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Exhibit 28

FINAL REPORT OF COMPREHENSIVE DOCUMENT REVIEW

FOR DUGWAY PROVING GROUND

September 19, 1995

Submitted To:

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FINAL REPORT OF COMPREHENSIVE DOCUMENT REVIEW FOR DUGWAY PROVING GROUND

1.0 INTRODUCTION

1.1 Purpose

Science Applications International Corporation (SAIC) received Work Assignment No. R08006 from the U. S. Environmental Protection Agency (EPA) Region VIII, under Contract No. 68-W4-0005, to provide comprehensive technical review of documents related to contamination by chemical, biological, and radiological (CBR) warfare testing at the U.S. Army Dugway Proving Ground (DPG), Dugway, Utah. The pupose of this Work Assignment was to:

- identify and fill data gaps in the EPA Region VIII administrative and technical files for the Resource Conservation and Recovery Act (RCRA) hazardous waste permit for DPG, using the existing EPA Region VIII index system(s);
- update EPA Region VIII files regarding radioactive, "mixed waste," chemical agent, and biological (infectious) waste unit areas at DPG, that may be relevant to general protection of human health and the environment and/or risk assessment requirements for RCRA Facility Investigations (RFIs);
- provide information for EPA Region VIII to assess the adequacy of the current RFA/RFI; and
- provide a list of relevant information that is in neither the Utah Department of Environmental Quality (UDEQ) nor the EPA files for DPG.

1.2 Background

Dugway Proving Ground (EPA ID No. UT3750211259) is a permitted RCRA treatment, storage, and disposal facility (TSDF) located 68 miles southwest of Salt Lake City, Utah. The facility is a "megasite" (a complex site of geographically large extent with multiple regulatory issues; this term is used for convenience but has no regulatory significance), encompassing over 1,255 square miles. DPG is also a large quantity generator (LQG) of hazardous waste. The State of Utah is authorized for the RCRA program, but has not yet been authorized for all of the Land Disposal Restrictions (LDRs).

On August 30, 1988, UDEQ issued a Consent Order (CO) under RCRA to DPG. A CO requiring closure of hazardous waste management units (HWMUs) at DPG became effective on September 19, 1990. The effective date of the most recent amendment to this Order is December, 1993. In accordance with the provisions of RCRA, as amended, these actions required DPG to perform investigative work to characterize the nature and extent of contamination at solid waste management units (SWMUs) where disposal activities took place on or after November 19, 1980. There are currently 41 SWMUs listed in the amended Order. DPG's RCRA Part B permit requires the investigation of the remaining SWMUs and areas of

concern (AOCs), and approximately 45 hazardous waste management units (HWMUs) undergoing RCRA closure. Beyond RCRA corrective action, various other investigative activities are on-going at DPG and involve: Installation Restoration Program (IRP) work; a CERCLA Preliminary Assessment and Site Investigation (PA/SI); and other Defense Environmental Restoration Program for Formerly Used Defense Sites (DERP-FUDS) work. In addition, DPG is also subject to the provisions of the Federal Facilities Compliance Act (FFCA) of 1992.

On March 20, 1992, UDEQ completed an RFA. In response to the findings of the RFA, DPG initiated an RFI. The references used in the preparation of the RFA are not comprehensive, because certain documents were unavailable due to classification for national security reasons until after the issuance of the RFA, and other documents were inadvertently omitted. Pursuant to Condition IV.E of DPG's RCRA permit, DPG must notify the UDEQ Division of Solid and Hazardous Waste (DSHW) of all newly identified SWMUs. Subsequent to the completion of the RCRA corrective action documents mentioned above, DPG has notified DSHW of several other newly identified SWMUs. An updated SWMU list, reflecting these newly discovered SWMUs, was approved as a Class 2 modification to DPG's RCRA permit; since that time, three more SWMUs have been identified. No new AOCs have been identified since issuance of the RFA. If new information becomes available regarding SWMUs that have been removed from DPG's RCRA Permit as no further action sites, Condition IV.F.4 of the permit allows DSHW to require additional investigation of such sites.

Upon discovery of a SWMU, DPG may include the newly identified unit as part of a nearby existing unit; otherwise, DPG installs a concrete survey monument at the unit, for use in an extensive GIS mapping system. However, the results of the GIS mapping are not yet available to EPA. Additional SWMUs and AOCs continue to be discovered; therefore, the locations of all AOCs and SWMUs that may contain radioactive, biological, and chemical agent constituents are not yet clear.

