Decommissioning Plan

Tulsa Facility
Tulsa, Oklahoma

Kaiser Aluminum and Chemical Corporation
Baton Rouge, Louisiana

Project Nos. 5427E and 5427L

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Revised 2003

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APPENDIX A

ACCEPTANCE REVIEW CHECKLIST

In the following checklist, all items are applicable to Kaiser Phase 2 DP except those marked with NA (NOT APPLICABLE)

Attachment 2

ACCEPTANCE REVIEW CHECKLIST

LICENSEE NAME: Kaiser Aluminum
LICENSE NUMBER: STB-472 (terminated) DOCKET NUMBER: 040-2377
FACILITY: 7311 East 41st Street, Tulsa, OK
DECOMMISSIONING PLAN DATED/VERSION: Phase 2 DP

Staff will review the decommissioning plan without assessing the technical accuracy or completeness of the information contained therein. The adequacy of this information will be assessed during the detailed technical review.

In most cases, licensees will not be required to submit all of the information in this checklist. Rather, the staff should use this checklist a basis for developing a site specific checklist for the individual facility. Staff should use the checklist first during the initial meetings with licensees to discuss the scope and content of the decommissioning plan for each site. The staff, in conjunction with the licensee, should determine what information should be submitted for the site, based on the uses of radioactive material at the site, the extent and types of radioactive material contamination, the manner in which the licensee intends to decommissioning the facility and other factors affecting the potential for increased risk to the public or workers from the decommissioning operations. This information should be documented by modifying the acceptance review checklist. Copies of the modified checklist should be provided to the licensee and maintained by the Project Manager. When the decommissioning plan is submitted the Project Manager should use the modified checklist to perform the acceptance review.

Staff will review the decommissioning plan table of contents and the individual decommissioning plan chapters or sections to ensure that the licensee or responsible party has included this information in the decommissioning plan. In addition, the staff may use the guidance regarding formatting and suggested length of individual as a guide in determining if the level of detail of the information appears to be adequate for the staff to perform a detailed technical review. Staff should recognize that failure to supply an item included in the checklist does not necessarily constitute grounds for rejecting the decommissioning plan. Rather, the staff should determine if the licensee can supply the information in a timely manner and if so communicate the additional information needs to the licensee in a deficiency letter. Only in those cases where a detailed technical review cannot begin without the required information should the DP be rejected. For example, if the licensee is requesting restricted release and has not obtained the appropriate input from community interests who could be affected by the decommissioning, the decommissioning plan should be rejected during the acceptance review. Questions regarding whether to reject a decommissioning plan based on the results of the acceptance review should be forwarded to the Decommissioning Branch, Division of Waste Management.

EXECUTIVE SUMMARY

1.0 the name and address of the licensee or owner of the site;
1.0 the location and address of the site;
- a brief description of the site and immediate environs;
1.0 a summary of the licensed activities that occurred at the site
1.0 the nature and extent of contamination at the site;
1.0 the decommissioning objective proposed by the licensee (i.e., restricted or unrestricted use);
1.0 the DCGLs for the site, the corresponding doses from these DCGLs and the method that was use to determine the DCGLs;
7.2 a summary of the ALARA evaluations performed to support the decommissioning;
- if the licensee or responsible party requests license termination under restricted conditions, the restrictions the licensee intends to use to limit doses as required in 10 CFR Part 20.1403 or 20.1404 and a summary of institutional controls, financial assurance.
- if the licensee requests license termination under restricted conditions or using alternate criteria a summary of the public participation activities undertaken by the licensee to comply with 10 CFR Part 20.1403(d) or 20.1404(a)(4);
1.0 the proposed initiation and completion dates of decommissioning;
- any post-remediation activities (such as groundwater monitoring) that the licensee proposes to undertake prior to requesting license termination; and
NA a statement that the licensee is requesting that its license be amended to incorporate the decommissioning plan

FACILITY OPERATING HISTORY

LICENSE NUMBER/STATUS/ AUTHORIZED ACTIVITIES

1.0 & 2.2 the radionuclides and maximum activities of radionuclides authorized and used under the former license;
2.2 the chemical forms of the radionuclides authorized and used under the former license;
NA a detailed description of how the radionuclides are currently being used at the site;
1.0 & 2.2 the location(s) of use and storage of the various radionuclides authorized under former licenses; and
NA a scale drawing or map of the site and environs showing the current locations of radionuclide use at the site;
NA a list of amendments to the license since the last license renewal.

LICENSE HISTORY

1.0 & 2.2 the radionuclides and maximum activities of radionuclides authorized and used under all previous licenses;
2.2 the chemical forms of the radionuclides authorized and used under all previous licenses;

2.2	a detailed description of how the radionuclides were used at the site;
2.2 & 4.1	the location(s) of use and storage of the various radionuclides authorized under all previous licenses
Figure 2-1	a scale drawing or map of the site, facilities and environs showing previous locations of radionuclide use at the site

PREVIOUS DECOMMISSIONING ACTIVITIES

1.0 & 2.4	a list or summary of areas at the site that were remediated in the past,
2.4	a summary of the types, forms, activities and concentrations of radionuclides that were present in previously remediated areas;
1.0	the activities that caused the areas to become contaminated;
1.0 & 2.4	the procedures used to remediate the areas and the disposition of radioactive material generated during the remediation;
2.4	a summary of the results of the final radiological evaluation of the previously remediated area
Figure 2-3	a scale drawing or map of the site, facilities and environs showing the locations of previous remedial activity

SPILLS *(Kaiser will provide a summary statement)*

2.5	a summary of areas at the site where spills (or uncontrolled releases) of radioactive material occurred in the past;
2.5	the types, forms, activities and concentrations of radionuclides involved in the spill or uncontrolled release, and;
2.5	a scale drawing or map of the site, facilities and environs showing the locations of spills

PRIOR ON-SITE BURIALS

2.6	a summary of areas at the site where radioactive material has been buried in the past;
2.6	the types, forms, activities and concentrations of waste and radionuclides in the former burial, and;
Figure 2-4	a scale drawing or map of the site, facilities and environs showing the locations of former burials.

FACILITY DESCRIPTION

SITE LOCATION AND DESCRIPTION

3.1	the size of the site in acres or square meters;
3.1	the State and county in which the site is located;
-	the names and distances to nearby communities, towns and cities;
3.1	a description of the contours and features of the site;
3.1	the elevation of the site;

3.3 a description of property surrounding the site; including the location of all off-site wells used by nearby communities or individuals;
3.7 the location of the site relative to prominent features such as rivers and lakes.
Figure 2-1 a map that shows the detailed topography of the site using a contour interval
3.3 the location of the nearest residences and all significant facilities or activities near the site
3.1 a description of the facilities (buildings, parking lots, fixed equipment, etc.) at the site

POPULATION DISTRIBUTION

3.2 a summary of the current population in and around the site, by compass vectors
3.2 a summary of the projected population in and around the site by compass vectors
3.2 a list of minority populations by compass vectors
3.2 demographic data by census block group to identify minority or low-income populations

CURRENT/FUTURE LAND USE

3.3 a description of the current land uses in and around the site;
3.3 a summary of anticipated land uses.

METROLOGY AND CLIMATOLOGY

3.4 a description of the general climate of the region
3.4 seasonal and annual frequencies of severe weather phenomena
- weather-related radionuclide transmission parameters
- routine weather-related site deterioration parameters
- extreme weather-related site deterioration parameters
3.4 a description of the local (site) meteorology
3.5 the National Ambient Air Quality Standards Category of the area in which the facility is located and, if the facility is not in a Category 1 zone, the closest and first downwind Category 1 Zone.

GEOLOGY AND SEISMOLOGY

3.6.1 a detailed description of the geologic characteristics of the site and the region around the site
3.6.2 a discussion of the tectonic history of the region, regional geomorphology, physiography, stratigraphy, and geochronology
Figure 3-5 a regional tectonic map showing the site location and its proximity to tectonic structures
3.6.1 a description of the structural geology of the region and its relationship to the site geologic structure
- a description of any crustal tilting, subsidence, karst terrain, landsliding, and erosion.
3.6.1 a description of the surface and subsurface geologic characteristics of the site and its vicinity
3.6.1 a description of the geomorphology of the site

3.6.2	a description of the location, attitude, and geometry of all known or inferred faults in the site and vicinity
3.6.2	a discussion of the nature and rates of deformation
-	a description of any man-made geologic features such as mines or quarries.
3.6.3	a description of the seismicity of the site and region
3.6.3	a complete list of all historical earthquakes that have a magnitude of 3 or more or a modified Mercalli intensity of IV or more within 200 miles of the site.

SURFACE WATER HYDROLOGY

3.7	a description of site drainage and surrounding watershed fluvial features
-	water resource data including maps, hydrographs, and stream records from other agencies (e.g., U.S. Geological Survey and U.S. Army Corps of Engineers).
Figure 2-1	topographic maps of the site that show natural drainages and man-made features
3.7	a description of the surface water bodies at the site and surrounding areas
3.7 & 8.1	a description of existing and proposed water control structures and diversions (both upstream and downstream that may influence the site).
-	flow-duration data that indicate minimum, maximum, and average historical observations for surface water bodies in the site areas
Figure 2-1	maps of the site and adjacent drainage areas identifying features such as drainage areas, surface gradients, and areas of flooding.
-	an inventory of all existing and planned surface water users, whose intakes could be adversely affected by migration of radionuclides from the site
Figure 3-6	topographic and/or aerial photographs that delineate the 100-year floodplain at the site
8.1	a description of any man-made changes to the surface water hydrologic system that may influence the potential for flooding at the site

GROUNDWATER HYDROLOGY

3.8	a description of the saturated zone
3.8.1	descriptions of monitoring wells
Tables 4-1 to 4-4	physical parameters
Figures 3-8 & 3-9	a description of groundwater flow directions and velocities
3.8	a description of the unsaturated zone
Table 4-3	information on all monitor stations including location and depth
Tables 4-1 to 4-4	a description of physical parameters
3.8	a description of the numerical analyses techniques used to characterize the unsaturated and saturated zones
4.3	the distribution coefficients of the radionuclides of interest at the site.

NATURAL RESOURCES

3.9	a description of the natural resources occurring at or near the site
3.9	a description of potable, agricultural, or industrial ground or surface waters

3.9 a description of economic, marginally economic, or subeconomic known or identified natural resources as defined in U.S. Geological Survey Circular 831.

3.9 mineral, fuel, and hydrocarbon resources near and surrounding the site which, if exploited, would effect the licensee' or responsible party's dose estimates

ECOLOGY/ENDANGERED SPECIES

3.10 a list of commercially or recreationally important invertebrate species known to occur within 5 km of the site

3.10 a list of all commercially important floral species known to occur within 5 km of the site

3.10 a list of commercially or recreationally important vertebrate animals known to occur within 5 km of the site.

3.10 estimates of the relative abundance of both commercially and recreationally important game and nongame vertebrates

3.10 a list of all endangered species at or within 5 km of the site

RADIOLOGICAL STATUS OF FACILITY

CONTAMINATED STRUCTURES

4.1 a list or description of all structures at the facility where licensed activities occurred that contain residual radioactive material in excess of site background levels;

NA a summary of the structures and locations at the facility that the licensee or responsible party has concluded have not been impacted by licensed operations and the rationale for the conclusion;

NA a list or description of each room or work area within each of these structures;

NA a summary of the background levels used during scoping or characterization surveys;

NA a summary of the locations of contamination in each room or work area

NA a summary of the radionuclides present at each location, the maximum and average radionulide activities in dpm/100cm^2, and, if multiple radionuclides are present, the radionuclide ratios;

NA the mode of contamination for each surface (i.e., whether the radioactive material is present only on the surface of the material or if it has penetrated the material);

NA the maximum and average radiation levels in mrem/hr in each room or work area; and

NA a scale drawing or map of the rooms or work areas showing the locations of radionuclide material contamination.

CONTAMINATED SYSTEMS AND EQUIPMENT

4.2 a list or description and the location of all systems or equipment at the facility that contain residual radioactive material in excess of site background levels;

NA a summary of the radionuclides present in each systems or on the equipment at each location, the maximum and average radionulide activities in dpm/100cm^2, and, if multiple radionuclides are present, the radionuclide ratios;

NA the maximum and average radiation levels in mrem/hr at the surface of each piece of equipment;
NA a summary of the background levels used during scoping or characterization surveys; and,
NA a scale drawing or map of the rooms or work areas showing the locations of the contaminated systems or equipment;

SURFACE SOIL CONTAMINATION *(Discussion of surface and subsurface soil Contamination will be combined in one section)*

4.3 a list or description of all locations at the facility where surface soil contains residual radioactive material in excess of site background levels;
4.3 a summary of the background levels used during scoping or characterization surveys
4.3 a summary of the radionuclides present at each location, the maximum, average, and variability of radionuclide activities in pCi/gm, and, if multiple radionuclides are present, the radionuclide ratios;
4.3 the maximum and average radiation levels in mrem/hr at each location; and
Appendix A a scale drawing or map of the site showing the locations of radionuclide material contamination in surface soil;

SUBSURFACE SOIL CONTAMINATION

4.3 a list or description of all locations at the facility where subsurface soil contains residual radioactive material in excess of site background levels;
4.3 a summary of the background levels used during scoping or characterization surveys
4.3 a summary of the radionuclides present at each location, the maximum, average, and variability of radionulide activities in pCi/gm, and, if multiple radionuclides are present, the radionuclide ratios;
4.3 the depth of the subsurface soil contamination at each location; and
Appendix A a scale drawing or map of the site showing the locations of subsurface soil contamination.

