

## **14.0 RECORDS DISPOSITION**

Upon completion of the public comment period for the Draft ER RSOP Modification 1, comments received from the public (including the regulatory agencies), the comment responsiveness summary, and the LRA approval letter will be incorporated into the RSOP AR File, along with a copy of the approved RSOP Modification 1 and copies of the RFETS documents referenced in this RSOP Modification, in addition to those already contained in the AR

For each ER project that implements this RSOP, the AR File will contain the RSOP Notification, including scoping meeting minutes, unit-specific information for RCRA-regulated units undergoing closure, and the ER Final Closeout Report for the project. In addition, project-specific information, such as characterization data, project correspondence, work control documents, and other information generated as a direct result of each ER project, will be filed in the Project Record and the AR, and RCRA records and closure documents will be maintained with the RCRA Operating Record. Electronic data will be archived in SWD. Both the Project Record files and the RCRA Operating Record files will be transferred to Site Records Management upon completion of the ER Final Closeout Report for each ER project.

The following information repositories have been established to provide public access to the AR Files for the Rocky Flats Closure Project:

EPA Region VIII  
Superfund Records Center  
999 18th Street, Suite 500  
Denver, Colorado 80202-2466  
(303) 312-6312

CDPHE  
Information Center, Building A  
4300 Cherry Creek Drive South  
Denver, Colorado 80220-1530  
(303) 692-2037

DOE Rocky Flats Public Reading Room  
Front Range Community College  
College Hill Library  
3705 West 112th Avenue  
Westminster, Colorado 80030  
(303) 469-4435

161

## **15.0 REFERENCES**

CDPHE, 1997, Rocky Flats Environmental Technology Site, RCRA Part B Permit #CO-97-05-30-01

DOE Order 414 1, Quality Assurance

DOE Order 435 1, Radioactive Waste Management

DOE Order 5400 1, General Environmental Protection Program

DOE Order 5400 5, Radiation Protection of the Public and the Environment

DOE, 1992, Historical Release Report, Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 1993 - 2000, Quarterly and Yearly Historical Release Report Updates, Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 1996a, Completion Report for the Source Removal at Trenches T-3 and T-4 (IHSSs 110 and 111 1), Rocky Flats Environmental Technology Site, Golden, Colorado, September

DOE, 1996b, Final Environmental Impact Statement for the Nevada Test Site and Offsite Locations in the State of Nevada, Las Vegas, Nevada, August

DOE, 1997a, Closeout Report for the Remediation of Individual Hazardous Substance Site 109, Ryan's Pit, Rocky Flats Environmental Technology Site, Golden, Colorado, July

DOE, 1997b, Closeout Report for the Source Removal at the Mound Site IHSS 113, Rocky Flats Environmental Technology Site, Golden, Colorado, October

DOE, 1997c, Closure Report Design-Build Underground Storage Tank Replacement Project, Rocky Flats Environmental Technology Site, Golden, Colorado, October

DOE, 1997d, Cumulative Impacts Document, Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 1997e, Cultural Resources Management Plan, Rocky Flats Environmental Technology Site

DOE, 1997f, Final Waste Management Programmatic Environmental Impact Statement for Managing, Treatment, Storage, and Disposal of Radioactive and Hazardous Waste, Washington, D C , May

DOE, 1998a, Application of Surface Contamination Guidelines for DOE Order 5400 5, April

DOE, 1998b, Historic American Engineering Record, Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 1999a, Industrial Area Characterization and Remediation Strategy, Rocky Flats Environmental Technology Site, Golden, Colorado, September

DOE, 1999b, Air Transport and Deposition of Actinides at the Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 1999c, Closeout Report for the Source Removal at Trench 1 Site IHSS 108, Rocky Flats Environmental Technology Site, Golden, Colorado, June

DOE, 1999d, RFCA Standard Operating Protocol for Recycling Concrete, Rocky Flats Environmental Technology Site, Golden, Colorado, September

DOE, 1999e, Environmental Assessment Finding of No Significant Impact for Temporary Storage of Transuranic and Transuranic Mixed Waste, Rocky Flats Field Office, Golden, Colorado, August

DOE, 2000a, Integrated Monitoring Plan Background Document, Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 2000b, RFCA Standard Operating Protocol for Facility Disposition, Rocky Flats Environmental Technology Site, Golden, Colorado, August

DOE, 2000c, Preliminary Data Quality Objectives, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, July

DOE, 2000d, Report on Soil Erosion and Surface Water Sediment Transport Modeling for the Actinide Migration Evaluations at the Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 2000e, Final Report on Phase Speciation of Pu and Am for Actinide Migration Studies, Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 2001a, Industrial Area Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 2001b, RFCA Standard Operating Protocol for Facility Component Removal, Size Reduction, and Decontamination Activities, Rocky Flats Environmental Technology Site, Golden, Colorado, February

DOE, 2001c, 2001 Annual Vegetation Management Plan for the Rocky Flats Environmental Technology Site, Golden, Colorado

DOE, 2001d, Asphalt and Soil Management RSOP, Rocky Flats Environmental Technology Site, Golden, Colorado, August

DOE, 2001e, Cumulative Impacts Document Update Report, Rocky Flats Environmental Technology Site, Golden, Colorado, October

DOE, 2002, Buffer Zone Sampling and Analysis Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, June

DOE, CDPHE, and EPA, 1996, Rocky Flats Cleanup Agreement, Rocky Flats Environmental Technology Site, Golden, Colorado, July

DOE, CDPHE, and EPA, 2003, Modifications to the Rocky Flats Cleanup Agreement Attachments, Rocky Flats Environmental Technology Site, Golden, Colorado, June

DOE, CDPHE, EPA, Kaiser-Hill, and RMRS, 1999, Rocky Flats Cleanup Agreement, Appendix 3 RFCA Implementation Guidance Document, July

EG&G, 1992, Phase II Geologic Characterization – Data Acquisition Surface Geologic Mapping of the Rocky Flats Plant and Vicinity, Jefferson and Boulder Counties, Colorado, March

EG&G, 1995a, Geologic Characterization Report for the Rocky Flats Environmental Technology Site, Volume I of the Sitewide Geoscience Characterization Study, Golden, Colorado, March

EG&G, 1995b, Hydrogeologic Characterization Report for the Rocky Flats Environmental Technology Site, Volume II of the Sitewide Geoscience Characterization Study, Golden, Colorado, March

EPA, 1997, Requirements for Quality Assurance Project Plans for Environmental Data Operations, QA/R-5

EPA, 1999, Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents, OSWER 9200 1-23P

Gilbert, R O , 1987, Statistical Methods for Environmental Pollution Monitoring, New York Van Nostrand Reinhold

K-H, 1999, Kaiser-Hill Team Quality Assurance Program, PADC-1996-00051

Safe Sites of Colorado, 1996, Tank Closure Report Building 771, UST No 20 Rocky Flats Environmental Technology Site, Golden, Colorado, August

1164

## Glossary

**Accelerated Action:** Accelerated actions are expedited response actions approved as a PAM, IM/IRA, or RSOP

**Accelerated Action Remediation Goals:** Accelerated action remediation goals are based on RFCA soil ALs as modified by stewardship and ALARA considerations

**Action Level (AL):** Numeric levels based on risk that, when exceeded, trigger an evaluation, remedial action, or management action are referred to as ALs. The soil ALs were developed to be protective of a wildlife refuge worker and ecological resources. The soil ALs are contained in Attachment 5 Table 3 of RFCA.

**Agreed-Upon Cleanup Level:** Agreed-upon cleanup levels are cleanup levels negotiated by the RFCA Parties that may take the place of RFCA ALs

**Analytical Services Division (ASD):** The ASD of K-H is responsible for managing offsite laboratory contracts, data validation, and archiving analytical data

**Applicable or Relevant and Appropriate Requirements (ARARs):** ARARs are promulgated standards, requirements, criteria, or limitations that will be met during closure activities to ensure the protection of human health and the environment and the proper management of waste. A requirement under environmental laws may be either "applicable" or "relevant and appropriate."

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Only those standards identified by a state in a timely manner and that are more stringent than federal requirements may be applicable (40 CFR 300.5)

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, their use is well suited to the particular site. Only those standards identified by a state in a timely manner and that are more stringent than federal requirements may be applicable (40 CFR 300.5)

**Area of Concern (AOC):** An AOC is an area that has soil with concentrations greater than background plus two standard deviations for metals or radionuclides or greater than detection limits for organics. An AOC is the area over which data will be evaluated to make accelerated action decisions.

**Asbestos:** The term asbestos includes asbestiform varieties of chrysotile, amosite (cummingtonite-grunerite), crocidolite, anthophyllite, tremolite, and actinolite.

**Asbestos-Containing Material (ACM):** ACM is material containing more than 1 percent friable asbestos

**Closure:** In the context of RCRA/CHWA hazardous waste management units, closure means actions taken by an owner or operator of a treatment, storage, or disposal unit to discontinue operation of the unit in accordance with the performance standards specified in 6 CCR 1007, §264.11 or §265.111, as appropriate (RFCA ¶25[p])

**Closure Project Baseline:** The current baseline scheduled scope of work for RFETS is referred to as the Closure Project Baseline. It includes cost, schedule, and technical performance for activities.

**Compliance Monitoring:** Compliance monitoring is the ongoing environmental monitoring of air, surface water, and groundwater conducted at RFETS in accordance with the IMP.

**Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA):** CERCLA, 42 U.S.C. §9601 *et seq.*, enacted in 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, Pub. L. 99-499, the Community Environmental Response Facilitation Act, Pub. L. No. 102-26, and the National Contingency Plan (NCP) and other implementing regulations (RFCA ¶25[m]), provides EPA with the authority to respond to releases or threatened releases of hazardous substances, pollutants, or contaminants that may endanger human health or the environment. The regulations implemented pursuant to CERCLA are defined in the NCP.

**Confidence Level:** The confidence level is the quantity  $(1-\alpha)100\%$  associated with the confidence interval. It is a quantitative measure of the limit about the true mean at a given level of probability. For example, it is the precision level at which the sample mean estimate is the population mean.

**Contamination Reduction Zone (CRZ):** The CRZ is the area at a hazardous waste site that has been set aside for the decontamination of equipment and personnel.

**Deactivation:** Deactivation is the process of placing a building, portion of a building, or building component (as used in the rest of this paragraph "building") in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program in a manner that is protective of workers, the public, and the environment. Actions during deactivation could include the removal of fuel, draining and/or deenergizing of nonessential systems, removal of stored radioactive and hazardous materials, and related actions. As the bridge between operations and decommissioning, based upon Decommissioning Operations Plans or the Decommissioning Program Plan, deactivation can accomplish operations-like activities such as final process runs, and decontamination activities aimed at placing the facility in a safe and stable condition. Deactivation does not include decontamination necessary for the dismantlement and demolition phase of decommissioning (i.e., removal of contamination remaining in fixed structures and equipment after deactivation). Deactivation does not include removal of contaminated systems or equipment except for the purpose of accountability of

special nuclear material (SNM) and nuclear safety. It also does not include removal of contamination except as incidental to other deactivation or for the purposes of accountability of SNM and nuclear safety (RFCA ¶25[y])

**Debris:** All nonsoil material found during ER remediation is referred to as debris

**Decommissioning:** Decommissioning means, for those buildings, portions of buildings, or building components (as used in the rest of this paragraph "building") in which deactivation occurs, all activities that occur after the deactivation. It includes surveillance, maintenance, component removal, decontamination and/or dismantlement, and size reduction for the purpose of retiring the building from service with adequate regard for the health and safety of workers and the public and protection of the environment. For those buildings in which no deactivation occurs, the term includes characterization, surveillance, maintenance, component removal, decontamination and/or dismantlement, and size reduction for the purpose of retiring the building from service with adequate regard for the health and safety of workers and the public and protection of the environment (RFCA ¶25[z])

**Decontamination:** Decontamination is the removal or reduction of radioactive or hazardous contamination from facilities, equipment, or soil by manual, mechanical, chemical, or other means

**Dense Nonaqueous Phase Liquid (DNAPL):** A DNAPL is an organic liquid, composed of one or more contaminants that is heavier than water and does not mix with water (e.g., chlorinated solvents)

**Derived Air Concentration (DAC):** The DAC is used to (1) estimate the potential dose from inhalation of workers exposed to airborne radioactive material, (2) determine the appropriate level of PPE required in an area, (3) evaluate the efficacy of engineering controls, and (4) evaluate the need to perform a dose assessment

The DAC is the concentration of a given radionuclide in air which, if breathed by reference man for 2,000 hours (assumed to be 1 working year), under conditions of light work (assumed air inhalation rate of 1.2 m<sup>3</sup>/h), results in an intake of 1 annual limit of intake

**Dismantlement:** Dismantlement is the demolition and removal of any building or structure or a part thereof during decommissioning (RFCA ¶25[ab])

**Equivalent Measure:** The term "equivalent measure" refers to the amount of soil gathered by using a removal mechanism to take approximately the same volume with each scoop. Examples include a backhoe bucketful or shovel scoop. Thus, when soil removal is conducted using a backhoe, an equivalent measure is one additional backhoe scoop

**Facilities:** Facilities include buildings and other structures, their functional systems and equipment, and other fixed systems and equipment installed therein, outside plant, including site development features such as landscaping, roads, walks, and parking areas, outside lighting and

communication systems, central utility plants, utilities supply and distribution systems, and other physical plant features

**Geostatistical Spatial Correlation:** The relationship between spatial measurements is referred to as the geostatistical spatial correlation. The concept of spatial correlation is that nearby sampling points are alike. Spatial correlation can be characterized through use of the semi-variogram model, which provides a measure of variance as a function of distance between data points. This measure is defined as one-half of the average squared difference between two values separated by vector  $h$ .

**Global Positioning System (GPS):** The GPS is a constellation of 24 satellites used for navigation and precise geodetic position measurements. The U.S. Department of Defense operates GPS satellites. GPS provides specially coded satellite signals that can be processed in a GPS receiver, enabling the receiver to compute position, velocity, and time. Four GPS satellite signals are used to compute positions in three dimensions and the time offset in the receiver clock.

**Hazard:** A hazard is a source of danger (i.e., material, energy source, or operation) with the potential to cause illness, injury, or death to personnel, or damage to a facility or the environment without regard for the likelihood or credibility of accident scenarios or consequence mitigation.

**Hazardous Waste:** Hazardous waste is any solid waste that either exhibits a hazardous characteristic (i.e., ignitability, corrosivity, reactivity, or toxicity) or is named on one of three lists published by EPA in 40 CFR 261, *Identification and Listing of Hazardous Waste*. To be considered hazardous, a waste must first meet EPA's definition of "solid waste," which includes liquids.

**Histogram:** A histogram is a multiple-bar diagram showing relative abundance of material or quantitative determinations (contaminant concentration) divided into a number of regulatory arranged groups.

**Interim Measure (IM):** IM is the RCRA/CHWA term for a short-term action to respond to imminent threats, or other actions to abate or mitigate actual or potential releases of hazardous wastes or constituents.

**Interim Remedial Action (IRA):** IRA is the CERCLA term for an expedited response action performed in accordance with remedial action authorities to abate or mitigate an actual or potential threat to public health, welfare, or the environment from the release or threat of a hazardous substance from RFETS.

**Isopleth:** A line on a map or chart drawn through points of equal size or abundance is referred to as an isopleth.

**Job Hazard Analysis (JHA):** A JHA is an analysis of procedurally controlled activities that uses developed procedures as a guide to address and consider the hazards due to any exposures present during implementation of (job) procedures, the use and possible misuse of tools, and

other support equipment required by the procedures. It is a type of hazard analysis process that breaks down a job or task into steps, examines each step to determine what hazard(s) exist or might occur, and establishes actions to eliminate or control the hazard.

**Kriging:** The spatial correlation model derived from the variogram analysis is used in a kriging simulation. Kriging is the process of simulating predicted values in unsampled areas by calculating a weighted least-squares mean of the surrounding data points. The weighted values account for not only the distance between known observations and points of predicted values, but also the correlation of clustered observations. For example, clustered data may provide redundancy and are weighted less than a single observation at an equal distance in a different direction. The kriging simulations are processed to produce maps defining the spatial distribution of the contaminants and uncertainty in the spatial distribution.

Probability kriging is based on multiple simulations of the contaminant concentration. The outcome of each simulation reflects the actual observations within the area. The multiple simulations of the concentrations provide the basis for determining the relative uncertainty so the probability of exceeding a specified threshold value (e.g., RFCA soil AL) at any point within the area can be estimated. The simulations are processed to produce maps defining the spatial distribution of the contaminants and the inherent uncertainty in spatial distribution.

**Lead Regulatory Agency (LRA):** The LRA is the regulatory agency (EPA or CDPHE) that is assigned approval responsibility with respect to actions under RFCA and at a particular OU pursuant to Part 8 of RFCA. In addition to its approval role, the LRA will function as the primary communication and correspondence point of contact. The LRA will coordinate technical reviews with the Support Regulatory Agency and consolidate comments, ensuring technical and regulatory consistency and that all regulatory requirements are addressed (RFCA ¶25[aq]).

**Light Nonaqueous Phase Liquid (LNAPL):** LNAPLs are liquids that do not mix with water and are lighter than water (e.g., gasoline and fuel oil).

**Low-Level (LL) Waste:** LL waste is any radioactive waste that is not classified as TRU waste, high-level waste, or spent nuclear fuel. No minimum level of radioactivity has been specified for LL waste. LL waste mixed with hazardous waste is referred to as LLM waste.

**Metadata:** Metadata is information that describes other primary data used within the decision management system (e.g., a description field within an ACCESS database).

**No Further Action/No Further Accelerated Action (NFA/NFAA):** An NFAA is the determination that remedial actions (or further accelerated actions) are not currently warranted; however, NFA/NFAA decisions are subject to revisitation at the time of the CAD/ROD and are also subject to paragraph 238 (Reservation of Rights) and to the CERCLA § 121(c) mandate for five-year review of remedial actions that result in hazardous substances, pollutants or contaminants remaining at the Site (RFCA Part 5 [av]).

**Nonroutine Actions:** Nonroutine actions, for the purpose of this RSOP, are those remedial actions that are a different remedy than excavation

**Operable Unit (OU):** OU refers to a grouping of IHSSs into a single management unit

**PCB Bulk Product Waste:** Waste derived from manufactured products containing PCBs in a nonliquid state, at any concentration where the concentration at the time of designation for disposal was equal to or greater than 50 ppm PCBs is referred to as PCB bulk product waste. PCB bulk product waste excludes PCBs or PCB items, but includes (1) nonliquid bulk waste or debris from the demolition of buildings and other man-made structures, (2) PCB-containing waste from the shredding of automobiles, household appliances, or industrial appliances, (3) plastics, preformed or molded rubber parts and components, applied dried paints, varnishes, waxes, or other similar coatings or sealants, caulking, adhesives, paper, Galbestos, sound-deadening or other types of insulation, and felt or fabric products such as gaskets, and (4) fluorescent light ballasts containing PCBs in the potting material

**PCB Item:** A PCB item is any PCB article, article container, PCB container, or PCB equipment that deliberately or unintentionally contains, or has as a part of, any PCB or PCBs. This category includes electrical equipment such as transformers, capacitors, and switches

**PCB Remediation Waste:** PCB remediation waste is waste containing PCBs as a result of a spill, release, or other unauthorized disposal, at the following concentrations: (1) materials disposed prior to April 18, 1978, that are currently at concentrations greater than or equal to 50 ppm PCBs, regardless of the concentration of the original spill, (2) materials that are currently at any volume or concentration where the original source was greater than or equal to 500 ppm PCB beginning on April 18, 1978, or greater than or equal to 50 ppm beginning on July 2, 1979, and (3) materials that are currently at any concentration if the PCBs are from a source not authorized for use under 40 CFR Part 761

PCB remediation waste includes soil, rags, and other debris generated as a result of any PCB spill cleanup, including, but not limited to, the following: (1) environmental media containing PCBs, such as soil and gravel, dredged materials, such as sediments, settled sediment fines, and decanted aqueous liquid from sediment, (2) sewage sludge containing less than 50 ppm PCBs and not in use in accordance with §760.20(a) (relating to uses of sewage sludge regulated under Parts 257, 258, and 503 of 40 CFR), (3) PCB sewage sludge, commercial or industrial sludge contaminated as a result of a spill of PCBs, including sludge located in or removed from any pollution control device, and decanted aqueous liquid from an industrial sludge, and (4) buildings and other man-made structures, such as concrete or wood floors or walls contaminated from a leaking PCB or PCB-contaminated transformer, porous surfaces, and nonporous surfaces

**Performance Monitoring:** Performance monitoring is air, surface water, or groundwater monitoring performed around decommissioning and remediation projects

**Process Waste:** Process waste is solid, hazardous, and mixed waste generated as a result of normal building operations and deactivation activities. Process waste includes mixed residues,

liquids, sludges, and oils in tanks and ancillary equipment, containerized waste generated prior to approval of this RSOP, and liquid waste chemicals (regardless of when generated)

**Process Waste Line:** Process waste lines are pipelines that carry process waste from the process system to the waste treatment system. At RFETS, the NPWL system is currently in operation. The OPWL was replaced by the NPWL.

**Radiological Buffer Zone (RBZ):** The RBZ is an intermediate area established to prevent the spread of radioactive contamination and protect personnel from radiation exposure. The area surrounds or is contiguous with Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas, Radiation Areas, or High Radiation Areas.

**Radiological Contamination:** Radioactive material present in a location where it should not be present is referred to as radiological contamination.

**RCRA-Regulated Units:** RCRA-regulated units are treatment, storage, or disposal areas that are regulated under RCRA.

**RCRA Stable:** RCRA stable is a step toward RCRA closure, whereby wastes are removed from a RCRA-regulated unit thereby eliminating the possibility of future waste input. For tank systems, this means a tank and its ancillary equipment have been drained to the maximum extent possible using readily available means, with the objective of achieving less than 1 percent holdup, and with no significant sludge or significant risk remaining. Physical means must then be used to ensure no waste is reintroduced to the system (e.g., lock out/tag out or blank flanges).

**Release Site:** A release site is a site where a hazardous or radioactive waste, hazardous constituent, or radionuclide was released to the environment.

**Remedial Action Objectives (RAOs):** RAOs are contaminant- and medium-specific goals designed to protect human health and the environment and are used to guide the accelerated actions.

**Remediation:** In this RSOP, any reference to remediation refers to an accelerated action under this RSOP and not a final CERCLA action.

**Remediation Waste:** Remediation waste includes all solid, hazardous, and mixed waste, all media and debris containing hazardous substances or listed hazardous or mixed wastes, or exhibiting a hazardous characteristic, and all hazardous substances generated from activities regulated under RFCA as RCRA corrective actions or CERCLA response actions, including decommissioning under an approved decision document. Remediation waste includes waste generated from decommissioning activities performed under this RSOP, solid waste chemicals (regardless of when generated), and residual liquids or sludges remaining in "RCRA stable" or "physically empty" tanks. Remediation waste does not include waste generated from other activities (e.g., normal building operations and deactivation activities).