All of the technical documents related to investigative work at DPG are directly relevant to RCRA corrective action, including risk assessment of contamination within and beyond the DPG facility boundaries. However, the documents have not yet been integrated into a common repository or site file. In 1993, as part of RCRA oversight responsibilities, EPA Region VIII determined that the UDEQ files did not duplicate the preponderance of information maintained at the facility. In addition, the EPA RCRA administrative and technical files for DPG were found to be incomplete and unindexed. Furthermore, the EPA Region VIII files for DPG are not easily retrieved because they are located in several storage areas, due to current space limitations. Finally, in the EPA files, a comprehensive reference list of Department of Defense (DOD) and UDEQ RCRA corrective action documents, identifying SWMUs containing radioactive, "mixed waste," and/or biological constituents, was found to be incomplete. On June 15, 1993, EPA Region VIII drafted a Facility Management Plan (FMP) that identified broad data gaps, including the absence of quantified risk assessment reports for radioactive, biological, and/or chemical wastes managed at DPG.

On April 11, 1994, an Associated Press story in the *Denver Post* and other Utah news reports described a history of radioactive testing at DPG that is not referenced in the RFA or RFI. On December 22, 1994, the *Deseret News* published an extensive list of CBR tests that took place at DPG between 1945 and 1986; the source of information on these tests was

documents obtained by Freedom of Information Act (FOIA) requests. The types of chemical, biological, and radioactive testing described by the news media are not substantiated by the limited information in EPA Region VIII files for SWMUs at DPG. Furthermore, in May 1994 the environmental contact for DPG, Mr. Ed Duplak, indicated to EPA Region VIII staff that there were "seventeen recently declassified documents regarding radioactive work at Dugway;" copies of these documents subsequently were provided to EPA and UDEQ. The revelation of the declassified documents and the newspaper reports indicate that the data gaps in EPA's files are more extensive than previously assumed.

As noted above, all of the IRP documents, State documents, documents referred to in press reports, and other information are needed to evaluate the status of ongoing quantified risk assessment for human health and the environment under RCRA 3004(u) and (v).

1.3 Technical Approach

SAIC's technical approach to this Work Assignment began with a review and evaluation of the UDEQ active files, archival files, and project manager working files at the Divisions of Solid and Hazardous Waste, Radiation Control, and Water Quality Control in Salt Lake City, Utah. Due to the volume of the files and the limited scope of this phase of the Work Assignment, a complete review of all the files was not possible. However, SAIC copied all documents related to radioactive testing at DPG, and copied at least the title pages and reference sections of other relevant documents.

Next, SAIC reviewed all documents pertaining to DPG in the EPA Region VIII Hazardous and Solid Waste Branch active and archival files, the RCRA and CERCLA project manager working files, and the Superfund Records Center file. Other relevant documents were obtained from the Office of External Affairs (National Environmental Policy Act documents) and the Office of Air, Radiation and Toxics (information regarding licensing of nuclear materials at DPG by the Nuclear Regulatory Commission). These documents were abstracted for information correlating the contaminants produced by chemical agent, biological, and radiological testing to specific SWMUs, AOCs, and other sites at and near DPG.

In addition, all references in the compiled documents to additional potential sources of information were recorded. These references were obtained either from the text of the source documents, or from the bibliographies and reference lists. Where possible, an abstract of the referenced document was prepared based on the context of the source document.

1.4 Report Organization

The following sections of this report discuss the findings of SAIC's document review; limitations of the review, data gaps, and apparent deficiencies in the existing corrective action documentation are presented. The information obtained from this review is summarized in the Appendices to this report. Appendix A contains several tables. Table A-1 is a list of all SWMUs and AOCs potentially contaminated by CBR wastes on or near DPG, including areas not previously identified as SWMUs or AOCs. Table A-2 is a list of those potentially contaminated areas within the DPG facility boundary. Table A-3 is a list of those potentially contaminated areas on known FUDS near DPG. Table A-4 is a list of those potentially contami-

nated areas on tribal lands in the Skull Valley or Ibapah and Gashute Indian Reservations. Table A-5 is a list of those potentially contaminated areas in the vicinity of DPG on public lands administered by the Bureau of Land Management. Tables A-6 through A-8 amplify the information presented in Table A-1, by listing the references alluding to suspected contamination at specific sites, the reasons for suspicion of contamination, and, if known, the type(s) of chemical, biological, and radiological contaminants, respectively, suspected to be present at each location.

