Monitoring for polychlorinated biphenyls as required by the Toxic Substances Control Act (TSCA) involved analysis of 43 various samples. None of the samples had results exceeding five parts per million.

At the HSC, 4 series of spill tests using 28 different chemicals were conducted during 1996. None of the tests generated enough airborne contaminants to be detected at the NTS boundary during or after the tests. Boundary monitoring was performed by R&IE-LV personnel.

1.4 COMPLIANCE ACTIVITIES

DOE/NV is required to comply with various environmental laws and regulations in the conduct of its operations. Monitoring activities required for compliance with the CAA, CWA, SDWA, TSCA, and RCRA are summarized above. Endangered Species Act activities include compliance with the USFWS Biological Opinion on Nevada Test Site Activities, USFWS Biological Opinion on Fortymile Canyon Activities, and preparation of Biological Assessments. Also, NEPA activities included action on 7 Environmental Assessments (EAs) and 34 Categorical Exclusions (CXs). Of these, only the CXs were initiated in 1996. The Record of Decision on the sitewide Environmental Impact Statement for the NTS and other test locations within the state of Nevada was published in December 1996.

Wastewater discharges at the NTS are not regulated under NPDES permits because all such discharges are to onsite sewage lagoons. Discharges to these lagoons are permitted under the Nevada Water Pollution Control Act. Wastewater discharges from the non-NTS support facilities were within the regulated levels established by city or county publicly owned treatment works.

During 1996, nine underground storage tanks were removed in accordance with state and federal regulations (see Chapter 3, Table 3.1). Reportable releases were discovered with the removal of tanks at three locations on the NTS.

In 1996, a cultural resource survey was conducted for historical and archaeological sites in Area 29. A data-recovery report for archeological data at a site in that area was prepared.

The American Indian Religious Freedom Act directs federal agencies to consult with Native Americans to protect their right to exercise their traditional religions. In 1996, work continued on a long-range study plan for Pahute and Ranier Mesas. The objective is to study a representative sample of all cultural resources on the Mesas.

Waste minimization and pollution prevention activities conducted at the NTS and its offsite facilities involve an intensive recycling program and active product substitution projects.

1.5 GROUNDWATER PROTECTION

A LTHMP was instituted in 1972 to be operated by the EPA under an Interagency Agreement. Surface and groundwaters were monitored on and around the NTS, at five sites in other states, and at two off-NTS locations in Nevada in 1996 to detect the presence in water supplies of any radioactivity that may be related to nuclear testing activities. No radioactivity was detected above background levels in the groundwater sampling network surrounding the NTS. Low levels of tritium, in the form of HTO, were detected in onsite wells as has occurred previously. None exceeded 33 percent of the National Primary Drinking Water Regulation level.

HTO was detected in samples from wells at formerly utilized sites, such as DRIBBLE (Mississippi), GNOME (New Mexico), and GASBUGGY (New Mexico) at levels

consistent with previous experience. The ^{3}H and ^{137}Cs in water from Well EPNG 10-36 at GASBUGGY that began to be detected about 1984, was detected for the fifth year in a row.

Because wells that were drilled for water supply or exploratory purposes are used in the NTS monitoring program rather than wells drilled specifically for groundwater monitoring, a program of well drilling for groundwater characterization has been started. The design of the program is for installation or recompletion of groundwater characterization wells at strategic locations on and near the NTS. Through 1996, 13 of these wells have been drilled and 11 existing wells recompleted for a total of 24. Of these, five wells were completed and sampled on Pahute Mesa and three zones were developed and sampled in wells on Buckboard Mesa and Yucca Flat.

Other activities in this program included studies of groundwater transport of contaminants (radionuclide migration studies) and nonradiological monitoring for water quality assessment and RCRA requirements.

1.6 RADIOACTIVE AND MIXED WASTE STORAGE AND DISPOSAL

Two RWMSs are operated on the NTS, one each in Areas 3 and 5. During 1996, the RWMSs received LLW generated at the NTS and other DOE facilities. Waste is disposed of in shallow pits, trenches in the RWMS-5, and in selected craters in the RWMS-3. Transuranic (TRU) and TRU mixed wastes are stored on a curbed asphalt pad on pallets in overpacked 55-gal drums and assorted steel boxes pending shipment to the Waste Isolation Pilot Plant in New Mexico. The RWMS-3 is used for disposal of bulk LLW waste and LLW that is contained in packages that are larger than the specified standard size used at the RWMS-5.