**Resource Conservation and Recovery Act (RCRA):** RCRA, 42 U S C §6901 *et seq* , enacted in 1976, as amended by the Hazardous and Solid Waste Amendments of 1984, the Federal Facility Compliance Act of 1992 (RFCA ¶25[ay]), and implementing regulations ensures solid and hazardous waste are managed in a manner that is protective of human health and the environment by focusing on improving waste disposal methods with the goal of preventing future CERCLA releases

**RFCA Standard Operating Protocol (RSOP):** An RSOP is an approved protocol applicable to a set of routine environmental remediation and/or decommissioning activities regulated under RFCA that DOE may repeat without reobtaining approval after the initial approval because of the substantially similar nature of the work to be completed Initial approval of an RSOP will be accomplished through an IM/IRA process

**Routine Actions:** For the purpose of this RSOP, routine actions are those remediations that include excavation of contaminated soil and debris Work controls may be used to control hazards at these remediations

**Sanitary Waste:**

**Routine Sanitary Waste** This type of sanitary waste is collected in dumpsters located throughout RFETS Typically these wastes consist of soft or compactable items generated by office/administrative and cafeteria areas and do not require a radiological WRE prior to generation or disposal into dumpsters Typical routine sanitary waste includes packaging and general office refuse, food waste from cafeteria or offices, nonrecyclable paper, cardboard, and miscellaneous glass, metal, rubber, and plastic items from routine office/administrative operations

**Special Sanitary Waste** Special sanitary waste is sanitary waste that requires specific treatment, analysis, certification, and/or packaging prior to disposal offsite Special sanitary waste includes asbestos and beryllium waste that is not hazardous waste

**Spatial Variability:** Spatial variability is the measure of the differences between sampling points It is defined by the semivariogram model

**Substantive Requirements:** Substantive requirements are those requirements that pertain directly to actions or conditions in the environment Examples include quantitative health- or risk-based restrictions upon exposure (for particular contaminants), technology-based requirements for actions taken upon hazardous substances (e g , incinerator standards requiring particular destruction and removal efficiency), and restrictions upon activities in certain special locations (e g , standards prohibiting certain types of facilities in a floodplain)

**Triangulation:** The laying out and accurate measurement of a network of triangles is referred to as triangulation

**Upper Confidence Limit (UCL):** The UCL is a random interval based on the upper bound of random variables that are computed from sample statistics That is, prior to collecting a single

sample, the UCL is the probability that the confidence interval will contain that particular sample measurement

**Variogram:** A variogram is a fundamental geostatistical tool used to define the spatial correlation structure of spatial data sets. It is used to compare paired sample data at different locations at given separation distances. The semi-variogram model is used to define the nugget, sill, and range, which are imperative kriging parameters.

Colorado Department of Public Health and the Environment, Civil Service	
Comments	Response
<p>1 Section 1 0 (page 1) and Section 3 0 (page 14) If Pu, Na, and CCl<sub>4</sub> have been selected as examples of the three types of PCOCs, then "e g" should preface each one The Site should also explain why SVOCs have been deleted as PCOCs Please note Section 6 5 2, page 90, still refers to a potential consideration of SVOC concentrations when considering thermal desorption</p>	<p>The text was revised as suggested</p>
<p>2 Section 1 0 (page 1) The bullets describing the routine actions in this RSOP could be more clearly written The following is suggested</p> <ul style="list-style-type: none"> <li>Excavation of contaminated soil according to the framework for conducting routine accelerated actions (Figures 6 and 7) and associated debris followed by offsite disposal with or without offsite treatment, and</li> <li>Excavation of contaminated soil according to the framework for conducting routine accelerated actions (Figures 6 and 7) and associated debris followed by onsite thermal desorption treatment of VOC-contaminated soil with onsite backfilling or offsite disposal</li> </ul>	<p>The text was revised as suggested, but Section 5 2 was referenced, not the figures</p>
<p>3 Section 1 4 (Page 5) The qualifying phrase after "Subsurface Soil Risk Screen" should be "as applicable" rather than "to the extent possible "</p>	<p>The subsurface soil risk screen is always applicable, but the data/information may not be available The word possible has been changed to practicable</p>
<p>4 Section 2 1 (page 8) It might be useful to add at the end of the third paragraph that approval of these reports constitutes agency concurrence with a proposal of No Further Accelerated Action</p>	<p>The text was revised to reference ALF Section 4 and 5</p>
<p>5 Section 2 2 3 (page 11) Add "and provides an assessment of the data quality" to second sentence of first paragraph</p>	<p>The text was revised as suggested</p>

<b>Colorado Department of Public Health and the Environment, Carl Spreng</b>	
<b>Comments</b>	<b>Response</b>
<p><b>6</b> Section 4.1 (pages 28-31) It is not clearly understood how this section interfaces with D&amp;D activities since the D&amp;D and ER integration activities are set forth in the Facility Disposition RSOP. The Facility Disposition RSOP is what is approved from a D&amp;D/ER interface perspective and it is expected that it will be followed. It is therefore assumed that the ER RSOP does not specifically override actions identified in the Facility Disposition RSOP, but may be utilized to provide additional actions to be performed. Any issues that may arise should be discussed with the regulatory agencies and the final action agreed to by the LRA. Some of the discrepancies between the two documents are as follows:</p> <p><b>A</b> The Facility Disposition RSOP identifies that facility structure and material are to be removed to below 3 feet of final grade, whereas the ER RSOP indicates that the facility structure and material will be removed to 3 feet below existing grade. This should be changed to below 3 feet of existing or final grade whichever is deeper, or as otherwise agreed.</p> <p><b>B</b> The Facility Disposition RSOP states that the sanitary sewer lines, tanks, and equipment associated with facilities will be flushed and removed to the isolation valve of the main system line. This is being changed in the ER RSOP to "a location outside the building footprint". Since the isolation valve should be outside the building footprint it is unclear why this change is needed, unless some of the isolation valves are within building footprints. Please provide appropriate rationale for this proposed change.</p> <p><b>C</b> The Facility Disposition RSOP specifies that ER will be responsible for removing contaminated structures not removed by D&amp;D. This is being removed from the ER RSOP. This should remain or be appropriately modified, or rationale for its removal provided.</p> <p><b>D</b> Second bullet on page 30 - If slab removal is delayed please provide the specific facility personnel that are responsible for the slab during the interim. Is this D&amp;D responsibility or ER responsibility? Are they the "landlord organization" as previously identified?</p> <p><b>E</b> 3rd bullet on page 30 - Please provide the rationale for not including tunnel disposition in the PMPs. Please identify the RFCA decision documents in which the disposition decision will be identified.</p>	<p>The bullets in this section were removed, and a reference was made to the RSOP for Facility Disposition.</p>

**Colorado Department of Public Health and the Environment, Carl Spreng**

	Comments	Response
7	<p>Section 5.2 (page 48) The third bullet and its 2 sub-bullets could be more clearly written. The following is suggested</p> <ul style="list-style-type: none"> <li>• When COC concentrations are below RFCA WRW ALs, but the frameworks for conducting routine accelerated action for contaminated soil (Figures 6 and 7) indicate action is necessary to protect surface water and/or ecological resources               <ul style="list-style-type: none"> <li>- Protection of surface water will be based on an evaluation of whether the contaminated soil source could cause an exceedance of surface water standards in accordance with ALF Section 2</li> </ul> </li> <li>This evaluation will consider whether environmental pathways and sufficient quantity of COCs exist that could cause an exceedance</li> <li>An evaluation may also consider the physical characteristics of COCs, the completeness of natural attenuation, and whether a groundwater intercept system does or will exist</li> <li>- Protection of ecological resources will be based on an evaluation triggered by an exceedance of ecological ALs in Table 3 in ALF</li> <li>This evaluation will include the considerations listed in Section 4.2 C of ALF</li> </ul>	<p>The text was revised</p>

Colorado Department of Public Health and the Environment, Carlsburg

	Comments	Response
8	<p>Section 5 2 1 (page 51) The third sentence of the first paragraph should reflect the more precise language in the second sentence of the fourth paragraph on page 107. The Division suggests that the third sentence be deleted and the following language be added preceding the current last sentence of the paragraph "When soil removal is initiated below 3 feet through application of Table 4 criteria, removal will continue in lifts between 3 and 6 feet until activity levels less than 1 nCi/g are achieved." Such would provide a better sequence of discussion and avoid any implication that the entire interval must be excavated. The discussion in the first paragraph fails to explain how the 2-foot thick subsurface sampling intervals will be used to provide data for calculating contamination levels for the 3- to 6-foot interval to compare with Table 4 trigger levels. The consultative process mentioned in ALF Section 5 3 C 5 in regards to subsurface radiological contamination should be mentioned here as well.</p> <p>This section should reference the basis for these protocols -- ALF Section 5 3. This section and Figure 6 go beyond ALF Section 5 3 and add protocols for contaminated soil deeper than 6 feet.</p> <p>In the second paragraph, the basis for the "one more equivalent measure" concept is unclear. Since the stated purpose is to "eliminate the need for future stewardship actions", these future actions should be clarified to help correctly apply this concept. Figure 6 applies this concept only to soils 3-6 feet deep.</p>	<p>The text was revised as suggested.</p>
9	<p>Table 4 (page 51) It is unclear why the volume extent limits with respect to 5 and 4 nCi/g were set at 31 and 37 respectively. Volume extent limits of 33 and 42 m<sup>3</sup> would provide the proper interpolation between 25 and 50 m<sup>3</sup>.</p>	<p>This table is consistent with the table in 5 3 C 3, Attachment 5 of RFCA.</p>
10	<p>Section 5 2 2 (page 51) This existing text could be merged into Section 5 2 1. A new Section 5 2 2 could address non-radiologically contaminated soil and Figure 7.</p>	<p>Section 5 2 2 has been added to 5 2 1.</p>

Colorado Department of Public Health and the Environment, Carl Spreng	
Comments	Response
<p><b>11</b> Section 5.4 (page 54) The reference to action levels in the first sentence of the last paragraph should be changed to, "March 21, 2000 RFCA ALs". The word "proposed" should be removed from the second sentence</p> <p>The discussion of why removal of soil above the 2000 RFCA ALs was not considered an alternative seems unnecessary, especially since the WRW ALs are no longer proposed, but final</p> <p>Alternative 2 could be titled as simply as Alternative 3 "Removal of Soil Based on the Wildlife Refuge Worker Land Use Scenario" or "Removal of Soil Based on the ER RSOP Framework for Conducting Routine Accelerated Actions for Contaminated Soil"</p>	<p>The text was revised as suggested</p> <p>The text was retained for clarity</p> <p>The text was revised as suggested</p>
<p><b>12</b> Section 5.4.1 (page 54) The statement in the second sentence of this section could be read as overly presumptive. It would be more appropriate to state that monitoring would be used to detect exceedances of surface water standards</p>	<p>The text was revised to "would continue to monitor surface water quality with respect to the standards."</p>
<p><b>13</b> Section 5.4.1 - <i>Protectiveness</i> (page 55) In the fifth sentence, please change "public health" to "human health", the term used in environmental regulations and guidance. Corresponding changes should be made in the <i>Protectiveness</i> sections on pages 60 and 63, the <i>Achieve Remedial Objectives</i> section on page 58, etc</p>	<p>The text was revised as suggested</p>

<b>Colorado Department of Public Health and the Environment, Carl Spreng</b>	
<b>Comments</b>	<b>Response</b>
<p><b>14</b> Section 5 4 2 (page 56) The first sentence in the second paragraph should be modified. As written, the sentence implies that cleaning up to WRW ALs will also protect ecological receptors and surface water, which may not always be the case. It also implies that surface water standards need to be met only at POCs. The 6<sup>th</sup> paragraph under <i>Achieve Remedial Objectives</i> on page 58 conveys the proper intent. The third sentence in this paragraph is redundant with the first paragraph. The following revision of this section is suggested:                      "Under this alternative, soil with contaminant concentrations greater than RFCA Attachment 5 WRW ALs (DOE et al 2003) will be removed following the framework in Figures 6 and 7. This framework implements the Action Determinations required by RFCA Attachment 5, Sections 4 2 and 5 3 and calls for additional excavation beyond that required by RFCA WRW ALs if necessary to protect ecological resources and surface water. Excavated soil will be shipped offsite for disposal with or without onsite or offsite treatment unless treatment reduces contamination to levels below RFCA WRW Soil ALs, in which case the soil may be returned to the RFETS environment (see RFCA Attachment 5, Section 1 1, Put Back Levels). It is anticipated that thermal desorption will be used as the onsite treatment method (see Section 6 5 2)."</p>	<p>The text was revised</p>
<p><b>15</b> Section 5 4 2 - <i>Achieve Remedial Objectives</i> (page 57) WRW ALs do not necessarily protect ecological receptors. The first sentence of the first paragraph in this section should therefore be corrected.                      "The first RAO would be achieved because the RFCA WRW and Ecological ALs are calculated to protect refuge workers and ecological receptors respectively."</p>	<p>The text was revised</p>
<p><b>16</b> Section 5 4 2 - <i>Achieve Remedial Objectives</i> (page 58) The discussion of radiologically contaminated materials in this section exclusively mentions Pu and its action level and fails to acknowledge the Am-241 action level</p>	<p>The text was revised</p>
<p><b>17</b> Section 5 4 3 (page 62) The capital costs for the residential-based alternative is 100 times the WRW-based alternative because the removed soil volume is 100 times as much. However, the acreage involved is only 5 times as much, since the assumed thickness of contamination is apparently 6 inches for Alternative 2 and 10 feet for Alternative 3. Site characterization does not appear to support the implication that a 10-foot thick section of contaminated soil exists over a 580-acre area</p>	<p>The depth of 10 feet assumes the rural resident will construct a basement and all soils will require remediation to the ALs. Since the Implementation Guidance Document, Appendix 3 indicates, "cost estimates can be "order-of-magnitude" with sufficient accuracy to allow for comparison, the cost are considered conservative</p>

**Colorado Department of Public Health and the Environment, Carl Spreng**

	<b>Comments</b>	<b>Response</b>
<b>18</b>	Section 5 4 5 and Table 5 (page 65 and 67-68) The last sentence in this section implies that Alternative 2 had the highest ranking in the categories mentioned. Actually, Alternative 3 ranked higher and the deciding criterion was cost. In the Capital Cost category, the L, M, and H scores should not be tied to low, medium, or high costs, but rather to the ability to achieve the criteria. An "H" score should always be a positive in favor of the alternative. Therefore, the scores in the Capital Cost row should probably be reversed.	The last sentence does not indicate that that Alternative 2 outranked Alternative 3, it indicates that Alternative 2 is the preferred alternatives based on all of the criteria. The table was revised as suggested.
<b>19</b>	Section 5 1 - <i>Surface Water Protection</i> (page 70) The first sentence in this sentence should be clarified. The following is suggested: "In accordance with the framework for conducting routine accelerated actions for contaminated soil (Figures 6 and 7), protection of surface water will be ensured through a separate evaluation step."	The text was revised as suggested.
<b>20</b>	Since two bullets have been eliminated, the remaining bullet should be revised to become the last sentence of the first paragraph. "Areas where soil is remediated in accordance with the framework for conducting routine accelerated actions for contaminated soil (Figures 6 and 7) will be backfilled according to Section 6 1 1, stabilized, and revegetated in order to prevent erosion of soil with residual contamination into surface water."	The text was revised as suggested.

<b>Colorado Department of Public Health and the Environment, Carl Spreng</b>	
<b>Comments</b>	<b>Response</b>
<p><b>21</b> Section 5.5 - <i>Surface Water Protection</i> (page 71) Where a pathway to surface water and a sufficient quantity of COC(s) exists, monitoring results from POE(s) and POC(s) are inadequate to determine if soil should be removed to protect surface water upstream of the POE/POCs. Proper consideration of pathway and source, "could affect the extent of the action" as stated in Section 5.5.1 on page 65. Modify the paragraph with the three bullets</p> <ul style="list-style-type: none"> <li>• "Where a pathway to surface water exists, either by overland flow or ground water transport, the following questions will be addressed</li> <li>• What are the most direct surface and subsurface pathways to surface water?</li> <li>• Do characterization data indicate there are COCs in soil of sufficient quantity to impact surface water?</li> <li>• Do monitoring results from points of evaluation (POEs) or POCs (Figure 10) indicate there are surface water impacts from the area under consideration?</li> <li>• Is the IHSS Group in an area with high erosion potential, based on ALF Figure 1 (DOE et al 2003)?</li> <li>• Is there evidence of ground water contamination above RFCA action levels downgradient of the IHSS Group?"</li> </ul>	<p>The text was revised as suggested</p>
<p><b>22</b> Section 5.5 - <i>Monitoring</i> (page 71) Modify 4<sup>th</sup> the bullet to ask, "Are additional monitoring stations or wells needed?"</p>	<p>The text was revised as suggested</p>
<p><b>23</b> Section 5.5.1 - <i>Institutional Controls</i> (page 74) The 6<sup>th</sup> bullet will read more smoothly if "monitoring systems", is inserted between "covers," and "groundwater barriers and treatment cells". Monitoring systems could refer to cover, ground or surface water systems</p>	<p>Monitoring systems could also be exclusive of covers, groundwater barriers, and treatment cells</p>
<p><b>24</b> Section 5.6.1 (page 79-80) The application of ALARA is not necessarily consistent with a "sharp concentration gradient or where a small volume" would eliminate residual contamination. A large volume of soil may need to be excavated to eliminate soils below a "sharply defined concentration" and would be inconsistent with the "Equivalent Measure" scenario under ALARA. This should be clarified</p>	<p>This application of ALARA is consistent with the analysis that is currently being used in ER RSOP notification and ALF Section 5 and will be implemented through the consultative process</p>

**Colorado Department of Public Health and the Environment, Carl Spreng**

	<b>Comments</b>	<b>Response</b>
<b>25</b>	<p>Figure 12, Figure 7 is referenced in the 1<sup>st</sup> diamond under <i>Implementation</i> for DQO criteria. The new Figure 7 no longer describes DQO criteria. Add a "No" to the right of the 2<sup>nd</sup> diamond under <i>Implementation</i> and replace the reference to "Tier I" with "ALs" or "WRW ALs" in the box below.</p> <p>The reference to Figure 13 in the last box, to the right, under <i>Implementation</i> is no longer valid. The "Soil Disposition" figure has been deleted. The new Figure 13 shows the ER RSOP Work Planning Process Chart.</p>	<p>The figure was revised as suggested.</p>
<b>26</b>	<p>Figure 13 Please verify that a Criticality Safety Review, in far right box, is pertinent to the ER RSOP process.</p>	<p>This is a Site requirement, although it is generally not required for ER work.</p>
<b>27</b>	<p>Section 6.5.2 (page 90) Modify the second sentence to make it consistent with Section 5.5.1 "Onsite backfilling of soil that has been treated through a thermal desorption process will be considered if the soil meets the criteria in the framework for conducting routine accelerated actions for contaminated soil (Figures 6 and 7)".</p>	<p>The text was revised as suggested.</p>
<b>28</b>	<p>Section 6.9 (page 114) In the third paragraph of this section the reference to Attachment 6 should be deleted since that attachment is proposed for deletion from RFCA and Attachment 5, particularly Sections 4.2 and 5.3, should be referenced. The term, "No Further Accelerated Action" (NFAA), is listed in the Glossary (page 176) and the concept should be explained here or at another appropriate place in the body of the ER RSOP.</p>	<p>The reference to Attachment 6 was deleted.</p>
<b>29</b>	<p>Section 6.11.2 (page 117) The consultative approach and case-by-case determination mentioned in the third bullet should also be applied to the criteria for put-back of soils in bullets 2 and 4 to ensure that ecological and surface water resources are also protected.</p>	<p>Since the levels will be below the RFCA WRW ALs, it is unclear why a case-by-case determination will be required. As always, the regulators will be involved using the consultative process during project execution.</p>
<b>30</b>	<p>Section 6.13 (page 119) Under the <i>Accelerated Action Activities</i> bullet, add sub-bullets:</p> <ul style="list-style-type: none"> <li>- Subsurface Risk Screen,</li> <li>- Data Quality Assessment, and</li> <li>- References (to supporting documents filed in the Administrative Record)</li> </ul> <p>Under <i>Post-Remediation Conditions</i>, add map of pipes and structures left below 3 feet.</p>	<p>The text was revised.</p>

Colorado Department of Public Health and the Environment, Carl Spreng		
Comments	Response	
31	Figure 20 (page 120) Please verify that this figure has been revised to reflect schedule changes	Verified
32	Table 13 (page 150) Please revise the dates as necessary	The table was revised as suggested
33	Section 12.1.1 (page 151) The revised text mentions "grid samples" and appears to ignore the use of biased samples	The text was revised as suggested
34	Section 15 (page 172) This definition of action levels should also refer to ecological action levels and reference Table 3 of RFCA Attachment 5	The text was revised as suggested
35	Section 1.2 (page 3) The reference for the quote from ALF should be "(DOE et al 2003)"	The text was revised as suggested
36	Figure 1 (page 7) It would be more practical if this flow chart and other figures were perforated at the top	The figure will be perforated as requested
37	Section 2.2.1 (page 8) and Section 2.3 (page 12) The ER RSOP probably does not need to reference itself in the first paragraph and first bullet respectively. If this reference is left, the date should be 2003 to reflect this modified version	The text was revised as suggested
38	Section 5.2.2 (page 51) The correct reference is, "ALF Section 5.3 C 5"	The text was revised as suggested
39	Section 5.5.1 - <i>Institutional Controls</i> (page 74) - Add an "n" to "know"	The text was revised as suggested
40	Page 57, last line -- "Eliminated", rather than "removed", would avoid repetitiveness	The text was revised as suggested

184

US Environmental Protection Agency, Tim Rinder	
Comments	Response
1 On page ES-1, 2nd paragraph, the last sentence needs to be revised so that it's clear no removal of soil/debris from landfills will be performed under the ER RSOP. Same comment applies to pg 52, 2 <sup>nd</sup> paragraph.	The sentence was removed.
2 Add reference to EPA's new storm water regs. The cite is 40 CFR 122.26 and 122.30 through 122.37. For all land disturbances greater than one acre -- implementation of storm water pollution prevention system to prevent erosion and control sediment run off.	This ARAR is already included in Section 5.1.2

U.S. FISH AND WILDLIFE SERVICE, Mark Sattelberg, Senior Contaminant Biologist	
Comments	Response
1 In a few sections discussing the potential contaminants of concern (PCOCs), the semivolatile organic compounds (SVOCs) were removed as PCOCs. Why have the SVOCs been removed from the RSOP? If they have been ruled out as PCOCs, where is the justification for doing so? The RFCA Attachment 5, Table 3 still has Wildlife Refuge Worker (WRW) Action Levels (ALs) and Ecological ALs for SVOCs. This needs to be aligned between the two documents.	The text was revised to the original text.
2 There are decision points that discuss that soil excavation will take place if soil contamination is above RFCA Attachment 5, Table 3, WRW ALs, or as indicated by the Attachment 5, Figure 3, Subsurface Soil Risk Screen. Although the Subsurface Risk Screen takes into account Ecological Action Levels (ECO-ALs), there is a lack of reference to ECO-ALs as a decision point in the ER RSOP for surface soils. The document also states that if the WRW ALs are met that it will be protective of human health and environment (ecological receptors), however this has yet to be proven since most of the ECO ALs have not been developed. We continue to be concerned about what we perceive as a lack of priority for considering impacts to ecological receptors in the planning documents. There needs to be a higher priority put on developing the ECO ALs and incorporating them into the decision matrix of the accelerated actions. Since this site will become a national wildlife refuge, additional emphasis should be put on the protection of ecological receptors.	The impacts to the ecological receptor are noted throughout the document. The document has been revised to address RFCA soil ALs without specifying WRW or ecological receptor and ecological portion of the subsurface risk screen have been added to the document. Section 5.2.2 has been added to the document, which addresses the Accelerated Action Ecological Screening Process.

