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REMEDIAL ACTION CONCEPT PAPER

FOR THE

URANIUM MILL TAILINGS

AT

THE VITRO SITE

SALT LAKE CITY, UTAH

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1. INTRODUCTION

In November 1978, Congress enacted Public Law 95-604, the "Uranium Mill Tailings Radiation Control Act of 1978" (UMTRCA). The Act authorizes the Department of Energy (DOE) to enter into cooperative agreements with the affected states and Indian tribes in order to establish assessment and remedial action programs at inactive uranium mill tailings sites. The Act stipulates that the DOE will meet the applicable radiation standards promulgated by the Environmental Protection Agency (EPA). It further states that the Nuclear Regulatory Commission (NRC) is to concur in all major decisions and to license the maintenance and monitoring of final disposal sites. The DOE is to provide 90 percent of the remedial action costs, with the affected states to pay the remaining costs. For those sites on Indian tribal lands, 100 percent of the remedial action costs will be borne by the Federal government.

Twenty-four sites including the Vitro site near Salt Lake City, Utah, have been designated as eligible for remedial action. A cooperative agreement establishing the guidelines, responsibilities, and conditions for remedial actions at the Vitro site was signed by Utah and the DOE, concurred in by the NRC, and became effective on January 30, 1981.

The remedial actions for the Vitro site will be managed by the DOE through the Uranium Mill Tailings Remedial Actions (UMTRA) Project Office, Albuquerque, New Mexico, in consultation with the State of Utah Department of Health and with concurrence by the NRC in major decisions.

The purpose of this Remedial Action Concept Paper (RACP) is to provide a written description of the conceptual framework within which the specific course of remedial action to be followed at the Vitro site will ultimately be decided. The conceptual framework set forth in the RACP includes an identification of the reasonable alternatives, a discussion of the significant factors affecting the remedial action decision, and a description of the feasible remedial action concepts.

The RACP does <u>not</u> represent decisions or commitments concerning specific actions. Such actions can be decided only after sufficient information has been obtained and analyzed, the requirements of the National Environmental Policy Act (NEPA) have been met, and definitive plans have been prepared. However, since the RACP does define the boundaries around an ultimate remedial action decision, it serves as a scoping document that provides a conceptual basis for the preparation of environmental documentation required by NEPA.

This RACP has been prepared by the DOE UMTRA Project Office and has been coordinated with the Department of Health of the State of Utah and the U.S. Nuclear Regulatory Commission. A final remedial action plan will be prepared after the NEPA process is completed, but will not be implemented until it has been concurred in by the State of Utah and the NRC.

2. SITE DESCRIPTION

The Vitro site is a 128-acre tract located about 4 miles southwest of downtown Salt Lake City, Utah, in the district known as South Salt Lake. The layout of the property and the area designated for remedial action are shown in Figure 1. Approximately 1.9 million dry tons of uranium mill tailings and more than 1 million tons of other contaminated materials are accumulated on the site. The Central Valley Water Reclamation Facility (CVWRF) Board presently owns the entire 128-acre tract and operates a sewage treatment plant on its northern boundary. The CVWRF Board plans to expand the capacity of the sewage treatment plant to 100 mgd by the year 2000; this expansion would require use of some of the lands that are now covered by tailings.

A plant for the production of alumina occupied the site during World War II. The plant was acquired in 1951 by the Vitro Chemical Company and subsequently modified to permit the processing of uranium ores. Vitro Chemical Company processed uranium ore at the site from 1951 to 1964; about 4,787 tons of concentrated "yellowcake" (U_3O_8) were produced and sold to the Federal government during this period. In 1965, the plant was converted to the extraction of vanadium from a byproduct of phosphorus production. Vanadium-extraction operations continued from 1965 to July 1968, when the plant was shut down. The removal of plant structures was substantially completed in 1970 except for a smokestack and water tower. The smokestack was demolished in 1980.

In addition to the actions at the inactive processing site, remedial actions will also be performed on vicinity properties, which are properties in the local area that have been contaminated with residues and other materials taken from the Vitro site. As many as 100 vicinity properties in the Salt Lake Valley may be included on the DOE list of contaminated properties when surveys are completed. About 260,000 cubic yards of tailings and contaminated soils have been estimated to exist at the 100 contaminated properties; this material will be removed from vicinity properties and disposed of with the on-site tailings.

3. REMEDIAL ACTION OBJECTIVES

The mission of the UMTRA Project at Salt Lake City is to carry out a cleanup program according to EPA standards for the disposal of tailings and for the cleanup of open lands and structures. The interim and proposed standards are summarized and discussed in Section 4. Final standards are expected to be issued by January 1983. The objective of the Project is to combine at one location the radioactive materials from the site and the vicinity properties. The final disposal site will be owned by the Federal government and licensed by the NRC. By combining and stabilizing all tailings and contaminated materials at one disposal site, potential health effects caused by exposure to the tailings will be minimized, and all other presently contaminated areas will be cleaned up sufficiently to be released for unrestricted use.

4. STANDARDS, LICENSING, AND EVALUATION CRITERIA

4.1 EPA Standards

Under Public Law 95-604, no remedial action may begin until final cleanup standards have been promulgated. The final standards have not yet been issued. However, in order to permit remedial action to begin at contaminated vicinity properties, the EPA has issued interim standards (45 FR 27366-27368, April 22, 1980) for open lands and structures in which elevated radiation levels occur because of the presence of residual radioactive materials from a designated inactive processing site. The numerical criteria are outlined in Table 1.

TABLE 1

EPA Interim Standards for Remedial Action Cleanup
of Open Lands and Structur

Type of radiation	Remedial action (RA) standard
External gamma radiation (EGR) in dwellings	RA required if EGR greater than 0.02 mR/hr above background
Radon daughter concentration (RDC) in dwellings	RA required if RDC greater than 0.015 WL including background (annual average)
Ra-226 concentration on open lands	RA required if Ra-226 concentration greater than 5 pCi/gm above background

Legend

mR/hr = milliroentgen per hour
WL = working level, or RDC per liter of air that results in eventual emission of 1.3×10^5 MeV of alpha energy
pCi/gm = picocuries per gram

The EPA has also proposed standards governing disposal of residual radioactive materials from inactive uranium processing sites (46 FR 2556-2563, January 9, 1981). These standards (Table 2) place limits on the amounts of certain elements and substances that may be released from the final disposal site. In addition, the disposal of the radioactive material must be done in such a manner that there is a reasonable expectation that the limits in the proposed standards will be maintained for at least 1000 years. The standards impose the following limits:

1. The average annual release of radon-222 from the surface of the site is limited to values less than or equal to 2 picocuries/meter^2-second plus the radon emissions expected from the materials covering the tailings.