SURFACE WATER

4.4 a list or description of all surface water bodies at the facility that contain residual radioactive material in excess of site background levels;
4.4 a summary of the background levels used during scoping or characterization surveys
4.4 a summary of the radionuclides present in each surface water body and the maximum and average radionuclide activities in pCi/l.

GROUNDWATER

4.5 a summary of the aquifer(s) at the facility that contain residual radioactive material in excess of site background levels;
4.5 a summary of the background levels used during scoping or characterization surveys

4.5 a summary of the radionuclides present in each aquifer and the maximum and average radionulide activities in pCi/l

DOSE MODELING

UNRESTRICTED RELEASE USING SCREENING CRITERIA

Unrestricted release using screening criteria for building surface residual radioactivity

NA the general conceptual model (for both the source term and the building environment) of the site; and,

NA a summary of the screening method (i.e., running DandD or using the look-up tables) used in the decommissioning plan.

Unrestricted release using screening criteria for surface soil residual radioactivity

(Kaiser will make a statement indicating that site specific information will be used)

5.1 justification on the appropriateness of using the screening approach (for both the source term and the environment) at the site; and,

5.1 a summary of the screening method (i.e., running DandD or using the look-up tables) used in the decommissioning plan.

UNRESTRICTED RELEASE USING SITE-SPECIFIC INFORMATION

5.2.1 source term information including nuclides of interest, configuration of the source, areal variability of the source, etc.

5.2.2 description of the exposure scenario including a description of the critical group.

5.2.1 & 5.2.2 description of the conceptual model of the site including the source term, physical features important to modeling the transport pathways, and the critical group.

5.1 & 5.2.2.1 identification/description of the mathematical model used (e.g., hand calculations, DandD Screen v1.0, RESRAD v5.81, etc.).

Appendix D description of the parameters used in the analysis.

5.2.5 discussion about the effect of uncertainty on the results.

Appendices B,C,D,E input and output files or printouts, if a computer program was used.

RESTRICTED RELEASE USING SITE-SPECIFIC INFORMATION

(This section is applicable if Kaiser decides to a restricted release scenario)

___ source term information including nuclides of interest, configuration of the source, areal variability of the source, and chemical forms;

___ a description of the exposure scenarios including a description of the critical group for each scenario;

___ a description of the conceptual model(s) of the site that includes the source term, physical features important to modeling the transport pathways, and the critical group for each scenario;

- identification/description of the mathematical model(s) used (e.g., hand calculations, RESRAD v5.81, etc.);
- a summary of parameters used in the analysis;
- a discussion about the effect of uncertainty on the results; and
- input and output files or printouts, if a computer program was used.

RELEASE INVOLVING ALTERNATE CRITERIA

NA source term information including nuclides of interest, configuration of the source, areal variability of the source, and chemical forms;
NA a description of the exposure scenarios including a description of the critical group for each scenario;
NA a description of the conceptual model(s) of the site that includes the source term, physical features important to modeling the transport pathways, and the critical group for each scenario;
NA identification/description of the mathematical model(s) used (e.g., hand calculations, RESRAD v5.81, etc.);
NA a summary of parameters used in the analysis;
NA a discussion about the effect of uncertainty on the results; and
NA input and output files or printouts, if a computer program was used.

ALTERNATIVES CONSIDERED AND RATIONALE FOR CHOSEN ALTERNATIVE

ALTERNATIVES CONSIDERED

Figure 8-5 &
8.2.7 a description of the facility if the alternative is employed;
5.0 a summary of the health effects to adjacent communities if the alternative is employed;
3.3 a summary of the impacts on community resources such as land use and property values;
5.0 a summary of the impacts on the geology, hydrology, air quality and ecology in and around the site;
6.0 a description of impacts to minority or low-income populations within a 0.6 mile radius of the center of the facility (urban location) or within a 4 mile radius of the center of the facility (rural location);
NA if appropriate, an assessment of the potential for criticality;
8.2.6 a summary of the irreversible and irretrievable commitment of resources.
6.0 an analysis of the proposed alternative and other alternatives as required by 10 CFR 51.45(c);
* a list of the permits, licenses, approvals, and other entitlements and the discussion of the status of compliance with these requirements required in 10 CFR 51.45(d)

RATIONALE FOR CHOSEN ALTERNATIVE

6.1 a description of why the licensee selected the preferred alternative described in the decommissioning plan

*Referenced in various sections throughout the Decommissioning Plan. (Kaiser will obtain necessary permits based on final design considerations.)

__ if the licensee has not selected the environmentally preferable alternative, an explanation of why this alternative was not selected.

ALARA ANALYSIS

7.1 a description of how the licensee or responsible party will achieve a decommissioning goal below the dose limit;
7.1 a quantitative cost benefit analysis;
7.1 a description of how costs were estimated; and,
7.2 a demonstration that the doses to the average member of the critical group are ALARA

PLANNED DECOMMISSIONING ACTIVITIES

CONTAMINATED STRUCTURES

NA a summary of the remediation tasks planned for each room or area in the contaminated structure in the order in which they will occur;
NA a description of the remediation techniques that will be employed in each room or area of the contaminated structure;
NA a summary of the radiation protection methods and control procedures that will be employed in each room or area;
NA a summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan;
NA a commitment to conduct decommissioning activities in accordance with written, approved procedures;
NA a summary of any unique safety or remediation issues associated with remediating the room or area; and,
NA for Part 70 licensees, a summary of how the licensee will ensure that the risks addressed in the facility's Integrated Safety Analysis will be addressed during decommissioning.

CONTAMINATED SYSTEMS AND EQUIPMENT

NA a summary of the remediation tasks planned for each system in the order in which they will occur including which activities will be conducted by licensee staff and which will be performed by a contractor;
NA a description of the techniques that will be employed to remediate each system in the facility or site;
NA a description of the radiation protection methods and control procedures that will be employed while remediating each system;
NA a summary of the equipment will be removed or decontaminated and how the decontamination will be accomplished;
NA a summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan;

NA a commitment to conduct decommissioning activities in accordance with written, approved procedures;

NA a summary of any unique safety or remediation issues associated with remediating any system or piece of equipment; and,

NA for Part 70 licensees, a summary of how the licensee will ensure that the risks addressed in the facility's Integrated Safety Analysis will be addressed during decommissioning.

SOIL

8.2.1 a summary of the removal/remediation tasks planned for surface and subsurface soil at the site in the order in which they will occur including which activities will be conducted by licensee staff and which will be performed by a contractor;

8.2.1 a description of the techniques that will be employed to remove or remediate surface and subsurface soil at the site;

8.2.1 a description of the radiation protection methods and control procedures that will be employed during soil removal/remediation;

8.2.1 a summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan;

8.3 a commitment to conduct decommissioning activities in accordance with written,

8.2.3.6 approved procedures;

& 8.2.4 a summary of any unique safety or removal/remediation issues associated with remediating the soil; and,

NA for Part 70 licensees, a summary of how the licensee will ensure that the risks addressed in the facility's Integrated Safety Analysis will be addressed during decommissioning.

SURFACE AND GROUNDWATER

NA a summary of the remediation tasks planned for ground and surface water in the order in which they will occur, including which activities will be conducted by licensee staff and which will be performed by a contractor;

NA a description the remediation techniques that will be employed to remediate the ground or surface water;

NA a description of the radiation protection methods and control procedures that will be employed during ground or surface water remediation

NA a summary of the procedures already authorized under the existing license and those for which approval is being requested in the decommissioning plan

NA a commitment to conduct decommissioning activities in accordance with written, approved procedures; and,

NA a summary of any unique safety or remediation issues associated with remediating the ground or surface water.

SCHEDULES

Figure 8-8 a Gantt or PERT chart detailing the proposed remediation tasks in the order in which they will occur

8.4 a statement acknowledging that the dates in the schedule are contingent on NRC approval of the decommissioning plan;

8.4 a statement acknowledging that circumstances can change during decommissioning, and, if the licensee determines that the decommissioning cannot be completed as outlined in the schedule, the licensee or responsible party will provide an updated schedule to NRC; and,

8.4 If the decommissioning is not expected to be completed within the timeframes outlined in NRC regulations, a request for alternative schedule for completing the decommissioning

PROJECT MANAGEMENT AND ORGANIZATION

DECOMMISSIONING MANAGEMENT ORGANIZATION

Figure 9-1 a description of the decommissioning organization

9.1 a description of the responsibilities of each of these decommissioning project units;

Figure 9-1 &9.1 description of the reporting hierarchy within the decommissioning project management organization

9.1 a description of the responsibility and authority of each unit to ensure that decommissioning activities are conducted in a safe manner and in accordance with approved written procedures

DECOMMISSIONING TASK MANAGEMENT

9.2 a description of the manner in which the decommissioning tasks are managed

9.2 a description of how individual decommissioning tasks are evaluated and how the SWPs are developed for each task;

9.2 a description of how the SWPs are reviewed and approved by the decommissioning project management organization;

9.2 a description of how SWPs are managed throughout the decommissioning project

9.2 a description of how individuals performing the decommissioning tasks are informed of the procedures in the SWP

DECOMMISSIONING MANAGEMENT POSITIONS AND QUALIFICATIONS

9.2 & 9.3 a description of the duties and responsibilities of each management position in the decommissioning organization and the reporting responsibility of the position;

9.2 & 9.3 a description of the duties and responsibilities of each chemical, radiological, physical and occupational safety-related position in the decommissioning organization and the reporting responsibility of the position;

9.2 & 9.3 a description of the duties and responsibilities of each engineering, quality assurance, and waste management position in the decommissioning organization and the reporting responsibility of the position

9.3 the minimum qualifications for each of the positions describe above

– a description of all decommissioning and safety committees, provided Kaiser decides to pursue a restricted release scenario

Radiation Safety Officer

9.3.3 a description of the health physics and radiation safety education and experience required for individuals acting as the licensee's or responsible party's RSO.
9.1.3 a description of the responsibilities and duties of the RSO; and
9.1.3 a description of the specific authority of the RSO to implement and manage the licensee's or responsible party' radiation protection program

TRAINING

9.4 a description of the radiation safety training that the licensee will provide to each employee
9.4.3 a description of any daily worker "jobside" or "tailgate" training that will be provided at the beginning of each workday or job task to familiarize workers with job-specific procedures or safety requirements
9.4.4 a description of the documentation that will be maintained to demonstrate that training commitments are being met.

CONTRACTOR SUPPORT

8.2.1 a summary of decommissioning tasks that will be performed by contractors
9.1 a description of the management interfaces that will be in place between the licensee or responsible party's management and on-site supervisors and contractor management and on-site supervisors;
9.1 a description of the oversight responsibilities and authority that the licensee or responsible party will exercise over contractor personnel;
9.3 & 9.4 a description of the training that will be provided to contractor personnel by the licensee or responsible party and the training that will be provided by the contractor
9.5 a commitment that the contractor will comply with all radiation safety and license requirements at the facility.

HEALTH AND SAFETY PROGRAM DURING DECOMMISSIONING

RADIATION SAFETY CONTROLS AND MONITORING FOR WORKERS

Air Sampling Program

10.1 a description which demonstrates that the air sampling program is representative of the workers breathing zones
10.1 a description of the criteria which demonstrates that air samplers with appropriate sensitivities will be used; and that samples will be collected at appropriate frequencies
10.1 a description of the conditions under which air monitors will be used
10.1.1 a description of the criteria used to determine the frequency of calibration of the flow meters on the air samplers
10.1.1 a description of the action levels for air sampling results

10.1.1 a description of how minimum detectable activities [MDA] for each specific radionuclide that may be collected in air samples are determined

Respiratory Protection Program

10.1.2 a description of the process controls, engineering controls or procedures to control concentrations of radioactive materials in air;
10.1.2 a description of the evaluation which will be performed when it is not practical to apply engineering controls or procedures
10.1.2 a description of the considerations used which demonstrates respiratory protection equipment is appropriate for a specific task based on the guidance on assigned protection factors;
10.1.2 a description of the medical screening and fit testing required before workers will use any respirator that is assigned a protection factor;
10.1.2 a description of the written procedures maintained to address all the elements of the respiratory protection program;
10.1.2 a description of the use, maintenance, and storage of respiratory protection devices
10.1.2 a description of the respiratory equipment users training program;
10.1.2 a description of the considerations made when selecting respiratory protection equipment

Internal Exposure Determination

10.1.3 a description of the monitoring to be performed to determine worker exposure
10.1.3 a description of how worker intakes are determined using measurements of quantities of radionuclides excreted from, or retained in the human body
10.1 a description of how worker intakes are determined by measurements of the concentrations of airborne radioactive materials in the workplace.
10.1.5 a description of how worker intakes, for an adult, a minor, and a declared pregnant woman are determined using any combination of the measurements above as may be necessary
10.1 a description of how worker intakes are converted into committed effective dose equivalent

External Exposure Determination

10.1.4 a description of the individual-monitoring devices which will be provided to workers
– a description of the type, range, sensitivity, and accuracy of each individual-monitoring device;
10.1.4 a description of the use of extremity and whole body monitors when the external radiation field is non-uniform
– a description of when audible-alarm dosimeters and pocket dosimeters will be provided
10.1 a description of how external dose from airborne radioactive material is determined
10.1.4 a description of the procedure to insure that surveys necessary to supplement personnel monitoring are performed

10.1 a description of the action levels for worker's external exposure, and the technical bases and actions to be taken when they are exceeded.