185

<b>U.S. FISH AND WILDLIFE SERVICE, Mark Sattelberg, Senior Contaminant Biologist</b>	
<b>Comments</b>	<b>Response</b>
<p>3 Throughout the document it is stated that structural material will be removed at least three feet below existing grade. This statement should be modified so that structural material will be removed to at least three feet below final grade. Once the final grading plan is produced, all subsurface structures can be removed to the appropriate depth. As presented in the RSOP, if the structural material is removed to three feet below existing grade and the final grade is lower, there may not be sufficient depth to protect the subsurface structural material from being exposed due to erosion or protect equipment used for revegetation of the areas that need to be restored.</p>	<p>The Facility Disposition RSOP and Kaiser-Hill contract require that structures be removed to three feet below final grade. It is Kaiser-Hill's responsibility to ensure that this requirement is met in order to obtain contract completion.</p>
<p>4 Throughout the document, there are conflicting statements concerning long-term stewardship, both within the document and between this document and the latest long-term stewardship strategy document. More time and effort should be made to align the statements of all of the documents.</p>	<p>Long-term stewardship is an important consideration in the ER RSOP and the RSOP has been modified to reflect the modifications to the RFCA Attachments.</p>
<p>5 Page 1, Section 1, second paragraph – SVOCs were removed as PCOCs. See general comment 1.</p>	<p>The text was revised to the original text.</p>
<p>6 Page 1, Section 1, first and second bullet in fourth paragraph – There is no discussion of the use of ECO-ALs as a decision point for remediation.</p>	<p>The impacts to the ecological receptor are noted throughout the document. The document has been revised to address RFCA soil ALs without specifying WRW or ecological receptor and ecological portion of the subsurface risk screen have been added to the document. Section 5.2.2 has been added to the document, which addresses the Accelerated Action Ecological Screening Process.</p>
<p>7 Page 2, Section 1, second paragraph – It states "These activities will be described in the RFETS Stewardship Plan (in preparation)". The RFETS long-term stewardship plan has not been started and is therefore not in preparation. The RFETS long-term stewardship strategy is in preparation. To which document is this sentence referring? Please clarify.</p>	<p>This sentence has been removed.</p>
<p>8 Page 3, Section 1.2, fourth paragraph – The paragraph states that accelerated action goals are based on RFCA WRW ALs and/or the Subsurface Soil Risk Screen. This does not include ECO ALs in the surface soil. See general comment 2.</p>	<p>The impacts to the ecological receptor are noted throughout the document. The document has been revised to address RFCA soil ALs without specifying WRW or ecological receptor and ecological portion of the subsurface risk screen have been added to the document. Section 5.2.2 has been added to the document, which addresses the Accelerated Action Ecological Screening Process.</p>

<b>U.S. FISH AND WILDLIFE SERVICE, Mark Sattelberg, Senior Contaminant Biologist</b>	
<b>Comments</b>	<b>Response</b>
<p><b>9</b> Page 6, Section 2 1, third paragraph, second bullet – It states that the Data Summary Reports are updated annually Where are those reports posted? How can we get them?</p>	<p>The bullet was deleted, Annual data summaries are no longer prepared Data can be obtained through close out reports and RADMS</p>
<p><b>10</b> Page 14, Section 3 0, third paragraph – SVOCs were removed as PCOCs See general comment 1</p>	<p>The text was revised to the original text</p>
<p><b>11</b> Page 27, Section 3 5, first paragraph – Change the next to last sentence to “ managed as a refuge where acceptable to the RFCA Parties and the U S Fish and Wildlife Service ”</p>	<p>Section 3 5 has been removed because it is no longer applicable based on the RFCA modifications</p>
<p><b>12</b> Page 28, Section 4 1, third paragraph, second and third bullet – Change the word “existing” to “final” See general comment 3</p>	<p>The Facility Disposition RSOP and Kaiser-Hill contract require that structures be removed to three feet below final grade It is Kaiser-Hill’s responsibility to ensure that this requirement is met in order to obtain contract completion</p>
<p><b>13</b> Page 28, Section 4 1, third paragraph, fourth bullet – What is meant by domestic water? Is that raw water, potable water, reused (treated) wastewater, or pond water? Please be more specific</p>	<p>This section has been removed based on comments from CDPHE, comment 6</p>
<p><b>14</b> Page 30, Section 4 1, eighth bullet – Change the word “existing” to “final” See general comment 3</p>	<p>This section has been removed based on comments from CDPHE, comment 6</p>
<p><b>15</b> Page 33, Section 4 4, second, sixth, and seventh bullet - Change the word “existing” to “final” See general comment 3</p>	<p>The Facility Disposition RSOP and Kaiser-Hill contract require that structures be removed to three feet below final grade It is Kaiser-Hill’s responsibility to ensure that this requirement is met in order to obtain contract completion</p>
<p><b>16</b> Page 33, Section 4 4, fifth bullet – The Service believes that all utility poles should be removed completely, unless located in Preble’s Meadow Jumping Mouse habitat, where they may be cut off at ground level</p>	<p>This bullet is consistent with the assumptions in Kaiser-Hill project baseline and is considered to be a safe practice that will not adversely affect future activities</p>
<p><b>17</b> Page 37, Table 3 – The Service questions whether the Fish and Wildlife Coordination Act (as amended) should be included as an ARAR, especially if the RSOP will be used in actions related to the creeks and ponds Also, since the RFCA parties have determined that a national wildlife refuge is the reasonably anticipated future land use, should the National Wildlife Refuge System Administration Act (as amended) be included as an ARAR?</p>	<p>Pursuant to the National Wildlife Refuge System Administration Act (as amended), the remedy takes precedence In addition, these are administrative requirements, which are generally not included as ARARs</p>
<p><b>18</b> Page 51, Section 5 2 2 – There is no Section 5 2 C 5, please change reference</p>	<p>The reference was modified</p>

<b>U.S. FISH AND WILDLIFE SERVICE, Mark Sattelberg, Senior Contaminant Biologist</b>	
<b>Comments</b>	<b>Response</b>
<p><b>19</b> Page 52, Section 5 3, number 3 - Routine components of nonroutine remediation actions could be implemented in accordance with this RSOP, however, the Service believes that the nonroutine remediation actions should have a preliminary plan established before the routine components are undertaken to avoid erroneous assumptions. The Service also believes that the draft plan for both the nonroutine and the routine components should be presented to the stakeholders before any actions are finalized</p>	<p>This RSOP does not address non-routine remedial actions. Non-routine actions will be addressed through separate decision documents, which will undergo formal public comment. As indicated in the ER RSOP Section 2 3, there are numerous opportunities for public involvement in routine remedial actions.</p>
<p><b>20</b> Page 56, Administrative Feasibility Section - It states "This alternative is not acceptable to the State and local communities." It does not state the position of DOE or EPA. Don't all RFCA parties have to concur on the alternatives?</p>	<p>In accordance with the Implementation Guidance Document, Appendix 3, and consistent with the CERCLA modifying criteria, Implementability should include, "consideration of the acceptability of the alternatives to the State and local community."</p>
<p><b>21</b> Page 56, Section 5 4 1, O&amp;M, fourth paragraph - It is confusing how the costs for institutional controls and monitoring compares to the most current LTS strategy. The strategy states that the annual costs will be \$12 million, with no decline in costs. See general comment 4</p>	<p>Long-term stewardship is an important consideration in the ER RSOP, however, final long-term stewardship decisions will not be made in this document. As a result, the comprehensive cost for long-term stewardship are not included for alternative comparison, but the operation and maintenance cost for the alternative is included.</p>
<p><b>22</b> Page 56, Section 5 4 2, first paragraph - There is no mention of ECO ALs. See general comment 2</p>	<p>The impacts to the ecological receptor are noted throughout the document. The document has been revised to address RFCA soil ALs without specifying WRW or ecological receptor and ecological portion of the subsurface risk screen have been added to the document. Section 5 2 2 has been added to the document, which addresses the Accelerated Action Ecological Screening Process.</p>
<p><b>23</b> Page 57, Protectiveness and Achieve Remedial Objectives Sections - In both sections it states that the alternative would be protective of human health and the environment (ecological receptors) because WRW ALs were calculated to protect WRW and ecological receptors. This is not true! These statements need to be clarified and additional language should be added to discuss the ECO ALs and how they will be used to protect ecological receptors. See general comment 2</p>	<p>The impacts to the ecological receptor are noted throughout the document. The document has been revised to address RFCA soil ALs without specifying WRW or ecological receptor and ecological portion of the subsurface risk screen have been added to the document. Section 5 2 2 has been added to the document, which addresses the Accelerated Action Ecological Screening Process.</p>
<p><b>24</b> Page 59, Technical Feasibility Section - It is not known what "No Endangered Species Act concerns are envisioned for this alternative" means. This alternative would require consultation on the Endangered Species and possible mitigation. Take permits may also have to be issued before this alternative could be implemented.</p>	<p>The section has been revised as follows, "Endangered Species Act considerations will be evaluated on a project-by-project basis and any wetlands issues could be accommodated by mitigation or restoration."</p>

<b>U.S. FISH AND WILDLIFE SERVICE, Mark Sattelberg, Senior Contaminant Biologist</b>	
<b>Comments</b>	<b>Response</b>
<p><b>25</b> Page 59, Administrative Feasibility Section – See comment 20 (16)</p>	<p>In accordance with the Implementation Guidance Document, Appendix 3, and consistent with the CERCLA modifying criteria, Implementability should include, “consideration of the acceptability of the alternatives to the State and local community”</p>
<p><b>26</b> Page 62, Administrative Feasibility Section – See comment 20 (16)</p>	<p>In accordance with the Implementation Guidance Document, Appendix 3, and consistent with the CERCLA modifying criteria, Implementability should include, “consideration of the acceptability of the alternatives to the State and local community”</p>
<p><b>27</b> Page 62, Capital Cost Section – The cost estimates presented in this alternative seems too high. Can we see a breakdown of the estimated costs?</p>	<p>In accordance with the Implementation Guidance Document, Appendix 3, “cost estimates can be “order-of magnitude” with sufficient accuracy to allow for comparison. In accordance with the Project Manager’s Desk Reference (PMBOK), an order of magnitude estimate is made without detailed data with a range of -25% to +75%. The costs are considered to be conservative and are based on previous remediation activities at RFETS</p>
<p><b>28</b> Page 62, Operation and Maintenance Section – The second sentence states “Long-term stewardship costs would be reduced and potentially eliminated”. The third sentence states “Stewardship costs associated with this alternative will be approximately the same as those in Alternative 2.” These seem to contradict themselves. Please clarify. See general comment 4</p>	<p>The third sentence was removed</p>
<p><b>29</b> Page 63, Achieve Remedial Objectives Section – If a cover was placed over the contaminated soil, it does not mean that the exposure pathways to ecological receptors would be eliminated. Also groundwater discharge to surface water would be a pathway that needed to be evaluated. Please clarify the paragraph</p>	<p>A properly designed cover would include both potential issues in the development of the design to ensure protection of ecological resources and surface water</p>
<p><b>30</b> Page 63, Technical Feasibility Section – See comment 24 (20)</p>	<p>The section has been revised as follows, “Endangered Species Act considerations will be evaluated on a project-by-project basis and any wetlands issues could be accommodated by mitigation or restoration</p>
<p><b>31</b> Page 64, Administrative Feasibility Section – See comment 20 (16)</p>	<p>In accordance with the Implementation Guidance Document, Appendix 3, and consistent with the CERCLA modifying criteria, Implementability should include, “consideration of the acceptability of the alternatives to the State and local community”</p>

**U.S. FISH AND WILDLIFE SERVICE, Mark Sattlerberg, Senior Contaminant Biologist**

	Comments	Response
32	Page 64, Capital Cost Section – Since there would be no transportation and disposal costs for the wastes, why would it be so expensive? Can we see a breakdown of the estimated costs?	In accordance with the Implementation Guidance Document, Appendix 3, “cost estimates can be “order-of magnitude” with sufficient accuracy to allow for comparison. In accordance with the Project Manager’s Desk Reference (PMBOK), an order of magnitude estimate is made without detailed data with a range of -25% to +75%. The costs are considered to be conservative and are based on previous remediation activities at RFETS
33	Page 65, Comparative Analysis of Alternatives Section – Due to these and other comments, this section may have to be reviewed	This section will be reviewed prior to finalizing the document
34	Page 66, last paragraph – Excavation to RFCA WRW ALs is not necessarily protective of the environment (ecological receptors) for the anticipated land use. See general comment 2	The impacts to the ecological receptor are noted throughout the document. The document has been revised to address RFCA soil ALs without specifying WRW or ecological receptor and ecological portion of the subsurface risk screen have been added to the document. Section 5.2.2 has been added to the document, which addresses the Accelerated Action Ecological Screening Process.
35	Page 79, Section 5.6.1, first paragraph – see comment 34 (30) and general comment 2	The impacts to the ecological receptor are noted throughout the document. The document has been revised to address RFCA soil ALs without specifying WRW or ecological receptor and ecological portion of the subsurface risk screen have been added to the document. Section 5.2.2 has been added to the document, which addresses the Accelerated Action Ecological Screening Process.
36	Page 107, Environmental Restoration Responsibilities Section – This section only represents the Pu/Am contamination in the OPWL, what about the non-radionuclide contamination?	This section is consistent with Attachment 14 of RFCA. As indicated in the second paragraph, characterization will be conducted in accordance with the IASAP, which will evaluate all COCs for each area.
37	Page 107, Environmental Restoration Responsibilities Section – The third bullet states that one of the considerations for removal of valve vaults deeper than six feet the cost/benefit to a WRW. It must also include the cost/benefit to ecological receptors that might utilize the area.	The following has been added to the third bullet, “and environment (ecological receptors)”
38	Page 116, Section 6.11.2, top bullet – The ECO ALs must be looked at before soil can be used as backfill. Soils that present a risk to ecological receptors should not be backfilled where there could be an exposure pathway to those ecological receptors.	The section has been revised.

<b>CITY AND COUNTY OF BROOMFIELD, Shirley Garcia</b>	
<b>#<sup>1</sup></b>	<b>Response</b>
<p><b>1</b> W4</p> <p><b>Comment</b></p> <p><b>Routine versus Non-routine Activities</b> Broomfield appreciates the response the Site provided in their letter dated September 4, 2001, related to the ER RSOP. The response stated <i>"Non-routine is an attribute ascribed to those remedial actions that require special engineering design and/or regulatory agency approval. These actions are not covered under the ER RSOP and include closure of the two landfills, the Solar Evaporation Ponds, the Industrial Area groundwater plume, the 903 Lip Area, and perhaps, a portion of the OPWL."</i></p> <p>Clarify why language was added to the document on page ES-1 to allow for components of the above mentioned projects to be considered routine operations. Broomfield at this time does not support partial remediation of the Present Landfill, Original Landfill, 903 Lip Area and Americium (AM) Zone, groundwater contaminant plumes, or other nonroutine remediations</p>	<p>This language was removed</p>
<p><b>2</b> W5</p> <p><b>Potential Contaminants of Concern</b> Clarify why semivolatile organic compounds (SVOCs) were removed from the potential contaminants of concern (POCs) in soil and debris. Provide the City &amp; County of Broomfield with the documentation and rationale to delete SVOCs from the POCs</p>	<p>The text was revised to the original text</p>

<sup>1</sup> Many of the comments submitted by Westminster and the Rocky Flat Citizens Advisory Board were similar in nature to the comments submitted by the City of Broomfield. Westminster comments are annotated with a W and the Westminster comment and Rocky Flats Citizens Advisory Board comments are annotated with a C and the Rocky Flats Citizens Advisory Board comment number under the City of Broomfield comment number

**CITY AND COUNTY OF BROOMFIELD Shirley Garcia**

#	Comment	Response
3 W6	<p>Future Land Use/Stewardship Broomfield continues to be apprehensive with the work planning and execution of remedial activities that may or may not capture a comprehensive stewardship evaluation. The City, along with other local governments, has on numerous occasions volunteered to assist the Site with the development of their Stewardship Plan due to the importance of protecting our communities and citizens. We thank you for incorporating a Stewardship section into the ER RSOP, but we are still unclear on the process and its' implementation and enforceability. In the original ER RSOP, the ER RSOP states, "DOE is developing the Stewardship Plan in consultation with the Stewardship Working Group". Broomfield is concerned the Stewardship Plan has been drafted and will not serve as an enforceable document. We have seen little progress on key issues such as enforceability of federal environmental laws and regulations and enforceability of institutional controls. Broomfield requests a commitment from DOE to work with local governments and the regulators to bring these issues to resolution. We want to emphasize the need to have local governments, which are asset holders, involved with stewardship activities and policy decisions. Broomfield understands the final stewardship analysis will be addressed in the final Corrective Action Decision/Record of Decision (CAD/ROD), but the enforceability and regulatory issues should be addressed now so as to not delay closure of the site.</p>	<p>Long-term stewardship is an important consideration in the ER RSOP, however, final long-term stewardship decisions will not be made in this document. The ER RSOP only involves the routine accelerated actions for soil removal. The land configuration, groundwater modeling and remedy, if required, and erosion control plan will all be factors in the long term stewardship associated with the Site. The information included in this document regarding stewardship, the decommissioning documents, and the documents mentioned above will be used to finalize the long term stewardship requirements in the CAD/ROD document. These comments will be considered in the development of long term stewardship requirements in the CAD/ROD document.</p>
4 W7	<p>Institutional Controls We appreciate the revisions in the ER RSOP to incorporate potential institutional controls, however we do have concerns the revised language lessens a strong long-term stewardship program which protects the remedies. We have issues with the following statements in Section 5.1, Institutional Controls, which identifies potential institutional controls:</p>	<p>The institutional controls listed in the document are potential controls that will be re-evaluated in the Close-out Report for the accelerated action and the final controls will be addressed during the final remedy selection. The section has been revised to be consistent with the information in RFCA Attachment 5.</p>
4 W7 C1	<p>1 "Prohibition on the construction and use of buildings in locations above subsurface contamination," Without having 100% characterization performed on the entire site, a prohibition of the construction and use of buildings should apply to any area with residual contamination</p>	<p>The bullet has been changed to coincide with the language in RFCA Attachment 5</p>

<b>CITY AND COUNTY OF BROOMFIELD, Shirley Garcia</b>		
<b>#</b>	<b>Comment</b>	<b>Response</b>
4 W7	2 "Prohibition on drilling wells for water use into contaminated groundwater, using contaminated groundwater, and/or pumping groundwater that could adversely affect the remedy." Delete the word "contaminated". There should be a prohibition on drilling wells for all water use regardless of whether or not the water is contaminated	The bullet has been changed to coincide with the language in RFCA Attachment 5
4 W7 C3	3 "Permanent restrictions on groundwater and onsite surface water use" The previous statement has been deleted from the document Broomfield does not support the use of any groundwater or surface water now or post-closure. Revise the document to include permanent restrictions on groundwater and onsite surface water use	This bullet is consistent with the language in RFCA Attachment 5
4 W7	4 "In addition, the RFCA Parties presume there will be no residential development at RFETS." Revise the language to state residential development will be prohibited for the reason that the site has not been cleaned to a level that would permit unrestricted use	The information in this section are consistent with the language in RFCA Attachment 5
4 C4	5 Section 25-15-320 of the Colorado Revised Statute (CRS) requires an environmental covenant under certain conditions. As of May 2003, the Parties have not reached agreement on the applicability of this statute to the federal government. If an agreed-upon resolution cannot be reached, each party reserves its rights as provided in RFCA Part 18. As stated earlier, we request the Site begin to address the enforceability of institutional controls and other long-term stewardship activities. Broomfield supports the environmental covenant, which serves as an additional layer for stewardship controls. Broomfield also supports a substantive role by the Colorado Department Public Health and the Environment (CDPH&E) post-closure	The RFCA parties are continuing to discuss to reach an agreed upon resolution

**CITY AND COUNTY OF BROOMFIELD, Shirley Garcia**

#	Comment	Response
5	<p><i>Environmental Restoration Remedial Action Decision Management System</i></p> <p>The Environmental Restoration Remedial Action Decision Management System (RADMS) is currently intended to allow RFETS staff to manage the collection of samples, verify and validate analytical data, retrieve and analyze project-specific and Sitewide analytical data, and display and generate maps and reports. This data management system should be utilized to archive project data for an information management system post-closure. We recommend RADMS continue to track closure of RCRA units, track ER waste volumes and compositions. Broomfield, as an asset holder, believes it is in our collective interest to develop a management system which can be utilized post-closure as a stewardship tool. If RADMS is utilized as a stewardship tool, Broomfield would request access to the system to retrieve information. If training is available on the system, Broomfield recommends a member of our staff be trained to access the system. We once again commit to work with the Site to develop a strong enforceable stewardship plan to protect our citizens and our community.</p>	<p>Broomfield recommendations and suggestions regarding RADMS will be maintained for future consideration.</p>

<b>CITY AND COUNTY OF BROOMFIELD, Shirley Garcia</b>	
<b>#1</b>	<b>Response</b>
<p><b>6</b> <b>W11</b> <b>C1</b></p> <p><b>Soils With Contaminant Concentrations &gt; Action Level Framework Used As Backfill</b> Section 6 11 2, Onsite Soil, page 117 contains the two following statements</p> <p>1 "Soil with contaminant concentrations less than RFCA Wildlife Refuge Worker (WRW) action levels (ALs) may be used as backfill in the IHSS, PAC, UBC site, or AOC that it came from "</p> <p>2 'Soil with contaminant concentrations greater than RFCA WRW ALs may be used as backfill in the IHSS, PAC, UBC site, or AOC that it came from on a case-by-case basis in consultation with the regulatory agencies. The case-by-case determination will take into account remedy effectiveness and protectiveness, anticipated future land uses, contaminant levels in surrounding soil, potential for contaminants to affect surface water quality and costs "</p> <p>Identify the RFCA WRW action levels and contaminant concentrations that will be used as backfill. If soils are blended, how will the levels for VOCs be addressed and/or characterized during stockpiling. Identify the process to ensure placement of residual contamination (backfill) and associated activities are captured in close-out reports and in the final mapping of residual contamination post-closure. Broomfield is concerned with the statement by DOE that soils with contaminant concentrations greater than RFCA WRW ALs may be used as backfill. If the RFCA Parties intend to use backfill with contaminants above the ALs, provide the City &amp; County of Broomfield with the process to ensure the site does not assume dispositioning of this waste becomes a routine practice. Broomfield request further dialogue to discuss the backfill criteria for depths greater than 3 feet along with concentration limits for depths greater than 3 feet. The City &amp; County of Broomfield does not support the use of soils with contaminant concentrations above the ALs at this time</p>	<p>These decision will be based on the original characterization data, although treatment, such as thermal desorption could blend soil, the intent of thermal desorption is to remove VOCs. These decisions will be made on an area-by-area basis and included in field documentation and close-out reports. The plutonium action level to which this statement refers is 50 pCi/g (as opposed to 1 nCi/g or 3 nCi/g). Soils contaminated with greater than 50 pCi/g will not be used as backfill from 0 - 3 feet, but only deeper than 3 feet</p> <p>The Site is committed to keeping Broomfield aware and up-to-date on the project decisions and status through the ER RSOP notifications, ER/D&amp;D meetings and additional meetings and information exchanges, as required/requested</p>
<p><b>7</b> <b>W2</b></p> <p>Section 5 2 Decision Framework, utilizes the decision frame work for conducting routine accelerated actions to protect surface water and ecological resources. The second bullet describes a data quality objective which states "If the potential for contaminants to exceed surface water standards exists, the quantity and physical characteristics of a COC, the completeness of natural attenuation, and whether a groundwater intercept does (or will) exist will be evaluated to determine the need for an accelerated action at the contaminant source "</p>	<p>These bullets were re-written based on comments from CDPHE, comment 7</p>

**CITY AND COUNTY OF BROOMFIELD, Shirley Garcia**

#	Comment	Response
7 W2	1 Clarify how the completeness of natural attenuation will be evaluated	The bullet was revised to read, "An evaluation may also consider the chemical and physical characteristics of COCs, the potential for natural attenuation, and whether a groundwater intercept system does or will exist." Natural attenuation will be evaluated based on historical and current analytical results and literature/research in consultation with the Agencies
7 W2	2 Clarify how impacts can be evaluated based on a potential groundwater intercept if the final land configuration design has not been finalized to identify the location of a potential groundwater intercept	The impacts will be evaluated based on the available information for the accelerated action including the on-going groundwater evaluation
8 W1	The ER RSOP states in Section 1.2 Regulatory Framework, paragraph 4 "Additional soil contamination may need to be remediated or managed to protect surface water quality." Yet in Section 5.2.1, Radionuclide-Contaminated Soil, the document states "Meeting the RFCA WRW AL in the top 3 feet of radiologically contaminated soil fully satisfies ALARA and removal of additional equivalent measures will not be required." This last statement contradicts the statement in Section 1.2. The Actinide Migration Evaluation (AME) Modeling report states run-off from soils containing 10 pCi/g or more of plutonium may exceed the surface water standard of 0.15 pCi/L. Revise the document to state during accelerated action, DOE and the Lead Regulatory Agency (LRA) will evaluate the impact to surface water quality when considering additional remedial action	The sentence was re-written for clarification as follows, "In general, meeting the RFCA soil AL in the top 3 ft of radiologically contaminated soil satisfies ALARA."