2. Concentrations of the elements listed in Table 2 in sources of underground drinking water are limited. Material released from a disposal site is neither to cause the concentrations of the specified elements in underground drinking water to exceed the levels in Table 2 nor to result in any increase in their concentrations if those levels are exceeded before the remedial actions are undertaken. These limitations apply to underground drinking water beyond 1.0 kilometer from a disposal site that was an inactive processing site, and beyond 0.1 kilometer from a new disposal site.

3. Materials released from disposal sites should not cause an increase in the concentration of any toxic substance in any surface waters. In general, "surface waters" mean any body of water on the earth's surface that the public may traverse or enter, or from which food may be taken.

4.2 NRC Licensing

The NRC has not issued and does not intend to issue regulations that apply to the cleanup and disposal of residual radioactive materials at the UMTRCA Title I inactive uranium processing sites. In conformance with UMTRCA, NRC concurrence in proposed remedial actions and determinations as to the licenseability of disposal sites for such materials will be to assure compliance with the final EPA Standards discussed in Section 4.1. On October 3, 1980, however, the NRC did issue regulations governing disposal of tailings from active uranium milling operations. These regulations (45 FR 65533-65536) are not applicable to UMTRAP remedial actions, but do contain technical criteria, primarily in the form of performance objectives, for disposal of uranium mill tailings. Though they will not be applied by the NRC to the inactive sites, the following is a summary of the NRC technical criteria that are most relevant to considerations of remedial action alternatives for an UMTRCA Title I inactive site.

TABLE 2

EPA Proposed Standards for Tailings Disposal

ELEMENT CONCENTRATION IN SOURCES OF UNDERGROUND DRINKING WATER		
Element	Maximum Permissible Concentration in Groundwater	
Arsenic	0.05	milligram/liter
Barium	1.0	milligram/liter
Cadmium	0.01	milligram/liter
Chromium	0.05	milligram/liter
Lead	0.05	milligram/liter
Mercury	0.002	milligram/liter
Molybdenum	0.05	milligram/liter
Nitrate nitrogen	10.0	milligram/liter
Selenium	0.01	milligram/liter
Silver	0.05	milligram/liter
Combined radium-226 and radium-228	5.0	pCi/liter
Gross alpha particle activity including radium-226 (but excluding radon and uranium)	15.0	pCi/liter
Uranium	10.0	pCi/liter
RADON FLUX LIMIT FROM DISPOSAL SITE		
Maximum permissible radon flux emitted from residual radioactive materials at the disposal site	2	pCi/m^2-second (annual average)

Legend

pCi = picocuries
m^2 = $(meter)^2$

1. The disposal site should be as remote from populated areas as possible.

2. Proliferation of small disposal sites should be avoided.

3. Hydrogeologic and related environmental conditions at a site should favor the isolation of contaminants from humans and the environment for thousands of years; there should be no need to rely on ongoing, active maintenance to achieve isolation.

4. The prime option for tailings disposal is placement below grade.

5. Methods such as liners or dewatering should be employed where necessary to reduce the seepage of toxic materials into ground waters.

6. Sufficient earth cover, but not less than 3 meters, should be placed over the tailings or radioactive residues to reduce the calculated radon-222 exhalation from the tailings or wastes to not more than 2 picocuries/meter^2-second.

7. A full self-sustaining vegetative cover or a rock cover should be established on the earth cover to reduce the potential for significant wind and water erosion of the earth cover. A rock cover is mandatory in arid and semi-arid regions where is it unlikely that vegetation will be fully self-sustaining.

4.3 Factors Affecting Evaluation

Many factors must be considered in the evaluation process used for determining the preferred option, most of which directly relate to meeting the requirements of the EPA standards. Generally, these factors may be classified in four principal groups, although some factors appear in more than one group. The evaluation of the effects of these factors is a major element in the analytic process included in the environmental impact statement (EIS) currently planned to evaluate the remedial action alternatives for the Vitro site. The use of the evaluation factors at this early stage contributes to a more rational choice of the option that seems to be the most feasible.

The four groups of factors that will be used to evaluate each option are the following:

1. Physical and technical factors. This group of factors concerns the ability of the potential disposal site to resist natural processes that might disturb the tailings after the remedial actions are completed. The factors in this group evaluate the vulnerability of the site to natural phenomena (seismic disturbance, floods, land or rock slides, avalanches, extreme erosion, mine subsidence, etc.). Among the factors are the characteristics of the hydraulic system in the area that includes the disposal site, e.g., depth of ground-water table, proximity to aquifers and streams, ground-water flow rates, quality of ground water, and potential for flowing artesian wells; the chemical and physical characteristics of the

surrounding soils and rocks; the type and condition of underlying strata and bedrock; the climate at the site; and the topography of the area.

2. Environmental factors. In this group the factors involve such things as the potential health effects from the transport and disposal of the tailings; the noise generated by the remedial actions; the short- and long-term effects on flora and fauna in the area; and the effects on underground sources of drinking water.

3. Economic factors. These factors relate to the economics of the decontamination, transportation, and stabilization. They include cost for site acquisition, rights-of-way, construction, transportation, impoundment system, cover materials, etc.

4. Social factors. These factors include the present and forecasted population density surrounding the potential disposal site; the potential use of the site for other activities (mineral recovery, agriculture, industrial development, wildlife refuge, transportation corridor, etc.); and the effects on the social and economic well being of the affected population.

5. REMEDIAL ACTION OPTIONS

The basic strategies considered for carrying out remedial actions at the Vitro site are to take no action, to stabilize the tailings at their present location, and to transport the tailings to a new disposal site and decontaminate the former processing site. The last two options can be further broken down into disposal with or without reprocessing. A discussion of each option follows.