Summation of Internal and External Exposures

10.1.5 a description of how the internal and external monitoring results are used to calculate TODE and TEDE doses to occupational workers;

10.1.5 a description of how internal doses to the embryo/fetus, which is based on the intake of an occupationally-exposed, declared, pregnant woman will be determined;

10.1.5 a description of the monitoring of the intake of a declared, pregnant woman if determined to be necessary;

10.1.8 a description of the program for the preparation, retention and reporting of records for occupational radiation exposures;

Contamination Control Program

10.1.6 a description of the written procedures to control access to, and stay time in, contaminated areas by workers if they are needed

10.1.6 a description of surveys to supplement personnel monitoring for workers during routine operations, maintenance, clean-up activities, and special operations;

14.2 a description of the surveys which will be performed to determine the baseline of background radiation levels and radioactivity from natural sources for areas where decommissioning activities will take place;

10.1.6 a description in matrix or tabular form which describes contamination action limits (that is, actions taken to either decontaminate a person, place or area, or restrict access, or modify the type or frequency of radiological monitoring)

10.1.6 a description (included in the matrix or table mentioned above) of proposed radiological contamination guidelines for specifying and modifying the frequency for each type of survey used to assess the reduction of total contamination

10.1.7 a description of the procedures used to test sealed sources, and to insure that sealed sources are leaked tested at appropriate intervals

Instrumentation Program

10.1.7 a description of the instruments to be used to support the health and safety program

10.1.7 a description of instrumentation storage, calibration and maintenance facilities for instruments used in field surveys

10.1.1 a description of the method used to estimate the MDC or MDA (at the 95% confidence level) for each type of radiation to be detected;

10.1.7 a description of the instrument calibration and quality assurance procedures;

10.1.7 a description of the methods used to estimate uncertainty bounds for each type of instrumental measurement;

10.1.7 a description of air sampling calibration procedures or a statement that the instruments will be calibrated by a qualified service provider.

Nuclear Criticality Safety (Section 10.1.8)

NA a description of how the NCS functions, including management responsibilities and technical qualifications of safety personnel, shall be maintained when needed throughout the decommissioning process;

NA a description of how an awareness of procedures and other items relied on for safety shall be maintained throughout decommissioning among all personnel with access to systems that may contain fissionable material in sufficient amounts for criticality;

NA a summary of the review of NCSA's or the ISA indicating either that the process needs no new safety procedures or requirements, or that new requirements or analysis have been performed; and

NA a summary of any generic NCS requirements to be applied to general decommissioning, decontamination, or dismantlement operations, including those dealing with systems that may unexpectedly contain fissionable material.

Health Physics Audits, Inspections and Record-Keeping Program.

10.1.9 a general description of the annual program review conducted by management

10.1.9 a description of the records to be maintained of the annual program review and management audits

10.1.9 a description of the types and frequencies of surveys and audits to be performed by the RSO and RSO staff

10.1.9 a description of the process used in evaluating and dealing with violations of NRC requirements or license commitments identified during audits

10.1.9 a description of the records maintained of RSO audits

ENVIRONMENTAL MONITORING AND CONTROL PROGRAM

ENVIRONMENTAL ALARA EVALUATION PROGRAM

11.1 a description of ALARA goals for effluent control;

11.1 a description of the procedures, engineering controls, and process controls to maintain doses ALARA

11.1 a description of the ALARA reviews and reports to management.

EFFLUENT MONITORING PROGRAM

11.2 a demonstration that background and baseline concentrations of radionuclides in environmental media have been established through appropriate sampling and analysis;

11.2 a description of the known or expected concentrations of radionuclides in effluents;

11.2 a description of the physical and chemical characteristics of radionuclides in effluents;

11.2, Fig.2.1 a summary or diagram of all effluent discharge locations;

11.2 a demonstration that samples will be representative of actual releases;

11.2 a summary of the sample collection and analysis procedures

11.2 a description of the procedures to ensure that releases to sewer systems are controlled and maintained to meet the requirements of 10 CFR 20.2003, and

11.1 a summary of the estimates of doses to the public from effluents and a description of the method used to estimate public dose.

RADIOACTIVE WASTE MANAGEMENT PROGRAM

SOLID RADWASTE

12.1 a summary of the types of solid radwaste that are expected to be generated during decommissioning operations

12.1.1 a summary of the estimated volume, in cubic feet, of each solid radwaste type summarized under bullet 1 above;

12.1 a summary of the radionuclides (including the estimated activity of each radionuclide) in each estimated solid radwaste type summarized under bullet 1 above;

12.1 & 12.3.1 a summary of the volumes of Class A, B, C and Greater-than-Class-C solid radwaste that will be generated by decommissioning operations;

12.1.3 a description of how and where each of the solid radwaste summarized under bullet 1 above, will be stored on-site prior to shipment for disposal;

12.1.3 & 12.3.2 a description of how the each of the solid radwastes summarized under bullet 1 above, will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal;

'2.1.3 & 12.3.2 if appropriate, how the licensee or responsible party intends to manage volumetrically contaminated material;

12.3.2 a description of how the licensee or responsible party will prevent contaminated soil, or other loose solid radwaste, from being re-disbursed after exhumation and collection; and

12.1.3 the name and location of the disposal facility that the licensee intends to use for each solid radwaste type summarized under bullet 1 above

LIQUID RADWASTE

12.2 a summary of the types of liquid radwaste that are expected to be generated during decommissioning operations

12.2 a summary of the estimated volume, in liters, of each liquid radwaste type summarized under bullet 1 above;

12.2 a summary of the radionuclides (including the estimated activity of each radionuclide) in each liquid radwaste type summarized under bullet 1 above;

12.2 a summary of the estimated volumes of Class A, B, C and Greater-than-Class-C liquid radwaste that will be generated by decommissioning operations;

12.2 a description of how and where each of the liquid radwastes summarized under bullet 1 above, will be stored on-site prior to shipment for disposal;

12.2 a description of how the each of the liquid radwastes summarized under bullet 1 above, will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal;

12.1.3 the name and location of the disposal facility that the licensee intends to use for each liquid radwaste type summarized under bullet 1 above

MIXED WASTE

12.4 a summary of the types of solid and liquid mixed waste that are expected to be generated during decommissioning operations;
12.4 a summary of the estimated volumes, in cubic feet of each solid mixed waste type summarized under bullet 1 above and in liters for each liquid mixed waste;
12.4 a summary of the radionuclides (including the estimated activity of each radionuclide) in each type of mixed waste type summarized under bullet 1 above;
12.4 a summary of the estimated volumes of Class A, B, C and Greater-than-Class-C mixed waste that will be generated by decommissioning operations;
12.4 a description of how and where each of the mixed wastes summarized under bullet 1 above, will be stored on-site prior to shipment for disposal;
12.4 a description of how the each of the mixed wastes summarized under bullet 1 above, will be treated and packaged to meet disposal site acceptance criteria prior to shipment for disposal;
12.4 the name and location of the disposal facility that the licensee intends to use for each mixed waste type summarized under bullet 1 above;
12.4 a discussion of the requirements of all other regulatory agencies having jurisdiction over the mixed waste; and,
12.4 a demonstration the that the licensee possess the appropriate EPA or State permits to generate, store and/or treat the mixed wastes;

QUALITY ASSURANCE PROGRAM

ORGANIZATION

13.1 a description of the QA program management organization,
13.1 a description of the duties responsibilities of each unit within the organization and how delegation of responsibilities is managed within the decommissioning program
13.2 a description of how work performance is evaluated;
13.1 a description of the authority of each unit within the QA program
Figure 13-1 an organization chart of the QA program organization

QUALITY ASSURANCE PROGRAM

13.2 a commitment that activities affecting the quality of site decommissioning will be subject to the applicable controls of the QA program and activities covered by the QA program are identified on program defining documents;
13.1 a brief summary of the company's corporate QA policies;
13.2 a description of provisions to ensure that technical and quality assurance procedures required to implement the QA program are consistent with regulatory, licensing, and QA program requirements and are properly documented and controlled;
13.2 a description of the management reviews, including the documentation of concurrence in these quality-affecting procedures;
13.2 a description of the quality-affecting procedural controls of the principal contractors

13.2 a description of the authority of each unit within the QA program
Figure 13-1 an organization chart of the QA program organization

QUALITY ASSURANCE PROGRAM

13.2 a commitment that activities affecting the quality of site decommissioning will be subject to the applicable controls of the QA program and activities covered by the QA program are identified on program defining documents;
13.1 a brief summary of the company's corporate QA policies;
13.8 a description of provisions to ensure that technical and quality assurance procedures required to implement the QA program are consistent with regulatory, licensing, and QA program requirements and are properly documented and controlled;
13.8 a description of the management reviews, including the documentation of concurrence in these quality-affecting procedures;
13.8 a description of the quality-affecting procedural controls of the principal contractors
– a description of how NRC will be notified of changes (a) for review and acceptance in the accepted description of the QA program as presented or referenced in the DP before implementation and (b) in organizational elements within 30 days after the announcement of the changes
13.8 a description is provided of how management regularly assesses the scope, status, adequacy, and compliance of the QA program;
13.8 & 9.4.3 a description of the instruction provided to personnel responsible for performing activities affecting quality
9.4.4 a description of the training and qualifications of personnel verifying activities
9.4 for formal training and qualification programs, documentation includes the objectives and content of the program, attendees, and date of attendance;
13.8 a description of the self-assessment program to confirm that activities affecting quality comply with the QA program;
13.1 a commitment that persons performing self-assessment activities are not to have direct responsibilities in the area they are assessing;
13.8 a description of the organizational responsibilities for ensuring that activities affecting quality are (a) prescribed by documented instructions, procedures, and drawings; and, (b) accomplished through implementation of these documents; and,
13.8 a description of the procedures to ensure that instructions, procedures, and drawings include quantitative acceptance criteria and qualitative acceptance criteria for determining that important activities have been satisfactorily performed.

DOCUMENT CONTROL

13.4 a summary of the types of QA documents that are included in the program
13.4 a description of how the licensee or responsible party develops, issues, revises and retires QA documents

CONTROL OF MEASURING AND TEST EQUIPMENT

13.5 a summary of the test and measurement equipment used in the program
13.5 description of how and at what frequency the equipment will be calibrated;
13.5 a description of the daily calibration checks that will be performed on each piece of test or measurement equipment;
13.5 a description of the documentation that will be maintained to demonstrate that only properly calibrated and maintained equipment was used during the decommissioning

CORRECTIVE ACTION

13.6 a description of the corrective action procedures for the facility, including a description of how the corrective action is determined to be adequate;
13.6 a description of the documentation maintained for each corrective action and any followup activities by the QA organization after the corrective action is implemented;

QUALITY ASSURANCE RECORDS

13.7 a description of the manner in which the QA records will be managed
13.7 a description of the responsibilities of the QA organization
13.7 a description of the QA records storage facility.

AUDITS AND SURVEILLANCES

13.8 a description of the audit program
13.8 a description of the records and documentation generated during the audits and the manner in which the documents are managed
13.8 a description of all followup activities associated with audits or surveillances
13.8 a description of the trending/tracking that will be performed on the results of audits and surveillances

FACILITY RADIATION SURVEYS

RELEASE CRITERIA

Table 14-1 a summary table or list of the $DCGL_W$ for each radionuclide and impacted media of concern;
Table 14-3 if Class 1 survey units are present, a summary table or list of area factors that will be used for determining a $DCGL_{EMC}$ for each radionuclide and media of concern;
Tables 14-4 & 14-5 if Class 1 survey units are present, the $DCGL_{EMCs}$ for each radionuclide and medium of concern;
Table 14-2 if multiple radionuclides are present, the appropriate $DCGL_W$ for the survey method to be used.

CHARACTERIZATION SURVEYS

14.2.1 to 14.2.3	a description and justification of the survey measurements for impacted media
14.2.1 to 14.2.3	description of the field instruments and methods that were used for measuring concentrations and the sensitivities of those instruments and methods;
14.2.1 to 14.2.3	a description of the laboratory instruments and methods that were used for measuring concentrations and the sensitivities of those instruments and methods;
14.2.1 to 14.2.3	the survey results including tables or charts of the concentrations of residual radioactivity measured;
Figure 2-4 & 14.2.4	maps or drawings of the site, area, or building showing areas classified as non-impacted or impacted
14.7	justification for considering areas to be non-impacted;
14.2.4	a discussion of why the licensee considers the characterization survey to be adequate to demonstrate that it is unlikely that significant quantities of residual radioactivity have gone undetected;
14.2.1 to 14.2.3	for areas and surfaces that are inaccessible or not readily accessible, a discussion of how they were surveyed or why they did not need to be surveyed;
14.2.4 & 14.5	for sites, areas, or buildings with multiple radionuclides, a discussion justifying the ratios of radionuclides that will be assumed in the final status survey or an indication that no fixed ratio exists and each radionuclide will be measured separately.