195

**CITY AND COUNTY OF BROOMFIELD, Shirley Garcia**

#	Comment	Response
9 W10 C5	<p><b>Remediation Strategy for Sanitary Sewer and Storm Drains</b> The City &amp; County of Broomfield is concerned with the lack of detail pertaining to the remediation strategy for sanitary sewer systems and storm drains. We understand the rationale to remove soils when required by the Subsurface Soil Risk Screen, however the structures themselves could serve as conduits for contaminant migration post-closure. Clarify the characterization methodology for the sanitary sewer drains and the storm drains. Broomfield request additional dialogue to address the Site's drainage plans for the numerous culverts on the eastern and northern side of the Industrial Area. We also request additional information and dialogue to address our concerns about the lack of details associated with the remediation of the sanitary sewer system. We assume the AMIE group is performing a water balance study in conjunction with the final land configuration design to determine the final plan for the sanitary sewer and storm drains located at the site. In addition to our concern about the drains acting as potential conduits, we also have concerns about the potential stewardship implications. The drains may require additional maintenance post-closure, thus increasing the long-term stewardship management costs.</p>	<p>The information requested is outside the scope of this document. The characterization of the sanitary sewer drains and the storm drains will be addressed in accordance with the IASAP and potentially the information made available through activities associated with the IMP. The final status of these system will depend on the final land configuration and the groundwater modeling effort. The site is committed to keeping Broomfield involved in the final status of these systems, and as information becomes available, it will be presented at ER/D&amp;D meetings.</p>
10 W4	<p><i>Building 771 Remediation Section 5.3, Routine Actions, page 52 states, "If DOE were confident, before remediation started, that remediation would require more than excavation (e.g., plus a diversion ditch), a Proposed Action Memorandum Proposed Action Memorandum ((PAM) or Interim Measure/Interim Remedial Action (IM/IRA) would be developed instead of invoking the ER RSOP." Clarify if Building 771 will require a PAM based on the proposed remediation requiring a french drain in addition to remediation.</i></p>	<p>As indicated in the 771 DOP responsiveness summary, "The groundwater management system and modification to the facility to control groundwater will be dictated by the final land configuration and groundwater modeling. If these activities are to control contaminated groundwater, the details will be documented in a project-specific RFCA decision document. If these activities are to control groundwater to minimize erosion and maintain the stability of the area, the details will be documented in work packages and implemented as a best management practice." This statement also applies to the potential french drain.</p>
11 W9	<p><i>Closure of Resource Conservation and Recovery Act (RCRA) Units</i>            Closure of RCRA units requires a Closure Description Document            Provide the City &amp; County of Broomfield with the process Environmental Restoration will use to close the units during remediation of contaminated soils. How will soils and groundwater be evaluated during closure of the units? Will ER close RCRA Unit 788.3? Unit 788.3 is not identified in the ER RSOP and if ER will close the unit, it should be added to the document. Identify the documents that identify the treatment standards and closure of the units.</p>	<p>The RCRA units will be closed in accordance with the approved permitted or interim status closure plans, and a Closure Description Document will be prepared.</p>

<b>CITY AND COUNTY OF BROOMFIELD, Shirley Garcia</b>	
# <sup>1</sup>	Response
<p>12 W8</p> <p><i>As Low As Reasonably Achievable (ALARA) Evaluation</i></p> <p>Page 80, Section 5.6.1, ALARA Evaluation, states if safety limits are exceeded during excavation to achieve ALARA, remediation will stop and the remediation will be considered ALARA. Yet on page 84, Section 5.7, Summary, key decisions made to direct field implementation of accelerated actions are based on evaluations indicating additional remediation based on ALARA and stewardship. To better understand the contradiction, provide us with a scenario describing why safety limits can not be controlled through shoring or other physical means.</p>	<p>There are always methods and controls that can be employed to continue excavation. However, the greater the excavation depth, the greater the hazard to the worker regardless of the controls that are put in place. It is anticipated that there may be circumstances where the industrial risks to the worker, outweigh the gain in the source reduction. In such instances, soil removal activities will cease.</p>

<b>CITY OF WESTMINSTER, Al Nelson</b>	
#	Response
<p>3</p> <p><b>Section 5.2 Decision Framework, Figure 7, page 50</b></p> <p>The framework uses "between 0 and 0.5 feet"</p> <p>Westminster has stated in the past, and reiterates now that we disagree that non-radionuclide contamination will only be remediated in the top six inches of soil and the Soil Risk Screen will be used for depths greater than six inches.</p> <p>Westminster supports the surface soil definition of three feet for both radionuclide and non-radionuclide contaminants.</p>	<p>The approach documented in the ER RSOP is consistent with the approved RFCAs modifications.</p>

<sup>2</sup> Many of the comments submitted by Westminster were similar in nature to the comments submitted by the City of Broomfield. Please refer to the City of Broomfield responsive summary, Westminster comments are annotated with a W and the Westminster comment number under the City of Broomfield comment number.

197

<b>ROCKY FLATS CITIZENS ADVISORY BOARD, Jerry Henderson, Program Specialist</b>	
<b>Comment<sup>3</sup></b>	<b>Response</b>
<p>6 Long-Term Stewardship In Section 5, Long-Term Stewardship, on page 66, the sentence "Remediation under the ER RSOP will be conducted to the agreed upon cleanup levels based on RFCA ALs and stewardship and ALARA considerations," was replaced by the following "However, additional long-term stewardship considerations may impact decisions made in accordance with this RSOP "</p> <p>RFCAB has previously recommended that both long-term stewardship and ALARA be explicitly incorporated into the remedial decision. The committee is concerned that the new language seems to lessen the consideration of stewardship and ALARA in the decision-making process</p>	<p>ALARA and long-term stewardship are still included in the ER RSOP and important decision factors with respect to the accelerated actions</p>

<b>ROCKY FLATS CITIZENS ADVISORY BOARD, Patricia Rice, Program Coordinator</b>	
<b>Comments</b>	<b>Response</b>
<p>1 I noticed a disparity in the draft ER RSOP Mod I with the Stewardship Strategy. On page 75, the draft includes physical controls under engineered controls. The stewardship strategy, written by John Rampe, combines physical controls with institutional controls. Engineered controls are a separate category in the strategy. I thought I would send in a comment in case you want to fix the disparity</p>	<p>The comment is appreciated. No change was made for purposes of the ER RSOP evaluation</p>

<sup>3</sup> Many of the comments submitted by Rocky Flats Citizens Advisory Board were similar in nature to the comments submitted by the City of Broomfield. Please refer to the City of Broomfield responsive summary, Rocky Flats Citizens Advisory Board comments are annotated with a C and the Rocky Flats Citizens Advisory Board comment number under the City of Broomfield comment number

**Melissa Anderson, via e-mail with Rick DiSalvo, Rocky Flats Coalition of Local Government Staff**

	Comments	Response
1	<p><b>Surface Water Protection</b> While the surface RSAL for plutonium has been set to 50pCi/g as per the recent RFCA Modifications, we know from the Actinide Migration Evaluation (AME) year 2000 Erosion Modeling Report that if runoff from soils containing 10pCi/g or more of plutonium was to reach surface water, the State water standard of 0.15pCi/L could be exceeded. Section 1.2 (Regulatory Framework) of the ER RSOP addresses this possibility with the provision that "accelerated action remediation goals are based on RFCA WRW ALs and/or the Subsurface Soil Risk Screen but may be modified by stewardship and As Low As Reasonably Achievable (ALARA) considerations. Additional soil contamination may need to be remediated or managed to protect surface water quality." Nevertheless, Section 5.2.1 (Radionuclide-Contaminated Soil) contains language which states that "Meeting the WRW AL in the top 3 feet of radiologically contaminated soil fully satisfies ALARA and removal of additional equivalent measures will not be required." This sentence appears to conflict with the earlier statement that cleanup beyond the action level may be required to protect surface water quality, among other reasons, and in fact appears to preclude additional soil removal in the top three feet of soil.</p> <p>This issue can be clarified by adding language to the second sentence referenced above that makes it clear that meeting the action level in the top three feet of contaminated soil satisfies ALARA and additional soil removal will not be required to meet ALARA.</p>	<p>The sentence in 5.2.1 was revised as follows, "In general, meeting the RFCA soil AL in the top 3 ft of radiologically contaminated soil satisfies ALARA."</p>

Melissa Anderson, via e-mail with Rick DiSalvo, Rocky Flats Coalition of Local Government Staff

	Comments	Response
2	<p><b>Groundwater Considerations</b> The Coalition understands that foundation drains can play an important role in directing groundwater movement around buildings. We have seen from the conversations surrounding the B771 deep basement remediation strategy that foundation drains may be an important part of the remedy, in that the foundation drains will help keep water out of the basement (thus reducing the potential for erosion due to seep formation) and route contaminated groundwater towards a treatment system.</p> <p>We are therefore concerned by the language in Section 6 7 (Foundation Drains) stating that "Decommissioning staff will remove all foundation drains if they are within 3 ft of the existing grade within a building footprint or to the nearest junction. All remaining drains will be cut off at the building footprint boundary, or the nearest junction outside the building footprint, and sealed with a watertight permanent seal."</p> <p>Add a caveat that foundation drains may need to be retained in certain buildings, and that the ultimate fate of the foundation drains needs to be decided in consultation with both D&amp;D and ER, taking into account any groundwater diversion and treatment needs.</p>	<p>The following was added to Section 6 7, "There may be instances where the foundation drains are maintained for groundwater management. The fate of the foundation drains will be decided in consultation with both Decommissioning and ER, taking into account groundwater modeling results. The decommissioning close-out report will annotate that the drains are still functioning."</p>
3	<p><b>Backfill Requirements</b> Section 6 11 2 (Onsite Soil) contains a provision that "Soil with contaminant concentrations above RFCA WRW ALs may be used as backfill in the IHSS, PAC, UBC site, or AOC that it came from on a case-by-case basis in consultation with the regulatory agencies."</p> <p>This statement is unclear. Please clarify in the document the concentration and depth limit on which soils greater than WRW ALs can be used as backfill.</p>	<p>The plutonium AL to which this statement refers is 50 pCi/g (as opposed to 1 nCi/g or 3 nCi/g). Soils contaminated with greater than 50 pCi/g will not be used as backfill from 0 - 3 feet, but only deeper than 3 feet.</p>



**Rocky Flats Environmental  
Technology Site**

**Industrial Area Revegetation Plan**

**Revision 1**

**May 21, 2003**

Classification Exemption Number CEX-105-01

## Introduction

The Rocky Flats Environmental Technology Site (Site) is undergoing decommissioning and closure. The decommissioning and closure activities include the removal of existing buildings and structures within the Industrial Area (IA) of the Site. As the buildings and other facilities and structures are removed, revegetation of the areas is needed to stabilize the soil, minimize erosion, and promote the establishment of native plant communities. In response to this need, Kaiser-Hill Company, L L C (K-H) contracted Savage and Savage Inc. to prepare revegetation specifications for the Industrial Area. Savage and Savage produced the *Rocky Flats Environmental Technology Site Industrial Area Revegetation Plan* (Savage and Savage 2003). Kaiser-Hill Company developed revegetation specification sheets for the IA using information contained within the Savage and Savage plan. The specification sheets and the Savage and Savage Plan were distributed for comment. The comments received are included in the Comment Responsiveness Summary located in Appendix A.

Based upon the Site's needs and the comments received, K-H has developed this *Rocky Flats Environmental Technology Site Industrial Area Revegetation Plan* (Plan). The Plan provides overall guidance and direction for revegetation activities within the IA. The revegetation specification sheets and an associated map are included in this Plan (Appendix B).

## Goals And Objectives

This Plan addresses specifically those areas considered part of the IA, although the information and specification sheets can be used anywhere at the Site. The IA consists largely of the buildings, parking lots, and other disturbed areas associated with the operation of the Site (Figure 1 in Appendix B).

- Goal 1 Wherever possible, avoid or minimize the loss of native habitat where it is still present in the IA.
- Goal 2 Develop sustainable native plant communities that provide habitat for native wildlife species that occur at the Site. The goal is revegetation, not restoration (see note below) /
- Goal 3 Remove areas of planted, exotic plant species that were used for landscaping purposes.
- Goal 4 Control noxious weeds in revegetation areas using an appropriate Integrated Weed Management Program (IWMP) strategy.
- Goal 5 Improve methods for re-establishing native plant communities.

The purpose of this Plan is revegetation, not restoration. As defined for this Plan, revegetation is defined as reseeding the dominant native plant species for a given plant community type. With respect to the IA this means planting the native dominant grasses found on the grasslands at the Site in the appropriate habitat. This is in contrast to restoration, which is defined as the re-establishment of the pre-disturbance native plant communities and all the associated natural processes and functions.

## Industrial Area Description And History

At an elevation of approximately 6,000 ft, the Site contains a unique ecotonal mixture of mountain and prairie plant species resulting from the topography of the area and its proximity to the mountain front. The Buffer Zone, the area surrounding the Industrial Area, is one of the largest remaining undeveloped tracts of its kind along the Colorado Piedmont. A number of plant communities present at the Site have been identified by the K-H Ecology Group and the Colorado Natural Heritage Program (CNHP) as increasingly rare and unique. These communities include the xeric tallgrass prairie, tall upland shrubland, wetlands, and Great Plains riparian woodland communities. Small inclusions of a number of other increasingly rare plant communities are also found on the Site.

202

The IA was constructed largely on the Rocky Flats Alluvium which is found on the pediment tops across the Site. The soil types on this surface are classified as Flatirons very cobbly sandy loam and Nederland very cobbly sandy loam (SCS 1980). The vegetation on this surface is predominantly xeric tallgrass prairie on the western portions of the Site and gradually changes to a needle and threadgrass community as the alluvium thins to the east (Figure 1). Based on evidence from the current vegetation map and historical aerial photographs, much of the IA was probably xeric tallgrass prairie prior to its construction. Common species on the xeric tallgrass prairie include *Andropogon gerardii*, *Andropogon scoparius*, *Muhlenbergia montana*, *Stipa comata*, *Bouteloua gracilis*, *Bouteloua curtipendula*, *Carex heliophila*, *Poa compressa*, and a variety of other graminoid and forb species. The dominance of these species varies from location to location.

Hillsides adjacent to the drainages would have been dominated by the mesic mixed grassland community that is common elsewhere on the hillsides at the Site. Soils on the hillslopes are classified as Denver-Kutch-Midway clay loams (SCS 1980). Common species on the mesic mixed grasslands includes *Bouteloua gracilis*, *Bouteloua curtipendula*, *Agropyron smithii*, *Stipa viridula*, *Poa pratensis*, *Poa compressa*, *Bromus japonicus*, and other forbs and graminoids.

Using historical aerial photographs, two small tributaries to Walnut Creek drained the IA and would have contained some wetland and riparian vegetation. These tributaries were modified and the channels moved for construction of the buildings at the Site. The soils on these flood plains and terraces are classified as Haverson loams elsewhere at the Site (SCS 1980). Riparian areas elsewhere at the Site are typically characterized by *Populus deltoides*, *Salix exigua*, *Amorpha fruticosa*, *Symphoricarpos occidentalis*, *Rosa arkansana*, and various wetland herbaceous plants such as *Carex nebrascensis*, *Juncus balticus*, and *Spartina pectinata*.

Prior to purchase by DOE most of the land where the Site occurs was rangeland that had been heavily overgrazed (Clark 1980). Historical aerial photographs show little riparian woodland or shrubland vegetation along the streams at the Site, likely attributable to overgrazing in the riparian corridors. After DOE purchase, grazing was stopped and the native plant communities were allowed to return with little or no management.

## Revegetation Planning Assumptions And Disclaimers

Initial planning for the D&D (Decontamination and Decommissioning) phase of the cleanup of the Site had permanent revegetation of the IA occurring at the end of the cleanup after all the buildings, structures, roads, and parking lots had been removed. After final grading and contouring, revegetation was to be done to return the Site to a more native state. More recently, however, the decision has been made to do final revegetation of project footprints as projects are completed (opportunistic revegetation approach). This has both positive and negative impacts on the final endstate of the IA. A positive outcome is that many of the smaller, isolated native areas that remain in the IA will be left untouched during cleanup. However, a result of an opportunistic revegetation approach to the revegetation of the IA is that different areas of the Site will be in varying states of succession for years to come, with many of these areas being quite small. This has the potential to increase maintenance and monitoring level of effort because each individual revegetation project (location) may have somewhat different needs.

While this Plan does contain specifications for wetland areas in the IA, any disturbance of jurisdictional wetland areas would require an approval by the U S Environmental Protection Agency (EPA) or U S Army Corps of Engineers (COE) that would address specifications for the wetlands, including reconstruction.

This Plan also does not address revegetation of soil covers which may have specific requirements for vegetation based on the purpose of the cover. The revegetation of soil covers will be designed specifically for each project and specified in the Rocky Flats Cleanup Agreement (RFCA) Decision Document.

## Revegetation Techniques

Appendix B contains a color coded map of the industrial area (Figure 1). The shaded colored areas on the map correspond to specification sheets for the shaded colored area. Specification sheets for each area are also included in Appendix B. The specification sheets contain basic instructions on seedbed preparation, seed mix, planting, and erosion control measures. These specification sheets are updated on occasion, therefore the most recent updates should be obtained from the K-H Ecology Group. Changes to any information provided on the specification sheets must be approved by the K-H Ecology Group.

Soil amendments will not be added unless soil sampling reveals deficiencies. Soil characterization of representative revegetation parcels in the IA for the specification sheets will be conducted and used to determine whether amendments need to be added. Results will be compared to soil characteristics outlined in Table 1 in Savage and Savage (2003) to determine whether amendments are necessary.

## Revegetation Management

Management of the revegetation locations is critical to final success. Management measures may include such activities as weed control, reseeding areas as necessary, thinning vegetation through fire or other mechanical means, relocating or eliminating undesirable wildlife species, and controlling or limiting anthropogenic activities within revegetated areas.

It is normal for any revegetation effort to go through an initial stage of annual weeds followed by the establishment and dominance of the desired perennial species. As a result, weed control is not always warranted. Species such as *Kochia scoparius*, *Salsola iberica*, *Helianthus annuus*, *Erodium cicutarium*, and various annual mustard species are often common the first two or three years of a revegetation effort. These species are adapted to the early successional environmental conditions and will not substantially reduce the growth and development of the desired perennial species. The species can actually protect the developing perennial vegetation by creating shade, reducing wind velocities, and creating favorable moisture conditions. In addition, they are providing additional organic matter to the topsoil. So removal of these species is not typically warranted during the first two or three years of establishment. However, after this time, control of the annual species is desirable. Control of noxious weeds will be conducted using appropriate control methods under an IWMP approach for the specific problem species.

Reseeding will be conducted only after it is determined that the desired perennial vegetation is not progressing adequately towards the revegetation goals and success criteria. Two potential scenarios will trigger reseeding efforts. First, when bare areas greater than 500 square feet exist over the course of a single growing season, and second, if after four growing seasons, quantitative data show that the total vegetation cover is less than 75 percent of the success criteria.

Other possible management considerations such as the use of prescribed fire or irrigation could be implemented if desired. Currently, however, no plans to utilize either prescribed fire or irrigation are planned.

Access to the revegetation areas should be restricted to provide the greatest opportunity for success of the revegetation effort. Access should be restricted through the use of fencing, signage, and education.

## IA Revegetation Success Criteria

Success criteria and monitoring are a necessary component of a revegetation plan to evaluate the success of the revegetation efforts. Revegetation success will be judged according to criteria for species richness, species composition, and total ground cover. These criteria are important indicators of site conditions and stability. The following criteria will be used for establishing revegetation success for in the IA.

#### Quantitative grassland success criteria

- 1 A minimum of 30% relative cover of live desired species (seeded native species and/or non-seeded native species)
- 2 A minimum of 70% total ground cover comprised of litter cover, current year live vegetation basal cover, and rock cover
- 3 A minimum of 50% of the seeded native species will be present at the revegetation site
- 4 No single species will contribute >45% of the relative foliar cover (except in areas where dominance by a single species is appropriate for long term wildlife and habitat management objectives)

#### Noxious weeds

Noxious weeds will be evaluated on a species specific basis and weed control will be employed as necessary using appropriate IWMP strategies to achieve the success criteria listed above

Monitoring will be conducted annually at selected locations to help determine the need for management and maintenance activities. Success will be based on the results from data collection. If severe weather conditions (i.e. drought) affect the vegetation and the vegetation cover does not meet success criteria, then data collection will be extended into the following year to evaluate success.

### IA Revegetation Monitoring Assumptions And Limitations

Revegetation monitoring will be conducted at selected locations in the IA to determine whether success criteria have been met. One of the challenges to monitoring revegetation success in the IA results from the fact that revegetation of the IA is not going to take place in one effort after all the buildings, other structures, and parking lots have been removed. Instead the plan is to revegetate each structure or parking lot footprint as they are removed. The result of this opportunistic revegetation approach to revegetation of the IA is that there will be a patchwork of revegetation in various stages of succession that will need monitoring. One of the limitations is the fact that not every tiny revegetation patch will be able to be monitored in depth. Therefore the following approach has been developed.