Option 1: No action

This option consists of performing no remedial action, i.e., allowing the present situation to continue with no corrective action.

Option 2: Stabilization of all material at the Vitro site

In this option, all tailings and contaminated materials would be stabilized above grade on a 69-acre portion of the Vitro site. The 69-acre portion is shown on Figure 2; it consists of about 63.6 acres of the designated site and an approximately 5.4-acre strip of vicinity properties located adjacent to the southwest corner of the 128-acre tract. The location and acreage of the disposal site, which may be modified following preparation of the final design, is based on minimizing the impact on Central Valley's expansion plans. Before stabilization of wastes could begin, the 5.4-acre strip and the required 63.6 acres of the site would be acquired by the State of Utah and permission to clean up the remainder of the 128-acre tract would be obtained from the CVWRF Board. The materials obtained in the cleanup of vicinity properties would be deposited on the Vitro site, to be later stabilized with the onsite materials.

Construction work at the site would begin by the rerouting of all sewer lines, ditches, and access roads that pass through the 69-acre portion of the site on which the wastes are to permanently reside. If it is determined that

a clay liner is needed to isolate the tailings from further contact with ground water, work towards emplacement of such a liner could proceed in the following manner: the tailings covering the 69-acre portion could be temporarily removed in strips, starting at the eastern side and working towards the western side; a layer of gravel and a layer of imported clay would then be placed in the bottom of each excavated strip before it is re-covered with the tailings excavated from the next strip. This process would minimize the need for double handling of materials.

In order to accommodate Central Valley's expansion plans, decontamination of the remaining 64.4 acres of the Vitro site, which are not used as part of the final disposal site, would be undertaken in a sequence that would be agreed upon by CVWRF, the State, and the DOE. All tailings, rubble, contaminated sewage sludge, and contaminated soils on the remainder of the site would be excavated and moved onto the 69-acre portion where they would be evenly deposited. The sludge ponds on the northwest segment of the Vitro site and any other sludge ponds would have to be drained before the materials in them could be excavated and moved. Imported natural soils would be used as backfill in all areas of the Vitro site where it is necessary to remove contaminated soils. Thus, the remaining 64.4 acres of the site would be restored to local grade, which is about 4235 feet above mean see level, and would be released for unrestricted use.

Following the consolidation of all contaminated materials on the 69-acre portion, the resulting irregular pile would be contoured and shaped such that its sideslopes would be no steeper than 5 horizontal to 1 vertical. A cover of natural soil would then be placed over the contoured pile to reduce the radon emissions to levels required by final EPA standards. With 6 feet of soil cover, the pile would stand 20 to 25 feet above local grade level, depending on whether a liner is emplaced underneath the tailings; the top of the pile would be a level, 49-acre area. If necessary, a layer of natural stones could be placed on the slopes of the mound to protect it against wind and water erosion. Vegetation of a local species type would probably be planted on top of the pile, and thus it would basically look like a grassy knoll.

When the stabilization procedures are completed, the 69-acre portion would become the property of the Federal Government; the DOE would apply to the NRC for a license to operate a uranium mill tailings disposal site which would necessarily remain under controlled access. However, the remaining 64.4 acres of the Vitro site, having been decontaminated, would be available to the CVWRF to expand its sewage facility to 100-mgd. Those vicinity properties from which tailings are removed would also be available for any use allowed by local zoning ordinances. Depending upon NRC's licensing requirements, it might be necessary to install monitoring devices (water-sampling wells, air-sampling apparatus) and to erect a fence around the boundaries of the 69-acre site.

It would take slightly less than 3 years to complete remedial actions using this option. Costs would range from 18 to 30 million dollars (including engineering and surveillance activities), depending on whether or not a liner is incorporated in the design.

Option 3: Decontamination of the Vitro site and transfer of all contaminated material to a new disposal site

In this option, the entire Vitro site would be decontaminated and reclaimed. All tailings and contaminated materials, including those materials obtained in the cleanup of vicinity properties, would be transported to and stabilized at a new disposal site that is different from the Vitro site. Three steps are required in this option: the selection of a new disposal site; the decontamination of the Vitro site and shipment of wastes to the new site; and disposal of the wastes in an engineered structure at the new site. The concepts behind these three steps are discussed below.

Potential disposal sites for the Vitro tailings

In 1980, the State of Utah nominated three parcels of land for consideration as alternate disposal areas for contaminated material at the Vitro site. A prime area and two alternate areas were nominated (see Figure 3):

A. The Prime Area is the so-called great depression located approximately 8 miles north of Clive in Tooele County, Utah. This area consists of three sections of federal lands: Sections 8, 17, and 20 of T1N, R11W.

B. The First Alternate Area is a section of state land located approximately 1 mile south of Clive in Tooele County, Utah: Section 32 of T1S, R11W.

C. The Second Alternate Area is a section of state land located approximately 3 miles west of Delle in Tooele County, Utah: Section 2 of T1S, R9W.

The State of Utah nominated the above three areas on the basis of their isolation and favorable geological and hydrological characteristics after conducting a search for environmentally acceptable areas for tailings disposal outside of the Salt Lake Valley. The nominations were endorsed by the governor of Utah on January 6, 1982; the governor's endorsement recommended consideration of the Prime Area and, as an alternate, the First Alternate Area. In April 1981, the three areas were studied by the DOE. The results of this study showed that the First Alternate Area was the preferred one in terms of characteristics that favor safe, long-term disposal with a minimum of environmental disturbance. The following table summarizes DOE's relative rankings of the three disposal areas according to seven environmental and engineering disciplines. A score of 1 indicates "most favorable," while a score of 3 indicates "least favorable."

Discipline	Prime Area	1st Alternate Area	2nd Alternate Area
Vegetation	1	2	3
Wildlife	2	1	3
Soils & Reclamation	3	2	1
Hydrology & Water Quality	2	1	3
Meteorology & Air Quality	2	1	3
Human Resources	3	1	2
Geotechnical Engineering	3	1	2
Composite Score	16	9	17

The First Alternate Area has the lowest composite score and is accordingly superior. Though the First Alternate Area is about 24 miles farther from the Vitro site than the Second Alternate Area, access to it is more direct than access to the other two areas because there would be no need to cross Interstate Highway 80 when moving the tailings from railroad offloading points. Accordingly, the disposal concepts are described below under the assumption that the First Alternate Area will contain the preferred disposal site. These disposal concepts would not be radically different if either the Prime Area or the Second Alternate Area contained the preferred disposal site. The major differences would lie in the requirements for transporting materials to the latter two areas from the nearest railroad offloading points.