REMEDIAL ACTION SUPPORT SURVEYS

14.3 & 14.9	a description of field screening methods and instrumentation;
Table 14-7	a demonstration that field screening should be capable of detecting residual radioactivity at the DCGL;

FINAL STATUS SURVEY DESIGN

14.4.2	a brief overview describing the final status survey design.
Figure 2-4 & 14.7	a description and map or drawing of impacted areas of the site, area, or building classified by residual radioactivity levels (Class 1, Class 2, or Class 3) and divided into survey units with an explanation of the basis for division into survey units.
14.6	a description of the background reference areas and materials, if they will be used, and a justification for their selection.
14.4.2.2	a summary of the statistical tests that will be used to evaluate the survey results,
14.9, 14.4.2.3, Table 14-7	a description of scanning instruments, methods, calibration, operational checks, coverage, and sensitivity for each media and radionuclide.
14.9, 14.4.2.3 & Table 14-7	for in-situ sample measurements made by field instruments, a description of the instruments, calibration, operational checks, sensitivity, and sampling methods with a demonstration that the instruments and methods have adequate sensitivity.
14-10	a description of the analytical instruments for measuring samples in the laboratory, calibration, sensitivity, and methods with a demonstration that the instruments and methods have adequate sensitivity;

14.10 a description of how the samples to be analyzed in the laboratory will be collected, controlled, and handled;

14.13.3 a description of the final status survey investigation levels and how they were determined

14.7.2 & 14.7.4 a summary of any significant additional residual radioactivity that was not accounted for during site characterization;

14.13.2 a summary of direct measurement results and/or soil concentration levels in units that are comparable to the DCGL and if data is used to estimate or update the survey unit;

14.12.2 & 14.13.2 a summary of the direct measurements or sample data used to both evaluate the success of remediation and to estimate the survey unit variance.

FINAL STATUS SURVEY REPORT

14.14 an overview of the results of the final status survey.

14.14 a discussion of any changes that were made in the final status survey from what was proposed in the Decommissioning Plan or other prior submittals.

14.14 a description of the method by which the number of samples was determined for each survey unit;

14.14 a summary of the values used to determine the numbers of sample and a justification for these values;

14.14 the survey results for each survey unit include:

- ___ the number of samples taken for the survey unit;
- ___ a map or drawing of the survey unit showing the reference system and random start systematic sample locations for Class 1 and 2 survey units and random locations shown for Class 3 survey units and reference areas;
- ___ the measured sample concentrations;
- ___ the statistical evaluation of the measured concentrations;
- ___ judgmental and miscellaneous sample data sets reported separately from the those samples collected for performing the statistical evaluation;
- ___ a discussion of anomalous data including any areas of elevated direct radiation detected during scanning that exceeded the investigation level or measurement locations in excess of $DCGL_w$.
- ___ a statement that a given survey unit satisfied the $DCGL_w$ and the elevated measurement comparison if any sample points exceeded the $DCGL_w$.

14.14 a description of any changes in initial survey unit assumptions relative to the extent of residual radioactivity

14.14 if a survey unit fails, a description of the investigation conducted to ascertain the reason for the failure and a discussion of the impact that the failure has on the conclusion that the facility is ready for final radiological surveys; and

14.14 if a survey unit fails, a discussion of the impact that the reason for the failure has on other survey unit information.

FINANCIAL ASSURANCE

COST ESTIMATE

Table 15-1 a cost estimate that appears to be based on documented and reasonable assumptions;

CERTIFICATION STATEMENT

NA the certification statement is based on the licensed possession limits and the applicable quantities specified in 10 CFR 30.35, 40.36, or 70.25

NA licensee is eligible to use a certification of financial assurance and, if eligible, that the certification amount is appropriate.

FINANCIAL MECHANISM

(Kaiser will prepare and submit financial cost estimates for remediation alternatives considered)

NA the financial assurance mechanism supplied by the licensee or responsible party consists of one or more of the following instruments:

- ___ trust fund;
- ___ escrow account;
- ___ government fund;
- ___ certificate of deposit;
- ___ deposit of government securities;
- ___ surety bond;
- ___ letter of credit;
- ___ line of credit;
- ___ insurance policy;
- ___ parent company guarantee;
- ___ self guarantee;
- ___ external sinking fund;
- ___ statement of intent; or
- ___ by special arrangements with a government entity assuming custody or ownership of the site

NA the financial assurance mechanism is an originally signed duplicate.

NA the wording of the financial assurance mechanism is identical to the recommended wording provided in Appendix F,

NA for a licensee regulated under 10 CFR Part 72, a means is identified in the decommissioning plan for adjusting the financial assurance funding level over any storage and surveillance period;

NA the amount of financial assurance coverage provided by the licensee for site control and maintenance is at least as great as that calculated using the formula provided in this SRP

RESTRICTED USE/ALTERNATE CRITERIA

(This section not required unless Kaiser proposes a restricted release scenario)

RESTRICTED USE

ELIGIBILITY DEMONSTRATION

___ a demonstration that the benefits of dose reduction are less than the cost of doses, injuries and fatalities; or
___ a demonstration that the proposed residual radioactivity levels at the site are ALARA

INSTITUTIONAL CONTROLS

___ a description of the legally enforceable institutional control(s) and an explanation of how the institutional control is a legally enforceable mechanism;
___ a description of any detriments associated with the maintenance of the institutional control(s);
___ a description of the restrictions on present and future landowners;
___ a description of the entities enforcing, and their authority to enforce, the institutional control(s);
___ a discussion of the durability of the institutional control(s);
___ a description of the activities that the entity with the authority to enforce the institutional controls may undertake to enforce the institutional control(s)
___ the manner in which the entity with the authority to enforce the institutional control(s) will be replaced if that entity is no longer willing or able to enforce the institutional control(s) (this may not be needed for Federal or State entities);
___ a description of the duration of the institutional control(s), the basis for the duration, the conditions that will end the institutional control(s) and the activities that will be undertaken to end the institutional control(s);
___ a description of the plans for corrective actions that may be undertaken in the event the institutional control(s) fail; and
___ a description of the records pertaining to the institutional controls, how and where will they will be maintained, and how the public will have access to the records.

SITE MAINTENANCE & FINANCIAL ASSURANCE

___ a demonstration that an appropriately qualified entity has been provided to control and maintain the site;
___ a description of the site maintenance and control program and the basis for concluding that the program is adequate to control and maintain the site;
___ a description of the arrangement or contract with the entity charged with carrying out the actions necessary to maintain control at the site;
___ a demonstration that the contract or arrangement will remain in effect for as long as feasible, and include provisions for renewing or replacing the contract;
___ a description of the manner in which independent oversight of the entity charged with maintaining the site will be conducted and what entity will conduct the oversight;

___ a demonstration that the entity providing the oversight has the authority to replace the entity charged with maintaining the site;
___ a description of the authority granted to the third party to perform, or have performed, any necessary maintenance activities;
___ unless the entity is a government entity, a demonstration that the third party is not the entity holding the financial assurance mechanism;
___ a demonstration that sufficient records evidencing to official actions and financial payments made by the third party are open to public inspection;
___ a description of the periodic site inspections that will be performed by the third party, including the frequency of the inspections.
___ a copy of the financial assurance mechanism provided by the licensee or responsible party; and,
___ a demonstration that the amount of financial assurance provided is sufficient to allow an independent third party to carry out any necessary control and maintenance activities[2].

OBTAINING PUBLIC ADVICE

___ a description of how individuals and institutions that may be affected by the decommissioning were identified and informed of the opportunity to provide advice to the licensee or responsible party;
___ a description of the manner in which the licensee obtained advice from these individuals or institutions;
___ a description of how the licensee provided for participation by a broad cross-section of community interests in obtaining the advice;
___ a description of how the licensee provided for a comprehensive, collective discussion on the issues by the participants represented;
___ a copy of the publicly available summary of the results of discussions, including individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants;
___ a description of how this summary has been made available to the public;
___ a description of how the licensee evaluated the advice, and the rationale for incorporating, or not incorporating, the advice from affected members of the community into the decommissioning plan.

DOSE MODELING AND ALARA DEMONSTRATION

___ a summary of the dose to the average member of the critical group when radionuclide levels are at the DCGL with institutional controls in place, as well as the estimated doses if they are no longer in place;
___ a summary of the evaluation performed pursuant to Section 7 of this SRP demonstrating that these doses are ALARA;
___ if the estimated dose to the average member of the critical group could exceed 100 mrem/yr (but would be less than 500 mrem/yr) when the radionuclide levels are at the DCGL, a demonstration that the criteria in 10 CFR 20.1403(e) have been met

ALTERNATE CRITERIA

___ a summary of the dose in TEDE(s) to the average member of the critical group when the radionuclide levels are at the DCGL (considering all man-made sources other than medical);
___ a summary of the evaluation performed pursuant to Section 7 of this SRP demonstrating that these doses are ALARA;
___ an analysis of all possible sources of exposure to radiation at the site and a discussion of why it is unlikely that the doses from all man-made sources, other than medical, will be more than 1 mSv/yr (100 mrem/yr);
___ a description of the legally enforceable institutional control(s) and an explanation of how the institutional control is a legally enforceable mechanism;
___ a description of any detriments associated with the maintenance of the institutional control(s);
___ a description of the restrictions on present and future landowners;
___ a description of the entities enforcing and their authority to enforce the institutional control(s);
___ a discussion of the durability of the institutional control(s);
___ a description of the activities that the party with the authority to enforce the institutional controls will undertake to enforce the institutional control(s)
___ a description of the manner in which the entity with the authority to enforce the institutional control(s) will be replaced if that entity is no longer willing or able to enforce the institutional control(s)
___ a description of the duration of the institutional control(s), the basis for the duration, the conditions that will end the institutional control(s) and the activities that will be undertaken to end the institutional control(s);
___ a description of the corrective actions that will be undertaken in the event the institutional control(s) fail; and
___ a description of the records pertaining to the institutional controls, how and where they will be maintained, and how the public will have access to the records.
___ a description of how individuals and institutions that may be affected by the decommissioning were identified and informed of the opportunity to provide advice to the licensee or responsible party;
___ a description of the manner in which the licensee obtained advice from affected individuals or institutions;
___ a description of how the licensee provided for participation by a broad cross-section of community interests in obtaining the advice;
___ a description of how the licensee provided for a comprehensive, collective discussion on the issues by the participants represented;
___ a copy of the publicly available summary of the results of discussions, including individual viewpoints of the participants on the issues and the extent of agreement and disagreement among the participants;
___ a description of how this summary has been made available to the public; and,

— a description of how the licensee evaluated advice from individuals and institutions that could be affected by the decommissioning and the manner in which the advice was addressed.

1.0 Executive Summary

This Decommissioning Plan (DP) was prepared by Earth Sciences Consultants, Inc. (Earth Sciences) on behalf of Kaiser Aluminum & Chemical Corporation (Kaiser) to present a description of the planned remediation activities for the Kaiser Aluminum Specialty Products facility located at 7311 East 41st Street in Tulsa, Oklahoma. This document has been prepared to specifically address the remediation of the affected portions of the 14-acre "Pond Parcel" at the facility. This parcel is divided into three parts--the unaffected former Freshwater Pond area to the west (approximately 4 acres), the affected Retention Pond/Reserve Pond area to the east (approximately 9 acres), and the area containing the Flux Building and paved area (approximately 1 acre). The known affected area covers approximately 10 acres east of the former Freshwater Pond eastern embankment. The remediation of the 3.5-acre land area of the facility known as the "former operational area" is addressed in the May 2002 (Revised May 2003) Decommissioning Plan Addendum (DPA).

This DP has been designed to address remediation of thorium dross and contaminated soil known to be present on the site. Moreover, this plan is based upon available information and existing conditions. Modifications to the DP may be made as new information becomes available and/or as dictated by practical engineering design and construction considerations. Changes in the DP that do not result in more than a minimal reduction in the protectiveness of the remedy will be documented and/or included in procedures developed to support plan implementation.

The Kaiser plant in Tulsa, Oklahoma was built by the Standard Magnesium Corporation (SMC) in the early to mid-1950s to manufacture magnesium products. Kaiser purchased the facility in 1964. SMC received a source materials license (C-4012) from the Atomic Energy Commission (AEC) in March 1958 to receive possession and title to magnesium-thorium alloy (a thorium metal) with up to 4 percent thorium content for processing. Historical operations at the facility included the smelting of scrap magnesium alloy for the production of anodes. Scrap magnesium-thorium alloy was smelted, along with other magnesium materials, to recover the magnesium. Thorium alloy material comprised a small fraction of the total magnesium refined on site. Licensed operations involving the recovery of magnesium-thorium alloy began in 1958 and continued through 1970. Magnesium refining operations continued at the facility until approximately 1985. Aluminum replaced magnesium in smelting and anode manufacture, and the plant continued operating until the 1997-1998 time frame.

The scrap magnesium alloy refining process consisted of placing the material into large melting pots, heating the material until molten, and then siphoning off the pure magnesium. Impurities from the mixture, including thorium, separated from the magnesium. This residue material was removed, allowed to cool, and crushed. The crushed material was returned to the heating pots for a second recovery process. Once refined, the metallic dross residue material was crushed and disposed on site.

The quantity of material SMC and later Kaiser were authorized to possess at one time was amended from time to time, but generally was limited to 30,000 pounds of magnesium-thorium alloy containing no more than 4 percent thorium. There appears to be no records indicating the actual quantity of material that was on site at any give time. A thorium percentage by weight of approximately 4 would equal approximately 4,400 picocuries per gram (pCi/g).