Appendix B is the index of documents (both sources and references) used in the preparation of this report. Appendix C contains a list of those documents referring to CBR testing at DPG, as well as the abstracts of those documents linking CBR testing to actual and potential SWMUs and AOCs at DPG. Appendix D is a list of known, recently declassified documents on radiation testing at DPG that are located at the UDEQ offices in Salt Lake City. Appendix E contains a summary review of the documents listed in Appendix D. Appendix F is a list of documents relevant to the RCRA administrative record that are not in EPA Region VIII files. Appendix G contains a reprint of the December 22, 1994 *Deseret News* article describing chemical, biological, and radiological warfare tests at DPG. Appendix H contains a map of the areas of known, suspected, or potential contamination by CBR wastes in the vicinity of DPG, including known SWMUs and AOCs. Appendix I contains a list of the biological agents known to have been used at DPG.

2.0 DOCUMENT REVIEW FINDINGS

2.1 Limitations of the Results

In many cases, the relevance of a referenced source of information could be inferred only from its title or from the context of the reference in the source document. Since most of these references were unavailable for review, it was not possible to establish their relevance with any degree of certainty. For completeness, all such identified references are included in the lists of relevant documents appearing at the end of this report. However, it should be understood that some of the listed documents may be spurious. Even when the relevance of an unavailable reference was obvious, specific locations of possible contaminants often could not be determined from the limited information available.

2.2 Summary of Findings

- References indicating actual or potential contamination by chemical, biological and radiological agents at DPG SWMUs, AOCs, and other areas on and near DPG are summarized below in Section 3.0 and in Appendix A.

- No references to tribal lands belonging to the Ibapah and Gashute Indian Reservation were found.

- The only references found to tribal lands belonging to the Skull Valley Indian Reservation cited the well-documented burial site resulting from the March 13, 1968 sheep kill incident and the Army's investigation of the incident.

- In addition to the four known FUDS listed in the Facility Management Plan, three other potential FUDS in the vicinity of DPG have been identified. According to the available documentation and personal communications with the EPA work assignment manager, the Wendover Bombing Range, the Hill Air Force Bombing Range, and the Utah Test and Training Range (UTTR) may have been used for CBR warfare activities originating at Dugway. At those sites, the boundaries of the areas that may have been affected by DPG activities are uncertain. Furthermore, if the March 13, 1968 sheep kill incident resulted in contamination of the sheep carcasses by chemical agent, two more off-site locations where the sheep were buried (the Skull Valley Indian Reservation and a private ranch) may be potential FUDS as well as the third off-site burial location (SWMU #67, a known FUDS). Other areas in Skull Valley also may have been contaminated during this incident and may be potential FUDS.

- Only two specific references to "mixed waste" were found: used scintillation cocktail and radioactive salts from laboratory chemical analyses, stored in Building 2021 (SWMU 174); and speculation in the RFA that the radioactive waste landfills (SWMUs 10 - 12 and 108 - 111) may contain other materials that could be considered "mixed wastes." SWMUs 23, 39, 40, 41, and 166 also may contain "mixed waste" (see below, Sections 2.3.2 and 2.3.4).

- Government entities (including at least the U.S. Air Force and the Atomic Energy Commission, and possibly others) besides the U.S. Army conducted testing at DPG. Since DPG was not the sponsoring or responsible organization for those tests, it is possible that documentation of such tests is not available either to DPG, UDEQ, or EPA. It may be necessary to contact the other agencies directly for more information. Furthermore, other organizations within the Army may have additional documents no longer available at DPG. For instance, the Chemical and Radiological Laboratories based at the Army's Aberdeen Proving Ground produced well over 400 interim and final reports on CBR warfare tests during the early 1950s; some of these may be relevant to DPG. At least two such relevant reports are known not to be available at DPG, UDEQ, or EPA (see below, Section 2.3.2).