Decontamination of the Vitro site

Before decontamination could begin, permission to clean up the 128-acre millsite would be obtained, and an approximately 110-acre site in the preferred disposal area would be withdrawn from public or state lands. The materials obtained in the cleanup of vicinity properties would be temporarily deposited at the Vitro site, to be later removed with the materials already on the site.

In the first step of decontamination, the tailings and other above-grade contaminated materials would be loaded into railroad cars for transport to the new disposal site. As the above-grade materials are removed, contaminated soil below the site would be exposed and would be excavated; these contaminated soils would also be transported by rail to the new disposal site. Excavations would be backfilled with natural soil, and the site would be leveled to grade. This would complete decontamination and restoration of the site, which could be returned to the CVWRF Board for unrestricted use. The second and final step of decontamination would consist of disposal of the wastes at the new site in the manner to be described below.

Assuming that 5,000 tons of material could be removed from the Vitro site in each working day, it would take slightly less than 3 years to completely

decontaminate the site and ship the contaminated material to the preferred disposal area. Preparation of the new disposal site could proceed in parallel with most of the decontamination operations.

Concepts of disposal in the First Alternate Area

As previously mentioned, the State of Utah would initially withdraw a 110-acre portion of the First Alternate Area from public use. Rights-of-way for a rail spur, 3 miles in length and running from the main railroad line at Clive to the 110-acre portion, would also be obtained. Once these actions are completed, operations at the new disposal site could begin. The rail spur would be constructed, and preparation of disposal pits to receive the wastes shipped from the Vitro site could begin.

The disposal of the wastes would be partially below-grade, in a series of trenches about 220 feet wide by 20 feet deep; the native soil excavated from these trenches would be stockpiled and used as cover later in the operations. About 11 such trenches, ranging in length from 1,000 to 2,000 feet, would be needed to contain the tailings and contaminated materials obtained in the decontamination of the Vitro site. Spacing of the trenches would be such that the buried material would cover about 110 acres.

The disposal trenches described above would be prepared and filled as the wastes are shipped from the Vitro site at an assumed rate of 5,000 tons per working day. As previously mentioned, shipment would be by railroad using dedicated trains. The rail distance from the Vitro site to a disposal site in the First Alternate Area is about 80 miles.

As the materials are shipped to the disposal site, final stabilization would proceed by the emplacement of a cover over the filled trenches. The stockpiled native soil would be spread continuously over the 110-acre buried material with a thickness that would reduce radon flux to levels prescribed by final EPA standards. The resulting pile would be leveled and contoured; if necessary, a layer of stones or rubble would be placed on the slopes of the cover to protect them against wind and water erosion. Depending upon NRC's licensing requirements, it might be necessary at this point to install monitoring devices (water-sampling wells, air-sampling apparatus) at the boundaries of the site, and to erect a fence around the site.

On completion of the stabilization operations, the DOE would assume custody of the 110-acre property, and would apply to the NRC for a license to operate a uranium mill tailings disposal site. Access to the property would be restricted.

The time required to complete remedial actions using this option would be more than 3 years. Costs would be on the order of 80 million dollars, including engineering and surveillance costs.

Option 4: Reprocessing of Vitro tailings prior to final disposal

In these options, the higher-grade tailings at the Vitro site would first be treated to recover residual ores of economic value and then placed in an

engineered structure for long-term disposal. A heap-leach or pit-leach operation at the final disposal site is the most economical method of reprocessing mill tailings to recover uranium. Thus, at least three basic options involving reprocessing are possible.

Suboption 4A: Onsite reprocessing of the Vitro tailings followed by onsite stabilization as described in Option 2.

Suboption 4B: Decontamination of the Vitro site and transfer of the wastes to the new disposal site mentioned in Option 3, followed by reprocessing and stabilization of tailings at the new site.

Suboption 4C: Essentially the same as Suboption 4B, except that reprocessing and stabilization would take place at an as-yet-undesignated location.

6. EVALUATION OF THE OPTIONS

The evaluation of the remedial action options for the Vitro tailings described in Section 5 is provided in this section. It should be emphasized that the assessments of each option are preliminary and based on information available at a particular point in time. More detailed analyses must be conducted and reported in the environmental impact statement before a final decision on the best option can be made. The purpose of the evaluation that follows is to structure a conceptual framework for the Salt Lake City remedial action by identifying options that do not appear to be qualified for implementation and by identifying the option or options that seem to be most feasible among those that do appear to be qualified.

Option 1: No action

This option involves no remedial actions. Since radon emanation rates, radon daughter concentrations, and external gamma radiation at the Vitro site exceed the proposed EPA standards, this option is not consistent with Public Law 95-604, which requires remedial action at the Vitro site to be in accordance with EPA standards. This option is therefore not feasible.

Option 2: Stabilization of all material at the Vitro site

This option involves using a part of the Vitro site as the long-term disposal site for all tailings and contaminated material now at the site, and for the contaminated material obtained in the cleanup of vicinity properties. A study to determine whether or not stabilization in place at the Vitro site is technically feasible will be completed in the summer of 1982. Preliminary results of this study indicate that stabilization in place is certainly possible from an engineering point of view, and that a disposal site at the Vitro site can be made to meet the EPA's standards through proper design of the emplacement system.

With respect to the factors affecting evaluation of these options (Section 4.3), stabilization of all material at the Vitro site is favored by economics and certain environmental factors. The dollar costs of this option are among the lowest of all options, because there would be no need to transport more than 3 million tons of material to a new disposal site.

Elimination of the transportation requirement would also reduce accidents and potentials for health effects incurred by workers and the public during the remedial actions.