Extensive site characterization activities have been conducted since 1994 within the 14.0-acre land area of the facility known as the pond parcel. These characterization activities have indicated the presence of residual radioactive material within a 10-acre portion of the pond parcel. The radioactive material identified within this portion of land is a thorium-bearing dross containing the isotopes Th-232, thorium-230 (Th-230), and thorium-228 (Th-228). No elevated uranium has been detected. Th-228 and Th-232 have been determined to be in secular equilibrium. In addition, a ratio of Th-230-to-(Th-232+Th-228)/2 of 3.5 has been calculated based on characterization data. Approximately 95 percent of the material on site has a concentration of Th-232 between 3.1 and 120 pCi/g.

The affected portion of the parcel contains the Retention Pond and former Reserve Pond area. The unaffected portion of the pond parcel contains a former Freshwater Pond area. This DP was prepared to address the decommissioning of the pond parcel land area. The pond parcel land area considered for remediation is bounded by the south fence line, the former Freshwater Pond embankment on the west, Fulton Creek ditch on the north, the east fence line, and the northern and eastern edges of the flux building and paved area. A central feature of this area is the Retention Pond and associated embankments. Thorium-bearing dross was present on land adjacent to current Kaiser property along the east and south fence lines and represented the margins of the material. Kaiser has remediated this land by excavation and storing affected soil within the pond parcel. Affected soil generated during remediation of the adjacent land is considered as part of the on-site decommissioning.

During the evaluation and screening of possible remediation alternatives, data from past characterization studies were used to develop isoconcentration maps to clarify spatial distribution of thorium levels in

soils. Kriging, a geostatistical technique, was utilized to accomplish this purpose and to develop volume estimates.

Having developed an understanding of the spatial distribution of thorium, the RESRAD model was used to calculate a preliminary Derived Concentration Guideline Level ($DCGL_W$). The $DCGL_W$ (3 pCi/g) was calculated to correspond with the basic dose limit criterion of 25 millirem per year (mrem/yr). Derivation of the $DCGL_W$ incorporated the Unity Rule which assures that cumulative doses from Th-232, Th-230, and their daughter products do not result in a total dose that exceeds the basic dose limit. The $DCGL_W$ was used to develop a conservative (high) estimate of the volume of impacted soil potentially requiring remediation. This upper bound estimate did not take into account the presence of natural background or the impact of restoring the site to grade subsequent to remedial excavation. Upper bound estimates were utilized in initial screening evaluations.

The purpose of this DP and the May 2002 DPA (Revised May 2003) is to decommission the facility safely and meet the NRC requirements for unrestricted use: residual radioactivity distinguishable from background will not result in a total effective dose equivalent (TEDE) to an average member of a critical group that exceeds 25 mrem/yr. In this DP, the critical group for evaluating unrestricted site release is the resident farmer. Additionally, implementation of this DP and the May 2002 DPA (Revised 2003) will reduce residual radioactivity to levels that are as low as reasonable achievable (ALARA).

The remediation alternative chosen for implementation requires excavating material with a net thorium-232 (Th-232) activity concentration greater than the established $DCGL_w$ of 3.0 picocuries per gram (pCi/g), based on a dose limit criterion of 25 mrem/yr. Material with Th-232 activity concentrations greater than 31.1 pCi/g will be segregated and disposed off site as either exempt or nonexempt material at a permitted facility. Material with activity concentrations less than 31.1 pCi/g Th-232 will be placed in the pond parcel excavation as backfill. The average Th-232 content of the below-criteria material is estimated to be 7 pCi/g. A layer of clean soil obtained from an off-site source will be placed over the below-criteria fill and graded in a manner to direct drainage away from the site, after which the site will be revegetated.

A current version of the RESRAD computer code (Version 6.0) was used to conduct the dose evaluations. Deterministic simulations were performed that required the assignment of single-value inputs to each of the model parameters. Site-specific values were assigned to model input parameters to the extent possi-

ble. The primary critical group evaluated was the resident farmer. An alternative residential scenario that assumes gardening rather than farming also was evaluated.

A modified version of NRC's dual simulation approach was utilized for the residential scenarios such that dose contributions from water-independent and water-dependent pathways were modeled separately. Generally, NRC's dual simulation approach assumes that under the residential scenario, a house is constructed atop the cover over the subsurface affected zone. Excavation of the foundation to a depth of 3 meters (m) is assumed to penetrate the affected zone with some of it being brought to the surface, mixed with cover material, and spread over the ground. However, for this DP, engineering designs based on postremediation site regrading and the need for topographic relief results in a layer of clean soil backfill that exceeds the 3-m depth of the foundation; therefore, no intrusion into the affected zone occurs and, therefore, adaptation of the dual simulation approach to better describe expected site conditions was necessary. In accordance with NRC's approach, the modified dual simulation entails modeling of water-independent pathways (Dual Simulation 1) separate from water-dependent pathways (Dual Simulation 2); however, Dual Simulation 1 is modified to account for gamma exposures both at the ground surface and from inside the basement.

Maximum total dose was used in reporting deterministic results in accordance with NUREG/CR-1727. For the resident farmer and gardener, doses of 0.276 and 0.261 mrem/yr were estimated respectively. Further analysis indicates that water-independent pathways (including both external gamma pathways) contributed negligibly to the total dose which is driven predominantly by drinking water ingestion of Th-230.

The remediation method that Kaiser will use to achieve the decommissioning goal is described in Chapters 5.0, 6.0, and 8.0 of this plan. As previously discussed, implementation results in off-site disposal of all material with Th-232 concentrations greater than 31.1 pCi/g as exempt material. This cutoff concentration was selected because (1) dose evaluations using the resident farmer as the critical group have demonstrated that the remaining average concentrations result in a dose significantly less than the 25 mrem/yr dose criteria established by NRC, and (2) the average concentration of material to be disposed off site will meet the definition of exempt material (less than 0.05 wt percent thorium), thereby greatly reducing disposal costs.

An ALARA analysis was conducted which demonstrated that the planned action is ALARA in accordance with NUREG 1727 in that the removal of additional soils/material is not cost beneficial. The

ALARA analysis was performed by comparing dose and cost of the planned action with the cost benefits of incremental soil removal to further reduce dose.

Kaiser has completed some site modification activities prior to undertaking the decommissioning project described in this plan. The most significant modifications related to closure of the Freshwater Pond which included the backfilling of the pond, the construction of an engineered channel to redirect the headwaters of Fulton Creek, and modification of the existing channel north of the Retention Pond.

During remediation, the site will be excavated to depths up to 15 to 20 feet and to an average depth estimated at 12 feet across most of the Retention and Reserve ponds. Excavation activities probably will not be conducted during winter months. Approximately 4,000,000 cubic feet (ft^3) of clean off-site soil will be used to backfill excavations. The minimum thickness of the clean fill layer will be 9.84 feet. The site will be graded and vegetated to minimize soil erosion and promote positive drainage.

Once the site is remediated to acceptable levels, it will be cleared through a MARSSIM-directed final status survey. Most likely, this will be conducted in stages where certain units will be cleared and backfilled as excavation occurs in other areas.

Upon approval of this DP and the May 2002 DPA (Revised 2003) by the Nuclear Regulatory Commission (NRC), Kaiser will undertake preparation of designs and specifications. Subsequently, a construction contractor will be selected. Kaiser may choose to develop performance specifications and require the contractor to develop design details. Alternatively, Kaiser may opt to develop detailed designs/specifications. In either case, preconstruction activities for both this DP and the May 2002 DPA (Revised 2003) are expected to take approximately 9 months.

Construction activities will probably not be conducted during the months of December through February. Therefore, remediation is anticipated to begin in March following completion of the design/contractor selection tasks and extend over a period of approximately 3 years. A detailed schedule will be prepared subsequent to NRC approval of the DP. This schedule will be updated as circumstances dictate.

Kaiser is seeking approval of this DP to authorize the activities described herein and NRC concurrence that if this plan is implemented as described, it will result in the property being suitable for unrestricted use. However, this remediation plan is premised on current knowledge of site conditions, regulatory guidance, and disposal market factors. If unforeseen circumstances result in significant changes in the

economics or feasibility of implementation of the proposed remedial action, Kaiser may find it necessary to reconsider other alternatives.

2.0 Facility Operating History

This chapter focuses on the facility operating history relative to the 14-acre "Pond Parcel" area. Supplemental information relative to the "former operational area" of the facility is provided in the May 2002 DPA (Revised May 2003).

2.1 Licensing Number/Status/Authorized Activities

No licensed activities are currently conducted at this site, nor have any licensed activities been conducted at the site since 1971.

2.2 License History

The Kaiser plant in Tulsa, Oklahoma was built by the SMC in the early to mid-1950s to manufacture magnesium products. Kaiser purchased the facility in 1964. SMC received a source materials license (C-4012) from the AEC in March 1958 to receive possession of and title to magnesium-thorium alloy (a thorium metal) with up to 4 percent thorium content for processing. Historical operations at the facility included the smelting of scrap magnesium alloy for the production of anodes. Scrap magnesium-thorium alloy was smelted, along with other magnesium materials, to recover the magnesium. Thorium alloy material comprised a small fraction of the total magnesium refined on site. Licensed operations involving the recovery of magnesium-thorium alloy began in 1958 and continued through 1970. Magnesium refining operations continued at the facility until approximately 1985. Aluminum replaced magnesium in smelting and anode manufacture, and the plant continued operating until the 1997-1998 time frame.

License C-4012 was superceded by License STB-472 in November 1961. License STB-472 was amended in June 1968 to add uranium to the list of authorized materials, but there is no record that uranium-bearing materials were ever received on site. The AEC license was terminated in 1971 by the AEC at Kaiser's request. At the time, Kaiser stated that it had not processed magnesium-thorium alloy in the past year.

The scrap magnesium alloy refining process consisted of placing the material into large melting pots, heating the material until molten, and then siphoning off the pure magnesium. Impurities from the mixture, including thorium, separated from the magnesium. This residue material was removed, allowed to cool, and crushed. The crushed material was returned to the heating pots for a second recovery process. Once refined, the metallic dross residue material was crushed and disposed on site.

The quantity of material SMC and later Kaiser were authorized to possess at one time was amended from time to time, but generally was limited to 30,000 pounds of magnesium-thorium alloy containing no more than 4 percent thorium. There appears to be no records indicating the actual quantity of material that was on site at any give time. A thorium percentage by weight of approximately 4 would equal approximately 4,400 picocuries per gram (pCi/g). One biased sample of a unique dross material (wrapped in plastic) taken in the area of the original Smelter Building during radiological characterization survey activities in February 2002 contained a Th-232 concentration of 6,429 pCi/g. This elevated concentration is most likely the result of magnesium recovery process, which removed magnesium mass from the scrap feed material. The removal of magnesium during the process would have decreased the mass of the material, thereby increasing the concentration of Th-232 in the dross residue. Consequently, Th-232 concentrations in dross could have been increased above the 4 percent by weight limit for the scrap feed material. However, thorium alloy material only comprised a small fraction of the total magnesium refined, and records indicate that thorium-bearing materials were generally only a small fraction (5 percent) of each production batch; consequently, it is not surprising that most samples were found to have concentrations well below 4 percent by weight. As indicated in Table A-2, 95 percent of the material on site has a concentration of Th-232 between 3.1 and 120 pCi/g.

Structures known to have been used to process thorium-bearing materials included the Smelter Building, the Crusher Building, and the Slag Storage Building. The smelting of magnesium alloy for purification occurred in the Smelter Building resulting in a thoriated metallic "dross" residue material. The Smelter Building was demolished in October 2000, following completion of survey activities which indicated no detectable contamination within the building. Operations conducted within the Crusher Building included the crushing of the dross/slag residue material from the smelting operations in a second magnesium recovery step and/or prior to disposal. Waste dross was conveyed to disposal ponds (Retention and Reserve ponds) north of the manufacturing complex. The Crusher Building was razed and rebuilt in the early 1970s to accommodate aluminum smelting operations at the facility. The current structure identified as the Crusher Building was not used to process thoriated material. The Slag Storage Building, constructed circa 1964, was used for the storage of dross/slag residue materials prior to the second magnesium recovery step. The building was removed in 1977. From about 1977 until plant shutdown, the Crusher Building was utilized for smelting aluminum. Instrument surveys indicate the absence of radioactive contamination.

Available information does not indicate the use of subsurface piping systems or the sanitary sewer for the conveyance of radioactive material. The pumping station structure identified near the Retention Pond

was used to convey noncontact cooling water used in plant operations. Sections 3.1 and 4.2 of the May 2002 DPA (Revised May 2003) presents information on the limited amount of sanitary sewer lines, subsurface piping, and culverts which exists within the former operational area of the Tulsa facility. Figure 3A-4 of the May 2002 DPA (Revised May 2003) shows a layout of the subsurface piping and the sanitary sewer for the Tulsa facility. As shown in that figure, several sections of storm drain/subsurface water piping and plant process piping (associated with the pumping station) were encountered and removed during the Adjacent Land Remediation Project (ALRP).

Extensive characterization activities conducted since 1994 have established that Th-228, Th-230, and Th-232 are present in dross/soil residues on the Kaiser property. No elevated uranium has been detected. Th-228 and Th-232 have been determined to be in secular equilibrium. In addition, a ratio of Th-230-to-(Th-232+Th-228)/2 of 3.5 has been calculated based on characterization data reported by Advanced Recovery Systems/Nuclear Fuel Services, Inc. and data in the Earth Sciences' Adjacent Land Remediation Plan as well as the Earth Sciences Adjacent Land Remediation, Final Status Survey Report from 2002. Supporting technical documentation for the radionuclide ratios is provided as Appendix F.