Environmental monitoring at both sites included air sampling for radioactive particulates and HTO in air and external exposure measurements using TLDs. Water sampling and vadose zone monitoring for moisture and hazardous constituents are conducted at the RWMS-5. Environmental monitoring results for 1996 indicated that measurable radioactivity from waste disposal operations was detectable only in the immediate vicinity of the facilities.

Because the NTS is not a RCRA-permitted disposal facility, RCRA regulations require the shipment of nonradioactive hazardous waste to licensed disposal facilities offsite. No disposal of hazardous waste was performed at the NTS in 1996.

A Mixed Waste Management Unit (MWMU) is planned to be located immediately north of the existing pits within RWMS-5 and will be part of routine disposal operations. This area, designed to encompass 10 ha (25 acres), will contain eight landfill cells to be used for mixed waste disposal. Construction of the MWMU will commence upon completion of necessary NEPA documentation and issuance of a state of Nevada Part B Hazardous Waste Permit.

Mixed waste and LLW will only be accepted for disposal from generators (onsite and offsite) that have submitted a waste application that meets the requirements of the Waste Acceptance Criteria document (NTS 1996) and that have received DOE/NV approval of the waste stream(s) for disposal at NTS.

1.7 QUALITY ASSURANCE

The quality assurance (QA) program covering NTS activities has three components. There are QA programs for nonradiological analyses, for onsite radiological analyses, and for offsite radiological analyses conducted by EPA's R&IE-LV.

ONSITE NONRADIOLOGICAL QUALITY ASSURANCE

The onsite nonradiological QA was not operative during 1996 because budgetary restrictions caused deactivation of the laboratory. The offsite subcontract laboratories are monitored for their participation and performance in various performance evaluation programs.

ONSITE RADIOLOGICAL QUALITY ASSURANCE

The onsite radiological QA program includes conformance to best laboratory practice and implementation of the provisions of DOE Order 5700.6C. The external QA intercomparison program for radiological data QA consists of participation in the DOE Quality Assessment Program administered by the DOE Environmental Measurements Laboratory and the Performance Evaluation Studies Program conducted by the EPA's National Exposure Research Laboratory.

OFFSITE RADIOLOGICAL QUALITY ASSURANCE

The policy of the EPA requires participation in a centrally managed QA program by all EPA organizational units involved in environmental data collection. The QA program developed by the R&IE-LV for the Offsite Radiological Safety Program meets all requirements of EPA policy and also includes applicable elements of the DOE QA requirements and regulations. The program defines data quality objectives (DQOs), which are statements of the quality of data a decision maker needs to ensure that a decision based on those data is defensible. Achieved data quality may then be evaluated against these DQOs.

1.8 ISSUES AND ACCOMPLISHMENTS

PRINCIPAL COMPLIANCE PROBLEMS FOR 1996

- On June 28, 1994, the state of Nevada filed a Complaint for Declaratory Judgement and Injunction in the U.S. District Court against DOE. Nevada claims that DOE has failed to comply with NEPA requirements at the NTS and must initiate a single, sitewide EIS for all major federal actions at the NTS. The state was seeking to halt shipments of LLW from Fernald and all other transportation, receipt, storage, and disposal of mixed waste, hazardous waste, and defense waste and was also seeking to enjoin DOE from pursuing any "Weapons Complex" activities until publication of the EIS. In January 1995, the U.S. District Court dismissed the claims regarding Fernald waste and the sitewide EIS. The remaining claim, regarding disposal of LLW from offsite facilities is still unsettled.

- A notification letter was received regarding alleged potentially responsible party status connected with a commercial disposal site in California. The state notified DOE/NV that Omega Chemical Co., a hazardous waste treatment and storage facility, possessed documents indicating that DOE/NV had shipped hazardous waste to the site between 1988 and 1992. The company has declared bankruptcy and is unable to clean up the site. Jurisdiction of this site has been transferred to the EPA which, so far, has made no contact.

ACCOMPLISHMENTS FOR 1996

- The draft sitewide EIS for the NTS and offsite locations in the state of Nevada was released for public comment in February 1996. The EIS was approved for publication in August and the Record of Decision was published in December 1996.

- Work was performed on seven EAs during 1996, of which two were assessed in the EIS.

- Throughout 1996, DOE/NV continued to maintain and update the "DOE/NV Compliance Guide" (Volume III), a handbook containing procedures,

formats, and guidelines for personnel responsible for NEPA compliance activities.

- Continued use of a Just-in-Time supply system allowed NTS contractors to reduce product stock and control potentially hazardous products.

- Progress continued on the NTS groundwater characterization program. Thirteen special wells have been completed and eleven existing wells have been recompleted to meet program requirements.