Stabilization of all material at the Vitro site is discouraged mainly by two special factors: (1) population density near the site; and (2) planned use of the 128-acre tract for expansion of sewage treatment facilities. The population within 0.5 miles of the site was 5,200 persons in 1975, and is predicted to be 14,000 persons by 1995. Furthermore, use of a portion of the Vitro site as a licensed mill tailings disposal site would constrain options for expanding sewage-treatment services offered by the CVWRF after the year 2000; the conceptual design presented for this remedial action option would not, however, seriously interfere with the planned upgrading of capacity to 100 mgd by the year 2000.

Option 3: Decontamination of the Vitro site and transfer of all contaminated material to a new disposal site

This option includes the decontamination of the Vitro site and the transfer of all contaminated materials to a new disposal area where the materials would be stabilized in a specially designed structure. Following decontamination and tailings removal, the 128-acre Vitro site and all vicinity properties where cleanup to EPA standards was practicable would be available for any use allowed by local zoning ordinances. However, access to the new disposal site would be restricted since the site would be licensed by the NRC as a uranium mill tailings disposal site. The First Alternate Area (1 mile south of Clive, Tooele County, Utah) appears to be the best candidate for the new disposal area in this option.

The First Alternate Area has certain physical and technical advantages, such as those dealing with hydrological considerations and soil characteristics. The factors that discourage a choice of this option are economics and the increased potential for occupational accidents (resulting from the need to doubly handle the materials, i.e., onloading and offloading, and their transport by train to the new disposal site). Regarding the economic factors, the estimated cost of this option is nearly 3 times the estimated cost of Option 2 (stabilization in place) and the large difference in cost may be difficult to justify by the increases in geotechnical and environmental benefits. A fuller examination of this issue will take place in the environmental impact statement.

Option 4: Reprocessing of Vitro tailings prior to final disposal

The options involving reprocessing of the Vitro tailings cannot be seriously evaluated until all procedures for determining the practicability of reprocessing have been completed. By law (PL 95-604, Title I, Section 108(b)), the DOE must solicit expressions of interest regarding the remilling of residual radioactive materials at designated inactive processing sites and, upon receipt of any expressions of interest, must determine whether the proposals are practicable. The determination of practicability includes an assay of the tailings to determine their residual mineral contents. The DOE has complied with these requirements by publishing requests for expressions of interest in the Federal Register, Commerce and Business Daily, and in local

newspapers. Expressions of general interest were received; and an assay program was begun in 1981. The Vitro tailings pile was sampled in May 1981, but the final report of the assay results is not yet published. A preliminary indication of this work is that reprocessing of the Vitro tailings would not be practicable from an economic point of view, given current and anticipated market values of uranium.

7. PROPOSED OPTION

A proposed option for the Vitro site remedial actions has not been selected by the cooperating parties, the DOE and the State of Utah. Accordingly, Options 2 and 3 will be given equal depth of study in the draft environmental impact statement (DEIS) covering the proposed remedial actions. The information supplied in the DEIS plus additional data and analyses to be published in 1982 will be used by the cooperating parties to reach agreement on the proposed course of action in the final EIS. Important considerations in deciding upon a proposed option will be: whether the options meet the EPA standards, the degree to which each option protects the environment and reduces health risks, the relative cost-benefit ratios of the options, and the impacts of each option on land use, social factors, and the physical environment.

8. SCHEDULE AND COST ESTIMATE

The schedule for the remedial actions at the Vitro site is shown in Figure 4. The 3.25 years, as shown for completion of the remedial actions, applies to Option 3. Time required to complete Option 2 would be slightly less than 3 years.

The preliminary cost estimates were mentioned earlier: in-place stabilization would cost between 18 and 30 million dollars (depending on whether a liner is used) and disposal at the First Alternate Area would cost about 80 million dollars. Both of these estimates are in current fiscal year dollars. Of the total costs, about 70 percent is estimated to be for the remedial actions; the remaining 30 percent is the cost of engineering, environmental analysis, and maintenance and surveillance activities.

9. FUTURE ACTIVITIES

This Remedial Action Concept Paper for the Vitro site is only the preliminary plan of action. The remainder of this paper describes the major activities to be performed.

9.1 Preparation of EIS and EA

An environmental impact statement (EIS) for the Vitro tailings remedial action is being prepared by Sandia National Laboratories for the DOE, with the assistance of Dames & Moore. Work on preparation of the EIS began after public meetings to define the scope of the EIS were held in May 1981. A draft EIS will be available for public comment in the late summer of 1982. The final EIS will be issued following the promulgation of the final EPA standards.

An environmental assessment (EA) of the remedial actions to be performed at the vicinity properties has been prepared for the DOE with the assistance of Ford, Bacon and Davis Utah.

Detailed data (meteorological, seismic, hydrological, geochemical, physical, etc.) are required for the potential disposal sites. The DOE will continue to gather these and other data necessary for the analyses to be reported in the EIS for the final disposal of the tailings.

9.2 Site Acquisition

As mentioned in Section 5, Option 2 or Option 4A would require acquisition of a 63.6-acre portion of the 128-acre Vitro site as well as the 5.4-acre strip of vicinity properties that are immediately adjacent to the southwest corner of the site. The State of Utah would negotiate all acquisitions. In Options 3 or 4B, only temporary rights to use the Vitro site would be needed for the term of the remedial actions; however, the State of Utah would need to withdraw land in the First Alternate Area for Option 3, or acquire as-yet-unspecified lands for Option 4C.

9.3 Engineering

A technical assistance contractor (TAC), Jacobs Engineering, has been selected by DOE to assist the UMTRA Project Office in planning and implementing remedial actions. A remedial action contractor (RAC) to provide architect-engineer and construction-management services will be selected by the DOE during 1982. The RAC will use the information developed under the UMTRAP technology development program, the Remedial Action Plan, and the EIS to develop detailed designs and issue subcontracts for the final course of remedial actions.

The TAC will be responsible for conducting maintenance and surveillance activities at disposal sites when the remedial actions have been completed.

9.4 Remedial Action Plan

A remedial action plan (RAP) consisting of detailed engineering designs, schedules, and cost estimates for the preferred disposal site will be prepared by the TAC. The RAP will be issued in accordance with the cooperative agreement for final concurrence by the state and the NRC. The RAP will also be used to establish an estimate of the state's 10 percent share of the remedial action cost.