In addition to the SWMUs and AOCs listed in the existing RCRA permit and corrective action documents, the following areas that are not currently considered SWMUs or AOCs were determined to be potentially contaminated with chemical, biological, and/or radiological agents or residues:

- Sheep kill burial site, Skull Valley Indian Reservation (possible FUDS)
- Sheep kill burial site, Hatch ranch (possible FUDS)
- Wendover Bombing Range (possible FUDS)
- Hill AFB Bombing Range (possible FUDS)
- Utah Test and Training Range (possible FUDS)
- Various locations east of Camels Back Ridge
- Various locations in the salt flats west of Granite Mountain (may include former SWMU #112 and AOC #17)

- Wig Mountain area
- Test Area 19
- Biological Test Area 22
- "Target H" near Granite Mountain
- "Target J" near Granite Mountain
- "Target K" near Granite Mountain
- "Target N" near Granite Mountain
- "Target P" near Granite Mountain
- "Target Q" near Granite Mountain
- "Target R-1" near Granite Mountain
- "Target S" near Granite Mountain
- "Target T" near Granite Mountain
- "RW slab" (may be a current SWMU)
- Dump site 300 yards from Target Q (may be same site as SWMU #10?)
- Disposal pit 0.25 miles from contaminated areas near Targets K and N
- Avery, near the Operations Building (presumed to be near Buildings 1004/1005/1006/1010)
- Building 3008
- "Field Release Test II" site and downwind areas (12 miles west of Granite Mountain)
- Private and state-owned lands in the Southern Triangle Vicinity (possible FUDS)
- Private and tribal lands in Skull Valley (possible FUDS)
- Various unspecified public lands (possible FUDS)

These areas (if the locations are known) are shown on the map in Appendix H. Tables A-6 through A-8 in Appendix A identify the information sources that refer to these areas.

2.3 Apparent Data Gaps

2.3.1 Biological Agents

Document number DB-006 (the December 22, 1994 *Deseret News* article describing CBR testing at DPG) states that at least 328 open-air tests of biological agents took place at DPG throughout the period between 1945 and 1986. None of the source documents or references reviewed by SAIC (including the RFA, RFI, and PA) describe any of these tests in sufficient detail to determine the time and place of the tests or the biological agents used. (Document number RH-066, the April 1979 Initial Installation Assessment for DPG, lists test dates and agents used for biological testing through 1968, but does not provide test locations and does not provide any references used to prepare the list.) The *Deseret News* obviously had access to many information sources (apparently unclassified documents obtained through FOIA requests) that are not known or available to EPA or UDEQ. The good correlation between the tests listed by the newspaper article and those listed by the Installation Assessment suggests that the Army had access to many of the same information sources as early as 1979. The newspaper may in fact have used the Installation Assessment as a source of information about these tests. However, the *Deseret News* also must have used other sources for descriptions of the tests that occurred subsequent to publication of the Installation Assessment.

Three tests of biological agent simulant (fluorescent particles of undisclosed composition, speculated to be cadmium sulfide) were conducted on "undisclosed public lands" outside the DPG boundaries in 1968. However, SAIC's review did not disclose whether these tests took place in the vicinity of Dugway. Tests of this nature are known to have been conducted throughout the U.S.

Document number RH-066 (the 1979 Installation Assessment) lists Test Areas 20 through 24 as "biological agents test areas." AOC #17, as described in the RFA and PA reports, no longer appears to include Test Area 22. Areas 20, 21, and 24 may correspond to the "BW area" mentioned in other documents and/or to biological tests areas suspected from other sources. (According to a verbal communication from the EPA work assignment manager, a former Lockheed employee who worked at DPG states that BW bomb tests were conducted north of Wig Mountain. No other details of such tests were found during SAIC's review.)

2.3.2 Radiological Agents

Two field tests of radiological munitions are known to have occurred at DPG in 1949. Document number DB-292 refers to Field Tests 270 and 276, which appear to have been these two tests. No reports of these tests were found among the "seventeen recently declassified documents regarding radioactive work at Dugway." Document number DB-309, a letter from the DPG Judge Advocate's office to UDEQ, references an internal DPG memo dated December 16, 1993 stating that the reports on these tests could not be located in DPG's technical library.