- The Waste Management Projects installed three pilot wells at RWMS-5 to monitor underground conditions. The data have also been used for site characterization. The uppermost groundwater table was found at approximately 244 m (800 ft). Only naturally occurring radioactivity was detected in the groundwater.

- DOE/NV has entered into several consent orders and agreements. These are: (1) a Memorandum of Understanding with the state covering radiological releases, (2) an Agreement in Principle with Nevada and Mississippi covering oversight of environment safety and health activities, (3) a Cooperative Agreement with Alaska's Fish and Wildlife Service, (4) a Settlement Agreement with the state to manage mixed TRU waste, (5) a FFACO for providing storage of low-level mixed waste generated at the NTS, and (6) a Programmatic Agreement with the state covering archaeological and historic preservation activities.

- The following remedial actions were completed in 1996:

  1) Plutonium-contaminated soil was removed from the site of the 1963 DOUBLE TRACKS nuclear device safety test on the Nellis Air Force Range Complex and the site was revegetated. The soil was disposed of in the LLW site in Area 3, NTS.

  2) The access shaft for the 1963 Project SHOAL underground test near Fallon, Nevada, was closed. The approximately 1,100-ft (433-m) deep shaft was filled with screened granite.

  3) The injection well at the Area 2 Bitcutter Shop was closed in place and the well at the Lawrence Livermore National Laboratory Postshot Containment Building was clean closed.

  4) One Corrective Action Unit under the FFACO, which described 23 abandoned lead sites on the NTS, was closed as all the sites have been remediated.

The environmental monitoring results presented in this report document that operational activities on the NTS in 1996 were conducted so that no measurable radiological exposure occurred to the offsite public. Calculation of the highest individual dose that could have been received by an offsite resident (based on estimation of onsite worst-case radioactive releases obtained by measurement or engineering calculation and assuming the person remained outside all year) equated to 0.11 mrem to a person living in Springdale, Nevada. This may be compared to that individual's exposure to 144 mrem from natural background radiation as measured by the PIC instrument at Beatty, Nevada.

There were no major incidents of nonradiological contaminant releases to the environment, and intensive efforts to characterize and protect the NTS environment, implemented in 1990, were continued in 1996.

Table 1.1 Radionuclide Emissions on the NTS - 1996[a]

Radionuclide	Half-life (years)	Quantity Released (Ci) [b]
Airborne Releases:		
^{3}H	12.35	[c]0.35
^{85}Kr	10.72	0.019
$^{239+240}Pu$	24065.	[c]0.28
Containment Ponds:		
^{3}H	12.35	[d]130
^{238}Pu	87.743	3.4×10^{-6}
$^{239+240}Pu$	24065.	2.7×10^{-5}
^{90}Sr	29.	4.4×10^{-6}
^{137}Cs	30.17	1.5×10^{-3}
Gross Beta	---	1.2×10^{-3}

(a) Assumes worst-case point and diffuse source releases.
(b) Multiply by 37 to obtain GBq.
(c) Includes calculated data from air sampling results, postulated loss of laboratory standards, and calculated resuspension of surface deposits.
(d) This amount is assumed to evaporate to become an airborne release.

Table 1.2 Summary of Effective Dose Equivalents from NTS Operations During 1996

	Maximum EDE at NTS Boundary[a]	Maximum EDE to an Individual[b]	Collective EDE to Population within 80 km of the NTS Sources
Dose	0.12 mrem (1.2×10^{-3} mSv)	0.11 mrem (1.1×10^{-3} mSv)	0.34 person-rem (0.34×10^{-2} person Sv)
Location	Site boundary 40 km WNW of NTS CP-1	Springdale, NV 58 km WNW of NTS CP-1	32,210 people within 80 km of NTS Sources
NESHAP Standard	10 mrem per yr (0.1 mSv per yr)	10 mrem per yr (0.1 mSv per yr)	-----
Percentage of NESHAP	1.2	1.1	-----
Background	144 mrem (1.44 mSv)	144 mrem (1.44 mSv)	3064 person-rem (30.6 person Sv)
Percentage of Background	8.0×10^{-2}	8.0×10^{-2}	1.1×10^{-2}

(a) The maximum boundary dose is to a hypothetical individual who remains in the open continuously during the year at the NTS boundary located 40 km (25 mi) WNW from the NTS Control Point 1.
(b) The maximum individual dose is to an individual outside the NTS boundary at a residence where the highest dose-rate occurs as calculated by CAP88-PC (Version 1.0) using NTS effluents listed in Table 5.1, assuming all tritiated water input to containment ponds was evaporated, assuming resuspended plutonium was carried offsite, and summing the contributions from each NTS source.

View of Mercury, the Main Base Camp at the NTS