9.5 On-site Remedial Action

An outline of the remedial action process at Vitro site is shown in Figure 4. It is expected that remedial actions will be started in 1983.

9.6 Certification

During the remedial work and following its completion, radiological surveys will be performed to verify the effectiveness of the remedial actions and ensure that the sites met the EPA standards. Certification will be carried out under the direction of the DOE Assistant Secretary for Environmental Protection, Safety, and Emergency Preparedness (ASEP).

9.7 Maintenance and Surveillance

Maintenance and monitoring procedures will be implemented by the DOE at the disposal site to ensure that the site remains environmentally sound. Conditions at the site must be maintained so that it continues to be in compliance with EPA standards and NRC license conditions.

10. RELATED DOCUMENTS

The following is a list of documents that relate to the Salt Lake City remedial actions.

1. Ford, Bacon & Davis Utah, Inc., April 1976, Phase II - Title I Engineering Assessment of Inactive Uranium Mill Tailings, Vitro Site, Salt Lake City, Utah, (FBDU 130-00), GJT-1, USERDA, Grand Junction, Colorado.

2. Ford, Bacon & Davis Utah, Inc., April 1981, Engineering Assessment of Inactive Uranium Mill Tailings, Vitro Site, Salt Lake City, Utah, (FBDU 360-00), DOE/UMT-0102, UMTRA Project Office, Albuquerque, New Mexico.

3. Ford, Bacon & Davis Utah, Inc., December 1981, Environmental Assessment of Remedial Actions at Offsite Properties Contaminated by Tailings From the Vitro Inactive Mill Site in Salt Lake City, Utah, UMTRA-DOE/ALO 261, Albuquerque, New Mexico.

4. Politech Corporation, October 1980, Salt Lake City Information Book, UMTRA-DOE/ALO-3, Albuquerque, New Mexico.

5. Sandia National Laboratories, June 1981, Contents of Environmental Impact Statements Prepared for the Uranium Mill Tailings Remedial Action Project, UMTRA-DOE/ALO-5, Albuquerque, New Mexico.

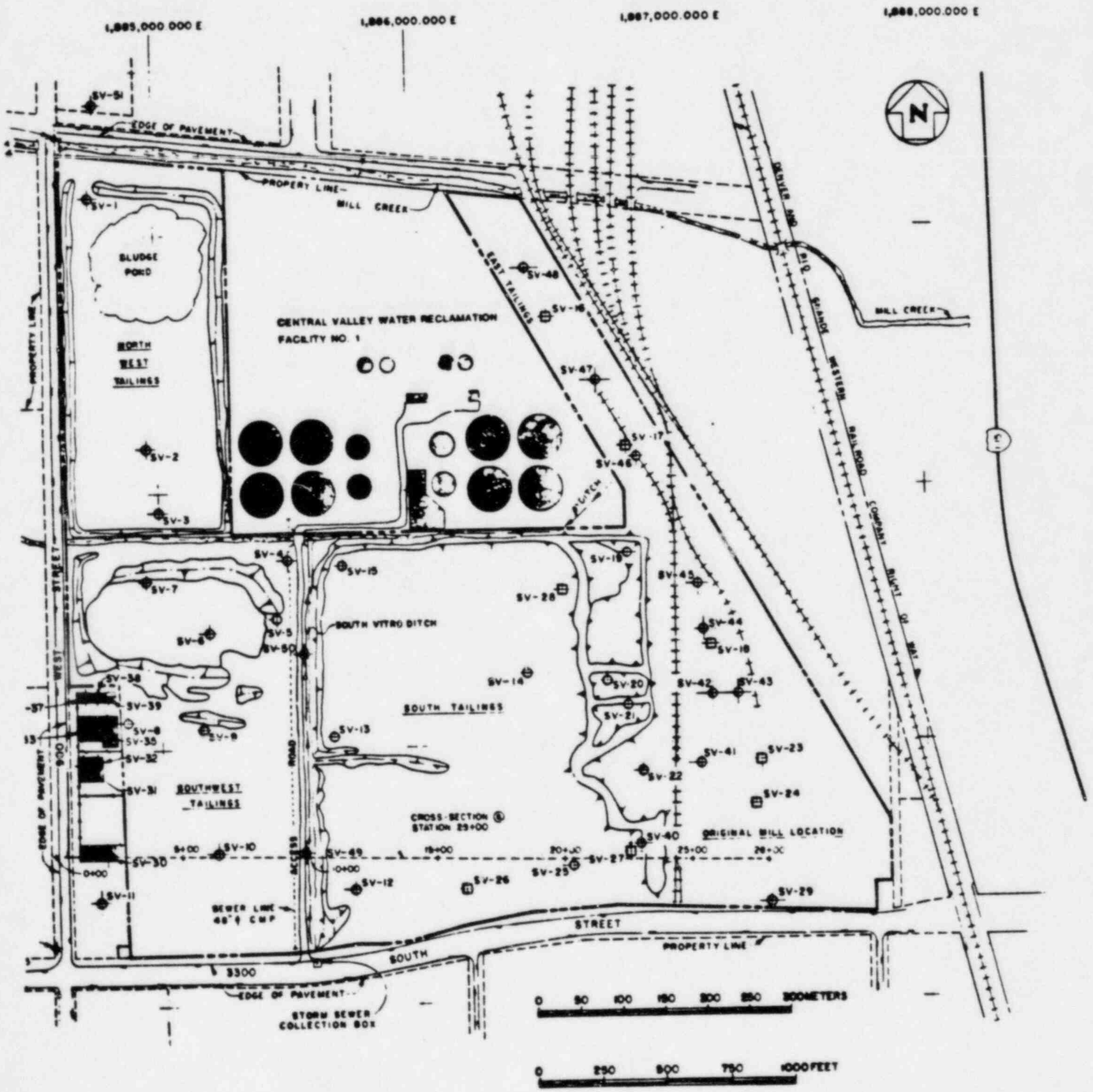
6. United States Environmental Protection Agency, December 1980, Draft Environmental Impact Statement for Remedial Action Standards for Inactive Uranium Processing Site, EPA 520/4-80-011, Washington, D.C.

7. United States Environmental Protection Agency, January 1981, Proposed Disposal Standards for Inactive Uranium Processing Sites; Proposed Rule and Extension of Comment Period, EPA 520/4-80-011, Washington, D.C.