RW testing at DPG during the period 1949 - 1952 used tantalum-182 (Ta-182) exclusively as the radiological agent, according to the available documentation. Document number DB-306 discusses the possibility of using other radionuclides, specifically zirconium-95 (Zr-95), niobium-95 (Nb-95), and protactinium-233 (Pa-233), as RW agents. No documentation was found to indicate whether any RW tests were conducted after 1952 using RW agents other than Ta-182. Ta-182, Zr-95, and Nb-95 all have short half-lives (115 days, 65 days, and 35 days respectively); radionuclides dispersed by any tests using these agents would have completely decayed to stable, innocuous materials long ago. However, Pa-233 decays quickly to uranium-233, a long-lived ($T_{½}$ = 162,000 years) alpha emitter. If any open-air tests using Pa-233 were conducted at DPG, there is a potential for continued significant hazards from exposure to the U-233 daughter product.

Field Tests 291 and 5-52 (described in document numbers DB-304 and DB-302 respectively) were land decontamination tests conducted in 1952 to determine the efficacy of various RW decontamination schemes. Each of these tests resulted in the dumping of radioactively contaminated soil at other locations near the RW targets (shown in Appendix H). The locations of these dump sites could not be determined from the available documentation; see Appendix E for further details.

Munitions for the 1949 - 1952 RW tests were assembled at an area identified only as the "RW slab." The location of this assembly area is not specified in the available documentation. Moreover, the disposition of excess RW agents, left over after assembly of the test munitions, is not documented.

Document number DB-288 describes work performed in anticipation of field tests scheduled to take place at DPG at an unspecified place and time, presumably during 1953. This source stated that "... one test at DPG is scheduled to deposit 100,000 curies over an area of 4 sq. mi." and that "... another DPG test is scheduled to deposit about 10,000 curies over 1 sq. mi." Both of these quantities of radiation are several orders of magnitude higher than those dispersed by any of the other radiological munitions tests conducted at DPG up to that time. No other references to these planned tests were found. It is not known if these scheduled tests actually took place or, if so, the time and location of the tests and the type of radiological agent used.

Document number DB-006 (the December 22, 1994 *Deseret News* article) states that a field test to release cobalt-60 at DPG was planned for 1957. No other reference to this test was found in any of the other documents reviewed. It is not known if this test actually took place or, if so, the time and location of the test. Co-60 is a relatively long-lived ($T_{½}$ = 5.26 years) beta emitter, and it releases high-energy gamma radiation upon decay. Slightly more than seven half-lives have elapsed since the date of the planned release, meaning that between 0.5% and 1% of the radioactivity originally used in such a test could still be present. Depending on the amount, location, and physical form of the agent, this level of radioactivity, if it was actually released in 1957, could still constitute a significant human health hazard.

Document number DE-205 (letter dated October 13, 1994 from DPG to the Science Advisor for the State of Utah) refers to enclosed documents "concerning radiation testing performed by the U.S. Air Force and the Atomic Energy Commission at Dugway during the 1950s." No attachments or document list was found with the copy of the transmittal letter reviewed by SAIC; therefore it is not known what documents were transmitted to the Science Advisor's office, or whether any of the documents were also transmitted to UDEQ. The letter also alludes to the difficulty DPG encountered in finding the documents (DPG apparently did not have copies since the tests were not conducted by the Army) and in obtaining authorization for their release.

Some aspects of the RW testing program conducted at DPG were contracted to academic institutions, including the University of Utah and the University of Rochester. Several source documents allude to these relationships, but relatively few references to specific documents were found. These institutions may be able to provide additional relevant documents if their release can be secured. Similarly, commercial government contractors such as Arco and Rand Corporation participated in various aspects of the RW testing program at DPG; these companies may be potential sources of information and documents that are not available at Dugway.

The PA report states that Ta-182 wastewater and "possibly mixed wastes" were disposed at SWMU 41; that RCRA-regulated solvents and metals, along with radioactive wastes (thus possibly constituting "mixed wastes") were disposed at SWMUs 166 and 174; and that both radioactive and CW agent wastes may have been disposed at SWMUs 10, 39, and 40. Except for SWMUs 10 and 174, the RFA does not address the possibility that "mixed waste" may be present at these SWMUs. At present, there appears to be insufficient evidence to determine whether "mixed waste" is actually present at any SWMU except SWMU 174.