### IA Revegetation Monitoring Methodology

Revegetation monitoring will take a two-fold approach using both qualitative and quantitative monitoring. Qualitative monitoring will be used to monitor revegetation locations less than one acre in size. Qualitative monitoring will be conducted through the use of permanent photopoints and field notes. A minimum of two photopoints will be used to document each revegetation location. Photopoints will be visited annually during the summer. Both landscape and quadrat photographs may be used as appropriate. Field notes will be taken to note the status of the revegetation and any management needs. These evaluations will be used to determine whether additional management actions are needed at these locations.

Quantitative monitoring will only be used to monitor revegetation locations that are larger than one acre in size. However, not all revegetation locations in the IA greater than one acre in size will be monitored. Quantitative monitoring will be conducted at selected locations in the IA. Each year until Site closure, ten 50-m transects (permanently marked) will be established in areas where revegetation has taken place the previous year. No pre-revegetation monitoring will be conducted the year the seeding is conducted since the areas will be bare ground. Thus quantitative monitoring will begin in selected areas during the second growing season. Transects will be randomly located (as feasible). Monitoring will be conducted during the late summer or early fall (August-September) each year and will evaluate species richness and cover.

Species richness will be determined in a 2-m-wide belt centered along the length of each 50-m transect. Every plant species rooted within the 100-m<sup>2</sup> area will be recorded. In addition, the numbers of any woody plant stems and cactus stems will be counted and recorded for the 100-m<sup>2</sup> area.

Basal cover and foliar cover will be estimated using a point-intercept method along each 50-m transect (Bonham 1989). A 2-m-long, 6-mm-diameter rod will be dropped vertically at 50-cm intervals along the transect to record a total of 100 intercept points. Two categories of hits will be recorded: basal and foliar.

Basal cover hits are recorded based on what material was hit by the rod at the ground surface. Hits can be vegetation (live plants), litter (fallen dead material), rock (pebbles and cobbles greater than the rod diameter), bare ground, or water, in that order of priority based on the protection from erosion provided by each type of cover. Basal vegetation hits are recorded by species only if the rod is touching the stem or crown of the plant where the plant enters the ground. Foliar vegetation hits (defined as a portion of a plant touching the rod) are recorded by species in three categories as defined by height and growth form. The topmost hit of each growth form is recorded. The growth forms measured will include herbaceous, woody <2 m in height, and woody >2 m in height.

Data will be analyzed and summarized for each year by combining results from all 10 transects for that set of revegetation sites (called a sample set) and by appropriate subsets of transects. Species richness data will be summarized by generating an overall species list for each sample set. Other species richness variables may be calculated from the species lists and used for comparison to previous years of data. Foliar cover data are reported as absolute cover, and relative cover for each species encountered. Absolute foliar cover is defined as the percentage of the number of hits on a species out of the total number of hits possible for each sample set (1000). This value is the actual cover of a species. Relative foliar cover is defined as the number of hits a species had relative to the total number of vegetative hits recorded per sample set (i.e., the percent of total vegetative cover [100 percent] represented by the species). A Shannon-Weaver diversity index may be used to calculate diversity and will be based on the relative foliar cover data (Brower and Zar 1977). A detrended correspondence analysis (DCA, PC-ORD 1999) ordination technique may be used in the future once a few years of data have been collected. These analyses will be used to evaluate changes in vegetation over time for each sample set or to compare sample sets to one another or to native grassland areas at the Site.

## References

- Bonham, C D. 1989. Measurements for Terrestrial Vegetation. John Wiley and Sons, New York.
- Brower and Zar. 1977. Field and Laboratory Methods for General Ecology. Wm. C. Brown Company Publishers, Dubuque, IA.
- Clark, S V., Webber, P J., Komarkova, V., and W A. Weber. 1980. Map of Mixed Prairie Grassland Vegetation, Rocky Flats, Colorado. Occasional Paper No. 35. Institute of Arctic and Alpine Research, University of Colorado, Boulder, CO.
- PC-ORD. 1999. PC-ORD Multivariate Analysis of Ecological Data Software. Version 4. Gleneden Beach, OR.
- Savage and Savage. 2003. Rocky Flats Environmental Technology Site Industrial Area Revegetation Plan. Prepared by Savage and Savage, Inc., Louisville, CO for Kaiser-Hill Company, LLC. January 2003.
- SCS. 1980. Soil Survey of Golden Area, Colorado. U.S. Department of Agriculture, Soil Conservation Service.

## **APPENDIX A**

# **Comment Responsiveness Summary**

**Comment Responsiveness Summary for the Savage & Savage Plan and Specification Sheets**

Reviewer	Comment No.	Comment	Comment Response
CDPHE	General - 1	The report and associated documents are not a plan nor do they encompass the program required for successful restoration. Erosion control of disturbed lands is achieved through a combination of slope stabilization and revegetation. Slope stabilization will be achieved through the final land surface reconfiguration, which will define site slopes and drainages, and the site wide water balance, which will define post-closure surface water and groundwater conditions including areas of seeps. A site revegetation plan will specify what is required to reestablish a vegetative covering across the site capable of preventing erosion of the surface. Since this revegetation is required for the life of the contaminants (essentially in perpetuity), the stability of the vegetation is necessary under a variety of conditions. The desired degree of stability is demonstrated by the natural vegetation in undisturbed areas of the site and this natural condition becomes the goal of revegetation and restoration.	The information developed by Savage & Savage, Inc has been used to develop the "Rocky Flats Environmental Technology Site Industrial Area Revegetation Plan". The revegetation plan has been incorporated into the Industrial Area (IA) Grading Plan. The combined document provides final Industrial Area grading, slope and revegetation requirements.
CDPHE	General - 2	A plan for the entire site's disturbed areas is not included. Restoration should address all disturbed areas across the site, such as the unused landfill, roadways and support facilities, and in particular those areas included in accelerated or remedial activities, such as the landfills, trenches, PU&D Yard and ponds.	While the revegetation plan and specification sheets were developed for the IA, they can easily be used elsewhere at the Site for any disturbances.
CDPHE	General - 3	The plan needs to address final land configuration. The Map and four revegetation specification sheets provide more specific guidance for what vegetative cover will be used where. However, the map indicates truncated drainages from what used to exist in the pre-industrial condition of the pediment. Even with engineered and management controls, historic erosion patterns will work over time to reestablish the historic drainages, and the most effective long-term approach will be to mimic natural drainages.	The engineering of the drainages in the IA is beyond the scope of the revegetation plan. Contouring of drainages is addressed in the IA Grading Plan.
CDPHE	General - 3	Seeps and the upland woodlands associated with the side slopes of the drainages are common now. Use of the modeling efforts for the	Seeps and upland woodlands associated with drainage side slopes will develop naturally over time or can be planted in

Reviewer	Comment No.	Comment Description	
		groundwater system post closure support such flows, but there is no consideration/differentiation of those areas or pertinent plant species considered.	the future if the managing agency deems it appropriate
CDPHE	General - 3	The groundwater modeling effort indicates higher water tables after closure and predicts little stream flow in the drainages downstream of the IA. While seeps and alluvial flow in and adjacent to the IA are expected to increase, sustained stream flows are not, rendering the present pond system moot. Therefore, the restoration plan should be based on re-configuration within the drainages in both the IA and buffer zone.	The scope of the revegetation plan encompasses the actual revegetation specifications. The slope stabilization, final land reconfiguration, and other issues are addressed within the IA Grading Plan.
CDPHE	General - 4	Restoration needs to include habitat restoration requirements. The natural drainages adjacent to the IA in North Walnut Creek have been modified substantially with road and parking areas, which will serve no purpose after closure and should be removed. This historic modification fragments the streams and riparian habitat in areas listed as proposed critical habitat for a threatened species under the Threatened and Endangered Species Act, the Prebles Meadow Jumping Mouse (PMJM). The plan should provide for enhancement of the habitat and succession criteria for the individual plant species and recovery of the PMJM.	Reconnecting fragmented riparian habitat is not within the scope of work planned or required for Site cleanup and closure. Any project activities impacting Prebles Meadow Jumping Mouse protection areas or proposed critical habitat are being addressed through the conferencing or Section 7 consultation process. Habitat enhancement and succession criteria within the protection areas or proposed critical habitat are specified in conference documents, biological evaluations, or biological opinions issued by the United States Fish and Wildlife Service (USFWS).
CDPHE	General - 5	The plan needs to address a schedule for implementation. Additional specifications for revegetation are required to include a schedule for implementation and delineation of practices to be followed over time. Since these efforts will extend beyond closure, they become an important part of the implementation of the Long-Term Stewardship Strategy.	The revegetation plan addresses the activities that are to be conducted between now and closure. Post-closure management and monitoring are beyond the scope of the K-H contract with the Department of Energy (DOE). Practices to be followed over time after the end of the contract are the responsibility of DOE and the USFWS.
CDPHE	Specific - 1	Why not provide some natural fertilizer, mulch, or other attribute to support germination and initial growth as indicated in Section 4.1 of the Final Draft (especially if there is not going to be any additional water augmentation to help germination of the seeds)? Plant cover can be used as a natural mulch, by mixing annual vegetation with sterile seeds in with the native seeds. This cover temporarily stabilizes the soil, allowing native vegetation to take hold, and in subsequent seasons, the dead plants serve as mulch.	Soil amendments may be added to address any deficiencies based on pending soil analysis results of recent disturbed areas.

Reviewer	Comment No.	Comment Description	Comment Resolution
CDPHE	Specific - 2	Will there be a wind restriction for planting or broadcasting/spreading the seeds and mulch?	A wind restriction of 25 m p h has been added to the specification sheets above which seeding/mulching activities may not take place
CDPHE	Specific - 3	Since this is "rocky flats" there should be a recognition that pebbles and rocks should be expected on the surface with often little real soil available for seed germination or planting Without the rocks and pebbles the soil will be removed by the wind, as well as the water on slopes As such, how will this effect the proposals to rip/scarify/disc the surface soil?	It is recognized that pebbles and rocks may be expected on the surface The ripping is done to reduce deeper soil compaction and the discing is simply to break up any large dirt clods These preparation techniques should not substantially reduce rocks and pebbles present on the surface soil
CDPHE	Specific - 4	The effectiveness of the revegetation process is dependent on the proper topsoil Topsoil should match that in the undisturbed areas from a chemical standpoint, and needs to include natural microorganisms from healthy local topsoil Sources of undisturbed local topsoil should be identified to inoculate revegetated areas Natural areas to be disturbed could serve as seed areas for this soil (Possibly topsoil from the adjacent mined areas could be used) Stockpiling the soil destroys the microorganisms and should be avoided	The IA Grading Plan identifies on-site borrow areas to be used. If imported topsoil is required, all efforts will be made to use local soils such as from adjacent mining sites
CDPHE	Specific 5	Will the gravel areas around the site be removed and used as fill as indicated in Section 4 2 2 1? These areas include the current and former security fence area and areas around several of the buildings and trailers where the ground is covered with several inches of gravel	In accordance with the IA Grading Plan, the referenced gravel areas will be used as fill or modified to support plant growth
CDPHE	Specific - 6	Why are the seed mixes in the "Revegetation Specification Sheets" different from those in the Plan? If not included in the initial seeding, when will the other grasses forbs and shrubs be added? Vegetation for wetlands, riparian woodlands and uplandshrublands needs to be included	The seed mixes in the spec sheets differ from those in the Savage and Savage plan for several reasons A Some of the species listed in the Savage & Savage Plan are not currently found at the Site These species were removed since the revegetation objective is to plant native species B Some of the varieties have been changed because the local seed dealers do not sell the varieties specified in the Savage & Savage Plan C Forb species were omitted from the original specification sheets since the potential for herbicide

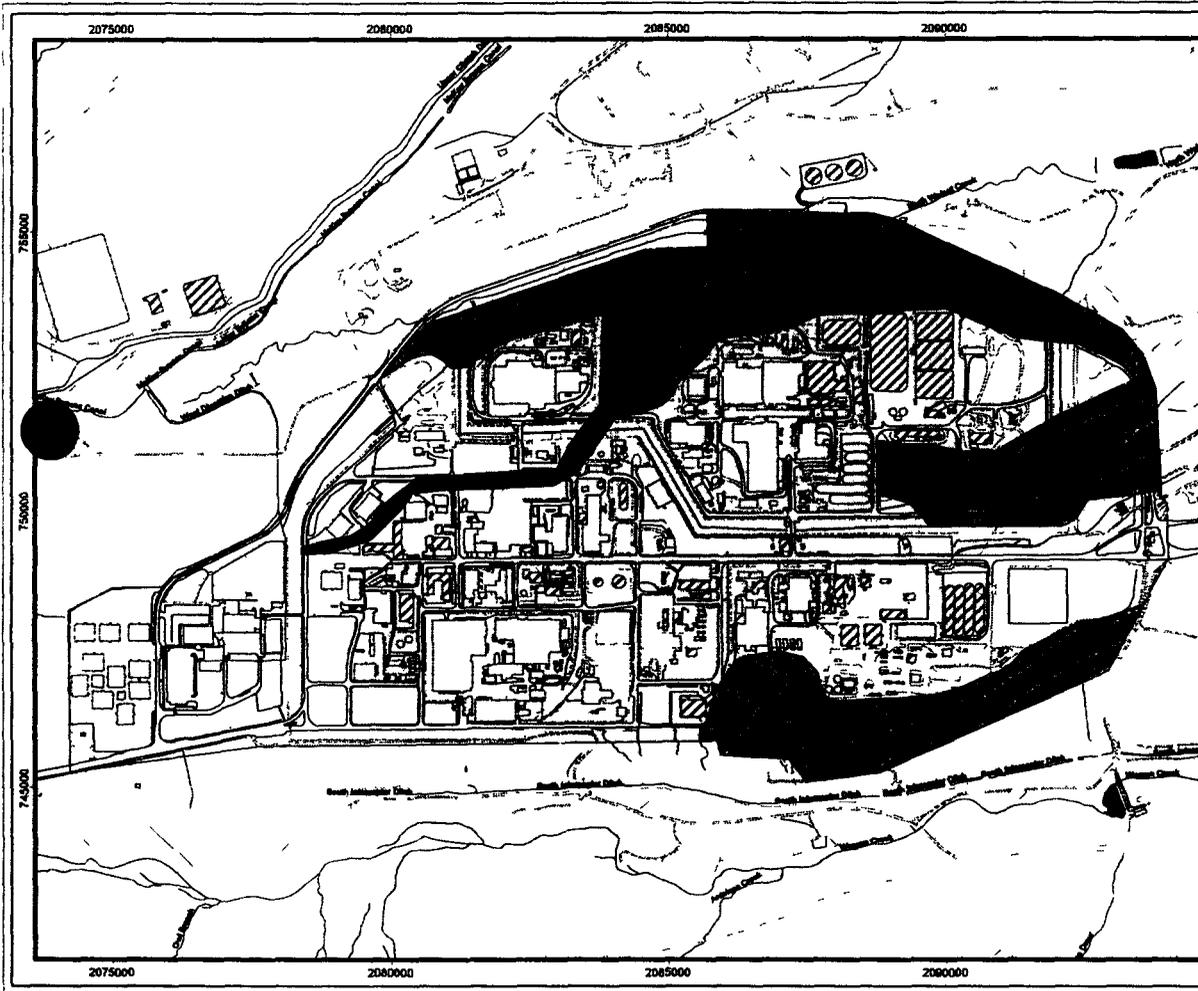
Reviewer	Comment No.	Comment Description	Comment Resolution
			<p>application on the re-vegetated areas may have led to killing the forbs This was originally a concern with the use of imported topsoil Forbs have been added back to the seed mixes per comments received from the USFWS</p> <p>K-H has no plans to do any additional seeding to add other grasses forbs and shrubs beyond what is specified in the plan and specification sheets The K-H goal is to seed back the dominant native plant species Additional seeding of subdominant and rarer plant species can be done in the future if desired by the managing agencies</p> <p>Wetland vegetation is specified in the drainage bottom area specification sheets K-H does not plan to put in any upland shrubland communities since these typically occur around seep lines The managing agencies can do this at a later date if they so choose based on the locations where seeps ultimately daylight on the hillsides They will also develop naturally themselves over time at these locations</p>
USFWS	Specific - 1	It is recommended that native hay mulch be used after seeding The native hay mulch must also be certified as weed and pest free, but it has been found at the Arsenal that the issues with weed propagules are not as prevalent with the native hay mulch as it is with straw mulch The Arsenal has also found that it is somewhat comparable in cost, depending on the source	The change to native hay mulch was made to the specification sheets
USFWS		Soil amendments should be added if deficiencies are found during soil characterization The first sentence in all of the 'Soil Amendments' sections should be modified to concur with the 'note' that follows the sentence	Added following note to specification sheets NOTE Soil characterization of representative revegetation parcels in the IA for this specification sheet will be conducted If results indicate deficiencies in soil characteristics as outlined in Table 1 in Savage and Savage (2003), appropriate measures will be taken
USFWS		Ripping to two to three feet should be done, especially where the soil has been compacted The Savage and Savage report	Changed ripping depth to 2 - 3 ft as needed

Reviewer	Comment No	Comment	Response
		recommends that ripping in compacted areas extend to three feet and to two feet if an area has not been compacted. If deep ripping is not done, rooting will be inhibited below the depth that ripping took place. Knowing the activities that are taking place in the industrial area, it is assumed most of the areas will be highly compacted by the heavy equipment, roads, and building slabs. Besides, this would be a great test to see if foundations and utilities are indeed covered by three feet of cover soil!	
USFWS		The Service still feels that initial irrigation is warranted to establish the vegetation. Even though the Savage and Savage report recommends no irrigation, the habitat management people from the Arsenal feel that if done properly (limiting water quantity and weaning the vegetation off the water in the late summer) it will enhance the success of the revegetation process.	Sentence added to Revegetation Management section that says irrigation may be used if desired.
USFWS		There is a lack of forbs in the seed mixes. There had been some previous discussions with Jody Nelson concerning inclusion of forbs in the seed mix and the ability to use herbicides to control weeds. However, since the soil will be characterized and amended only as necessary (rather than importing topsoil), there is less concern about having to control large amounts of weeds. Therefore, the Service recommends that the forbs should be added back into the seed mix, as recommended by the Savage and Savage report.	See specification sheets to see forbs that were added to the different seed mixes.
USFWS		Three major issues that were covered in the Savage and Savage report are not covered in the specification sheets. The decision not to include them may have to do with the way Kaiser-Hill is planning on subcontracting the revegetation process, however, they need to be addressed somewhere. Those issues include revegetation management, revegetation monitoring, and success determination. Once the seed is in the ground and the mulch is applied, the job is not done. The revegetated areas need to be managed and monitored, and ultimately the revegetation needs to be deemed successful. Does Kaiser-Hill have a plan of where these issues will be addressed? The Service recommends that the subcontractor that is responsible for revegetation also be responsible for management and monitoring of the sites and that Kaiser-Hill and ultimately DOE	Revegetation management, revegetation monitoring, and success criteria have been added to the revegetation plan. The responsibility of conducting the management, monitoring, and success criteria will remain K-H until the end of their contract with DOE. At that point it will transfer to the managing agency for the Site.

Reviewer	Comment No	Comment Description	
		be responsible for success determination However this all needs to be spelled out before the process begins	

## **APPENDIX B**

# **Revegetation Specification Sheets and IA Revegetation Map**



**Industrial Area  
Revegetation Specification  
Sheet Map**

**Figure 1**

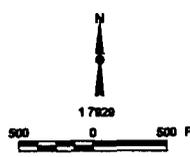
**LEGEND**

- Flat Areas (Blue Spec Sheet)
- Hillside Slope Areas (Red Spec Sheet)
- Drainage Bottom Area (Brown Spec Sheet)

**Standard Features**

- Buildings
- Demolished Buildings
- Lakes & ponds
- Streams & ditches
- Fences
- Paved roads
- Dirt roads
- Trails
- Contours (20 ft. intervals)

DATE: 08/01/00  
 Author: [illegible]  
 Title: [illegible]  
 Project: [illegible]  
 Scale: [illegible]



U.S. Department of Energy  
 Rocky Flats Environmental Technology Site  
 Prepared by  
**LABAT ICH**  
LABAT ICH Company, LLC  
 MAP ID: 83-4883      AP/ETS 898 Dept. 385-888-7787      April 4, 2003

**Blue Map Areas**  
**Flat Areas (Areas On Pediment Tops\* With Slopes Less Than 10%)**  
**Revegetation Specification Sheet**

**This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS**  
**Date 4/3/03**

<b>Seedbed Preparation</b>	
1	No imported topsoil will be used
2	Soil surface is to be ripped or scarified to a depth of 2 –3 feet to relieve soil compaction, as needed
3	Soil surface is to be disced to reduce soil particle size and get rid of larger clods, as needed
<b>Seed Mix</b>	
1	Purchase attached seed mixture for the total number of acres to be reseeded. The values in the far right hand column are the amounts per acre to be used when drill seeding. Be sure to order the correct variety of seed. <u>NOTE</u> For broadcast seeding, double the amounts shown in the far right hand column
2	The seed is to be certified seed (it comes with a Blue Tag)
3	The seed is to be ordered as pure live seed (PLS)
4	The seed must be certified weed free
5	Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding
6	Pull the seed bag tags off the bags and provide them to the K-H Ecology Group
<b>Seed Application</b>	
1	Timing of revegetation is important for success. The two windows for seeding are spring (March 15 to June 15) and fall (August 15 to November 15)
2	The seed can be drill seeded or broadcast seeded over the disturbed areas. Make sure to use the correct amount of seed for the application method chosen
3	For broadcast seeding, handseeding or mechanical seeders such as a centrifugal, fan, airblast, or hydroseeder are to be used to distribute the seed. After broadcasting, the area is to be drag-chained or raked to cover the seed slightly and provide better seed/soil contact. Broadcasting may be more appropriate on the steeper slopes for safety concerns
4	Drill seeding is best used on the flat or shallow slope areas. For drill seeding, the seeding depth is to be between 0.25 inches and 0.5 inches. Because the Site is prone to high winds, drill seeding is to be done using two passes, with the applications being perpendicular to each other and 45 degrees offset from the predominant wind direction. Seeding should not be done when wind speeds are greater than 25 mph
5	Seeding will be done prior to any mulch applications
<b>Soil Amendments</b>	
No soil amendments will be added	
<b>Mulch Application</b>	
1	Native hay mulch is to be spread across the revegetated area after seeding (drilled or broadcast) has been completed. It is to be applied at a rate of 2 tons per acre. <u>NOTE</u> The native hay must be certified as weed and pest free according to the Colorado Weed Free Forage Act. See the listing at the end of the spec sheet for local certified weed and pest free hay producers
2	The straw is to then be crimped into the soil to prevent it from blowing away. If crimping is not feasible, then after the straw has been blown onto the seeded surface it is to be covered with a chemical tackifier following the manufacturers recommended application rate. Tackifying agents found to be "environmentally friendly" and chemically acceptable for use at the Site are those comprised of plant gums or organic copolymers. Tackifier is to be applied at the manufacturer recommended rate per acre

\* The pediment tops are the upper flat surface areas throughout the IA

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687

216

Flat Areas (Areas On Pediment Tops\* With Slopes Less Than 10%) Revegetation Seed Mix  
(Based on 50 seeds/sq ft.)