8. Nuclear Regulatory Commission, October 1980, Uranium Mill Licensing Requirements, 45 Federal Register 65521-65538, Washington, D.C.

9. Office of Nuclear Material Safety and Safeguards, September 1980, Final Generic Environmental Impact Statement on Uranium Milling, NUREG-0706 Vol. 1, Washington, D.C.

Figure 1. Map of Vitro Site



——— INDICATES BOUNDARIES OF AREA REQUIRING REMEDIAL ACTION

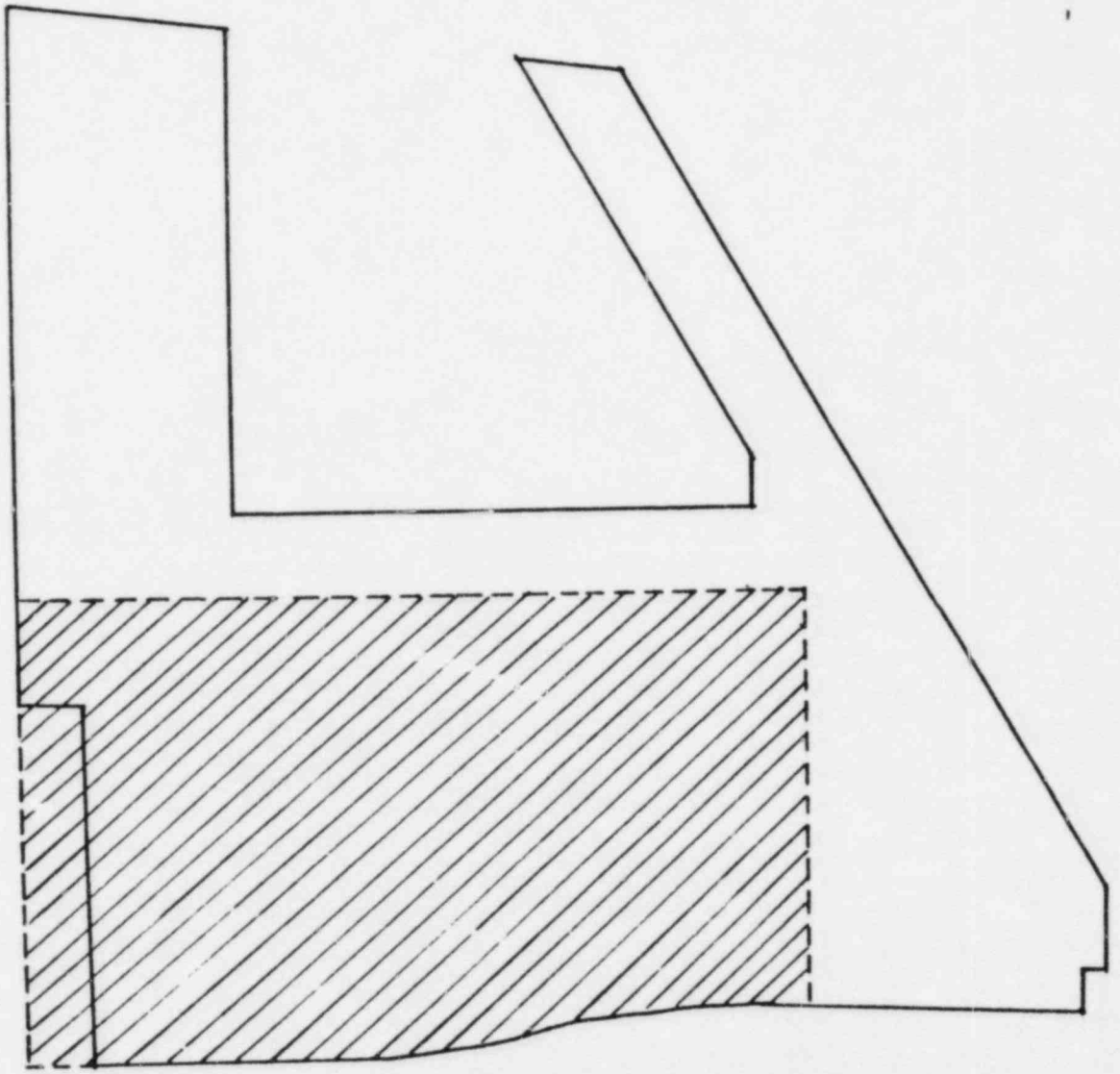
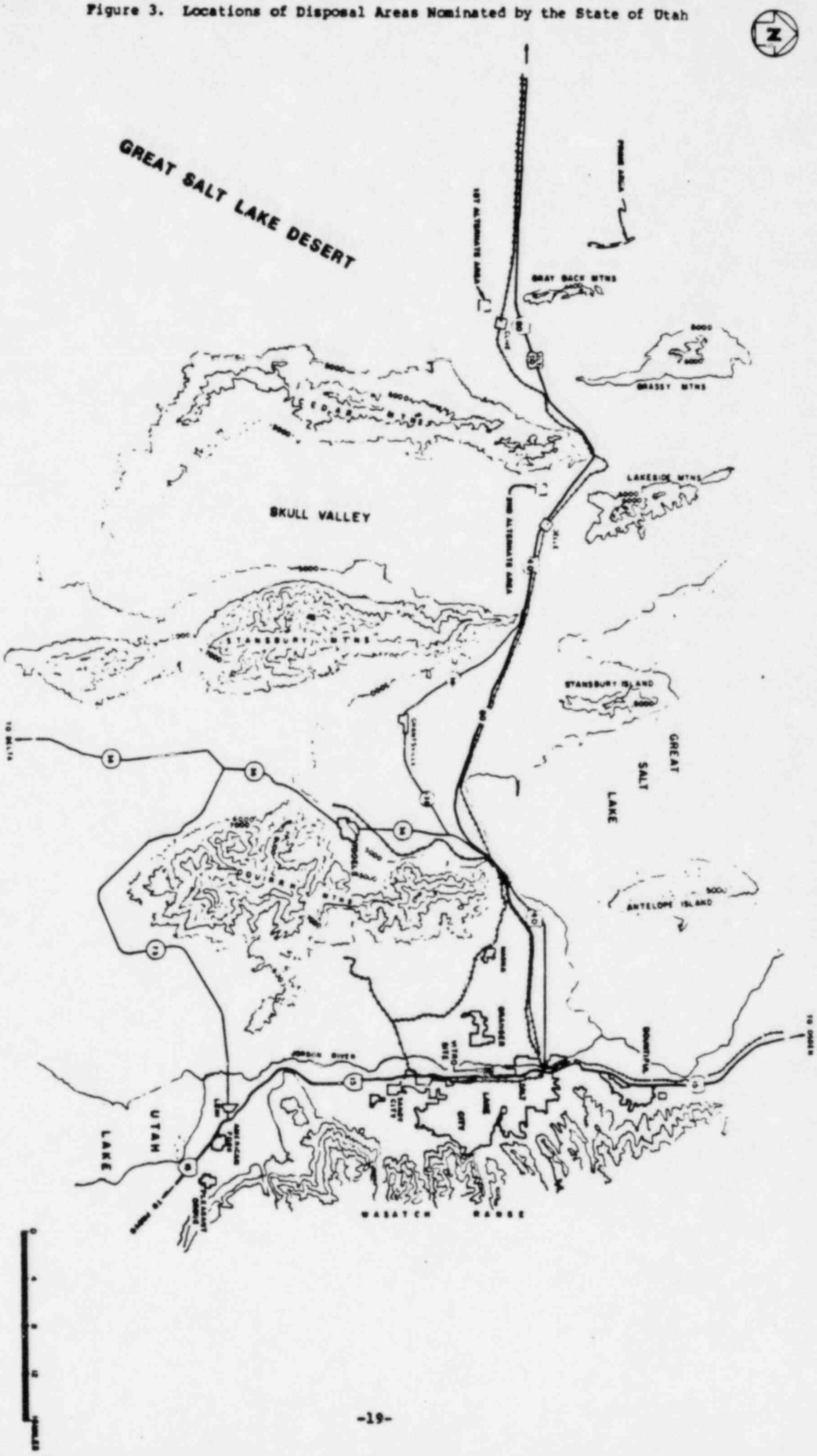


Figure 2. Final Location of Tailings in Option 2

Figure 3. Locations of Disposal Areas Nominated by the State of Utah



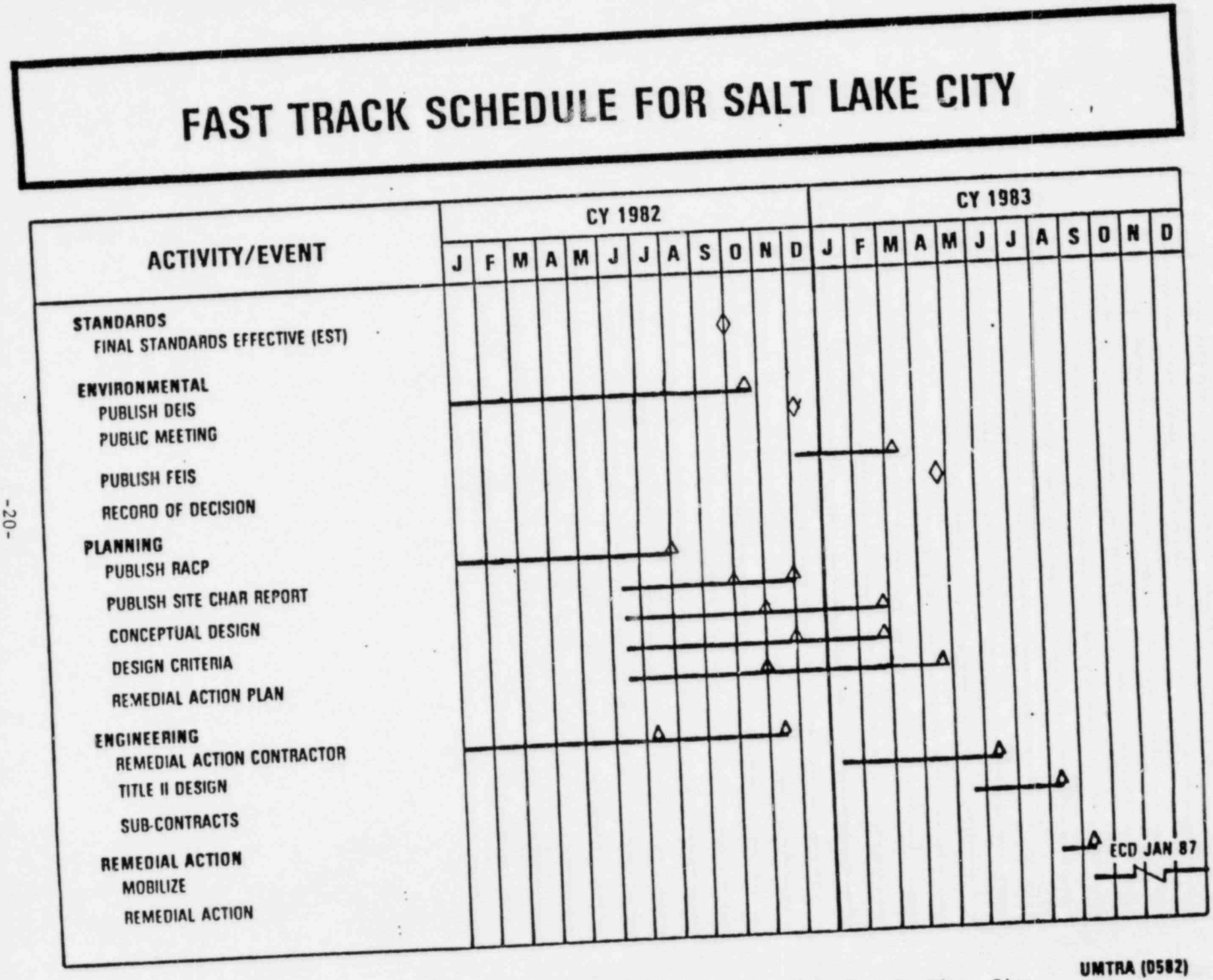


Figure 4. Remedial Action Schedule for the Vitro Site