The May 2002 DPA (Revised May 2003) was prepared and submitted to specifically address the approximate 3.5-acre land area of the Tulsa facility known as the former "operation area". The former "operational area" of the facility is defined as the triangular parcel of land north of 41st Street and south of the Union Pacific Railroad right-of-way in which plant processes and operations occurred (Figure 2). The former operational area currently houses several structures including the North Extrusion, Office, Maintenance, Warehouse, Crusher, and Crusher Addition buildings. The Flux Building, located to the northeast of the triangular parcel, is also included as part of the former operational area. The "land areas" of the former operational area consist mainly of land beneath concrete pavement.

A Historical Site Assessment (HSA) was performed during late 2001 for the former operational area of the former Kaiser Aluminum Specialty Products facility. The HSA was conducted as the first step toward decommissioning the former operational area at the facility. The objective of the HSA was to compile as much historical information as possible for the facility and, using the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidelines, categorize the land areas and structures of the former operational area of the facility as either impacted or nonimpacted.

The results of the HSA (Appendix A of the May 2002 DPA (Revised May 2003)) were used to design radiological survey efforts for the structures and land areas of the former operational area. The

recommended radiological extended scoping (nonimpacted structures) and characterization (impacted land areas) survey efforts were described in a work plan prepared by Earth Sciences (December 2001). The primary objectives of the extended scoping survey of the six structures was to verify their initial classification of "nonimpacted" during the HSA. The primary objectives of the characterization survey of the "impacted" land areas were to determine the nature and extent of residual radioactive materials within the former operational area and collect sufficient data to support evaluation of remedial alternatives and technologies for the impacted land areas of the former operational area. The radiological survey efforts were completed during the months of January and February 2002. Results of the radiological survey efforts are presented Section 4.1 of the May 2002 DPA (Revised May 2003).

2.3 Site Development and Utilization

Kaiser was not able to locate records showing the quantities and location of dross disposal. Aerial photographs documenting site development from the 1940s to 1991 have been presented and discussed elsewhere (A&M Engineering and Environmental Services, Inc. [A&M Engineering], July 1999; Roberts/Schornick & Associates [R/S&A], 1996). These images show prefacility (1940s to early 1950s) features consisting of the Freshwater Pond plus two smaller ponds immediately downstream in a low marshy area fed by ephemeral streams. Water drained from the Freshwater Pond through a pipe at the center of the embankment. An overflow spillway was located at the south end of the embankment dam, near the railroad right-of-way.

By 1950, the small downstream ponds had been merged into a single pond by constructing embankments along the east and north sides of the pond area. Water was released from this "east" pond through a ditch at the north side of the pond embankment, although a seepage area was identified at the east side of the pond. A December 1950 image indicates that the Freshwater Pond's spillway exited to the southeast and approached very close to the railroad right-of-way (within approximately 25 feet) before turning northeast toward the downstream ponds. By 1964, the Freshwater Pond flow had been diverted to an excavated ditch (now called Fulton Creek) at the north end of the embankment, constructed along the north edge of the pond parcel.

Magnesium-processing facilities constructed by SMC in the early to mid-1950s are shown in a July 1958 aerial photograph. This image shows a small operation that, in a subsequent October 1964 aerial photograph, was considerably changed and expanded. Utilization of the pond parcel is not evident in the July 1958 aerial photograph and there are no indications of construction, roads, or dumping in the pond area. Between the 1958 and 1964 images, a serious fire is reported to have occurred at the old smelter. It is

unknown if the fire spread to other structures elsewhere on site. Newer site structures observed in the 1964 photograph may be the result of a rebuilding, plant growth, or a combination.

By October 1964, the pond parcel had been modified with the construction of the Flux Building and significant adjustments to the pond embankment. A large debris pile was present between the Retention Pond and the railroad embankment. Changes to the east fence line suggest that approximately 3.5 acres of land along the east property line had been sold and commercial-industrial buildings constructed on what have since become known as the Specific Systems and Red Man Pipe and Supply Co. (Red Man) properties to the east. A 1965 photograph indicates that part of the 3.5 acres was reacquired and the Reserve Pond constructed on this land. In addition, the eastern property line, shared with Specific Systems, had been moved to the west, and the land paved over into a parking/loading area. This resulted in a westward shift of the Retention Pond embankment by about 40 to 50 feet.

By September 1965, much of the debris area had been regraded, the Retention Pond boundaries expanded to the north, the Reserve Pond constructed, and a paved area established west of the Flux Building. In addition, a series of new industrial-commercial buildings was being added northeast of the pond parcel. By 1972, the Reserve Pond was being backfilled. New or modified plant structures appeared at and adjacent to the crusher in the 1979 photograph. Continued development was evident around the site in 1979 with the influx of light industrial and commercial facilities. By 1990, all adjacent land had been developed.

Disposal of dross to the Retention and Reserve ponds was accomplished by hauling material to the parcel and dumping into the ponds. The ponds also received cooling water from plant operations south of the railroad. It appears that other low spots in this parcel also received waste material including the spillway area adjacent to the railroad right-of-way. Distribution of dross deeper in the subsurface correlates reasonably well with the older pond limits. The thorium concentration for on-site material ranges from approximately 2 pCi/g to 416 pCi/g for Th-232 + Th-228. Figure 2-1, Site Plan, illustrates the historical lay out of the plant as well as the pond areas and adjacent properties.

Additional Site Characterization Activities (ASCA) activities were conducted during mid-2001. The ASCA included a hazardous waste determination for the thorium-bearing dross material to be excavated during remediation and an assessment of an area of the site historically identified as a debris pile. Results of the Toxicity Characteristic Leaching Procedure (TCLP) testing of ten samples of thorium-bearing dross collected from test pit excavations during the characterization indicated that the material is nonhazardous.

As for the former debris pile area, seven exploratory test trench excavations were advanced at biased locations based on aerial photograph interpretations and field observations. Five of the seven test trench excavations revealed the presence of a significant amount of debris material (concrete, scrap steel, rebar, wood, plastic, wires, cables, and rubber belts) intermixed with soil and licensed material (dross). Exposure rate readings acquired during the test trenching ranged from 11 μR/hr to 160 μR/hr. Surface contamination levels were not assessed on debris identified during the excavation of test trenches in the former debris pile area. Debris buried within the dross and soil mixture are generally not potential candidates for clearance surveys due to the possibility of volumetric contamination and inaccessible surfaces. These materials will be size reduced to meet the applicable disposal facility waste acceptance criteria. Clearance surveys may be performed if large, nonporous, solid debris with only surface contamination are uncovered during residue excavation. In this case, clearance surveys for total and loose alpha will be performed on the debris to ensure that released items are released in accordance with the NRC Fuel Cycle Policy and Guidance Directive FC 83-23.

2.4 Previous Decommissioning Activities

Over time, certain portions of the original SMC property were transferred to other entities. Consequently, some contamination existed on property adjacent to current Kaiser property boundaries. The NRC detected surface contamination around the site in 1993 and subsequently in off-site areas adjacent to the pond parcel. Although no human health risk was reported from either on-site or off-site contamination, the Retention Pond area was placed on the NRC's Site Decommissioning Management Plan. Characterizations of the pond area and areas adjacent to the south and east property boundaries subsequently were performed in accordance with procedures described in NUREG/CR-5849. Predecommissioning conditions of the adjacent land property are summarized in reports by ADA Consultants, Inc. (ADA), March 1999; ADA, undated; B. Koh & Associates, Inc. (B. Koh), May 1998; and B. Koh, November 1999; and depicted in Figure 2-2.

Kaiser prepared and submitted to the NRC an Adjacent Land Remediation Plan. This plan was approved by the NRC on April 4, 2000. Kaiser conducted off-site remediation and subsequent final status surveys from October 2000 through May 2001. Contamination of the adjacent properties was found to occur at the ground surface and to reach depths of up to 15 feet with contamination levels ranging from sample MDA to approximately 365 pCi/g Th-232. More than 91 percent of the samples obtained during characterization activities for the ALRP contained less than 10 pCi/g Th-232 and 95 percent of the samples contained less than 20 pCi/g Th-232. Contaminated materials that were encountered during the remediation process consisted mostly of soil and soil-like materials. In addition to the soil and soil-like materials,

impacted piping, drainage channels, and culverts were encountered during the ALRP project (see Section 3, Figure 3A-4 of the May 2002 DPA (Revised May 2003).

The extent of the contamination was limited to the following properties: Union Pacific Railroad right-of-way, northwest corner of Specific Systems (formerly Unarco) property, along Fulton Creek on the Bee-jay, Inc. property, north of the north extrusion building, north of the Smalley Equipment property, and adjacent to the Red Man (formerly Premier) property. Contamination also was found along the north side of East 41st Street, between the roadway and the Kaiser building. In addition, contamination was found south of Kaiser's Flux Building, outside the Retention Pond property fence, and on Kaiser property between the building and the Union Pacific Railroad property.

During the course of the adjacent land remediation project, a buried spillway structure was uncovered southwest of the Retention Pond (Figure 2-3). Although this lies primarily on the pond parcel, its southern extremity extends onto the Union Pacific Railroad right-of-way. Decommissioning of the entire buried structure will be included in the current decommissioning effort.

Remediation was performed in the adjacent land areas to achieve unrestricted release. Field surveys were performed to guide remediation activities that, in this case, primarily involved excavating affected soil (and piping, culverts, etc.) and moving it onto Kaiser's property. A final status survey was performed following completion of remediation/excavation in each discrete affected survey grid to demonstrate that radiological conditions satisfy criteria for unrestricted release. Following successful remediation, excavations were backfilled.

The Final Status Survey Report (FSSR) was prepared and submitted to the NRC. The extent of the remediation activities completed on adjacent properties is depicted in Figure 2-4 which is an updated map of the actual areas that were excavated. Calculations indicated that the total residual Th-232 activity above the average background in soil postremediation for the adjacent land area is approximately 3.27×10^{10} pCi. In a letter dated March 7, 2002, the NRC provided Kaiser with a determination that the remediated adjacent properties met the criteria for unrestricted release. Further details concerning the ALRP project are contained in FSSR for the Tulsa facility. Section 2.4 of the May 2002 DPA (Revised May 2003) provides a summary description of previous predecommissioning and decommissioning activities performed at the Tulsa facility including the radiological survey and deconstruction of the Smelter Building and the adjacent land remediation project. Section 4.1 of the May 2002 DPA (Revised May 2003) also provides details on previous radiological survey activities of existing site structures.

2.5 Spills

No spills or uncontrolled releases of chemical or radiological materials are known to have occurred at the site.

2.6 Prior On-Site Burials

Kaiser's predecessor, SMC, received an AEC source material license in 1958. The Kaiser AEC license STB-472 was terminated in 1971. Based on the HSA as documented in the May 2002 DPA (Revised May 2003) (Appendix A), it appears that early disposal of licensed materials in the Reserve Pond was performed under the guidance of 10 Code of Federal Regulations (CFR) Part 20.304. These materials will be excavated, segregated, and processed during the planned decommissioning activities. Records do not indicate that licensed material was handled under the provisions of either 10 CFR Part 20.302 or NUREG 1101.

The large majority of dross disposed on site is expected to be limited to the Retention and Reserve ponds. Material was placed in these areas by hauling to the parcel and dumping into the ponds. The ponds also received cooling water from plant operations south of the railroad. It appears that other low spots in this parcel also received waste material including the spillway area adjacent to the railroad right-of-way. Distribution of dross deeper in the subsurface correlates reasonably well with the older pond limits. Concentrations of thorium in the on-site material were calculated using both on-site and off-site data. On-site concentrations have been calculated by kriging, using data generated by Advanced Recovery Systems (ARS) (1995). The thorium concentration for on-site pond parcel material ranges from approximately 2 pCi/g to 416 pCi/g for Th-232 + Th-228. Figure 2-3 illustrates the boundaries of the two ponds.

References

1. ADA Consultants, Inc., March 1999, Adjacent Land Characterization, Kaiser Aluminum Specialty Products, Appendix A, Estimate of Volume of Off-Site Contaminated Soil, Adjacent Land Characterization Report, Baton Rouge, Louisiana.

2. ADA Consultants, Inc., Addendum to Adjacent Land Characterization, Baton Rouge, Louisiana.

3. Advanced Recovery Systems/Nuclear Fuel Services, Inc., April 25, 1995, Kaiser Aluminum Specialty Products, Field Characterization Report, Tulsa, Oklahoma.

4. Advanced Recovery Systems, 1995, Volume II, Plate 1, Field Characterization Report, Appendix F.

5. A&M Engineering and Environmental Services, Inc., July 1999, Hydrologic and Geologic Investigation, Kaiser Aluminum Specialty Products, Tulsa, Oklahoma.

6. B. Koh & Associates, Inc., May 1998, Characterization Survey, Kaiser Aluminum & Chemical Corporation, Tulsa, Oklahoma, Revision 0.

7. B. Koh & Associates, Inc., November 1999, Supplementary Radiological Characterization Survey, Kaiser Aluminum & Chemical Corporation, Tulsa, Oklahoma, Revision 1.

8. Earth Sciences, October 2001, Additional Site Characterization Activities, Former Kaiser Aluminum Specialty Products Facility, Tulsa, Oklahoma, Kaiser Aluminum & Chemical Corporation, Baton Rouge, Louisiana.

9. Earth Sciences, December 2001, Historical Site Assessment, Operational Area, Former Kaiser Aluminum Specialty Products Facility, Tulsa, Oklahoma, Kaiser Aluminum & Chemical Corporation, Baton Rouge, Louisiana.

10. Earth Sciences, December 2001, Work Plan, Characterization Survey of the Operational Area, Former Kaiser Aluminum Specialty Products Facility, Tulsa, Oklahoma, Kaiser Aluminum & Chemical Corporation, Baton Rouge, Louisiana.

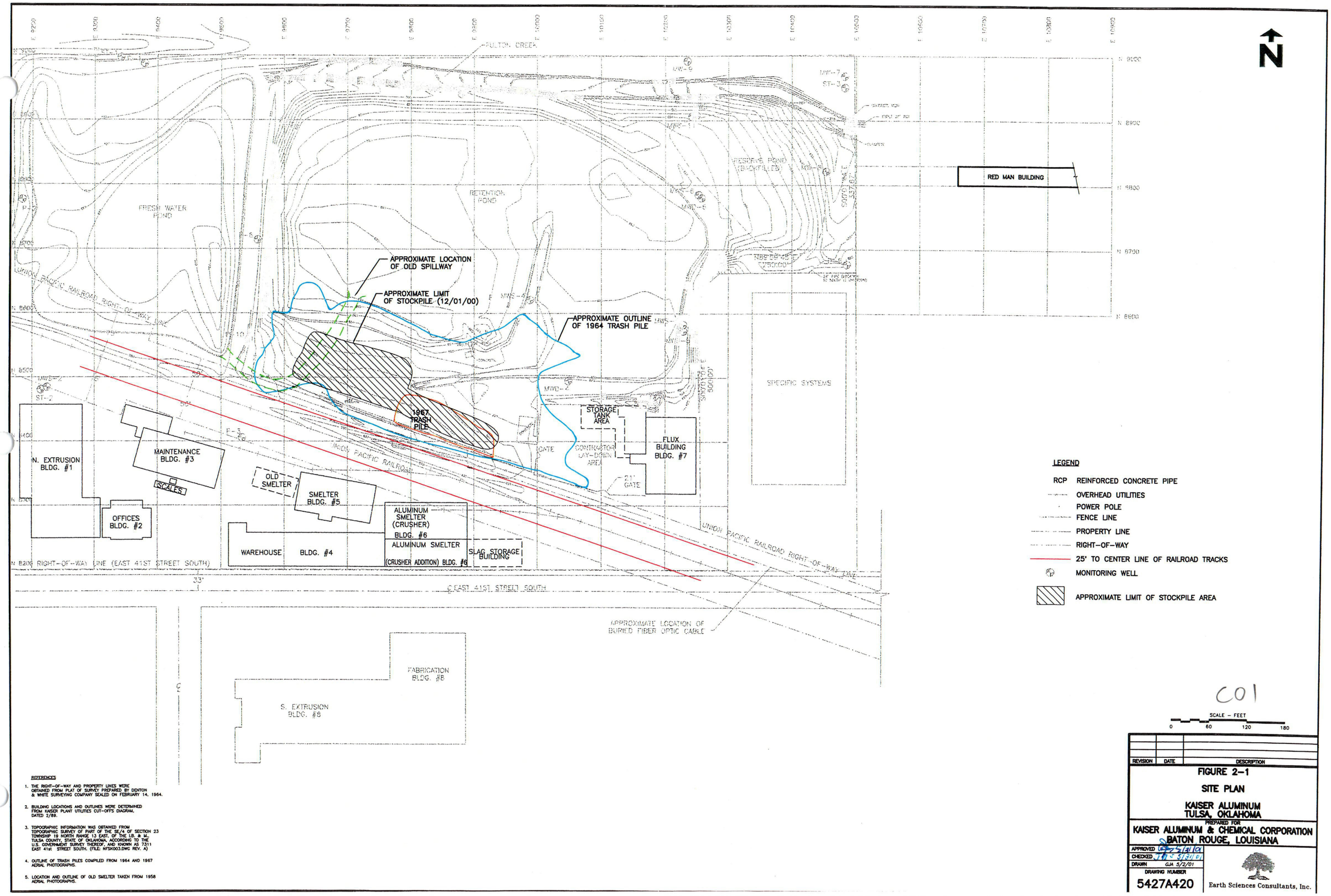
11. Earth Sciences, February 2002, Final Status Survey Report, Adjacent Land Area, Tulsa, Oklahoma Facility.

12. Earth Sciences Consultants, Inc., May 2002, Revised May 2003, Decommissioning Plan Addendum, Tulsa Facility, Tulsa, Oklahoma, Kaiser Aluminum & Chemical Corporation, Baton Rouge, Louisiana.

13. Kaiser Aluminum Specialty Products, August 1998, Adjacent Land Remediation Plan for Kaiser Aluminum & Chemical Corporation, Tulsa, Oklahoma.

14. NUREG/CR-5849, Manual for Conducting Radiological Surveys in Support of License Termination (June 1992).

15. Roberts/Schornick & Associates, March 20, 1996, Local and Regional Environmental Data Report, Kaiser Aluminum Specialty Products, Tulsa, Oklahoma.



C01

REFERENCES

1. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM PLAT OF SURVEY PREPARED BY DENTON & WHITE SURVEYING COMPANY SEALED ON FEBRUARY 14, 1964.
2. BUILDING LOCATIONS AND OUTLINES WERE DETERMINED FROM KAISER PLANT UTILITIES CUT-OFF'S DIAGRAM, DATED 2/89.
3. TOPOGRAPHIC INFORMATION WAS OBTAINED FROM TOPOGRAPHIC SURVEY OF PART OF THE SE/4 OF SECTION 23 TOWNSHIP 19 NORTH RANGE 13 EAST, OF THE I.B. & M., TULSA COUNTY, STATE OF OKLAHOMA, ACCORDING TO THE U.S. GOVERNMENT SURVEY THEREOF, AND KNOWN AS 7311 EAST 41st STREET SOUTH. (FILE: NFSK003.DWG REV. A)
4. OUTLINE OF TRASH PILES COMPILED FROM 1964 AND 1967 AERIAL PHOTOGRAPHS.
5. LOCATION AND OUTLINE OF OLD SMELTER TAKEN FROM 1958 AERIAL PHOTOGRAPHS.

REVISION	DATE	DESCRIPTION

FIGURE 2-1

SITE PLAN

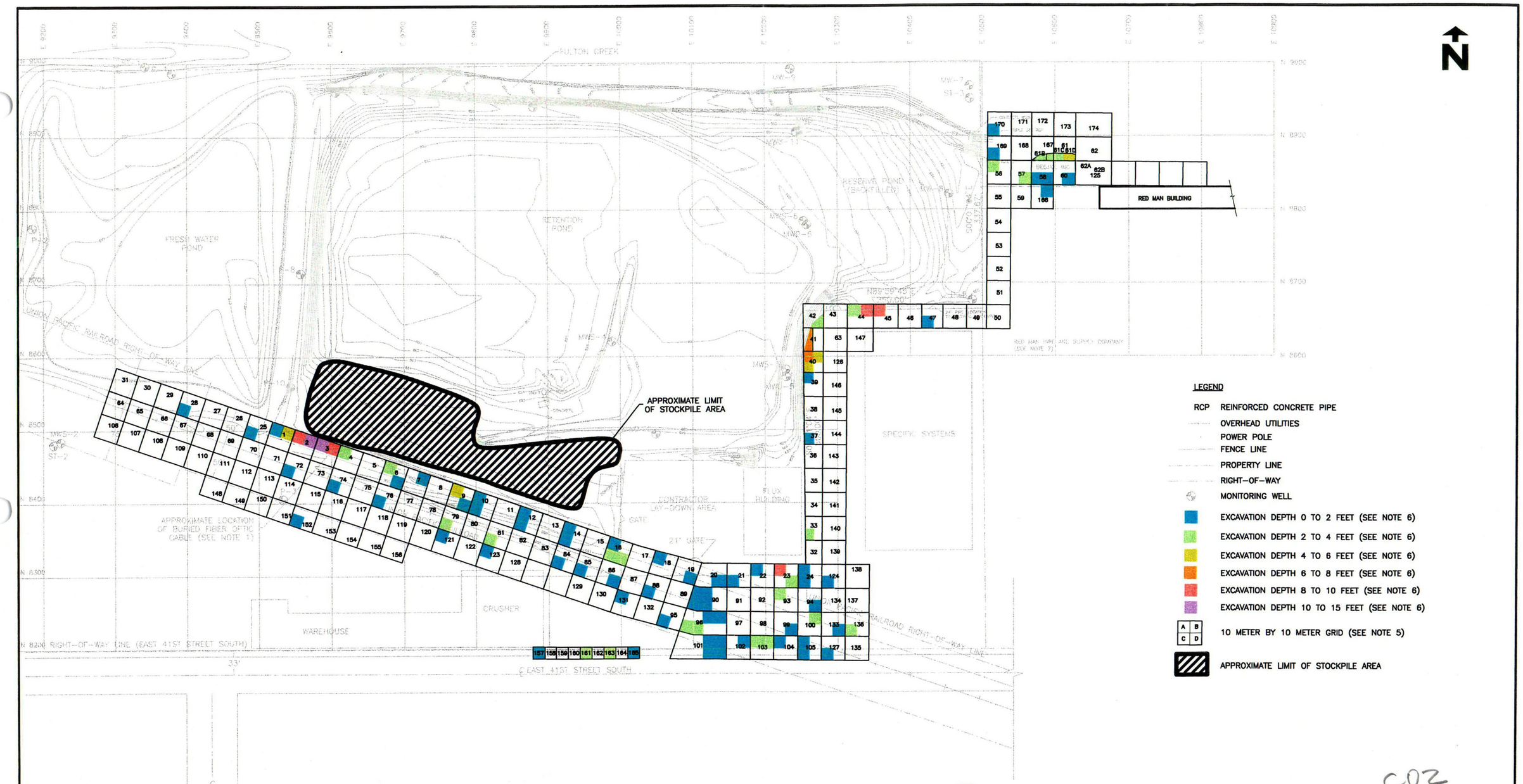
KAISER ALUMINUM
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED 5/2/01
CHECKED 5/2/01
DRAWN GJA 5/2/01

DRAWING NUMBER
5427A420

Earth Sciences Consultants, Inc.



LEGEND

- RCP REINFORCED CONCRETE PIPE
- OVERHEAD UTILITIES
- POWER POLE
- FENCE LINE
- PROPERTY LINE
- RIGHT-OF-WAY
- MONITORING WELL
- EXCAVATION DEPTH 0 TO 2 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 2 TO 4 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 4 TO 6 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 6 TO 8 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 8 TO 10 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 10 TO 15 FEET (SEE NOTE 6)
- A B / C D 10 METER BY 10 METER GRID (SEE NOTE 5)
- APPROXIMATE LIMIT OF STOCKPILE AREA

NOTES

1. SPRINT FIBER OPTIC CABLE IS LOCATED UNDERGROUND. THE LOCATION HAS BEEN FLAGGED AND SPRAY PAINTED ORANGE. FOR ADDITIONAL INFORMATION CALL 1-800-521-0579.
2. INFORMATION SHOWN MAY NOT BE COMPLETE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES (ABOVE GROUND AND BELOW GROUND) AND OTHER INTERFERENCES WHICH MAY AFFECT THE WORK.
3. THE CONTRACTOR SHALL PAY FOR ALL COSTS TO REPAIR OR TO REPLACE MONITORING WELLS DAMAGED DURING REMEDIATION.
4. THE EXCAVATION DEPTHS SHOWN WERE OBTAINED BASED ON INFORMATION PRESENTED IN SECTION 1.3 OF THE PERFORMANCE SPECIFICATIONS.
5. SURVEY DATA FOR 10 METER BY 10 METER GRIDS CAN BE OBTAINED FROM APPENDIX E OF THE PERFORMANCE SPECIFICATIONS. LOCATIONS FOR GRIDS 157-165 ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
6. REFER TO TABLE 1 OF THE PERFORMANCE SPECIFICATIONS FOR SPECIFIC QUARTER-GRID CONTAMINATION DEPTHS.
7. THE CONTRACTOR SHALL REFER TO SECTION 6.8 OF THE PERFORMANCE SPECIFICATIONS FOR COMPACTION SPECIFICATIONS FOR THE RED MAN PROPERTY. THE CONTRACTOR SHALL RESTORE DISTURBED SURFACES TO AT LEAST THEIR ORIGINAL LOAD BEARING CAPACITY DUE TO OPERATION OF HEAVY EQUIPMENT BY THE OWNER.

REFERENCES

1. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM PLAT OF SURVEY PREPARED BY DENTON & WHITE SURVEYING COMPANY SEALED ON FEBRUARY 14, 1964.
2. TOPOGRAPHIC INFORMATION WAS OBTAINED FROM TOPOGRAPHIC SURVEY OF PART OF THE SE/4 OF SECTION 23 TOWNSHIP 19 NORTH RANGE 13 EAST, OF THE I.B. & M., TULSA COUNTY, STATE OF OKLAHOMA, ACCORDING TO THE U.S. GOVERNMENT SURVEY THEREOF, AND KNOWN AS 7311 EAST 41st STREET SOUTH. (FILE: NFSK003.DWG REV. A)

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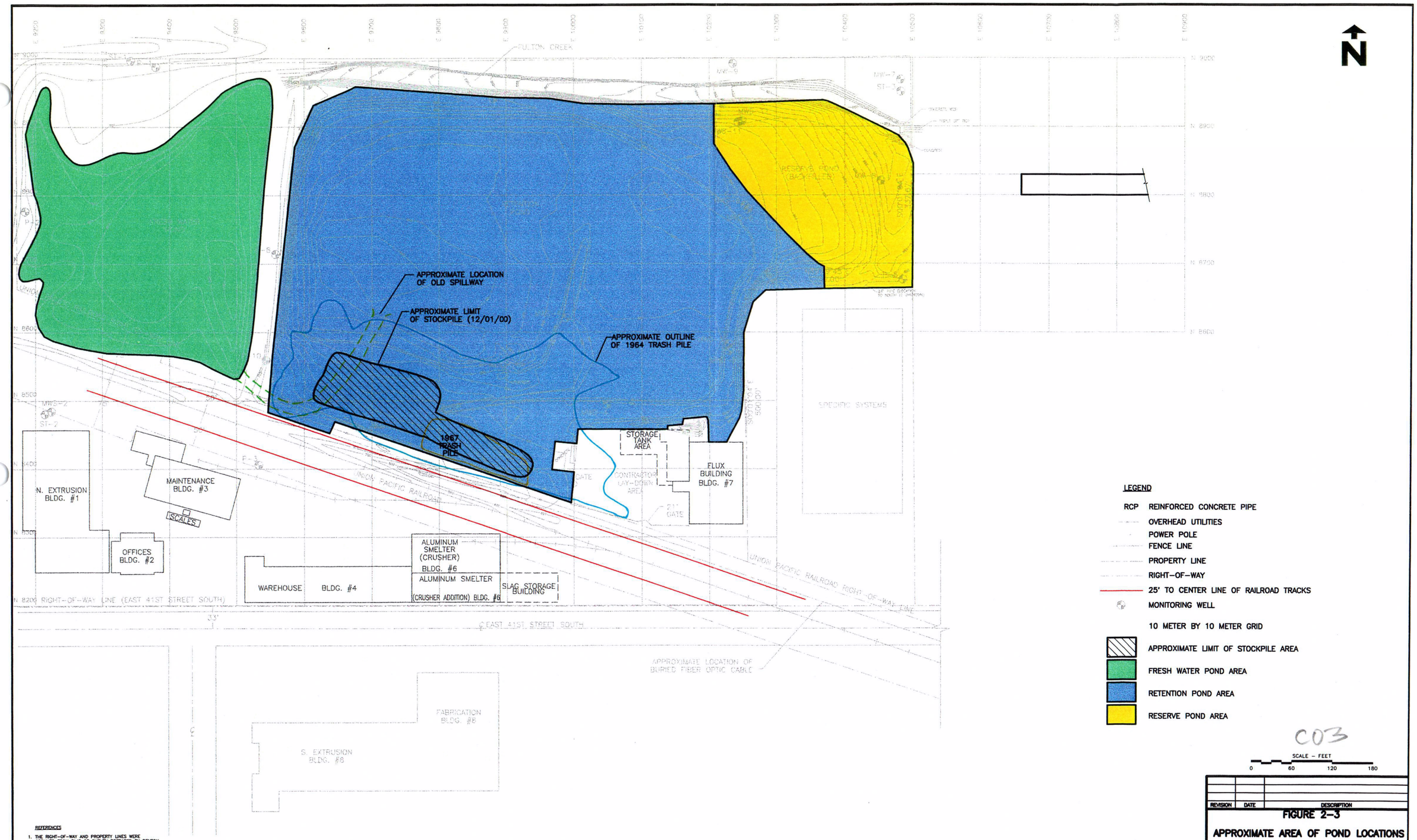
REVISION	DATE	DESCRIPTION

FIGURE 2-2
REMEDIATION PLAN
ADJACENT LAND AREA REMEDIATION
KAISER ALUMINUM
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED
CHECKED
DRAWN
DRAWING NUMBER
5427A402

Earth Sciences Consultants, Inc.



REFERENCES

1. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM PLAT OF SURVEY PREPARED BY DENTON & WHITE SURVEYING COMPANY SEALED ON FEBRUARY 14, 1964.
2. BUILDING LOCATIONS AND OUTLINES WERE DETERMINED FROM KAISER PLANT UTILITIES CUT-OFFS DIAGRAM, DATED 2/89.
3. TOPOGRAPHIC INFORMATION WAS OBTAINED FROM TOPOGRAPHIC SURVEY OF PART OF THE SE/4 OF SECTION 23 TOWNSHIP 19 NORTH RANGE 13 EAST, OF THE I.B. & M., TULSA COUNTY, STATE OF OKLAHOMA, ACCORDING TO THE U.S. GOVERNMENT SURVEY THEREOF, AND KNOWN AS 7311 EAST 41st STREET SOUTH. (FILE: NFSKO03.DWG REV. A)
4. OUTLINE OF TRASH PILES COMPILED FROM 1964 AND 1967 AERIAL PHOTOGRAPHS.
5. LOCATION AND OUTLINE OF OLD SMELTER TAKEN FROM 1958 AERIAL PHOTOGRAPHS.

REVISION	DATE	DESCRIPTION

FIGURE 2-3

APPROXIMATE AREA OF POND LOCATIONS

KAISER ALUMINUM
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

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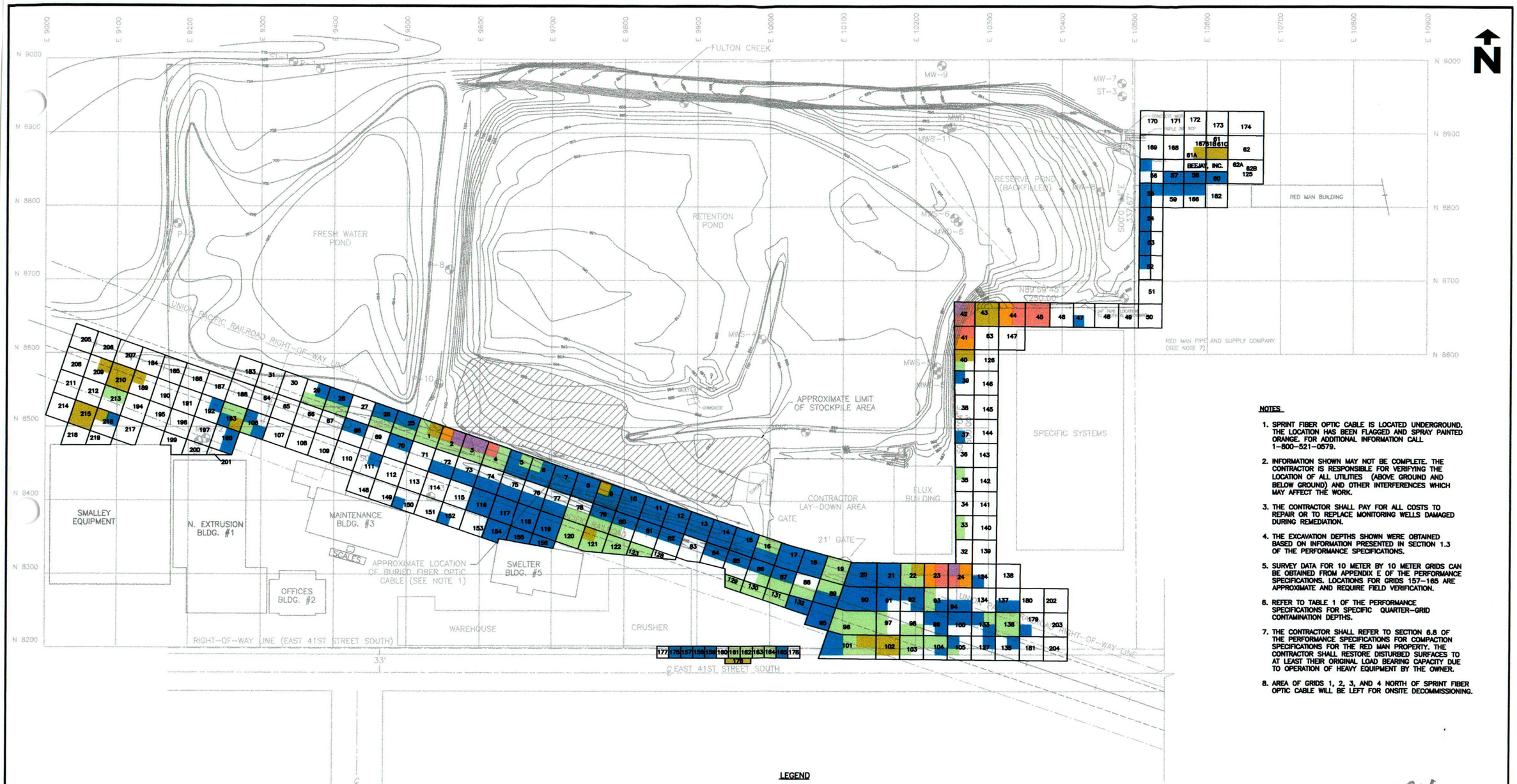

NOTES

1. SPRINT FIBER OPTIC CABLE IS LOCATED UNDERGROUND. THE LOCATION HAS BEEN FLAGGED AND SPRAY PAINTED ORANGE. FOR ADDITIONAL INFORMATION CALL 1-800-521-0579.
2. INFORMATION SHOWN MAY NOT BE COMPLETE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL UTILITIES (ABOVE GROUND AND BELOW GROUND) AND OTHER INTERFERENCES WHICH MAY AFFECT THE WORK.
3. THE CONTRACTOR SHALL PAY FOR ALL COSTS TO REPAIR OR TO REPLACE MONITORING WELLS DAMAGED DURING REMEDIATION.
4. THE EXCAVATION DEPTHS SHOWN WERE OBTAINED BASED ON INFORMATION PRESENTED IN SECTION 1.3 OF THE PERFORMANCE SPECIFICATIONS.
5. SURVEY DATA FOR 10 METER BY 10 METER GRIDS CAN BE OBTAINED FROM APPENDIX E OF THE PERFORMANCE SPECIFICATIONS. LOCATIONS FOR GRIDS 157-165 ARE APPROXIMATE AND REQUIRE FIELD VERIFICATION.
6. REFER TO TABLE 1 OF THE PERFORMANCE SPECIFICATIONS FOR SPECIFIC QUARTER-GRID CONTAMINATION DEPTHS.
7. THE CONTRACTOR SHALL REFER TO SECTION 6.8 OF THE PERFORMANCE SPECIFICATIONS FOR COMPACTION SPECIFICATIONS FOR THE RED MAN PROPERTY. THE CONTRACTOR SHALL RESTORE DISTURBED SURFACES TO AT LEAST THEIR ORIGINAL LOAD BEARING CAPACITY DUE TO OPERATION OF HEAVY EQUIPMENT BY THE OWNER.
8. AREA OF GRIDS 1, 2, 3, AND 4 NORTH OF SPRINT FIBER OPTIC CABLE WILL BE LEFT FOR ONSITE DECOMMISSIONING.

LEGEND

- RCP — REINFORCED CONCRETE PIPE
- OVERHEAD UTILITIES
- POWER POLE
- MONITORING WELL
- FENCE LINE
- PROPERTY LINE
- RIGHT-OF-WAY
- 25' OFFSET OF RAILROAD CENTER LINE
- SURVEY UNIT BOUNDARY
- A B / C D — 10 METER BY 10 METER GRID (SEE NOTE 5)
- APPROXIMATE LIMIT OF STOCKPILE AREA
- EXCAVATION DEPTH 0 TO 2 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 2 TO 4 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 4 TO 6 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 6 TO 8 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 8 TO 10 FEET (SEE NOTE 6)
- EXCAVATION DEPTH 10 TO 15 FEET (SEE NOTE 6)

REFERENCES

1. THE RIGHT-OF-WAY AND PROPERTY LINES WERE OBTAINED FROM PLAT OF SURVEY PREPARED BY DENTON & WHITE SURVEYING COMPANY SEALED ON FEBRUARY 14, 1964.
2. TOPOGRAPHIC INFORMATION WAS OBTAINED FROM TOPOGRAPHIC SURVEY OF PART OF THE SE/4 OF SECTION 23 TOWNSHIP 19 NORTH RANGE 13 EAST, OF THE I.B. & M., TULSA COUNTY, STATE OF OKLAHOMA, ACCORDING TO THE U.S. GOVERNMENT SURVEY THEREOF, AND KNOWN AS 7311 EAST 41st STREET SOUTH. (FILE: NFSK003.DWG REV. A)

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REVISION	DATE	DESCRIPTION

FIGURE 2-4
APPROXIMATE EXCAVATION EXTENT
ADJACENT LAND AREA REMEDIATION
KAISER ALUMINUM
TULSA, OKLAHOMA

PREPARED FOR
KAISER ALUMINUM & CHEMICAL CORPORATION
BATON ROUGE, LOUISIANA

APPROVED WPD 5/05
CHECKED CEB 5/05
DRAWN GJM 4/13/01
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