Blue Map Areas

This Revegetation Specification Sheet Supersedes All Previous Revegetation Information For RFETS  
Date 4/3/03

Scientific Name	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb.	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
<b>Graminoids</b>							
<i>Agropyron dasystachyum</i>	Thickspike Wheatgrass	Critana	7	152460	150000	3.5	1.02
<i>Agropyron smithii</i>	Western Wheatgrass	Ariba	20	435600	120000	10.0	3.63
<i>Agropyron trachycaulum</i>	Slender Wheatgrass	San Luis	10	217800	120000	5.0	1.82
<i>Andropogon gerardii</i>	Big Bluestem	Bonilla	8	174240	130000	4.0	1.34
<i>Andropogon scoparius</i>	Little Bluestem	Aldous	7	152460	225000	3.5	0.68
<i>Bouteloua curtipendula</i>	Side-Oats Grama	Vaughn	15	326700	190000	7.5	1.72
<i>Bouteloua gracilis</i>	Blue Grama	Hachita	15	326700	710000	7.5	0.46
<i>Buchloe dactyloides</i>	Buffalo Grass	Texoka	5	108900	45000	2.5	2.42
<i>Koeleria pyramidata</i>	June Grass		3	65340	2315400	1.5	0.03
<i>Sorghastrum nutans</i>	Indian Grass	Cheyenne	2	43560	120000	1.0	0.36
<i>Stipa viridula</i>	Green Needlegrass	Lodorn	5	108900	115000	2.5	0.95
<b>Forbs</b>							
<i>Gallardia aristata</i>	Blanket Flower		1	21780	132000	0.5	0.17
<i>Liatris punctata</i>	Dotted Gayfeather		1	21780	135000	0.5	0.16
<i>Ratibida columnifera</i>	Prairie Coneflower		1	21780	900000	0.5	0.02
	<b>Total</b>		<b>100</b>	<b>2178000</b>		<b>50.0</b>	<b>14.77</b>

Sq ft/acre 43560  
Seeds/sq ft. 50  
Seeds needed/acre 2178000

- 1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast the application rates are to be doubled.
- 2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.
- 3) The seed is to be certified weed free.
- 4) The seed is to be certified seed (i.e. Blue Tag).
- 5) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

**NOTE**

The pediment tops are the upper flat surface areas throughout the IA.  
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231 x3560 or x3687

217

## Red Map Areas

# Hillside Slope Areas (Hillside Areas Or Areas With Slopes Greater Than 10%) Revegetation Specification Sheet

This Revegetation Specification Sheet Supersedes All Previous Revegetation Information For RFETS  
Date 4/3/03

### Seedbed Preparation

- 1 No imported topsoil will be used
- 2 Soil surface is to be ripped or scarified to a depth of 2 –3 feet to relieve soil compaction, as needed
- 3 Soil surface is to be disced to reduce soil particle size and get rid of larger clods, as needed

### Seed Mix

- 1 Purchase attached seed mixture for the total number of acres to be reseeded The values in the far right hand column are the amounts per acre to be used when drill seeding Be sure to order the correct variety of seed  
**NOTE** For broadcast seeding, double the amounts shown in the far right hand column
- 2 The seed is to be certified seed (it comes with a Blue Tag)
- 3 The seed is to be ordered as pure live seed (PLS)
- 4 The seed must be certified weed free
- 5 Seed is to be ordered and bagged separately by species (i e the seed company should deliver all the seed in separate bags by species) This allows Site ecologists to examine the seed for purity prior to seeding
- 6 Pull the seed bag tags off the bags and provide them to the K-H Ecology Group

### Seed Application

- 1 Timing of revegetation is important for success The two windows for seeding are spring (March 15 to June 15) and fall (August 15 to November 15)
- 2 The seed can be drill seeded or broadcast seeded over the disturbed areas Make sure to use the correct amount of seed for the application method chosen
- 3 For broadcast seeding, handseeding or mechanical seeders such as a centrifugal, fan, airblast, or hydroseeder are to be used to distribute the seed After broadcasting, the area is to be drag-chained or raked to cover the seed slightly and provide better seed/soil contact Broadcasting may be more appropriate on the steeper slopes for safety concerns
- 4 Drill seeding is best used on the flat or shallow slope areas For drill seeding, the seeding depth is to be between 0.25 inches and 0.5 inches Because the Site is prone to high winds, drill seeding is to be done using two passes, with the applications being perpendicular to each other and 45 degrees offset from the predominant wind direction Seeding should not be done when wind speeds are greater than 25 mph
- 5 Seeding will be done prior to any mulch applications

### Soil Amendments

No soil amendments will be added

### Mulch Application

Because of the potential for soil erosion on the steeper slopes these areas will be hydromulched Application of seed within hydromulch is not an accepted practice at the Site Therefore areas are to be seeded (drilled or broadcast) prior to the hydromulch application The hydromulch is to be applied with a tackifying agent to help further prevent erosion

Acceptable hydromulches include inert wood and plant fiber products (cellulose) Only tackifiers based on vegetable-based binders are acceptable at the Site to prevent undesired chemicals from leaching into the groundwater Tackifying agents found to be "environmentally friendly" and chemically acceptable for use at the Site are those comprised of plant gums or organic co-polymers The product known by the brand name "SoilGuard®" was also found to be chemically acceptable Hydromulch and tackifier are to be applied at the manufacturer recommended rates per acre

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687

218

Hillside Slope Areas (Hillside Areas Or Areas With Slopes Greater Than 10%) Revegetation Seed Mix  
(Based on 50 seeds/sq ft)

Red Map Areas

This Revegetation Specification Sheet Supersedes All Previous Revegetation Information For RFETS  
Date 4/3/03

Species	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb	# Seeds/Sq Ft.	Lbs./Acre (PLS)
<b>Graminoids</b>							
Agropyron dasystachyum	Thickspike Wheatgrass	Critana	5	108900	150000	2.5	0.73
Agropyron smithii	Western Wheatgrass	Amba	22	479160	120000	11.0	3.99
Agropyron trachycaulum	Slender Wheatgrass	San Luis	15	326700	120000	7.5	2.72
Bouteloua curtipendula	Side-Oats Grama	Vaughn	12	261360	190000	6.0	1.38
Bouteloua gracilis	Blue Grama	Hachita	23	500940	710000	11.5	0.71
Buchloe dactyloides	Buffalo Grass	Texoka	10	217800	45000	5.0	4.84
Stipa viridula	Green Needle Grass	Lodona	10	217800	180000	5.0	1.21
<b>Forbs</b>							
Achillea millefolium	Western Yarrow		1	21780	3000000	0.5	0.01
Linum lewisii	Blue Flax		1	21780	300000	0.5	0.07
Ratibida columnifera	Prairie Coneflower		1	21780	900000	0.5	0.02
	<b>Total</b>		<b>100</b>	<b>2178000</b>		<b>50.0</b>	<b>15.68</b>
	Sq ft/acre		43560				
	Seeds/sq ft		50				
	Seeds needed/acre		2178000				

- 1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast, the application rates are to be doubled.
- 2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.
- 3) The seed is to be certified weed free.
- 4) The seed is to be certified seed (i.e. Blue Tag).
- 5) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

**NOTE**  
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231 x3560 or x3687

219

## Brown Map Areas

### Drainage Bottom Area Revegetation Specification Sheet

This Revegetation Specification Sheet Supersedes All Previous Revegetation Information For RFETS

Date 4/3/03

#### Seedbed Preparation

- 1 No imported topsoil will be used
- 2 Soil surface is to be ripped or scarified to a depth of 2 –3 feet to relieve soil compaction, as needed
- 3 Soil surface is to be disced to reduce soil particle size and get rid of larger clods, as needed

#### Seed Mix

- 1 Purchase attached seed mixture for the total number of acres to be reseeded. The values in the far right hand column are the amounts per acre to be used when drill seeding. Be sure to order the correct variety of seed. NOTE For broadcast seeding, double the amounts shown in the far right hand column
- 2 The seed is to be certified seed (it comes with a Blue Tag)
- 3 The seed is to be ordered as pure live seed (PLS)
- 4 The seed must be certified weed free
- 5 Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding
- 6 Pull the seed bag tags off the bags and provide them to the K-H Ecology Group

#### Seed Application

- 1 Timing of revegetation is important for success. The two windows for seeding are spring (March 15 to June 15) and fall (August 15 to November 15)
- 2 The seed can be drill seeded or broadcast seeded over the disturbed areas. Make sure to use the correct amount of seed for the application method chosen
- 3 For broadcast seeding, handseeding or mechanical seeders such as a centrifugal, fan, airblast, or hydroseeder are to be used to distribute the seed. After broadcasting, the area is to be drag-chained or raked to cover the seed slightly and provide better seed/soil contact. Broadcasting may be more appropriate on the steeper slopes for safety concerns
- 4 Drill seeding is best used on the flat or shallow slope areas. For drill seeding, the seeding depth is to be between 0.25 inches and 0.5 inches. Because the Site is prone to high winds, drill seeding is to be done using two passes, with the applications being perpendicular to each other and 45 degrees offset from the predominant wind direction. Seeding should not be done when wind speeds are greater than 25 mph
- 5 Seeding will be done prior to any mulch applications

#### Soil Amendments

No soil amendments will be added

#### Mulch Application

##### Drainage Bottom Areas With Slopes Less Than 10%

Native hay mulch is to be spread across the revegetated area after seeding (drilled or broadcast) has been completed. It is to be applied at a rate of 2 tons per acre. NOTE The native hay must be certified as weed and pest free according to the Colorado Weed Free Forage Act. See the listing at the end of the spec sheet for local certified weed and pest free hay producers.

The straw is to then be crimped into the soil to prevent it from blowing away. If crimping is not feasible, then after the straw has been blown onto the seeded surface it is to be covered with a chemical tackifier following the manufacturers recommended application rate. Tackifying agents found to be "environmentally friendly" and chemically acceptable for use at the Site are those comprised of plant gums or organic co-polymers. Tackifier is to be applied at the manufacturer recommended rate per acre.

##### Drainage Bottom Areas With Slopes Greater Than Or Equal To 10%

Because of the potential for soil erosion on the steeper slopes these areas will be hydromulched. Application of seed within hydromulch is not an accepted practice at the Site. Therefore areas are to be seeded (drilled or broadcast) prior to the hydromulch application. The hydromulch is to be applied with a tackifying agent to help further prevent erosion.

Acceptable hydromulches include inert wood and plant fiber products (cellulose). Only tackifiers based on vegetable-based binders are acceptable at the Site to prevent undesired chemicals from leaching into the groundwater. Tackifying agents found to be "environmentally friendly" and chemically acceptable for use at the Site are those comprised of plant gums or organic co-polymers. The product known by the brand name "SoilGuard®" was also found to be chemically acceptable. Hydromulch and tackifier are to be applied at the manufacturer recommended rates per acre.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687

**Drainage Bottom Area Revegetation Seed Mix**  
(Based on 50 seeds/sq ft.)

Brown Map Areas

This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS  
Date 4/3/03

Wet Areas Along Edge of Streambank or Pond Edge							
Scientific Name	Common Name	Wetland Designation	% of Seed Mix	# Seeds Needed	# Seeds/Lb	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
<b>Graminoids</b>							
<i>Agrostis scabra</i>	Hair Grass	FAC	20	435600	5000000	10.0	0.09
<i>Carex nebrascensis</i>	Nebraska Sedge	OBL	25	544500	534000	12.5	1.02
<i>Eleocharis palustris</i>	Longstem Spike Rush	OBL	10	217800	1240000	5.0	0.18
<i>Juncus balticus</i>	Baltic Rush	OBL	25	544500	500000	12.5	1.09
<i>Scirpus americanus</i>	Three-Square	OBL	15	326700	600000	7.5	0.54
<b>Shrubs</b>							
<i>Amorpha fruticosa</i>	Leadplant	OBL	5	108900	77000	2.5	1.41
<b>Total</b>			100	2178000		50.0	4.33

Dryer Areas Away From Edge of Streambank or Pond Edge							
Scientific Name	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb	# Seeds/Sq. Ft.	Lbs./Acre (PLS)
<b>Graminoids</b>							
<i>Pyron smithii</i>	Western Wheatgrass	Arriba	15	326700	120000	7.5	2.72
<i>Pyron trachycaulum</i>	Slender Wheatgrass	San Luis	20	435600	120000	10.0	3.63
<i>Andropogon gerardii</i>	Big Bluestem	Bonilla	15	326700	130000	7.5	2.51
<i>Bouteloua gracilis</i>	Blue Grama	Hachita	10	217800	710000	5.0	0.3
<i>Elymus canadensis</i>	Canada Wildrye		20	435600	115000	10.0	3.79
<i>Panicum virgatum</i>	Switchgrass	Nebraska 28	20	435600	390000	10.0	1.12
<b>Total</b>			100	2178000		50.0	14.08
			Sq ft/acre	43560			
			Seeds/sq ft.	50			
			Seeds needed/acre	2178000			

- 1) This pounds per acre assumes drill seeding is used. If the seed is to be broadcast, the application rates are to be doubled.
- 2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.
- 3) The seed is to be certified weed free.
- 4) The seed is to be certified seed (i.e. Blue Tag).
- 5) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

NOTE  
Slender wheatgrass and thickspike wheatgrass have been added to species mix as early successional species.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231 x3560 or x3687

221

# Temporary Seeding Revegetation Specification Sheet

This Revegetation Specification Sheet Supersedes All Previous Revegetation Information For RFETS

Date 4/3/03

This specification sheet is to be used where temporary vegetation cover for erosion control is required at locations that will be regraded and/or have final revegetation applied in the future

## Seedbed Preparation

- 1 No imported topsoil will be used
- 2 Soil surface is to be ripped or scarified to a depth of 2-3 feet to relieve soil compaction, as needed
- 3 Soil surface is to be disced to reduce soil particle size and get rid of larger clods, as needed

## Seed Mix

- 1 Purchase attached seed mixture for the total number of acres to be reseeded. The values in the far right hand column are the amounts per acre to be used when drill seeding. Be sure to order the correct variety of seed.  
**NOTE** For broadcast seeding, double the amounts shown in the far right hand column
- 2 The seed is to be certified seed (it comes with a Blue Tag)
- 3 The seed is to be ordered as pure live seed (PLS)
- 4 The seed must be certified weed free
- 5 Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding
- 6 Pull the seed bag tags off the bags and provide them to the K-H Ecology Group

## Seed Application

- 1 Timing of revegetation is important for success. The two windows for seeding are spring (March 15 to June 15) and fall (August 15 to November 15)
- 2 The seed can be drill seeded or broadcast seeded over the disturbed areas. Make sure to use the correct amount of seed for the application method chosen
- 3 For broadcast seeding, handseeding or mechanical seeders such as a centrifugal, fan, airblast, or hydroseeder are to be used to distribute the seed. After broadcasting, the area is to be drag-chained or raked to cover the seed slightly and provide better seed/soil contact. Broadcasting may be more appropriate on the steeper slopes for safety concerns
- 4 Drill seeding is best used on the flat or shallow slope areas. For drill seeding, the seeding depth is to be between 0.25 inches and 0.5 inches. Because the Site is prone to high winds, drill seeding is to be done using two passes, with the applications being perpendicular to each other and 45 degrees offset from the predominant wind direction. Seeding should not be done when wind speeds are greater than 25 mph
- 5 Seeding will be done prior to any mulch applications

## Soil Amendments

No soil amendments will be added

## Mulch Application

### Flat Areas (Slopes Less Than 10%)

Native hay mulch is to be spread across the revegetated area after seeding (drilled or broadcast) has been completed. It is to be applied at a rate of 2 tons per acre. **NOTE** The native hay must be certified as weed and pest free according to the Colorado Weed Free Forage Act. See the listing at the end of the spec sheet for local certified weed and pest free hay producers

The straw is to then be crimped into the soil to prevent it from blowing away. If crimping is not feasible, then after the straw has been blown onto the seeded surface it is to be covered with a chemical tackifier following the manufacturer's recommended application rate. Tackifying agents found to be "environmentally friendly" and chemically acceptable for use at the Site are those comprised of plant gums or organic co-polymers. Tackifier is to be applied at the manufacturer recommended rate per acre

### Hillslope Areas (Slopes Greater Than 10%)

Because of the potential for soil erosion on the steeper slopes these areas will be hydromulched. Application of seed within hydromulch is not an accepted practice at the Site. Therefore areas are to be seeded (drilled or broadcast) prior to the hydromulch application. The hydromulch is to be applied with a tackifying agent to help further prevent erosion

Acceptable hydromulches include inert wood and plant fiber products (cellulose). Only tackifiers based on vegetable-based binders are acceptable at the Site to prevent undesired chemicals from leaching into the groundwater. Tackifying agents found to be "environmentally friendly" and chemically acceptable for use at the Site are those comprised of plant

222

gums or organic co-polymers. The product known by the brand name "SoilGuard®" was also found to be chemically acceptable. Hydromulch and tackifier are to be applied at the manufacturer recommended rates per acre.

For questions regarding this spec sheet or if variances from these specifications are required contact the K-H Ecology Group at x2231, x3560, or x3687.

**Temporary Seeding Revegetation Seed Mix**  
 (Based on 50 seeds/sq ft)

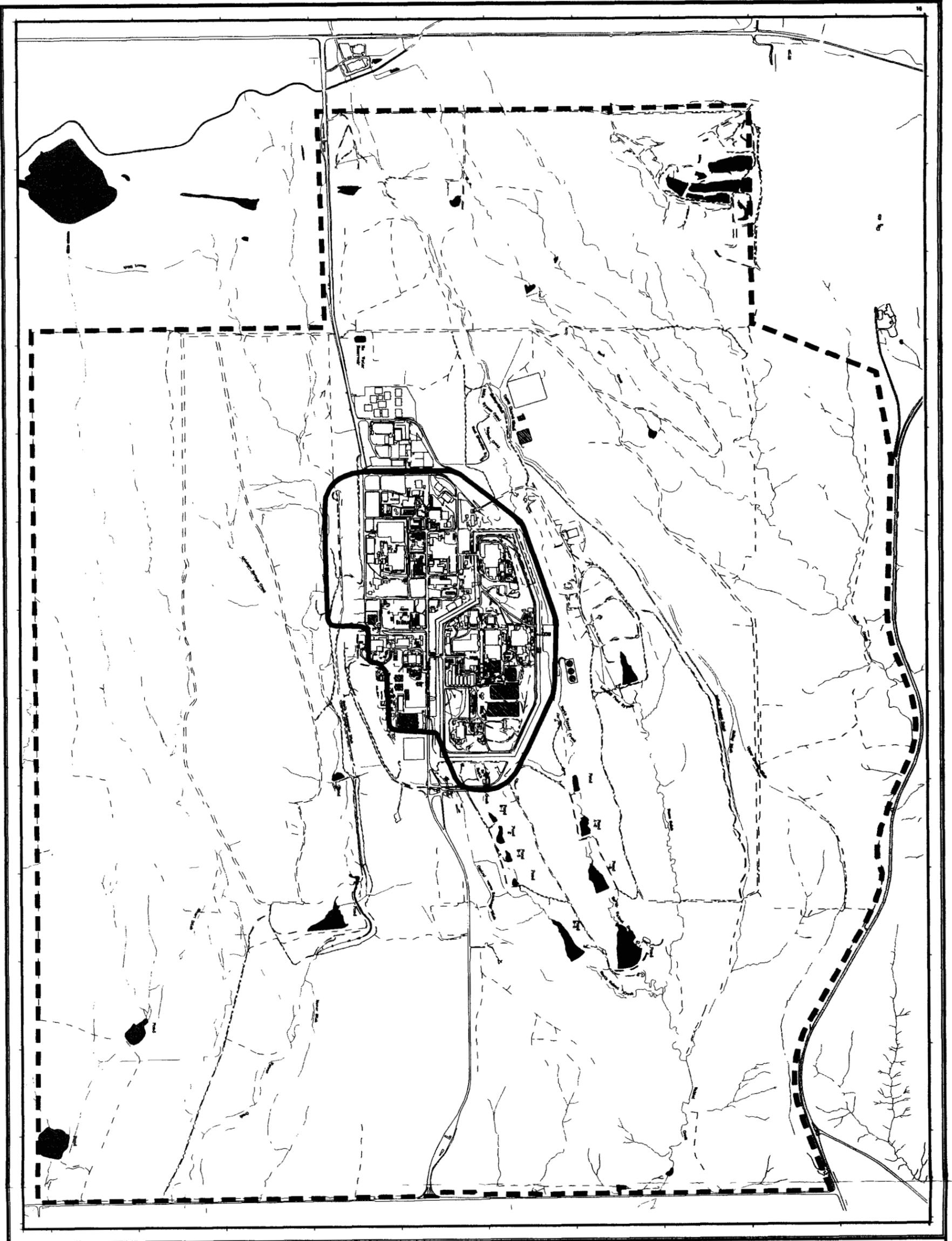
**This Revegetation Specification Sheet Supercedes All Previous Revegetation Information For RFETS**  
 Date 4/3/03

Species	Common Name	Variety	% of Seed Mix	# Seeds Needed	# Seeds/Lb	# Seeds/Sq Ft	Lbs./Acre (PLS)
<i>Agropyron dasystachyum</i>	Thickspike Wheatgrass	Crtana	35	762300	150000	17.5	5.08
<i>Agropyron smithii</i>	Western Wheatgrass	Amba	25	544500	120000	12.5	4.5
<i>Agropyron trachycaulum</i>	Slender Wheatgrass	San Luis	40	871200	120000	20.0	7.3
<b>Total</b>			<b>100</b>	<b>2178000</b>		<b>50.0</b>	<b>16.9</b>
Sq ft/acre			43560				
Seeds/sq ft			50				
Seeds needed/acre			2178000				

- 1) This pounds per acre assumes drill-seeding is used. If the seed is to be broadcast the application rates are to be doubled.
- 2) PLS = pure live seed. Be sure to specify this to the seed dealer when ordering.
- 3) The seed is to be certified weed free.
- 4) The seed is to be certified seed (i.e. Blue Tag).
- 5) Seed is to be ordered and bagged separately by species (i.e. the seed company should deliver all the seed in separate bags by species). This allows Site ecologists to examine the seed for purity prior to seeding.