2.3.3 Chemical Agents

The *Deseret News* article states that at least 1,174 open-air tests of munitions using CW agents were conducted at DPG. The article provides specific dates, as well as types and amounts of agents used, for several of the tests; many more are said merely to have taken place "throughout the year." The article does not provide specific locations for any of the tests. The level of detail provided in the descriptions of some of these tests leads to the conclusion that the information was obtained from test reports, presumably obtained through FOIA requests. Except for a fairly complete description of the CW tests conducted at the Yellow Jacket mine area in 1945 ("Project Sphinx"), none of the other documents reviewed by SAIC provided such detailed information. It appears that the *Deseret News* had access to documents, not in the possession of UDEQ or EPA, providing detailed descriptions of at least some of the chemical agent tests performed at DPG.

Many of the previous site studies have indicated large areas where contamination by CW agents may exist; one study estimated that up to one-third of the DPG facility (i.e., over 400 square miles) may have been contaminated. Due to the large number of tests that took place, the likelihood that subsurface unexploded ordnance (UXO) containing CW agents is still present, and the lack of detailed records of impact sites for the earlier tests, it is not possible to delineate precisely those areas that may be contaminated by CW agents within the scope of the present Work Assignment. It is possible that contamination is even more widespread than is indicated by these documents. For example, several documents state that the test ranges have been cleared of UXO, and that a search of the perimeter of the Rising Sun Grid (SWMU #15/AOC #2) revealed no surface UXO outside the grid boundary. However, document number DE-045 states that a bomb containing chemical agent, targeted for the Rising Sun Grid, was found in the Yellow Jacket Ranges (SWMU #126). This indicates that considerable targeting error occurred, and suggests the possibility of an expanded area for potential contamination by both surface and subsurface UXO containing chemical agents.

Insufficient information regarding chemical agent testing at the Yellow Jacket Ranges is of special concern, due to the facts that the exact locations of the abandoned mines where the testing occurred are not known and that the area is accessible to the public.

It is reported that carcasses from the sheep kill incident that occurred on March 13, 1968 were buried at three off-site locations (at SWMU #67, and at locations on the Skull Valley Indian Reservation and on a privately-owned ranch). Apparently, only SWMU #67 has been considered a FUDS to date. If the sheep carcasses at the other two burial sites contained chemical agents, those sites are also potential FUDS. Other areas in Skull Valley also may have been contaminated during this incident and may be potential FUDS.

2.3.4 Other Data Gaps

There is a general lack of documentation regarding the effects of activities at DPG on nearby areas, such as tribal and BLM lands. Chemical, biological, and radiological agents are all known to have been dispersed beyond the facility boundaries; the *Deseret News* article states that the Army knew about such contaminant migration (implicitly, at the time of or shortly after the tests that caused the contaminant migration). However, the article provides no specific

references documenting such knowledge. The extent of the Army's prior knowledge of contaminant migration therefore is unclear.

Both the RFA and document number RH-073 state that SWMU 23 contains residue from "Trial C-990." This test was classified, and no further information regarding possible constituents appears to be available. Given the types of tests historically performed at DPG, and the type of information formerly considered to be classified, this SWMU may contain chemical, biological, radiological, or RCRA hazardous wastes or any combination thereof.

3.0 CONCLUSIONS

- Known or potential contamination by biological agents appears to exist at AOCs 1, 5, 15, 16, 17 and 19; at SWMUs 1, 3 - 5, 12, 14, 17, 23, 32, 33, 35, 43, 92, 104, 112, 119 - 123, 159 - 161, 169, 180, and 202; near Targets Q and T around Granite Mountain; at Biological Test Area 22; and at various poorly-defined locations east of Camels Back Ridge, west of Granite Mountain (in the salt flats), and in the area (especially north) of Wig Mountain.

- Known or potential contamination by radiological agents appears to exist at SWMUs 10 - 12, 23, 39 - 41, 43, 108 - 111, 166, 174, 184, and 202; and at various poorly-defined locations west of Granite Mountain (in the salt flats). In addition, testing of RW munitions containing Ta-182 occurred at a minimum of nine previously unidentified locations near Granite Mountain (at Targets H, J, K, N, P, Q, R-1, S, and T), as shown on the map in Appendix H of this report; radioactivity from these tests is expected no longer to be detectable. RW operations also occurred at the "RW slab," whose location is unknown; at two waste disposal sites near Targets Q and K; and at the Avery Operations Building and ancillary facilities. Moreover, eight simulated nuclear reactor meltdown tests resulted in the open-air release of a variety of radionuclides from a location approximately 12 miles west of Granite Mountain on Goodyear Road. These tests dispersed radioactivity over a large area extending generally to the north-northwest from the release site. Some of this radioactivity presumably migrated beyond the DPG facility boundaries to the north, possibly as far as the communities of Wendover and Knolls, Utah. Some areas within the path of the release may still be contaminated by long-lived radionuclides.

- Potential contamination by "mixed waste" may exist at SWMUs 10 - 12, 23, 39 - 41, 108 - 111, 166, and 174.

- Known or potential contamination by chemical (Surety) agents and decontamination residues appears to exist at AOCs 1 - 10, 12, 13, 15, 16, and 18 - 21; at SWMUs 1 - 5, 7 - 10, 12 - 21, 23 - 26, 28, 29, 31, 32, 36 - 40, 43, 48 - 63, 65 - 67, 79, 80, 82, 87, 90, 93, 96 - 99, 103 - 107, 114 - 118, 124, 126, 127, 134, 147, 150 - 158, 162, 168, 171, 183, 185, 186, 188 - 190, 192 - 196, 199, and 201 - 203; and at various poorly-defined locations east of Camels Back Ridge, west of Granite Mountain (in the salt flats), and in the area of Wig

Mountain. There is also evidence of contamination by chemical agents at Test Area 19, Target J (near Granite Mountain), and Building 3008. According to the *Deseret News* article, up to one-third of the DPG facility may be contaminated by CW agents. Some of these chemical agents (such as BZ) may exhibit extremely long lifetimes in soils and groundwater.

4.0 RECOMMENDATIONS

Based on the information collected and reviewed for this work assignment, the following recommendations are made:

(1) If possible, DPG should provide EPA and UDEQ with copies of the documents listed as "reference documents" in Appendix B of this report. Those documents have been identified as potentially relevant to delineating the nature and extent of contamination at DPG, based on their citation by relevant source documents that are in the EPA and UDEQ files. These missing documents should be reviewed to verify their relevance, and copies of relevant documents added to the appropriate EPA and state files. Since most such references were cited in documents prepared by or on behalf of Dugway, the DPG technical library should contain many of the missing documents. Other documents may be obtainable from the Defense Technical Information Center at the Defense Logistics Agency in Alexandria, Virginia.

(2) The *Deseret News* should be contacted to ascertain whether the list of documents used to prepare the December 22, 1994 article about DPG can be obtained. If so, the documents used by the newspaper should be checked against the list in Appendix B of this report, and nonduplicative entries should be added to the list in Appendix B. If possible, it should be ascertained from what sources the newspaper obtained its documents.

(3) The offices of the Governor and the Science Advisor for the State of Utah, the office of Utah Congresswoman Karen Shephard, and the Universities of Utah and Rochester should be contacted and asked to provide a list of documents in their possession relevant to testing and/or contamination at DPG. Those documents should be checked against the list in Appendix B of this report to ascertain whether the Governor, the State Science Advisor, Representative Shephard, or the universities have access to relevant documents not in the possession of EPA or UDEQ.

(4) CERCLA 120(d) and/or RCRA 3007(a) information requests should be made to other federal government agencies and departments, regarding activities conducted by or on behalf of such agencies and departments at DPG that may have resulted in the generation, treatment, or disposal of hazardous wastes at DPG. Such other government entities should include the Nuclear Regulatory Commission and the Department of Energy (successor agencies to the Atomic Energy Commission, which appears to have sponsored RW testing at DPG); the U.S. Army Testing and Evaluation Command (TECOM), successor to the command that conducted CBR tests for the Chemical and Radiological Laboratories at Aberdeen Proving Ground; and the other branches of the U.S. armed services (especially the U.S. Air Force, which appears to have conducted a number of RW and conventional munition tests at DPG and nearby FUDS, and Fort Detrick, which may have conducted BW tests at DPG).

(5) An evaluation should be made to determine the possibility of continuing contamination by long-lived radionuclides, known to have been released by the simulated nuclear reactor meltdown tests conducted west of Granite Mountain in 1957 (described in document numbers DE-202 and DE-204; see Appendix E for further details). It is also recommended that an attempt be made to ascertain whether any other long-lived radionuclides, such as Co-60 or U-233 (daughter product of Pa-233), may have been released at DPG.