For questions regarding this spec sheet or if variances from these specifications are required contact the K H Ecology Group at x2231, x3560 or x3687

224/224



**Figure 2**  
**Rocky Flats Environmental  
 Technology Site**

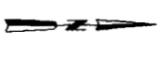
**EXPLANATION**

- N 1 d still Air Bo dary
- N 2 ne Bou dary

**Standard Map Features**

- Build ng d othe r structure
- D m lsh d build g nd Othe r structure
- Lak d p d
- Stream d h s, oth dr nage fs
- Fen d ho b
- Paved oad
- D oad

**DATA SOURCE FEATURES**  
 Buildings / ne / hydrography / roads and / w / rest / as / rom / 4 aerial / y-over data / ap used b / EG&G RSL, Las Vegas, / Digitized from the orthophoto graphs, 1985 / Industrial as Boundary data, Approve / M & D moat / ISSSQC 303- 6-46061



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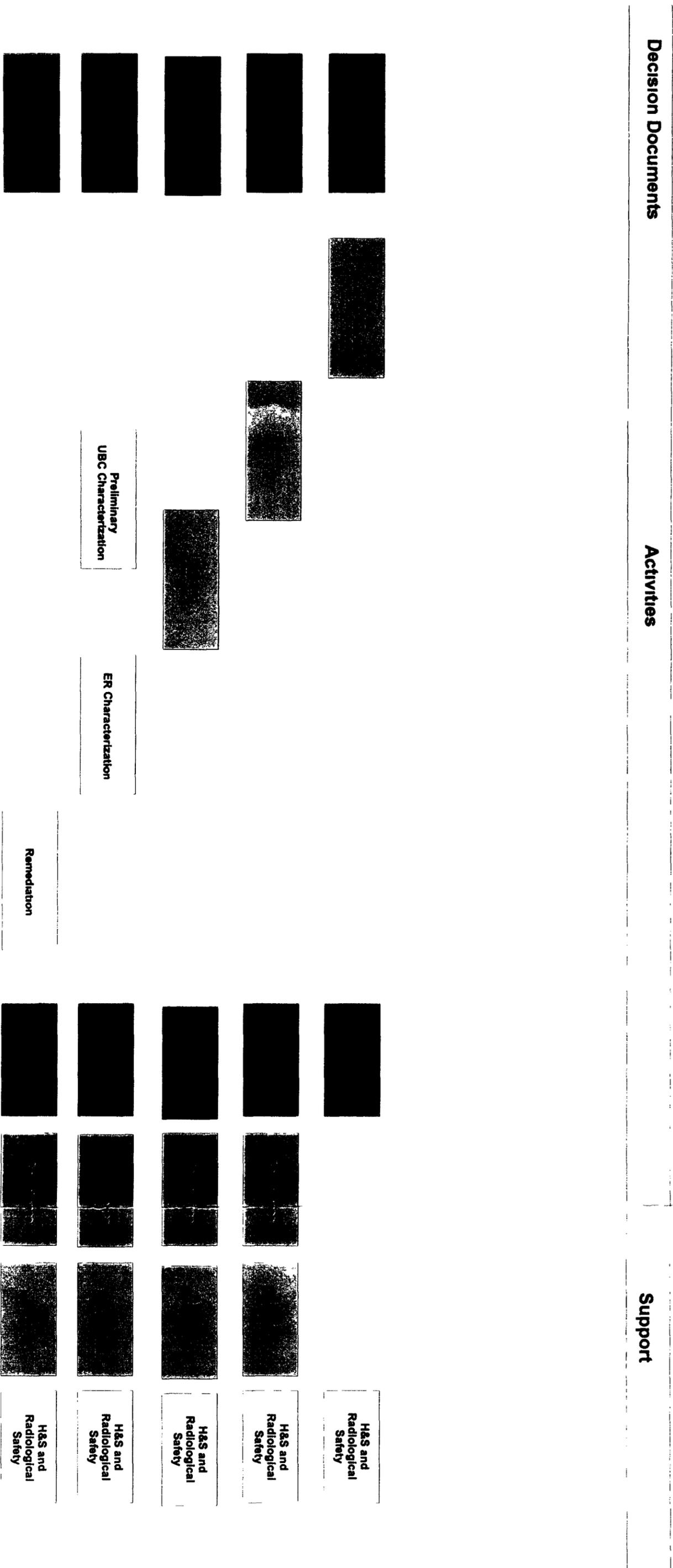
U S Department of Energy  
 Rocky Flats Environmental Technology Site

Prepared by CH2MHILL  
 Date: 803-985-770

Prepared by KAISER ILL  
 April 24, 2003



**Figure 5  
Key Project Interfaces**





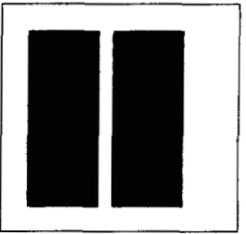


Figure 7  
Framework For Conducting Routine Accelerated Actions for Nonradiologically and Uranium Contaminated Soil

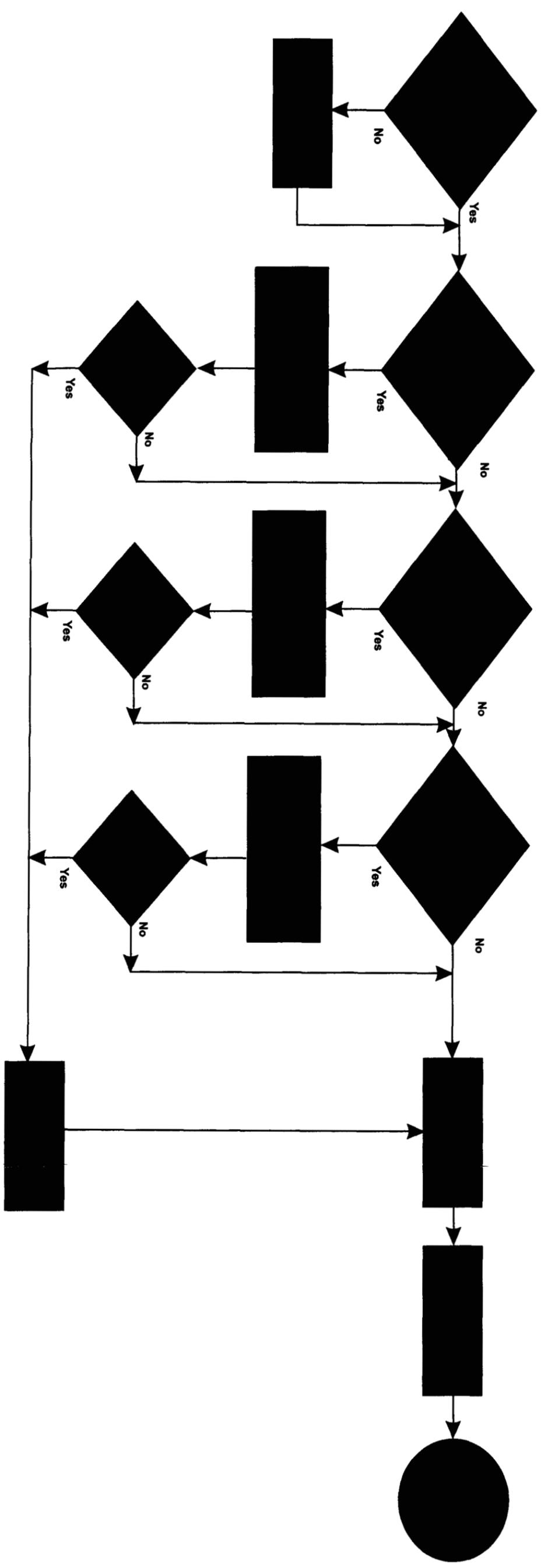
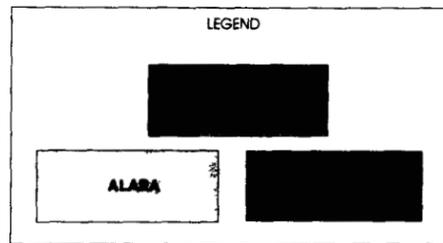
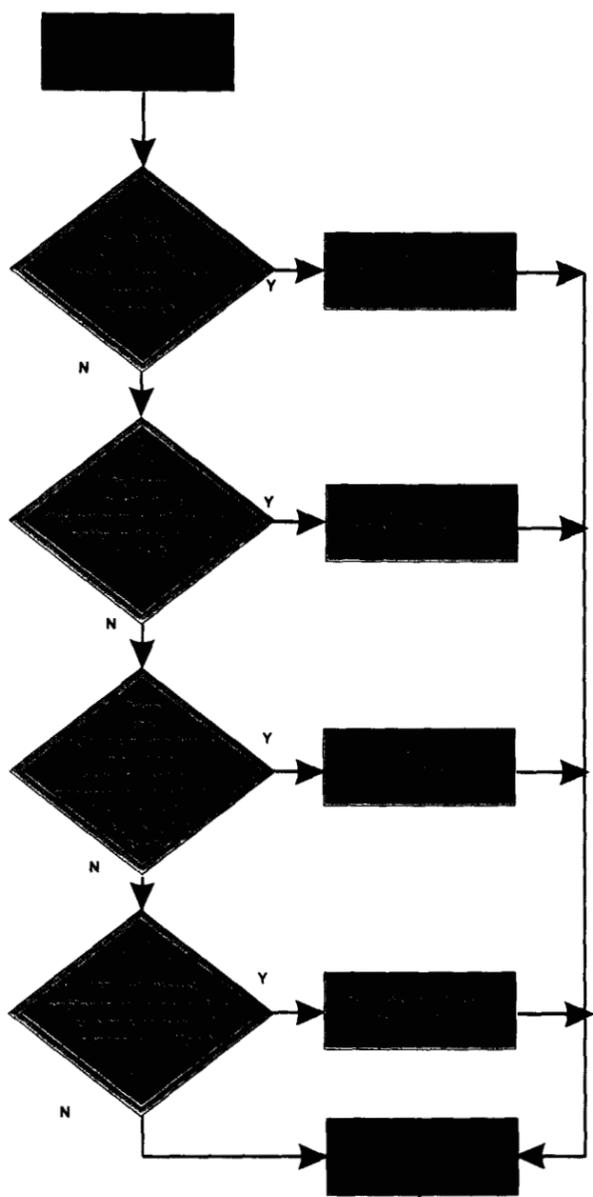




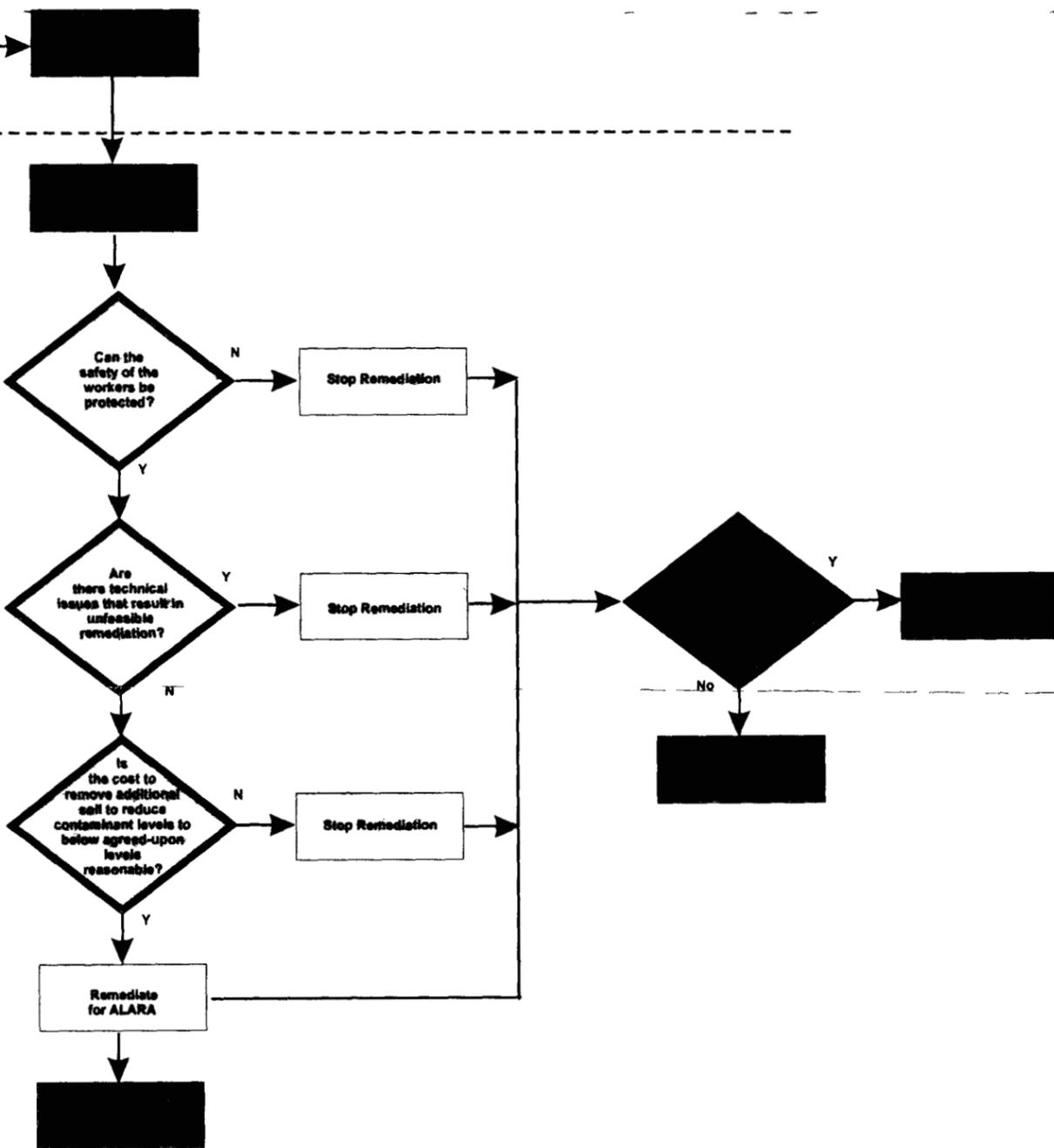
Figure 9  
Stewardship and ALARA Process Overview



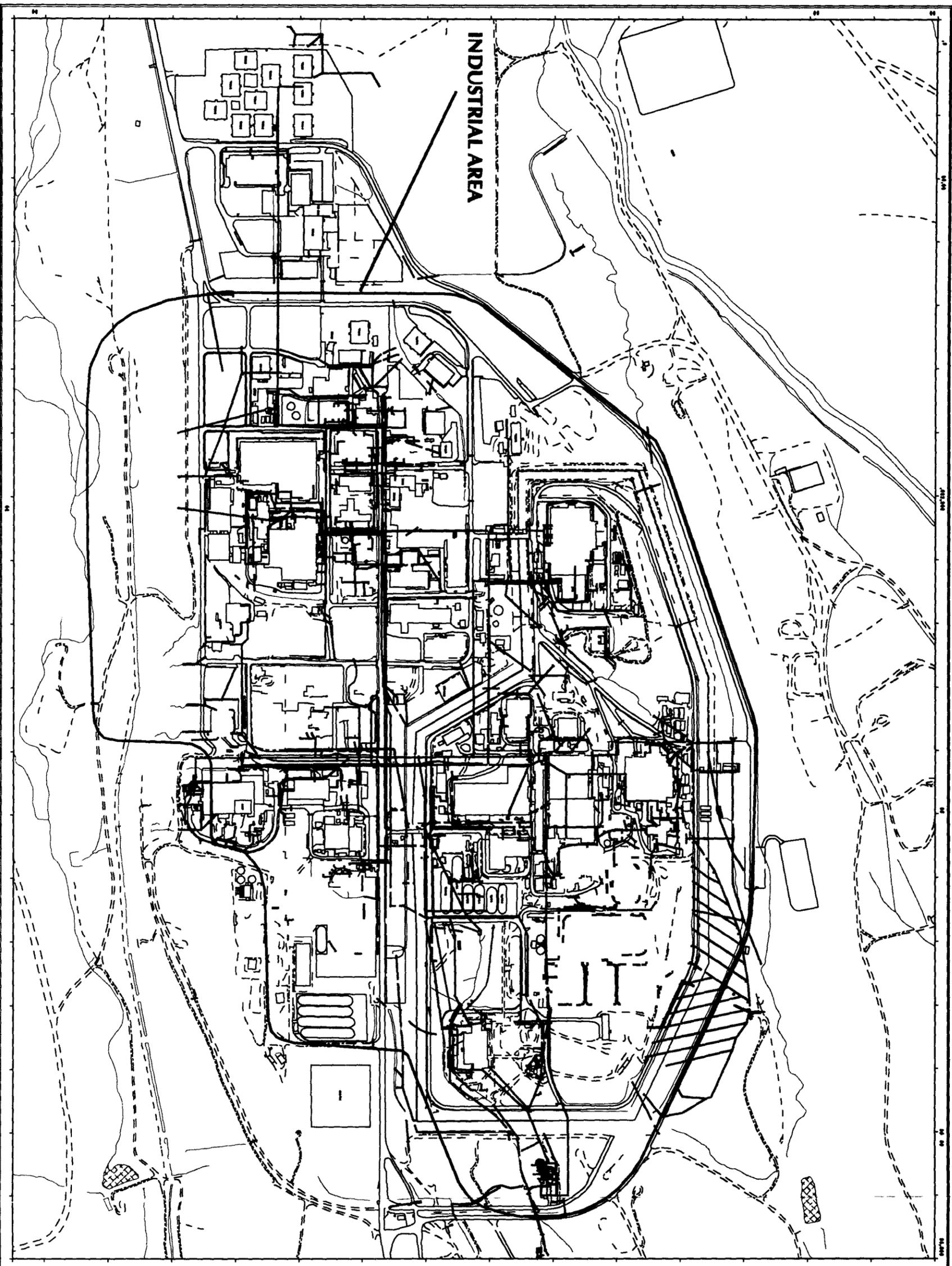
Planning Process



Field Process







**Figure 17**  
**New Process Waste Lines,  
 Sanitary Sewer System and  
 Storm Drains**

- HAZ Groupings**
- N New Process Waste Lines 000-4
- N Storm Drains 000-
- N Sanitary Sewer System 000-3
- N PAC, HHS, USBC sites, or Tank

- Other Map Features**
- Buildings and other structures
- ▨ Solid Emulsion Ponds (SEP)
- ▧ Lagoon ponds
- ▧ Streams, ditches, or other drainage features
- ▧ Fences and other barriers
- Paved roads
- - - Dirt roads
- N Industrial Area Openable Unit Boundary

The Rocky Flats Environmental Technology Site is a former nuclear weapons production facility. The site is located in the northern part of the Denver metropolitan area, approximately 65 miles northwest of Denver, Colorado. The site is currently being used for the production of medical isotopes. The site is owned and operated by Lockheed Martin Energy Research Corporation (LM-ERCO). The site is subject to various federal, state, and local laws and regulations. The site is also subject to ongoing environmental monitoring and remediation activities. For more information, please contact the site manager at (303) 440-1000.

Scale 1" = 7730 feet  
 1 inch represents perimeter of 643 feet

State Plane Coordinate Projection  
 Colorado Central Zone  
 Datum NAD27

U S Department of Energy  
 Rocky Flats Environmental Technology Site

Prepared by: [Logo]  
 Prepared by: [Logo]  
 18 Date: 808-808-7707  
 R 1111  
 April 08, 2008

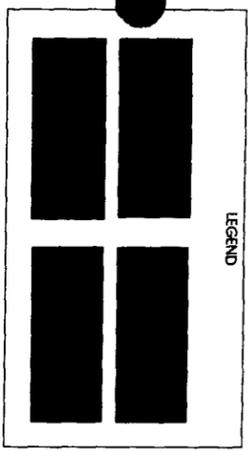
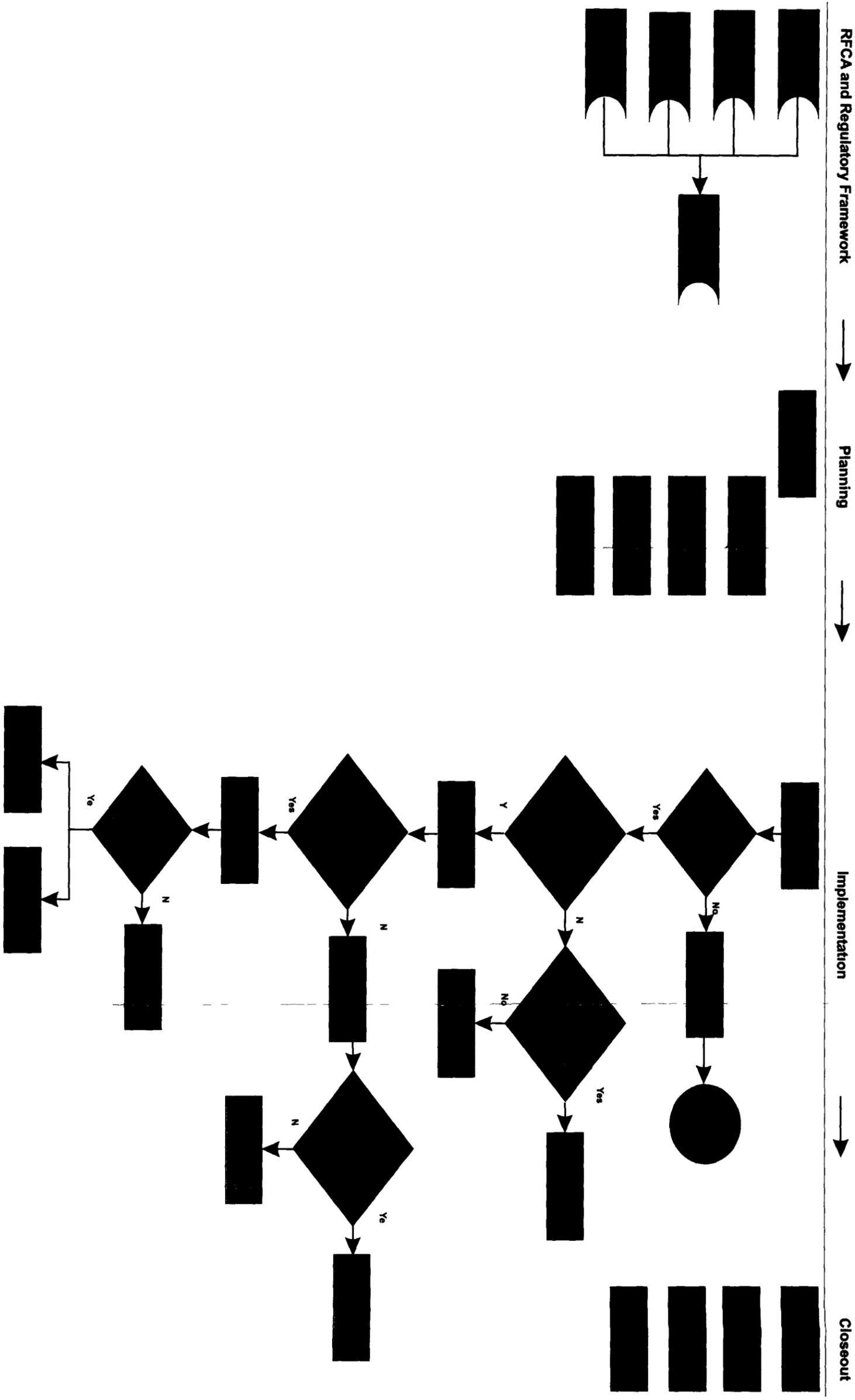
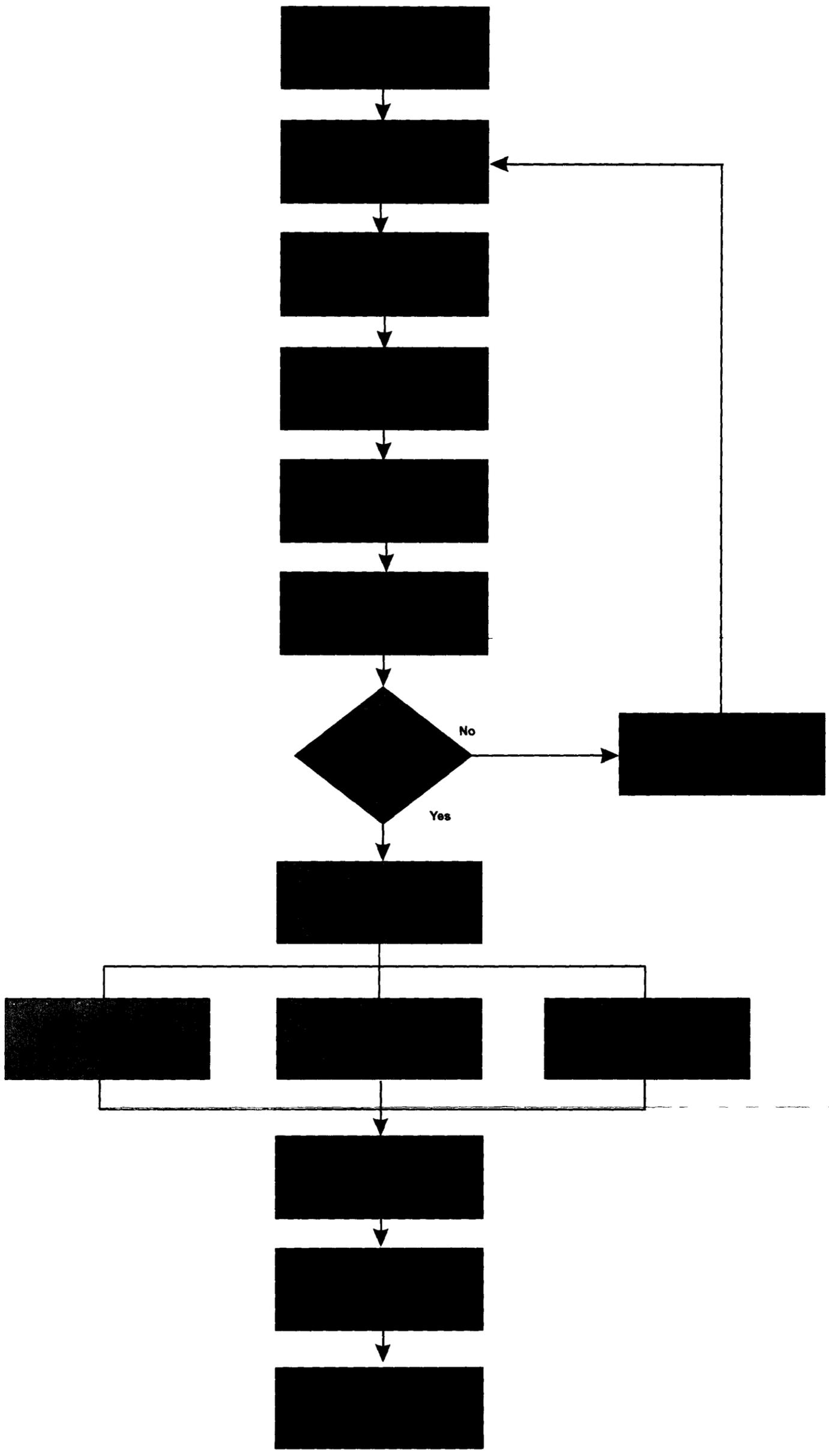
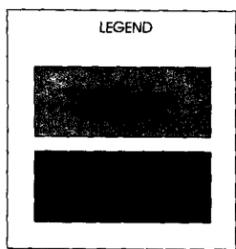


Figure 12  
Accelerated Action Summary

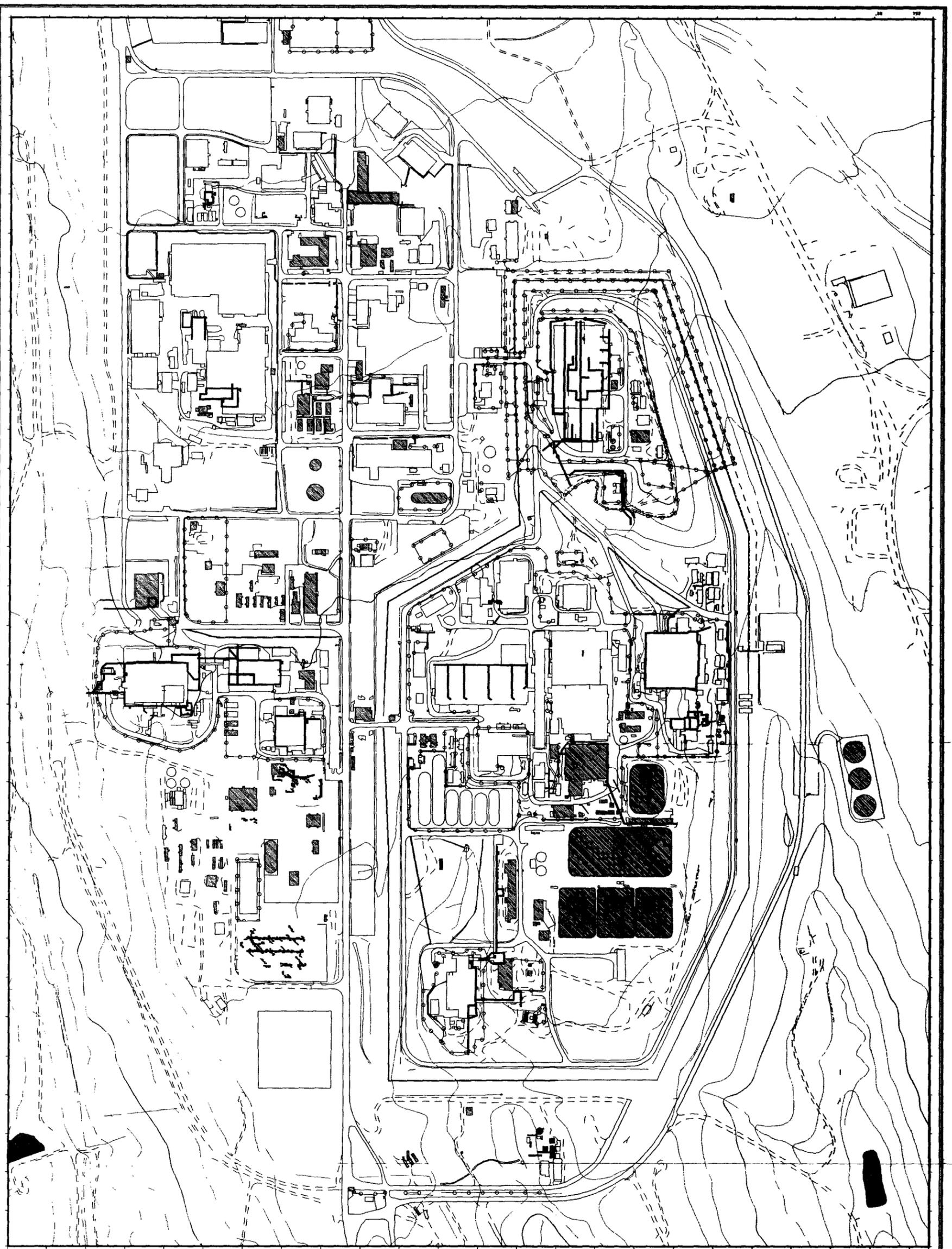


96

**Figure 14**  
**Detailed Accelerated Action Process**







**Figure 19**  
Foundation Drains

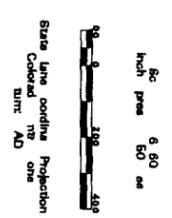
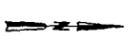
**EXPLANATION**

- Foundation Drain
- Standard Map Features**
- Underground structures
- Buildings and other structures
- ▨ Demolished buildings and Other Structures
- ▩ Sol r Evapor tion Pond (SEPs)
- Lakes and ponds
- Str ans dir hes or other drainage features
- Fences and ther barriers
- Topographic Contour (20 Foot)
- Paved r ad
- Dirt road

**DA SOURCE MAP FEATURES**  
All Features: Contours and other features were generated by the NAD83 coordinate system.  
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ESRI  
9300 North  
174th Street  
Redlands, CA 92353  
714.770.0000

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**NOTES**  
1. All features are shown in black.  
2. All features are shown in black.  
3. All features are shown in black.

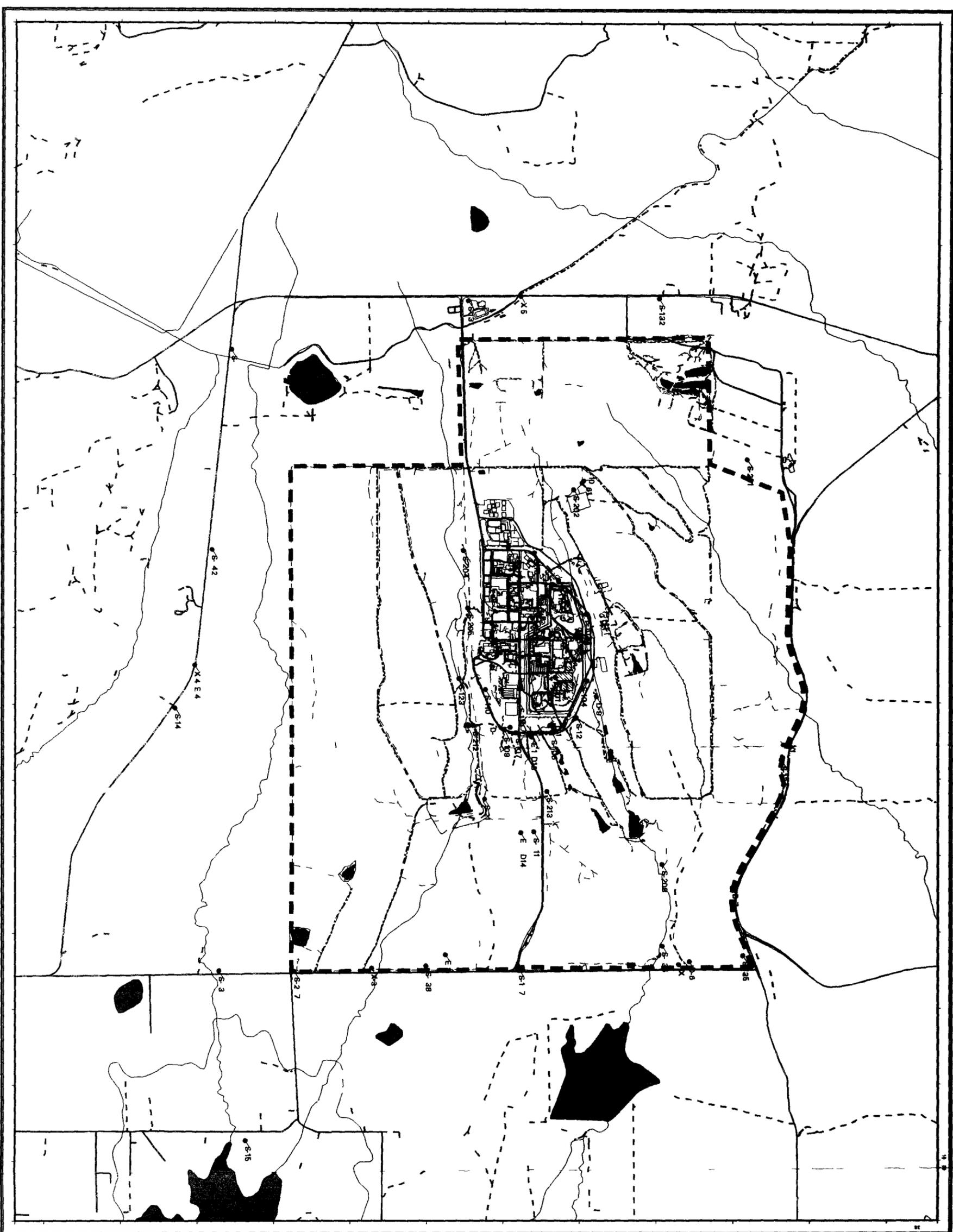


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Project: CH2M HILL  
Project: KAISER HILL  
Date: 8/28/03  
Apr. 2003

Figure 22

Rocky Flats Environmental  
Technology Site  
Air Sampling Location Map



LEGEND

● Air monitoring station

Standard Map Features

□ Building footprints

▨ Soil Exposure Potential (SEP)

■ Lake

— Paved

— Rocky Flats Environmental Technology Site boundary

— Heavy duty paved road

— Medium duty paved road

— Light duty paved road

— Dirt road

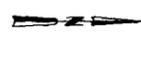
— Stream

— Ditch

— Fencing

NOTE: SOURCE: Aerial photographs, 1985. Buildings, roads, and other features are shown in black. The site boundary is shown in a dashed line. The map is based on the 1985 aerial photographs.

DATE: 1985. PREPARED BY: Environmental Sciences Division, Health, Safety, and Environment Department, Rocky Flats Environmental Technology Site. SCALE: 1 inch = 3,280 feet. COORDINATE SYSTEM: NAD 83. PROJECTION: UTM. DATUM: NAD 83. ELEVATION: Mean Sea Level. UNITS: Feet. SHEET: 1 of 1. TOTAL SHEETS: 1. DRAWING NUMBER: ESD/ES&E/85-01. REVISIONS: None. APPROVED BY: [Signature].



Scale: 1 inch = 3,280 feet

Scale: 1 inch = 3,280 feet

Scale: 1 inch = 3,280 feet

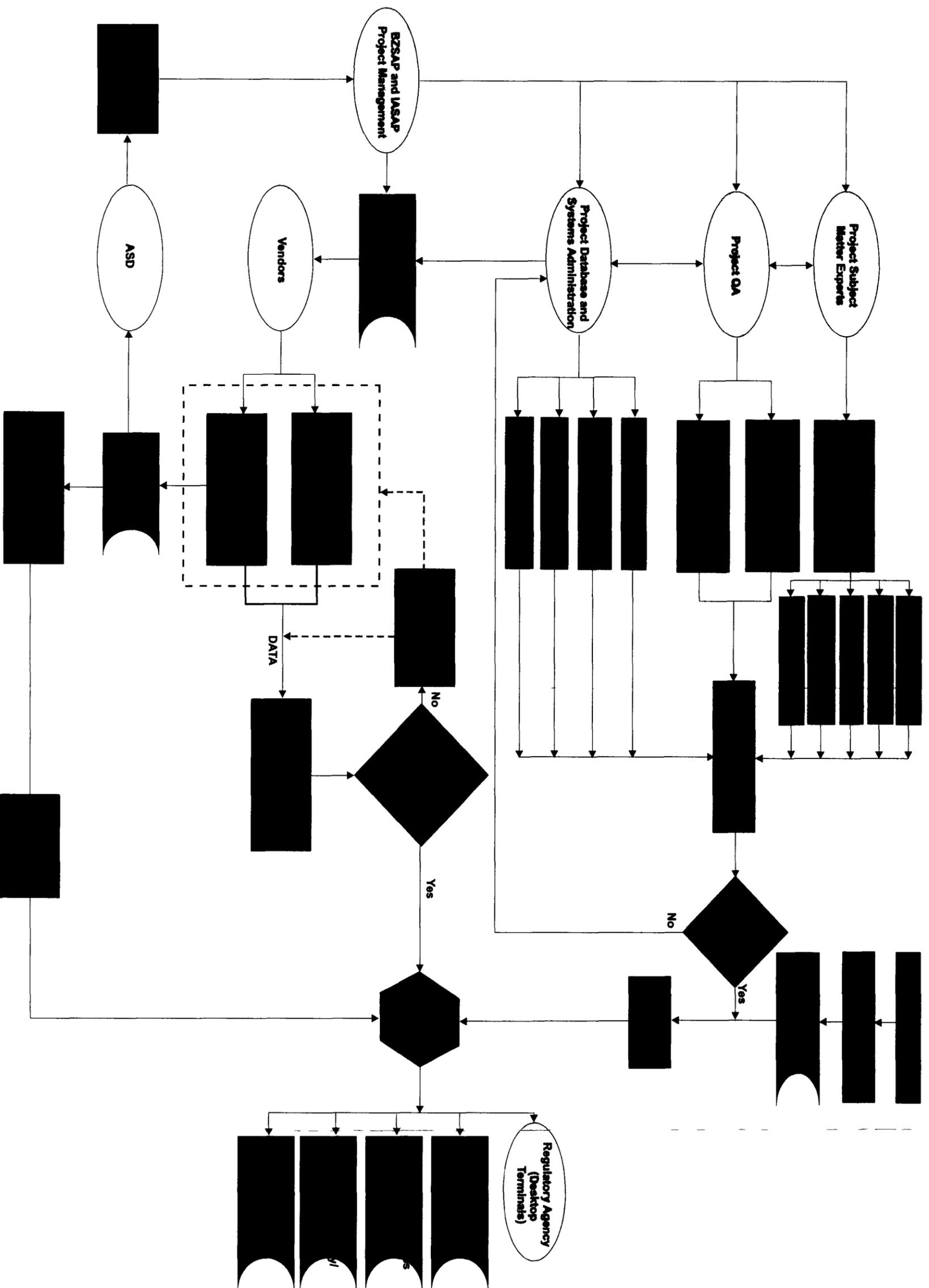
U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by: [Name]

CH2MHILL  
Kaiser Hill

April 08, 2003

Figure 23  
Remedial Action Decision Management System Configuration





# Figure 4

## Buffer Zone IHSS & PACs

### EXPLANATION

-  Buffer Zone OU IHSS
-  Operable Unit 5 IHSS
-  Operable Unit 6 IHSS
-  Operable Unit 7 IHSS
-  Operable Unit 11 IHSS
-  Operable Unit 16 IHSS

-  Potential Areas of Concern
-  HRR Zone Boundary
-  Industrial Area Boundary

### Other Map Features

-  Buildings and other structures
-  Demolished buildings and Other Structures
-  Lakes and ponds
-  Streams, ditches, or other drainage features
-  Paved roads
-  Dirt roads

### NOTES:

**DATA SOURCE BASE FEATURES:**  
Buildings, fences, hydrography, roads and other structures from 1995 aerial fly-over data. Digitized from the orthophotographs, 1995.

Scale = 1 : 7840  
1 inch represents approximately 653 feet



State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD27

U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by: GIS Dept. 303-966-7707

Prepared for:



April 24, 2003



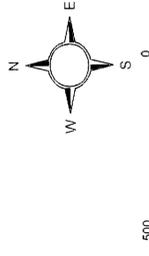


**Figure 18**  
**Known and Suspected**  
**OPWL Leak and**  
**Sampling Locations**

**KEY**

- Sample Locations of Suspected Leaks Outside 700 Area
- Sample Locations of Suspected Leaks in 700 Area
- Reported OPWL Leaks
- Previously Collected Samples at UBCs
- Vaults and Manholes
- Pipes Below 6 feet in 700 Area
- === Removed Pipes
- Existing Pipe Above 3 feet
- Dirt Road
- Paved Road
- OPWL Tanks
- OPWL
- UBC
- Building/Structure
- IHSS

Disclaimer: Assume all locations and features are approximate. Locations and features are estimated and need further evaluation.



Scale 1: 3,000

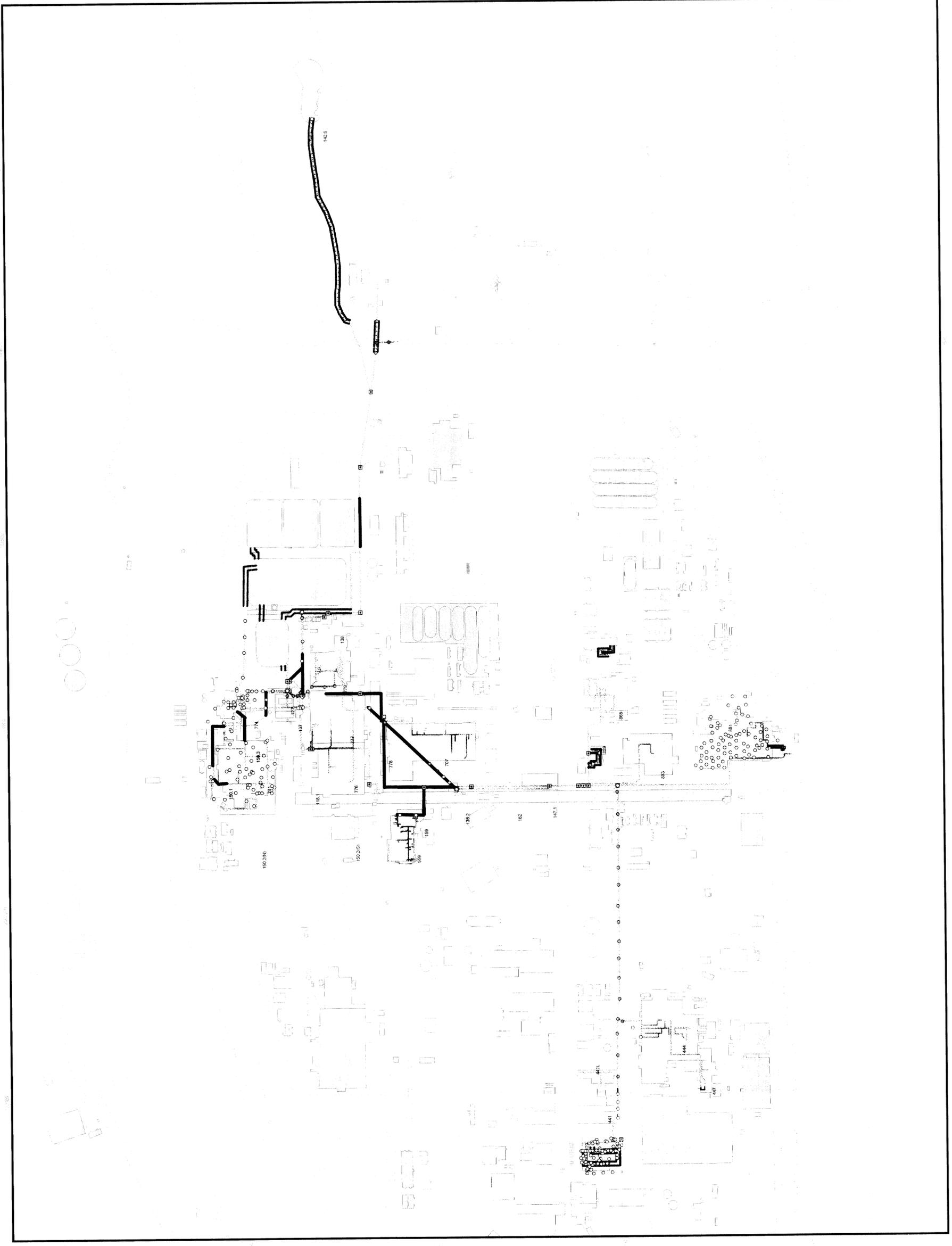
State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD 27

U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by:

**RADMS**

Prepared for:





# Figure 11 Groundwater Monitoring Locations

- IMP Well Type**
- Water Quality/Flow Monitoring
  - Industrial Area Flow Monitoring
  - Background Flow Monitoring
  - △ 2000 Wells (color denotes IMP well type)

- Standard Map Features**
- Buildings
  - Lakes and ponds
  - Streams, ditches, or other drainage features
  - Fences and other barriers
  - Contours (20' Intervals)
  - Roads
  - Rocky Flats Boundary

**DATA SOURCE BASE FEATURES:**  
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data  
Contours from 1994 aerial fly-over data  
Roads from 1994 aerial fly-over data  
Digitized from the orthophotographs, 1995



Scale = 1 : 7200  
1 inch represents 600 feet

State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD27

U.S. Department of Energy  
Rocky Flats Environmental Technology Site  
GIS Dept. 303-966-7707

Prepared by:

