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PHASE I RFI/RI WORK PLAN FOR OPERABLE UNIT 8 700 AREA

VOLUME I - TEXT

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INFORMATION ONLY

DOCUMENT MODIFICATION REQUEST (DMR)

SAS 1/31/95

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1. Date	25.
1/18/95	DMR No. 95-DMR-ERM-0010

2. Existing Document Number/Revision	3. New Document Number or Document Number if it is to be changed with this Revision
21100-WP-OU8.01/Rev. 0	N/A
4. Originator's Name/Phone/Pager/Location	**5. Document Title**
Duane Craft/8757/5471/080	Environmental Restoration Program Phase I RFI/RI Work Plan Operable Unit No. 8 700 Area

6. Document Type ☐ Procedure ☒ Other Work Plan

7. Document Modification Type (Check only one)
☐ New ☐ Revision ☐ Intent Change ☒ Nonintent Change ☐ Editorial Correction ☐ Cancellation

8. Item	9. Page	10. Step	11. Proposed Modifications
1	Sec.2 6	2.3.2	At the end of this paragraph add: "Degreasing solvents which may have been stored in or adjacent to the organic solvent tank include carbon tetrachloride, petroleum distillates, benzene and dichloromethane paint thinner, 1,1,1-trichloroethane (TCA), and methyl ethyl ketone (MEK) (2-butanone). Solvent held in the carbon tetrachloride tank is used in Buildings 776 and 707."
2	Sec. 2 13	2.3.6	Make the last line in the last paragraph of this page read: "The reidentification of the site in the HRR is considered to be adequate for the 1976"
3	Sec. 2 40	2.4	At the end of the first paragraph add: "Based on experience including OU 1, it is apparent that professional judgment must be utilized in background comparison issues whether inferential (e.g. hypothesis testing) or comparative as this case is comparative. The environmental science literature is filled with reference to the variability in natural materials. For example, Dragun (1988) cites the

12. Justification (Reason for Modification, EJO #, TP #, etc.)

This DMR is being done to incorporate additional comments made to the Work Plan since its latest version, revise the Work Plan with new information, and to correct errors that have been found since the distribution of the final copy.

If modification is for a new procedure or a revision, list concurring disciplines in Block 13, and enter N/A in Blocks 14 and 15. If modification is for any type of change or a cancellation, organizations are listed in Block 13, then Concurror prints, and signs in Block 14, and dates in Block 15.

13. Organization	14. Print, Sign (if applicable)	15. Date (if applicable)
SME	Wayne A. Fuller	1/23/95
Proj. Mgr.	Wayne A. Fuller	1/23/95
QA	Robert M. Nilsson	1/23/95
	S Luker	1.23.95

16. Originator's Supervisor (print/sign/date)
Bruce D. Peterman Jan. 23, 1995 SAS

17. Assigned SME/Phone/Pager/Location	18. Cost Center	19. Charge Number	20. Requested Completion Date	21. Effective Date
Wayne Fuller/8759/5480/080	3113	989092	1/27/95	2/1/95

22. Accelerated Review? Yes ☒ No ☐ | 23. ORC Review: Not Req.

24. Responsible Manager (print,sign,date)
Wayne Fuller 1/23/95

REVIEWED FOR CLASSIFICATION / UCNI
BY _____
DATE _____

DMR (continuation sheet)

1/31/95

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25. DMR No. 95-DMR-ERM-0010

2. or 3. Document Number/Revision	5. Document Title
21100-WP-OU8.01/Rev. 0	Environmental Restoration Program Phase I RFI/RI Work Plan Operable Unit No. 8 700 Area

8. Item	9. Page	10. Step	11. Proposed Modifications
3	Sec. 2 40	2.4	**Continued** the typical range of copper as 2.0 to 100 mg/kg (a two order of magnitude spread) and the extreme limits as 0.1 to 14,000 mg/kg (a six order of magnitude spread). As a result of such variability that is not always captured and expressed, information in the Background Geochemistry Report must not be used without perspective. This would include: qualification as the history of the data, its statistical veracity relative to the application, and its position with respect to the published natural variation. An additional consideration for a data user is the data's conformance to the principles of data quality objectives, and the PARCC parameters (Precision, Accuracy, Representativeness, Completeness, and Comparability) as discussed in Guidance (EPA, 1987a).
4	Sec. 2 40	2.4-2.4.1	Add page 40A
5	Sec. 2 68	2.4.1.8	In the first paragraph, third line, make it read: "...may have been cleaning out a..."
6	Sec. 2 123	IHSS 150.4	At the end of the first paragraph, add: "Manhole leaks are believed to be related to a leaking above ground process waste line (see Section 2.3.13)."
7	Sec. 2 133	2.5.3.3.1	At the end of paragraph one following IHSS 118.2, add: "(see Sections 2.3.2 and 2.4.1.2)."
8	Sec. 2 133	2.5.3.3.1	Make paragraph three read: "IHSS 118.2 has been redefined as a 30- by 20-foot area adjacent to the north side of Building 707 (Figure 2.4) as described in Section 2.3.2. The area occupies part of the long, narrow alley between Building 707 and 778."

12. Justification (Reason for Modification)

DMR (continuation sheet)

1/31/95

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25. DMR No. 95-DMR-ERM-0010

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21100-WP-OU8.01/Rev. 0	Environmental Restoration Program Phase I RFI/RI Work Plan Operable Unit No. 8 700 Area

8. Item	9. Page	10. Step	11. Proposed Modifications
9	Sec. 2		Replace the following figures at the end of Section 2: Figure 2-2 (p. 240), Figure 2-3 (p. 241), Figure 2.6 (p. 244), Figure 2-8 (p. 246), Figure 2-9 (p. 247), Figure 2-17 (p. 255), Figure 2-21 (p. 259), Figure 2-24 (p. 262), Figure 2-26 (p. 264)
10	Sec. 6 41	6.5.4	In the last line of the last paragraph on this page, remove the beginning of the sentence "If soil borings are required" to have the sentence begin "TM 2 will specify the..."
11	Sec. 6 46	6.5.9	Redo sentence two and add sentences three and four before the sentence beginning "Additionally...": "The subsurface has been affected at both of these sites due to sewer line breaks associated with four underground waste holding tanks located north of Building 776 and east of Building 701 in a small structure identified as Building 730. They are designated as Tanks 776 A through D. They were built in approximately 1956 (Rockwell, 1976) and were taken out of service in the 1980s."
12	Sec. 6 54	6.5.18	At the end of paragraph two add: "The logic for looking for the slab first is that the slab should be easy to locate using geophysical methods and once located a sampling plan will be developed from the slab area back towards the original location. The historical account of how the slab was buried indicated that following decontamination the slab was pushed a short distance north of its original location into a ditch and used as fill. Thus, once the slab is located, the original location can be investigated more precisely (see Section 2.3.20)."
13	Sec. 6		Replace the following Figures at the end of Section 6: Figure 6-4 (p. ~~98~~ 90 ADD), Figure 6-5 (p. 91), Figure 6-8 (p. 94), Figure 6-9 (p. 95), Figure 6-14 (p. 100)
14	Sec. 7		Replace pages 2 & 3 with the new "Final OU 8 RFI/RI Work Plan and Field Implementation Schedule"
15	Sec. 8		Replace the following Figure at the end of Section 8: Figure 8-1 (p. ~~28~~ 26 ADD)
16	Sec. 11 3		At the top of the page, add the reference for "Dragun, 1988: Dragun, J., 1988, The Soil Chemistry of Hazardous Materials, Hazardous Materials Control Research Institute, Silver Spring, MD."

around the structure was approximately 1 foot below the top of the structure. This structure encased only approximately 3 feet of the south end of the tank. The tank was supported by the concrete structure and a concrete footing approximately 3 feet wide located at the north end. It is unclear from the design drawings how deeply the north portion of the tank (that was not enclosed in the structure) was buried. The material which had surrounded the north portion of the tank is unknown. The ground surface around the tank location was diked (EG&G, 1990c).

The area is currently relatively flat and includes both paved and unpaved surfaces. Prior to 1968, the entire area was unpaved. The location is highly congested with overhead, ground-level, and underground pipes and utilities.

2.3.2 IHSS 118.2 - Solvent Spill South End of Building 776

Available references state that IHSS 118.2 consists of a 5,000 gallon, above ground carbon tetrachloride tank located within a bermed area between the north side of Building 707 and the alleyway south of Building 778 (Figure 2-4). In June 1981, the tank ruptured and leaked solvent onto the ground, contaminating the soil. An unknown amount of carbon tetrachloride was released in this incident. The tank and the area of the spill were subsequently cleaned up. Materials that were contaminated, were boxed and shipped to Nevada and materials that were not were likely placed in the present landfill (IHSS 114). No documentation was found which further details response to this occurrence. It is not known whether sampling and analysis was conducted to verify the complete removal of contaminated soil (DOE, 1992b). Degreasing solvents which may have been stored in or adjacent to the organic solvent tank include carbon tetrachloride, petroleum distillates, benzene and dichloromethane paint thinner, 1,1,1-trichloroethane (TCA), and methyl ethyl ketone (MEK) (2-butanone). Solvent held in the carbon tetrachloride tank is used in Buildings 776 and 707.

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IHSS 118.2 was originally defined as a 30- by 70-foot area south of Building 776 (EG&G, 1990c). The HRR more precisely located this IHSS between the north side of Building 707 and the alleyway south of Building 778. More recent information provided by Doty & Associates (Appendix B) indicates that IHSS 118.2 be redefined as an area approximately 30 by 20 feet

the East Chiller Cooling Water (Glycol mix) System. Cooling Tower 4 (Building 784) consists of four units and is the Standby Cooling Water System (Appendix B).

IHSS 138 is related to two separate releases from the cooling towers for Building 779 that occurred 14 years apart (DOE, 1992b). The first is a piping leak that occurred on December 8, 1976 in an underground line that connected to the original cooling towers and the second is related to an overflow event that occurred on December 8, 1990. Both events are described below.

Utilities personnel at RFP recalled that the 1976 spill occurred when an underground water line for a cooling tower broke east of Building 779 and adjacent to the northwest corner of Building 727. The leak discharged approximately 400 gallons of cooling tower effluent into a storm sewer. At the time, it was stated that the spill drained toward Trench No. 6, which was part of the original surface-water and shallow groundwater collection system north of the solar ponds (Appendix B).

The second event occurred on December 8, 1990 when a sump filled and water backwashed into Building 785 (Cooling Tower No. 2) and spilled out of the fan on the east side of the structure. An estimated 1,000 gallons of cooling tower water flowed onto the ground. According to Building 779 utilities personnel, the spray from the backwash extended no more than 5 to 6 feet east of the building (Appendix B).

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IHSS 138 was originally defined as a 75- by 75-foot area northeast of Building 779 (EG&G, 1990c). The area of the cooling tower water line break is of smaller extent and located farther to the east than presented in the IAG as IHSS 138. It was proposed that IHSS 138 be redefined as a 50- by 50-foot area north of Building 727 (DOE, 1992b). The IHSS boundary presented in the IAG was concluded to be too large and too far west of where the 1976 event occurred. The reidentification of the site in the HRR is considered to be adequate for the 1976

of detectable concentrations for a given constituent for the calculation of tolerance intervals, the Background Geochemical Characterization Report provides the maximum detected value. The analytical data obtained for OU8 were compared to the upper tolerance limit (or both upper and lower tolerance limits for pH) or the maximum detected concentration for each parameter to determine if the concentration exceeded background. In addition, when the upper tolerance limit was exceeded the concentrations were compared to the maximum concentration detected in background samples as an additional indicator of whether the concentration detected may be evidence of a release to the environment. When the pH of a sample was greater than the upper tolerance limit or less than the lower tolerance limit it was also compared to the range of background values. Based on experience including OU 1, it is apparent that professional judgment must be utilized in background comparison issues whether inferential (e.g. hypothesis testing) or comparative as this case is comparative. The environmental science literature is filled with reference to the variability in natural materials. For example, Dragun (1988) cites the typical range of copper as 2.0 to 100 mg/kg (a two order of magnitude spread) and the extreme limits as 0.1 to 14,000 mg/kg (a six order of magnitude spread). As a result of such variability that is not always captured and expressed, information in the Background Geochemistry Report must not be used without perspective. This would include: qualification as the history of the data, its statistical veracity relative to the application, and its position with respect to the published natural variation. An additional consideration for a data user is the data's conformance to the principles of data quality objectives, and the PARCC parameters (Precision, Accuracy, Representativeness, Completeness, and Comparability) as discussed in Guidance (EPA, 1987a).

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Background data for media relevant to the discussion of the nature and extent of contamination associated with OU8 are summarized in Tables 2.3 to 2.6. For the purposes of this discussion, analytical data for surficial materials identified as artificial fill on borehole logs were compared to background data for North Rocky Flats Alluvium. Regardless of whether borehole logs identified bedrock as being weathered or not, all bedrock data were compared to the background concentrations for weathered bedrock.

2.4.1 Contamination in the Vicinity of IHSSs Within OU8

Subsections 2.4.1.1 through 2.4.1.24 discuss the nature and extent of contamination associated with each IHSS within OU8. These discussions are based primarily on the documented events related to each release within an IHSS and the available analytical data for borehole and groundwater samples. Data on surface-water and sediment monitoring are generally not discussed on an IHSS-specific basis due to the fact that the monitoring locations for these media are such that contamination attributable to individual IHSSs cannot be defined. Summaries of the data available for these media are provided in Subsection 2.4.2.

the exact location of the sewer line break between Buildings 777 and 779 is unknown, the boundaries of IHSS 144(S) include all of the alleyway. At the time of the incident, maintenance may have been cleaning out a clean-out plug near Building 701, further increasing the potential impacts on the environment (Appendix B).

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Activities of samples taken from the toilet bowl in Building 701 were as high as 136,000 pCi/l on June 7 and 8. A sludge sample taken from a clean-out plug in the Building 701 sanitary sewer line contained only minimal radioactivity. Analyses of the sediments from the bottoms of Tanks 776 A, B, and D indicated liquid phase activities of 68,000 pCi/l, 9,100 pCi/l, and 302,000 pCi/l, respectively (Appendix B).

Interviewees for CEARP Phase I recalled a sewer line break between Buildings 779 and 777, which was discovered when contamination was found in a restroom. It is believed that this is the same incident as the 1972 patch rupture discussed above.

The rupture in the line patch east of the tanks resulted in soil contamination. Approximately 50 drums of soil were removed. A conflicting document states that 38 drums of soil were removed. The contaminated soil around Building 701 was also apparently removed. It is probable that residual soil contamination is present. As of June 8, 1972, 19 drums of soil had been removed. No soil count was detected at that time (Appendix B). Disposal of these drums was at either the present landfill (IHSS 114) or, if contaminated (definition of "contaminated" not provided), at Idaho.

The radiometric survey performed with a FIDLER in the late 1970s and early 1980s indicated no extremely contaminated (500,000 to 1,000,000 pCi/g) areas at or near this IHSS (Appendix B).

IHSS 150.3 - Radioactive Site Between Buildings 771 and 774 (IAG Name: Radioactive Leak Between Buildings 771 and 774)

The primary source of contamination at IHSS 150.3 is believed to be process waste lines in a cement tunnel running between Buildings 771 and 774. The primary release mechanism at this IHSS is leakage of the PWL.

IHSS 150.4 - Radioactive Site East of Building 750 (IAG Name: Radioactive Liquid Leaks East of Building 750)

The primary source of contamination and the primary release mechanism at IHSS 150.4 are unclear. IHSS 150.4 has been described as a 20- by 20-foot area northeast of Building 750. The surface is flat and mostly paved, and is used for storage, parking and loading/unloading for Building 750. The area has been paved since construction of Building 750 in 1969. In May of 1969 a fire occurred in Building 776-777. Following the fire, the tanks and pumps that handled the decontamination fluid may have been placed into the Building 750 courtyard. Several leaks have been noted from the manholes in this area since it was paved. This area is suspected to have residual contamination from the storage of the decontamination equipment, however, no documentation is available that describes the contamination of the parking area by the decontamination tanks and pumps. Manhole leaks are believed to be related to a leaking above ground process waste line (see Section 2.3.13).

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IHSS 150.4 is presented again in Group III. It is presented in both Groups due to the inability to determine whether the primary release originated above or below ground surface.

South of Building 779; IHSS 150.8 - Radioactive Site Northeast of Building 779; IHSS 151 - Fuel Oil Leak - Tank 262 North of Building 347; IHSS 163.1 - Radioactive Site North of Building 774; IHSS 163.2 - Radioactive Site North of Buildings 771 & 774; IHSS 172 - Central Avenue Waste Spill; IHSS 173 - Radioactive Site - 900 Area (Storage Vaults Near Building 991); IHSS 184 - Radioactive Site - Building 991 Steam Cleaning Area (near Building 992); and IHSS 188 - Acid Leak (Southeast of Building 374). Figure 2-37 presents a schematic diagram of the conceptual model for Group III.

2.5.3.3.1 Contaminant Sources and Release Mechanisms

Primary Sources and Release Mechanisms

IHSS 118.2 - Solvent Spill South End of Building 776 (IAG Name: Multiple Solvent Spills (South End of Building 776)

A 5,000-gallon above-ground carbon tetrachloride tank located within a bermed area between the north side of Building 707 and the alleyway south of Building 778 is believed to be the primary source of contamination at this site (see Sections 2.3.2 and 2.4.1.2).

This tank is known to have ruptured and leaked solvent onto the ground, which contaminated the soil. An unknown amount of carbon tetrachloride was released. The tank and the area of the spill were cleaned up. No documentation was found that further details response to this occurrence.

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IHSS 118.2 has been redefined as a 30- by 20-foot area adjacent to the north side of Building 707 (Figure 2.4) as described in Section 2.3.2. The area occupies part of the long, narrow alley between Building 707 and 778.

14 sample locations, collection of 4 vertical soil profile (VSP) samples, collection of surface soil samples, and implementation of a soil-gas survey. The surface soil sample collection and soil-gas survey will be conducted on a 50-foot grid, resulting in 9 sample locations (Figure 6-7). The surface soil samples will be analyzed for nitrate, Ph, fluoride, and TAL metals; the soil-gas survey will analyze for the compounds of interest listed on Table 6.2.

Stage 3 may include additional surficial soil sampling and will include the installation of soil boring(s) and collection of groundwater samples via the BAT• if groundwater is encountered. TM 2 will specify the number and location of soil borings to be drilled. Additionally, TM 2 will specify the analyses required for the soil and groundwater samples collected in the soil borings. Also, soil samples will be collected from the soil borings for analysis of geophysical and geochemical properties as described in Section 6.4.4.2. TM 3 will provide the basis for any additional sampling that may be required beyond Stage 3 sampling.

6.5.4 Cooling Tower Blowdown (IHSS 135)

IHSS 135 consists of a containment pond and connecting drainage that was affected by cooling tower blowdown water. This water may have contained phosphates, chromate, and tritium.

Stage 1 activities as described in Section 6.4.1 will be performed as required to enhance subsequent stage investigations.

Stage 2 investigations will include collecting surficial soil samples on a 50-foot grid, resulting in 5 sample locations (Figure 6-8). These samples will be analyzed for total chrome and tritium.

Stage 3 may include additional soil sampling and will include the installation of soil boring(s) for confirmation and/or assessment of nature and extent of contamination and collection of groundwater samples via the BAT• if groundwater is encountered. TM 2 will specify the

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number and location of soil borings to be drilled. Additionally, TM 2 will specify the analyses required for the soil and groundwater samples collected in the soil borings. If soil borings are installed, it is currently proposed that the soil and groundwater samples be analyzed for chrome and possibly tritium. Also, soil samples will be collected from the soil borings for analysis of geophysical and geochemical properties as described in Section 6.4.4.2. TM 3 will provide the basis for any additional sampling that may be required beyond Stage 3 sampling.

6.5.5 Cooling Tower Blowdown (IHSS 137)

The ground surface between and surrounding Buildings 712 and 713 has been impacted by cooling tower water from drift, blowdown, and leaks. Chromates and phosphates have been added to this water as algicides and rust and corrosion inhibitors.

Stage 1 activities such as document review and site visits will be performed as required to enhance subsequent stage investigations.

Stage 2 investigations will include collection of surface soil samples on a 50-foot grid, resulting in 7 sampling locations (Figure 6-5). Surface soil samples will be analyzed for total chromium.

Stage 3 investigations may include additional surficial soil sampling and will include the installation of soil borings for confirmation and/or assessment of nature and extent of contamination and collection of groundwater samples via the BAT• if groundwater is encountered. TM 2 will specify the number and location of soil borings to be drilled. Additionally, TM 2 will specify the analyses required for the soil and groundwater samples collected in the soil borings. It is currently proposed that soil and groundwater samples be analyzed for total chromium. Also, soil samples will be collected from the soil borings for

properties as described in Section 6.4.4.2. TM 3 will provide the basis for any additional sampling that may be required beyond Stage 3 sampling.

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6.5.9 Sewer Line Breaks (IHSS 144)

IHSS 144 is divided into two separate areas, IHSSs 144(N) and 144(S). The subsurface has been affected at both of these sites due to sewer line breaks associated with four underground waste holding tanks located north of Building 776 and east of Building 701 in a small structure identified as Building 730. They are designated as Tanks 776 A through D. They were built in approximately 1956 (Rockwell, 1976) and were taken out of service in the 1980s. Additionally, the ground surface west of IHSS 144(N), east of Building 701, was also affected by the ruptured pipeline incident. The releases consisted of process waste and laundry waste. It is assumed that radionuclides, metals, and organic chemicals were included in this release (see Sections 2.3.9 and 2.4.1.9).

Following the 1972 pressurization incident, the Building 995 outfall and other downstream points were sampled daily. There was increased radioactivity in the Building 995 outfall. The highest sample concentration of total alpha-emitting radionuclides in the outfall was 417 Pci/l on June 11, 1972 (Appendix B).

Stage 1 activities as described in Section 6.4.1 will be performed as required to enhance subsequent stage investigations.

Stage 2 activities consist of collecting sediment samples downstream of Building 995 outfall and analyzing the samples for target analyte list (TAL) metals, radionuclides (i.e., total plutonium, total americium, tritium, uranium-233/234, 235, and 238, gross alpha, and gross beta), and SVOCs. Additionally, a soil-gas survey and surficial soil sample collection will be conducted on a 25-foot grid at IHSSs 144(N) and 144(S), resulting in 5 and 7 sample locations, respectively (Figure 6-5 and 6-9). Samples collected for soil-gas will be analyzed for the compounds of interest listed on Table 6.2. Surface soil samples will be analyzed for SVOCs and TAL metals. A 15 x 15 foot area next to the doorway on the east of building 701 will be also be investigated

will be collected on a 50-foot grid, resulting in 9 sample locations (Figure 6-10). Soil samples will be analyzed for TPH, TAL metals, and nitrate; and samples collected during the soil-gas survey will be analyzed for the compounds of interest listed in Table 6.2.

Stage 3 may include additional surficial soil sampling and will include the installation of soil boring(s) for confirmation. Also, groundwater samples will be collected via the BAT• sampler if groundwater is encountered. TM 2 will specify the number and location of soil borings to be drilled and the analyses required for the soil and groundwater samples collected in the soil borings. Also, soil samples will be collected from the soil borings for analysis of geophysical and geochemical properties as described in Section 6.4.4.2. TM 3 will provide the basis for any additional sampling that may be required beyond Stage 3 sampling.

6.5.18 Radioactive Site (IHSS 163.2)

The subsurface may have been contaminated with americium and plutonium due to the burial of a contaminated concrete slab. Stage 1 activities as described in Section 6.4.1 will be performed as required to enhance subsequent stage investigations.

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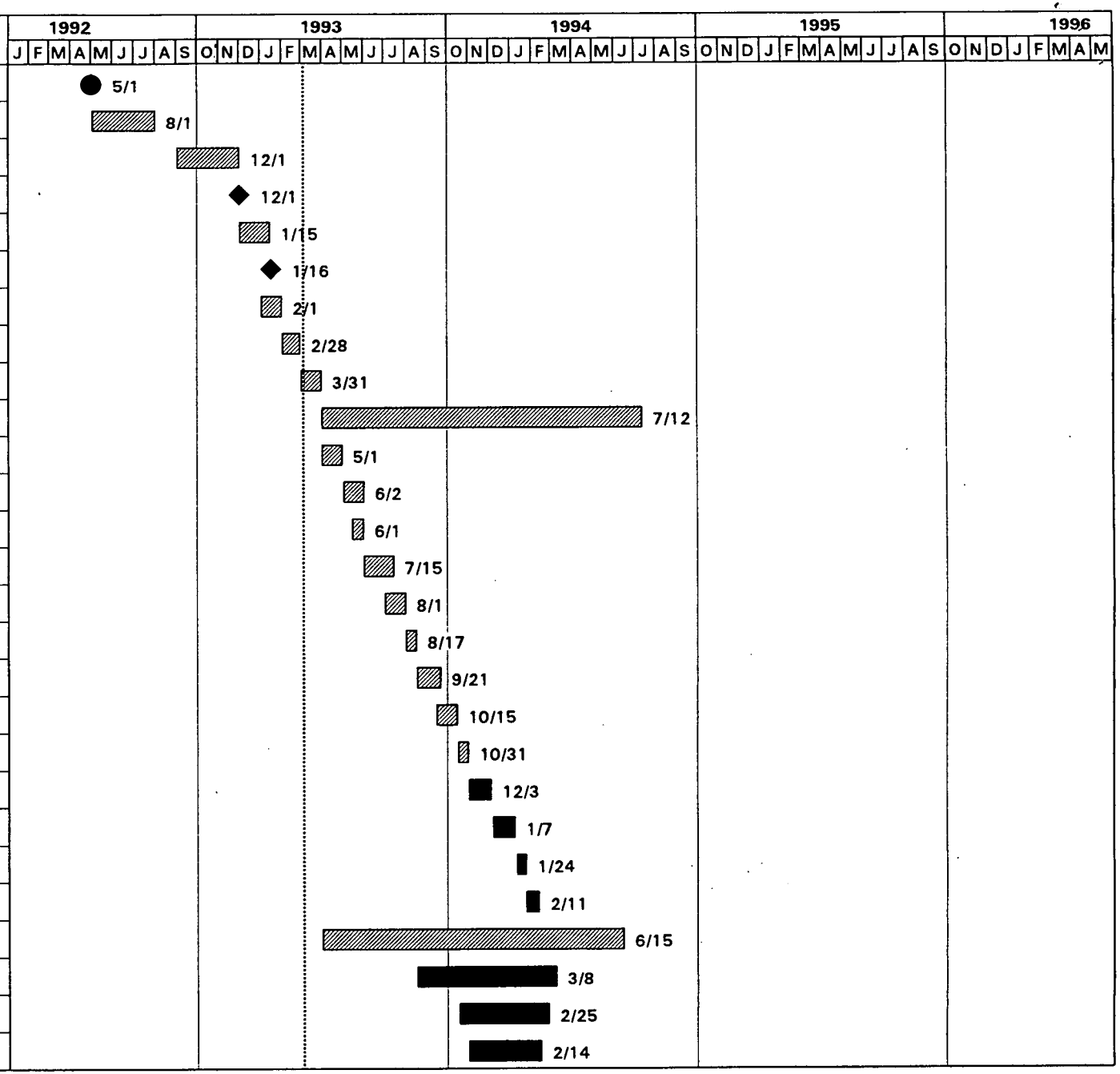
Stage 2 investigations will be conducted in an effort to determine the location of the buried slab. These efforts will include conducting a ground penetrating radar (GPR) survey and possibly a magnetometer survey (assuming that the slab has been reinforced with rebar). The logic for looking for the slab first is that the slab should be easy to locate using geophysical methods and once located a sampling plan will be developed from the slab area back towards the original location. The historical account of how the slab was buried indicated that following decontamination the slab was pushed a short distance north of its original location into a ditch and used as fill. Thus, once the slab is located, the original location can be investigated more precisely (see Section 2.3.20).

Stage 3 will include the installation of soil boring(s) and/or test pits as an effort to locate the slab, provided the Stage 2 efforts failed, and/or to assess nature and extent of subsurface contamination. TM 2 will specify the number and location of soil borings to be drilled and the analyses required for the soil samples collected. Currently it is recommended that the soil samples be analyzed for americium and plutonium. Also, soil samples will be collected from the soil borings for analysis of geophysical and geochemical properties as described in Section

Final OU 8 RFI/RI Work Plan and Field Implementation Schedule

ID	Name
1	Submit Draft Phase I Workplan
2	EPA/CDH Review of Workplan
3	Prepare Final Phase I Workplan
4	Submit Final Phase I Workplan
5	EPA/CDH Review of Final Phase 1 Work Plan
6	EPA/CDH Approval of Final Workplan
7	Prepare Project Mgmt. Plans (PMP)
8	EG&G/RFP/DOE Review & Approval (PMP)
9	Field Mobilization
10	Implement Community Relations
11	Implement Stage 1 Field Sampling Plan
12	Pepare Technical Memorandum 1 (TM1)
13	EPA/CDH Review TM1
14	Implement Stage 2 Field Sampling Plan
15	Prepare Technical Memorandum 2 (TM2)
16	EPA/CDH Review TM2
17	Implement Stage 3 Field Sampling Plan
18	Prepare Technical Memorandum 3 (TM3)
19	EPA/CDH Reveiw TM3
20	Implement Stage 4 Field Sampling Plan
21	Prepare Technical Memorandum 4 (TM4)
22	EPA/CDH Reveiw TM4
23	Implement Stage 5 Field Sampling Plan
24	Data Validation
25	Conduct Risk Assessment
26	Corrective Measurse Study/Feasibility Study
27	Prepare Draft Phase I Report



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Final OU 8 RFI/RI Work Plan and Field Implementation Schedule

ID	Name	1992	1993	1994	1995	1996
		J F M A M J J A S	O N D J F M A M J J A S	O N D J F M A M J J A S	O N D J F M A M J J A S	O N D J F M A M
28	Submit Draft RFI/RI Phase I Report			◆ 2/14		
29	EPA, CDH, LRA Review of Draft RFI/RI Report			▨ 3/28		
30	Prepare Final RFI/RI Phase I Report			▨ 7/12		
31	Submit Final RFI/RI Phase I Report			◆ 7/12		

95-AME-EEN1-0010

Dragun, 1988: Dragun, J., 1988, The Soil Chemistry of Hazardous Materials, Hazardous Materials Control Research Institute, Silver Spring, MD.

EG&G, 1990a: EG&G Rocky Flats, Inc., "Wetlands Assessment, Rocky Flats Site Revision C," 1990.

EG&G, 1990b: EG&G Rocky Flats, Inc., "Background Geochemical Characterization Report, Rocky Flats Plant for 1989": Prepared for the U.S. Department of Energy, Rocky Flats Plant, Golden, Colorado, 6 sections, 34 figures, 81 tables, 3 plates, and Appendices A through D, December 21, 1990.

EG&G, 1990c: EG&G Rocky Flats, Inc., "First Draft Phase I RFI/RI Work Plan, Operable Unit No. 5": Prepared for U.S. Department of Energy, Rocky Flats Plant, Golden, Colorado, 7 sections, 7 figures, 6 tables, 2 plates, Appendices A-E, July, 1990.

EG&G, 1991a: EG&G Rocky Flats, Inc., "Quality Assurance Project Plan for CERCLA Remedial Investigations and Feasibility Studies and RCRA Facility Investigations and Corrective Measures Studies Activities," Environmental Restoration Program, 1991.

EG&G, 1991b: EG&G Rocky Flats, Inc., "EG&G Rocky Flats General Radiochemistry and Routine Analytical Services Protocol, Parts A & B (GRRASP)," Environmental Management Department, 1991.

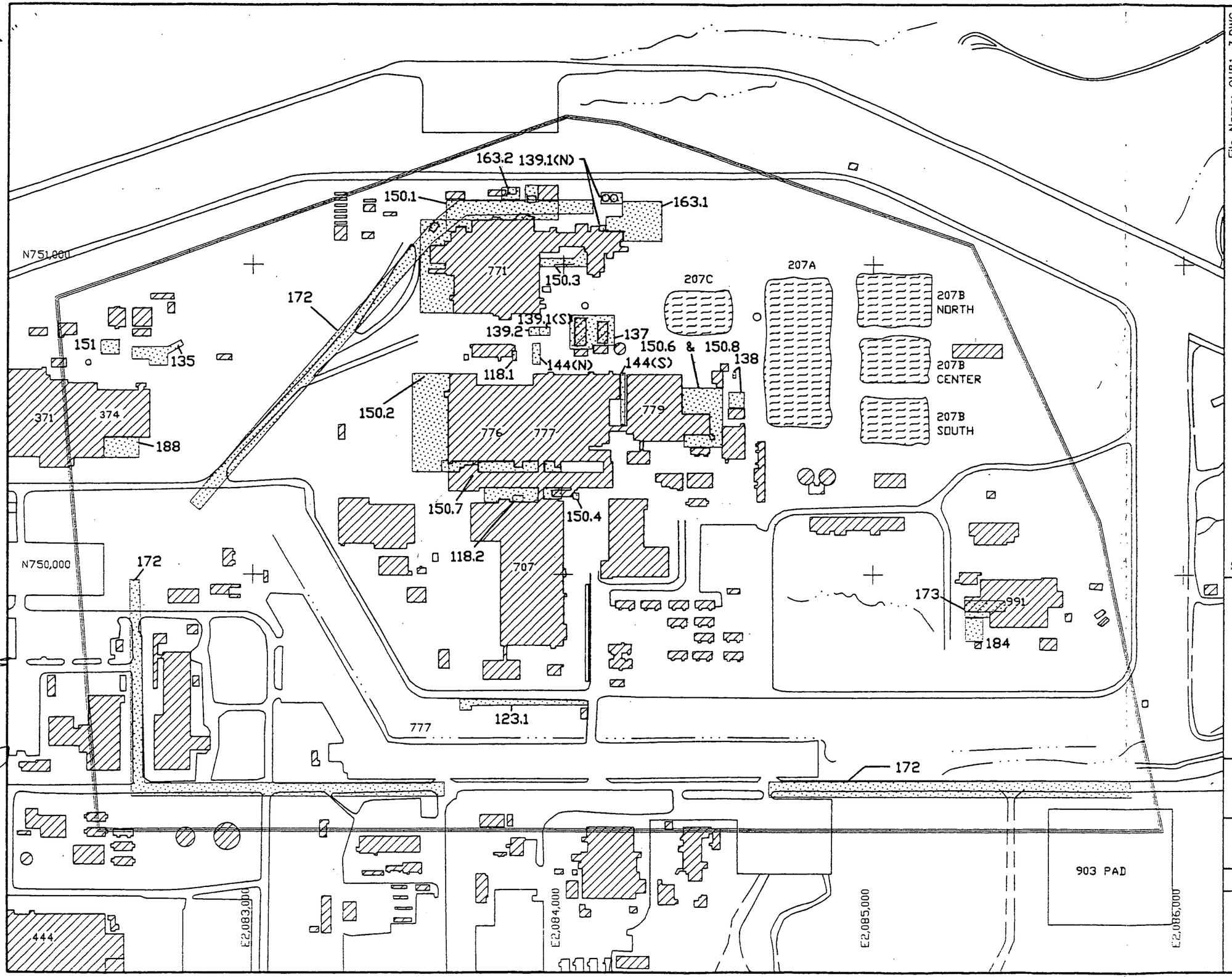
EG&G, 1991c: EG&G Rocky Flats, Inc., "Draft Final Geologic Characterization Report," with Appendices, July 31, 1991.

EG&G, 1991d: EG&G Rocky Flats, Inc., "Surface Water and Sediment Monitoring Plan," Environmental Restoration Program, 81 p., 5 figures, 10 tables, and 2 plates, February 15, 1991.

EG&G, 1991e: EG&G Rocky Flats, Inc., "Radiological Guidelines Manual," No. 3-21000-SOPS-EMRG, Environmental Management Department, 1991.

EG&G, 1991f: EG&G Rocky Flats, Inc., "Draft, Rocky Flats Surface Water Management Plan," Prepared for U.S. Department of Energy, Rocky Flats Area Office, Volumes I and II, March 1991.

EG&G, 1991g: EG&G Rocky Flats, Inc., "Final Groundwater Protection and Monitoring Program Plan for Rocky Flats Plant," in compliance with DOE Order 5400.1, 9 sections, 1 plate, 31 figures, 20 tables, and Appendices A through E, November 27, 1991.



File Name: OU81-3.DWG

Approved By _____ Date 11/20/92

MAP LEGEND

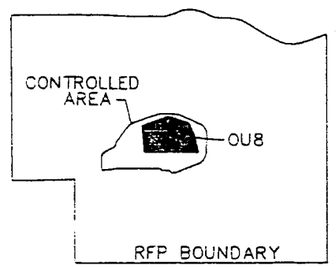
- OPERABLE UNIT 8
- STREAMS DITCHES DRAINAGE FEATURES
- PAVED ROADS
- DIRT ROADS
- SURFACE WATER IMPOUNDMENTS
- BUILDINGS
- INDIVIDUAL HAZARDOUS SUBSTANCE SITES

N

SCALE IN FEET

0 300 600

Source: Groundwater Protection and Monitoring Program Plan. ASI Nov. 1991

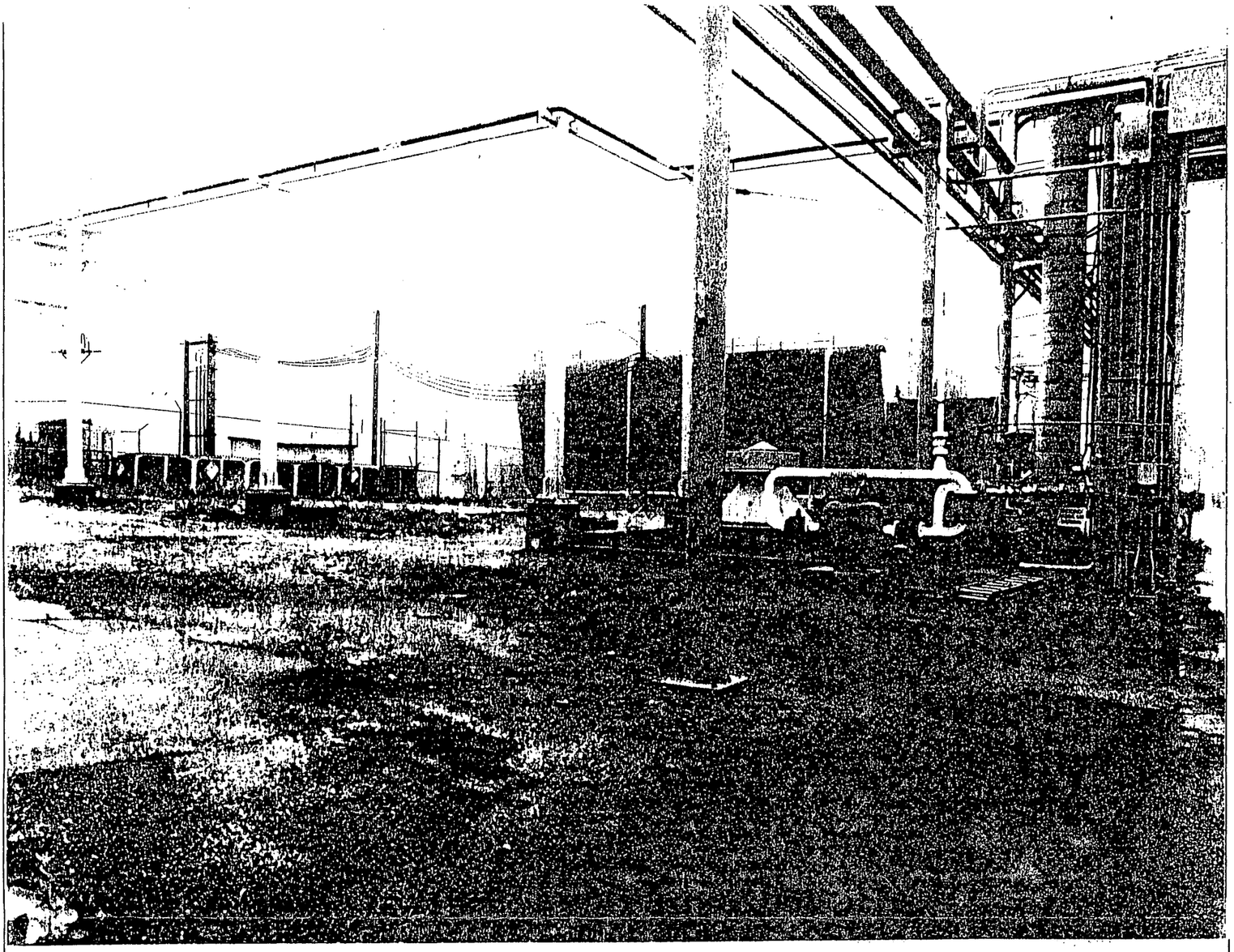


U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

FIGURE 2-2

LOCATION OF INDIVIDUAL HAZARDOUS SUBSTANCE SITES OPERABLE UNIT 8 700 AREA



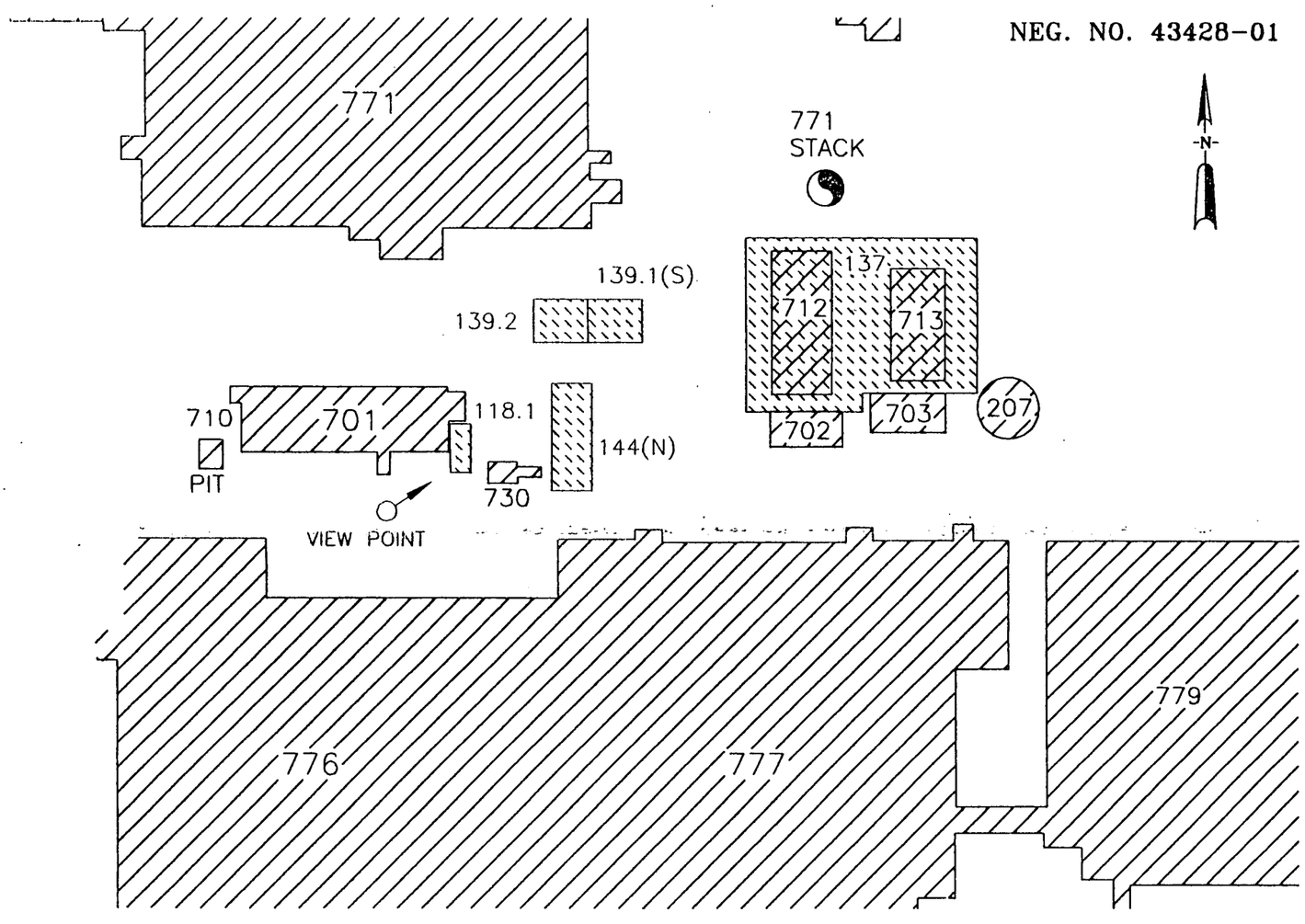
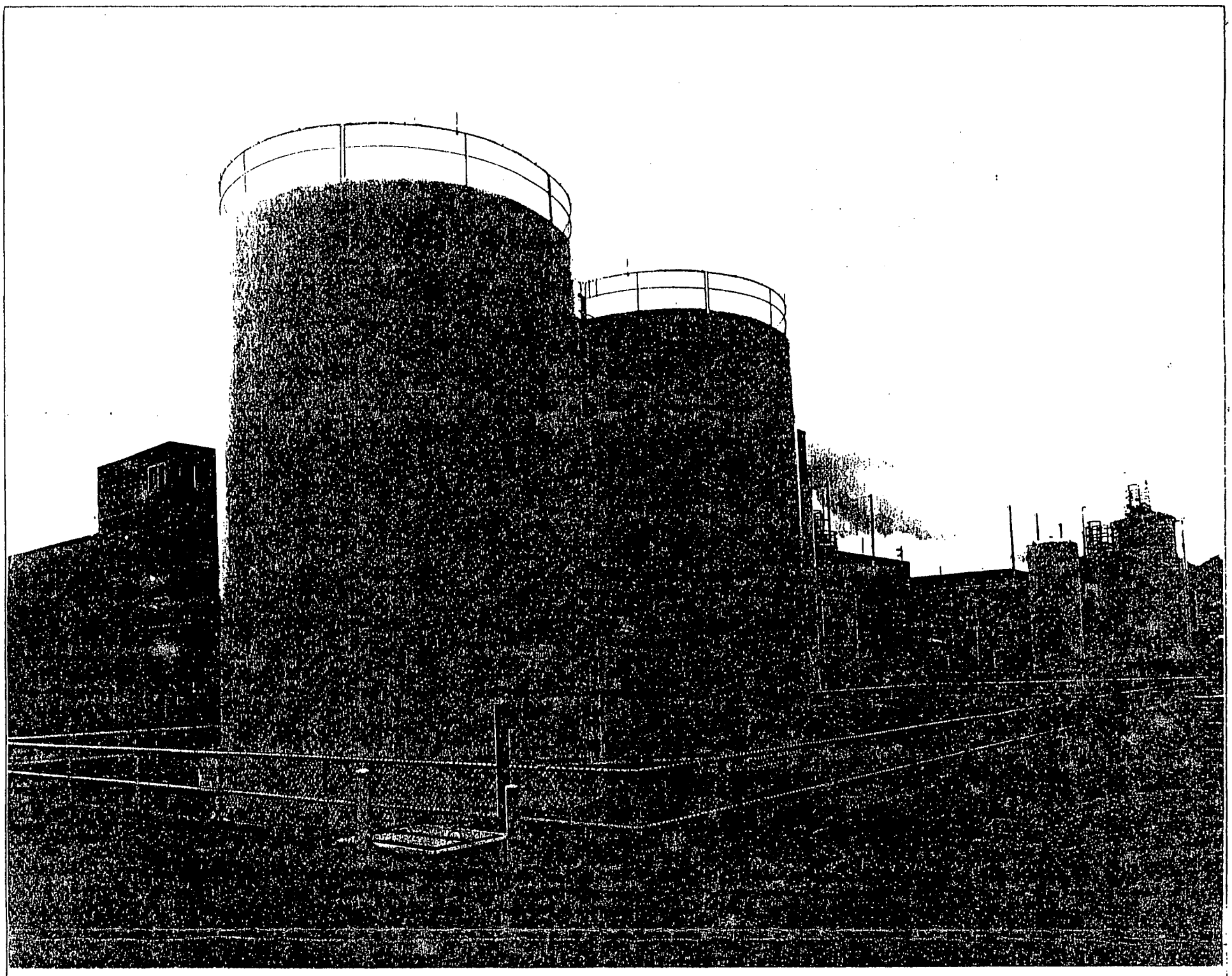


FIGURE 2-3

IHSSs 118.1, 137, 139.1(S), 139.2, and 144(N)

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado



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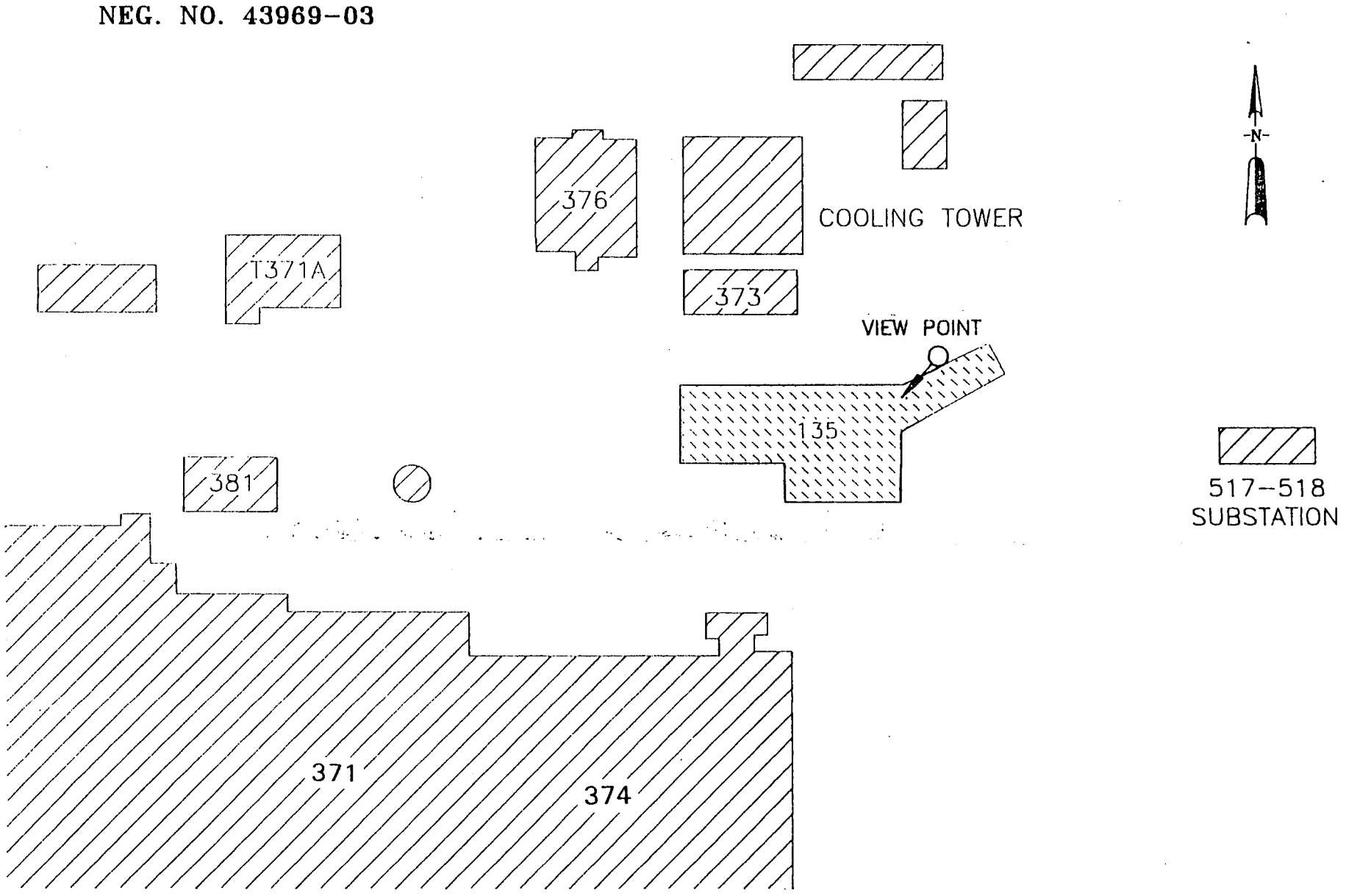
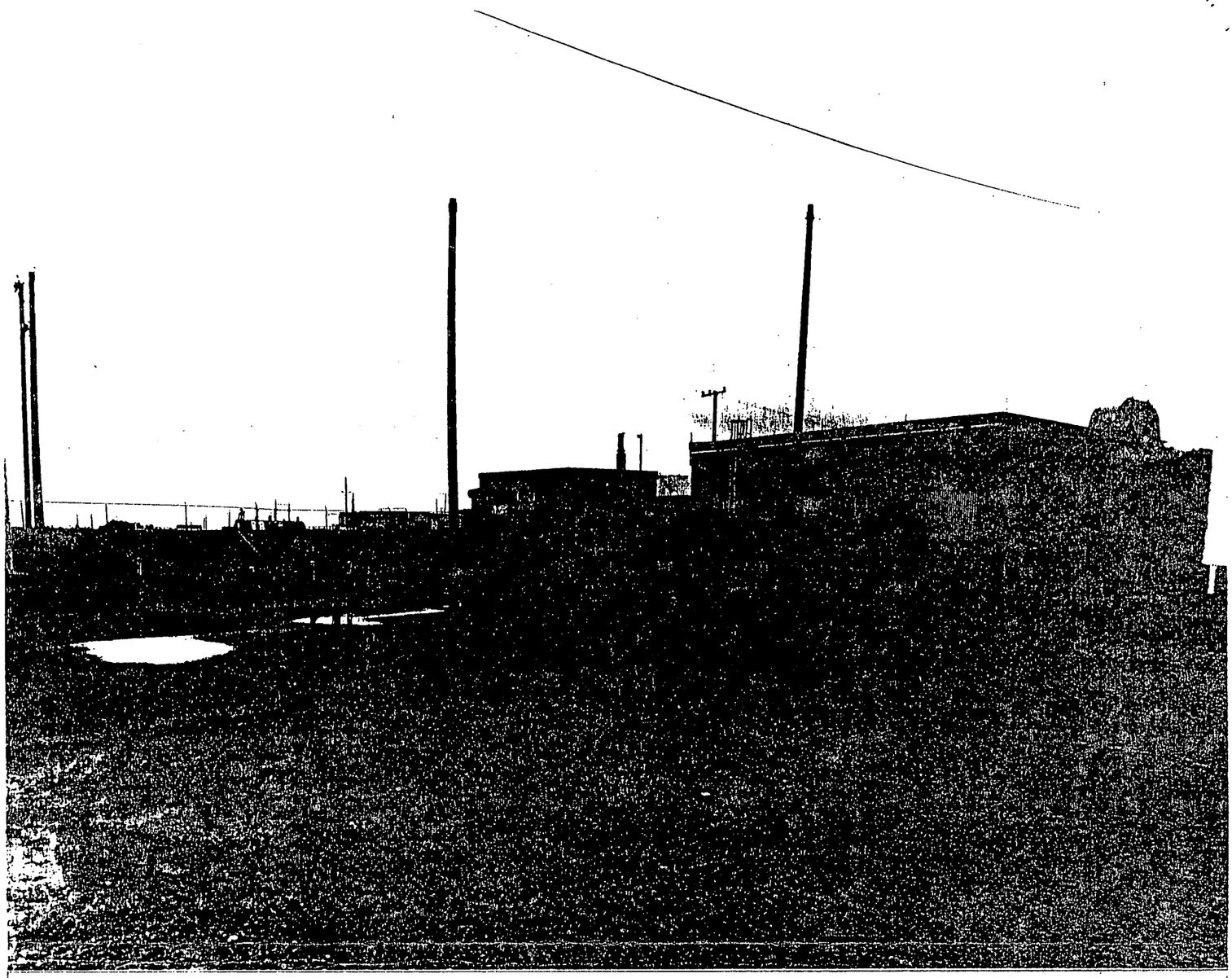


FIGURE 2-6

IHSS 135

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado



NEG. NO. 43430-06

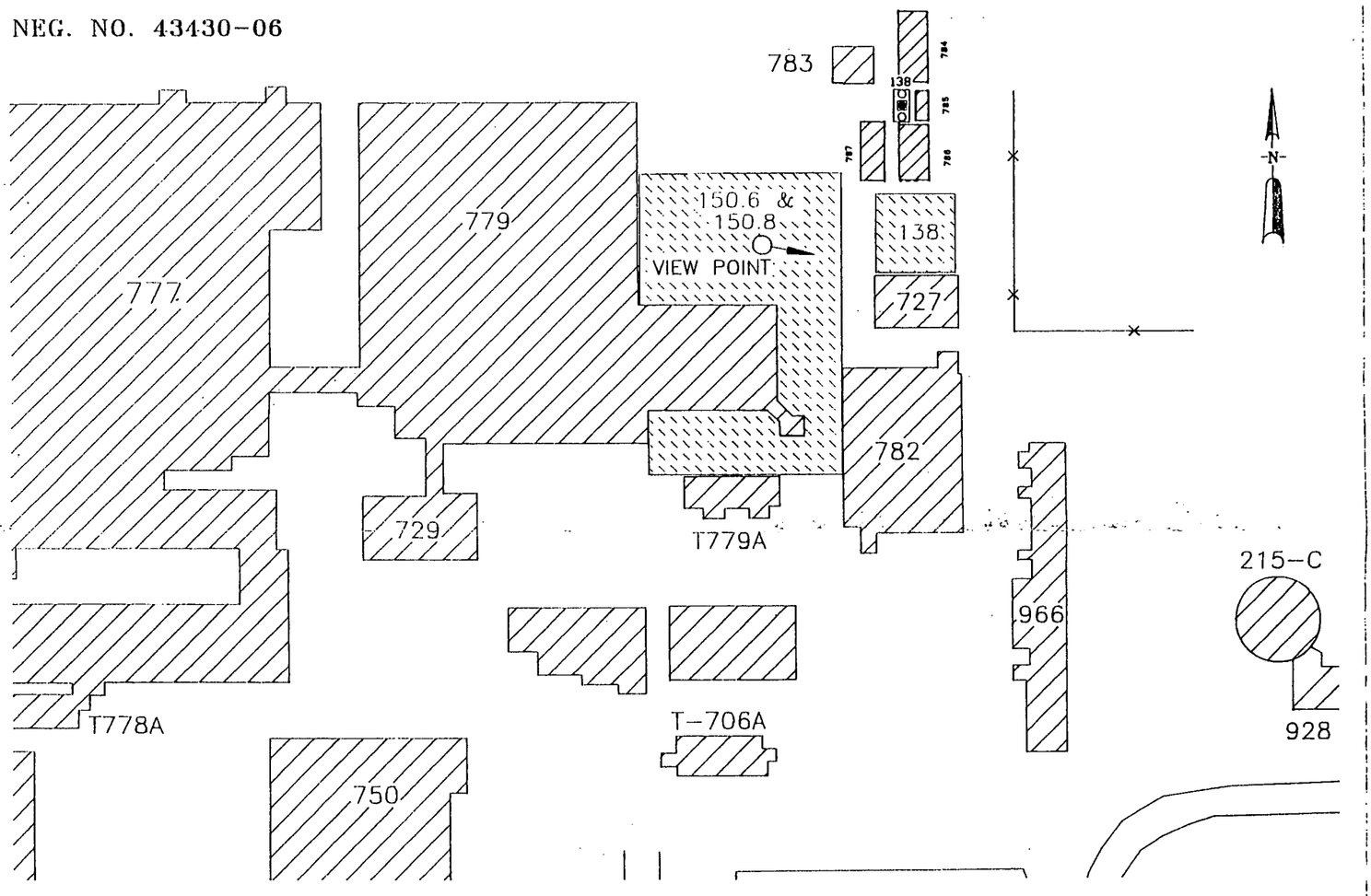
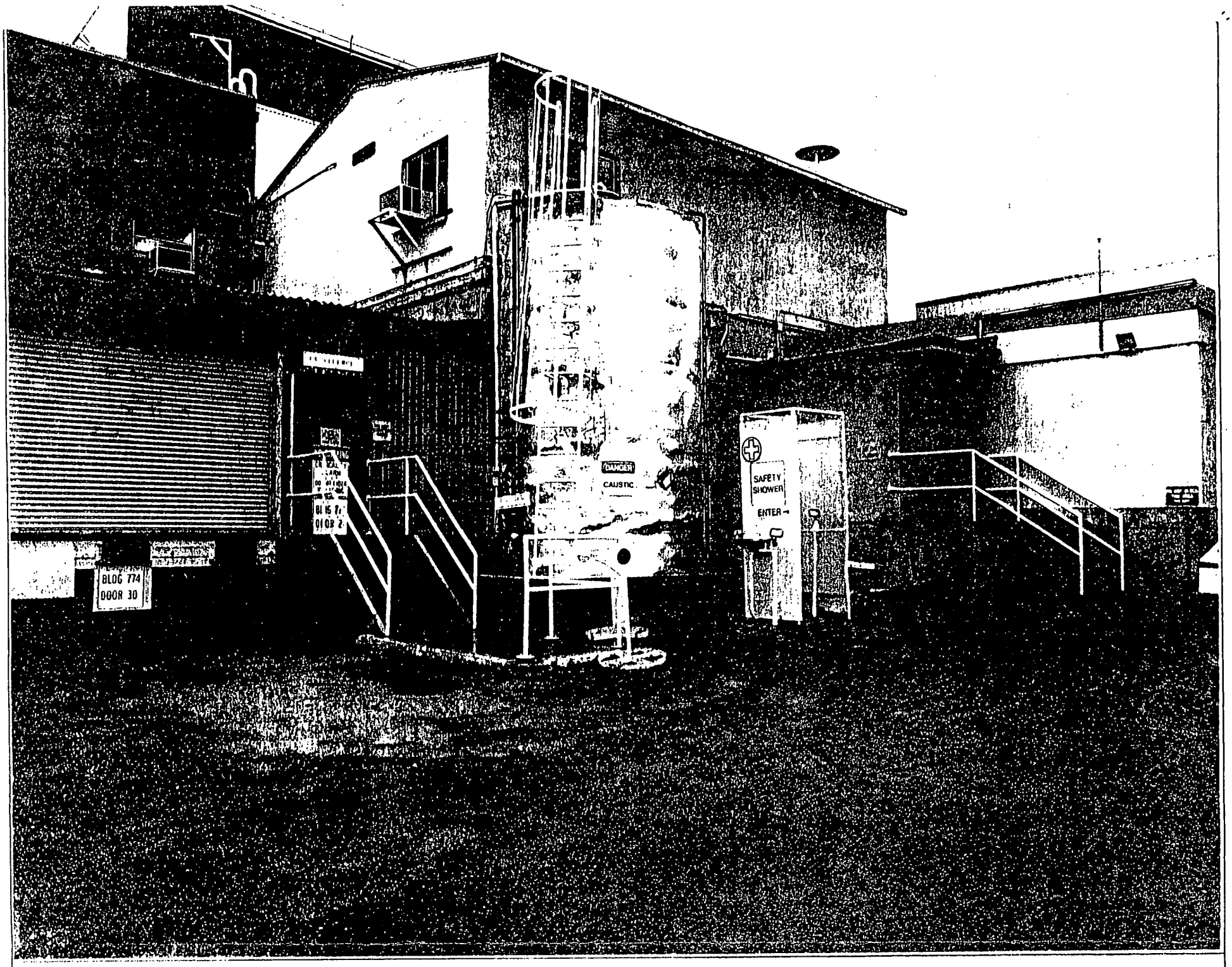


FIGURE 2-8

IHSSs 138 and 150.6/150.8 (partial)

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado



NEG. NO. 43429-01

PATROL ROAD

770

CONDENSATE
HOLDING TANKS

139.1 (N)

VIEW POINT

139.1(N)

774

771

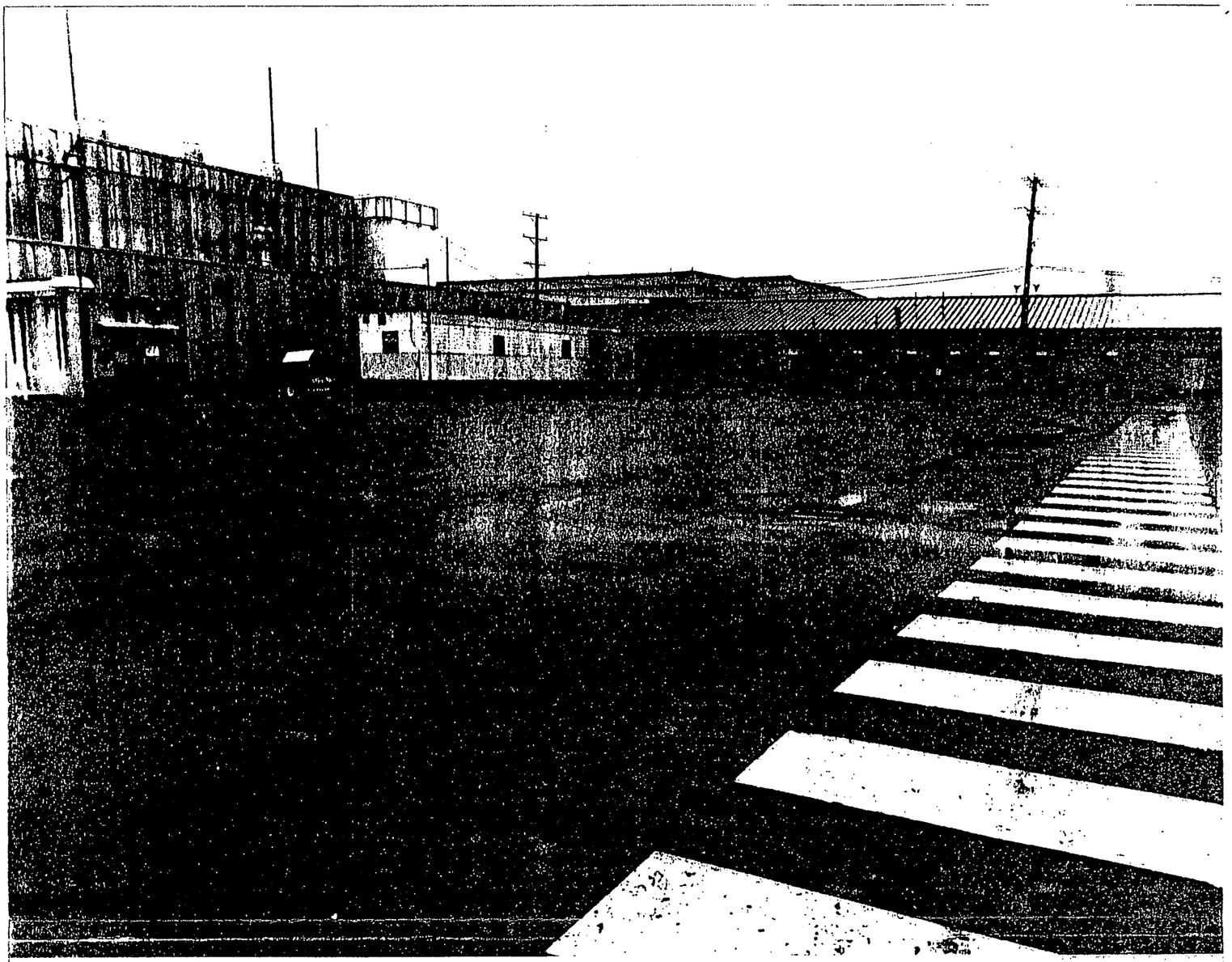
N

FIGURE 2-9

IHSS 139.1(N)

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado



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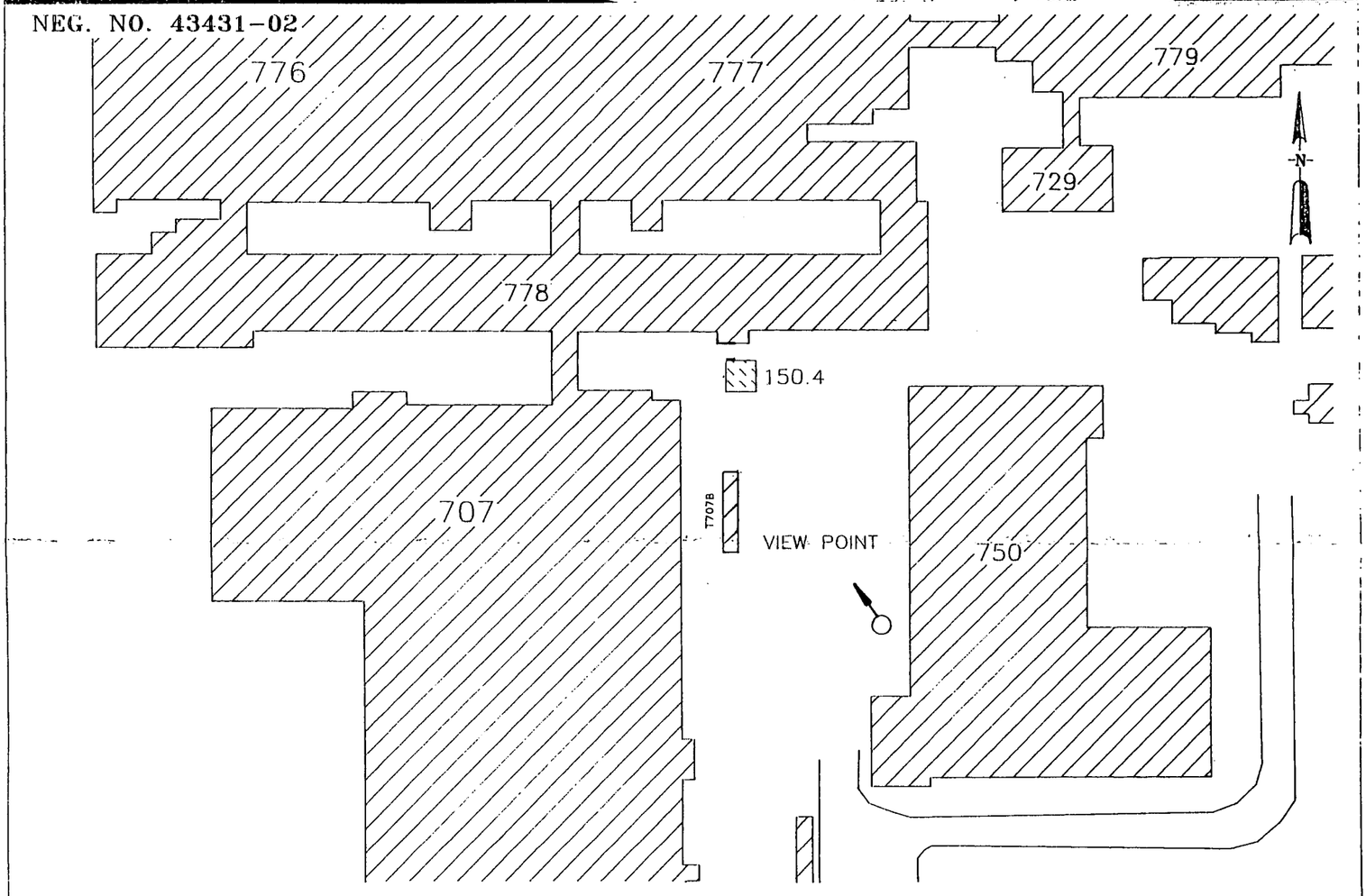
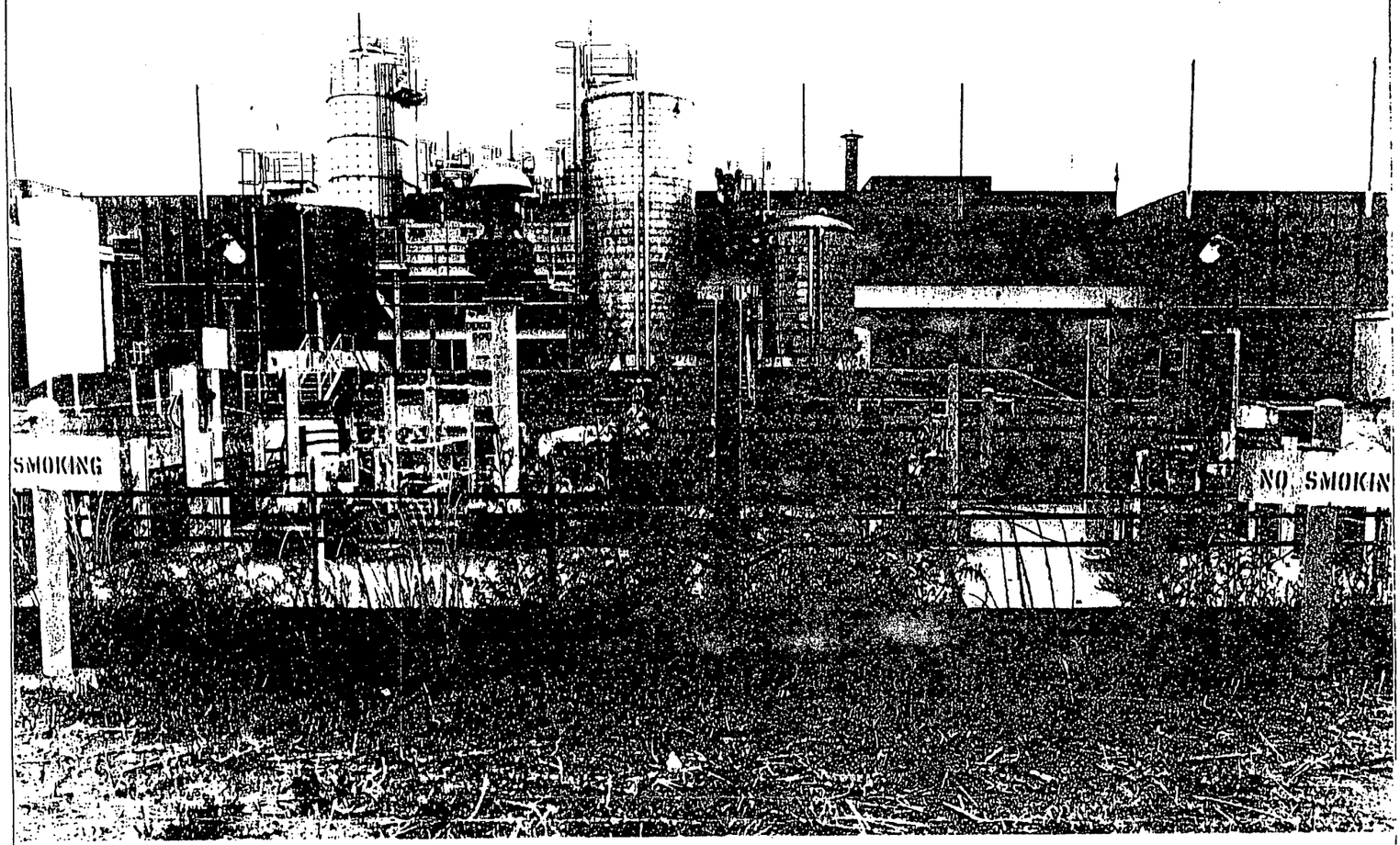


FIGURE 2-17
IHSS 150.4

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado



NEG. NO. 43969-04

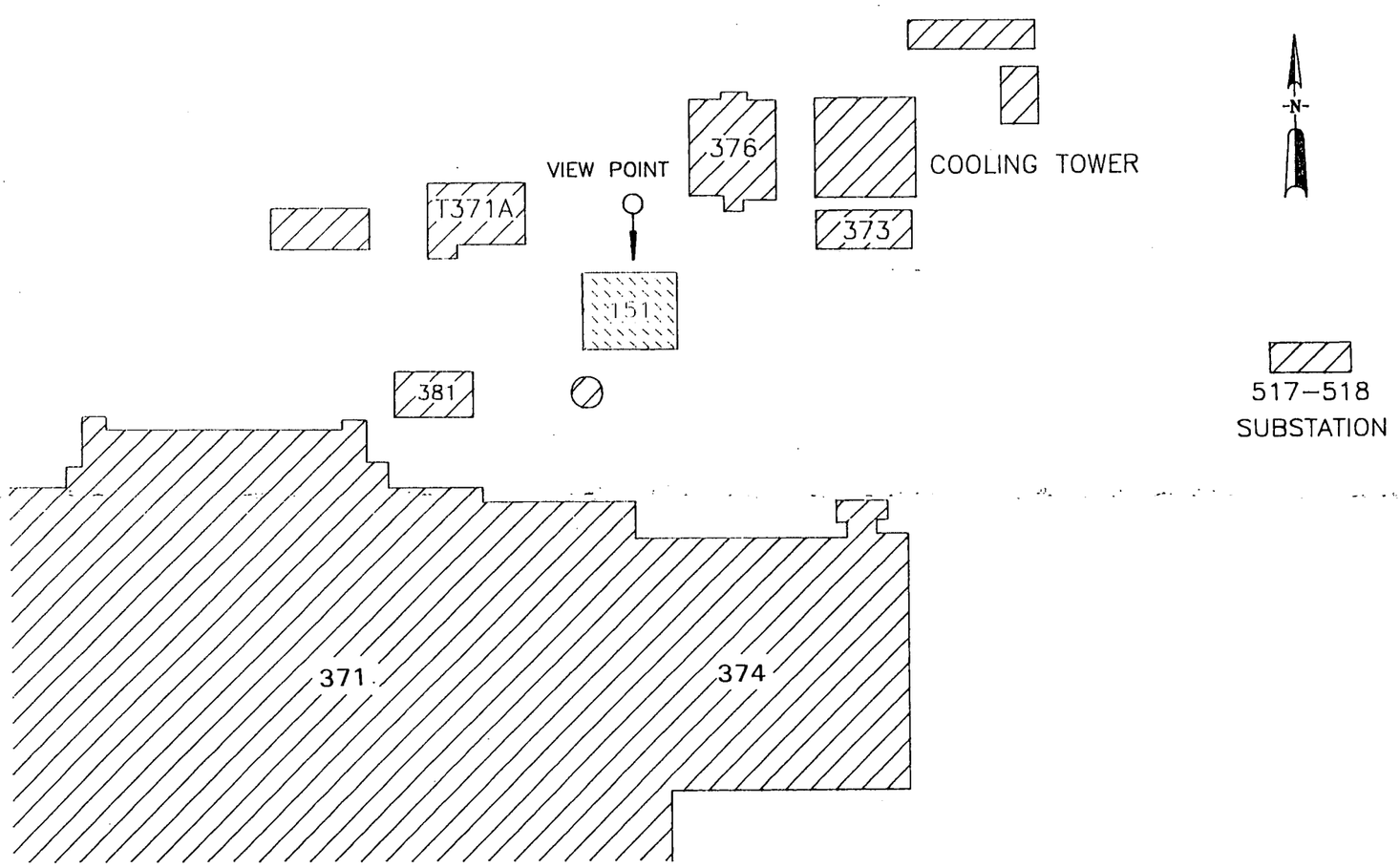


FIGURE 2-21
IHSS 151

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado

NEG. NO. 42090-00

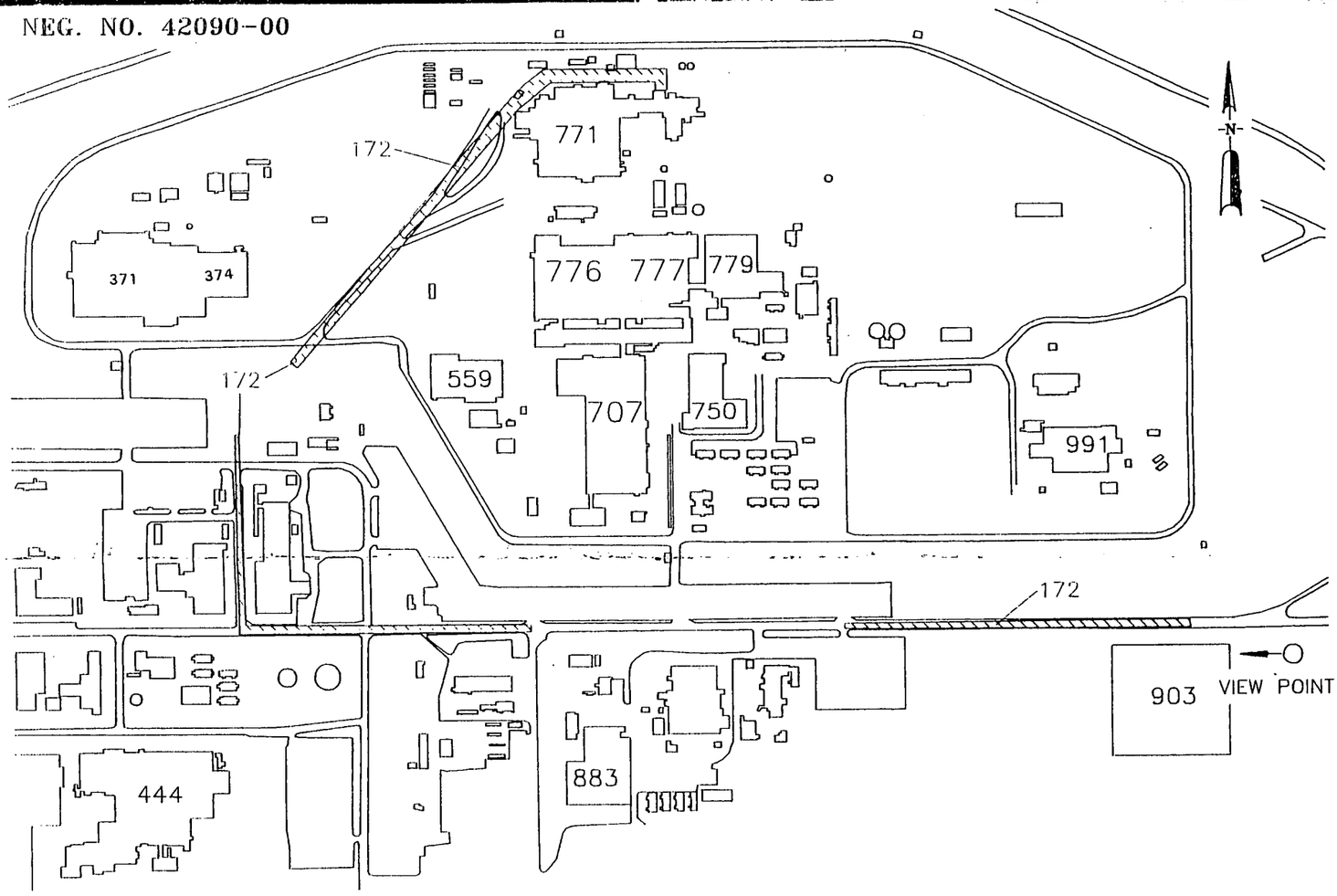
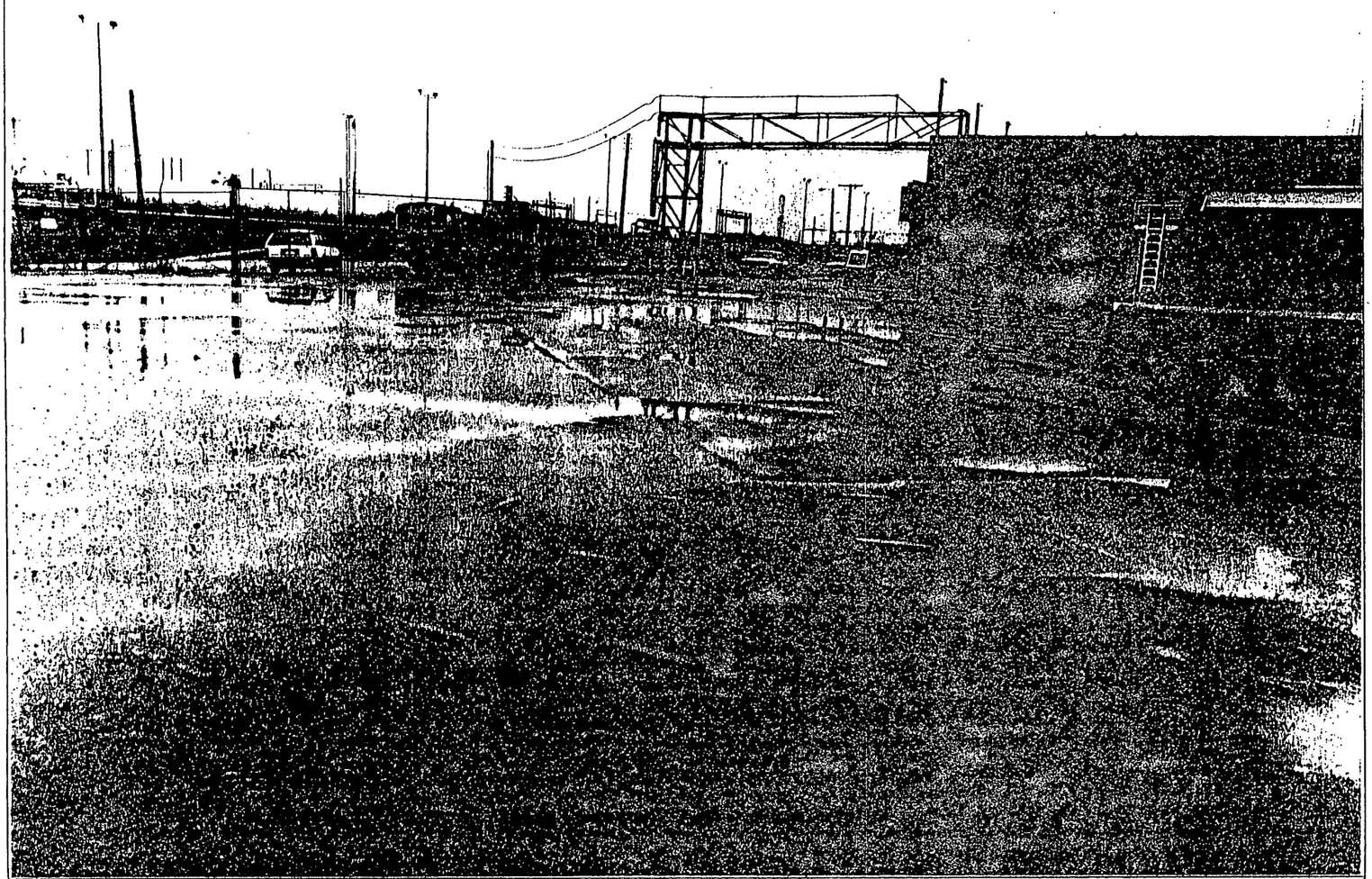


FIGURE 2-24
IHSS 172

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado



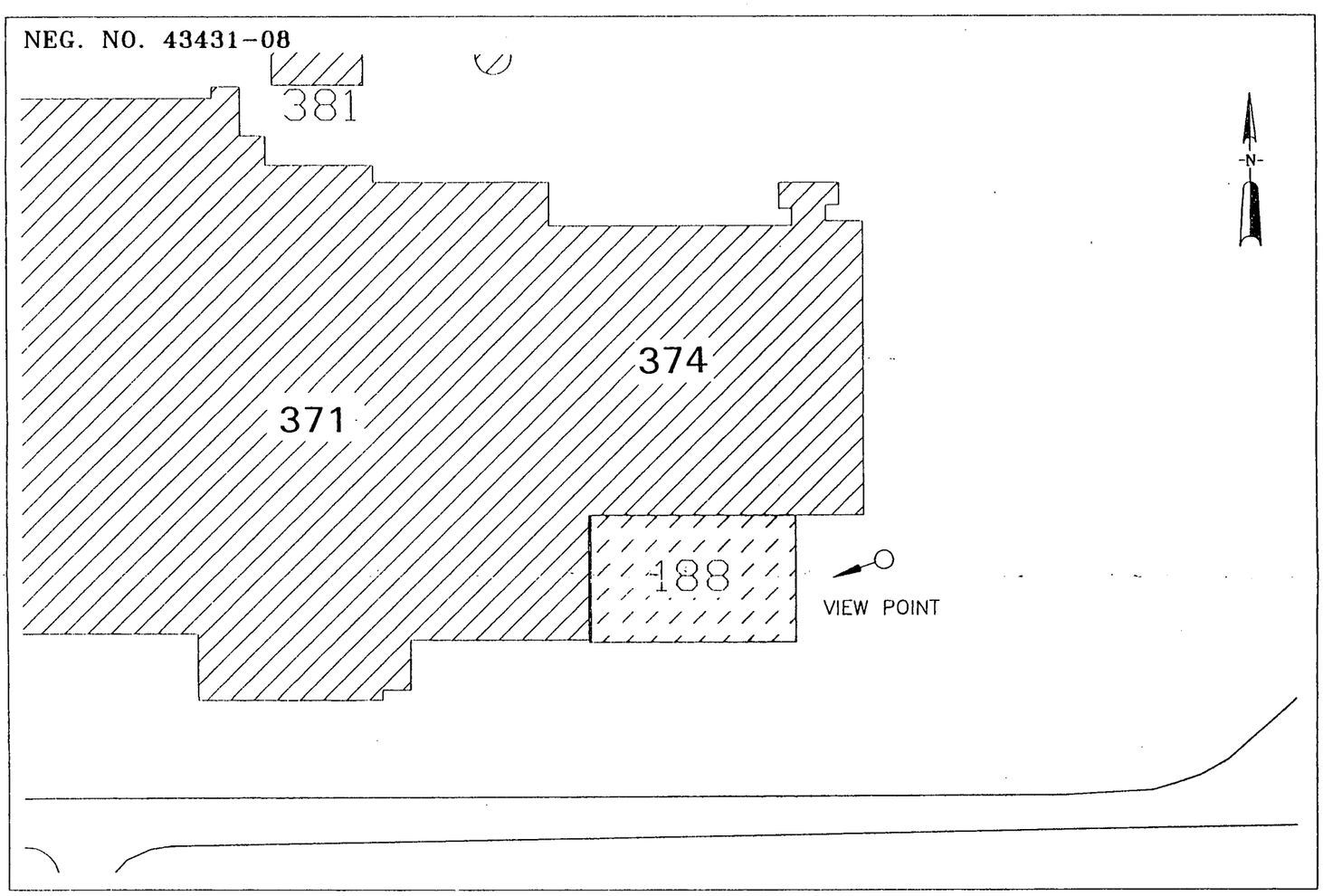
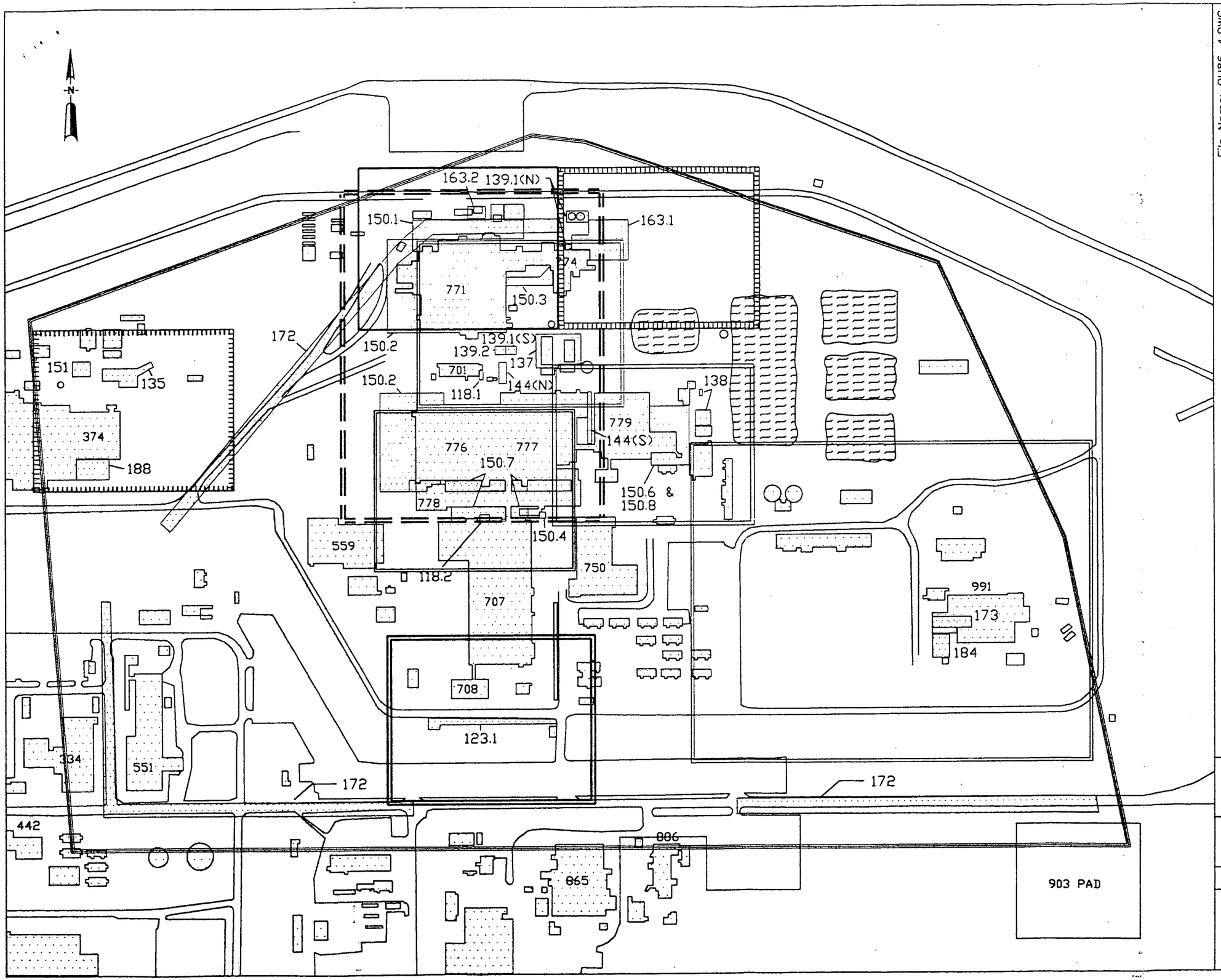


FIGURE 2-26

IHSSs 188

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant, Golden, Colorado



File Name: OU86-4.DWG

Date ___/___/___

Approved By _____

MAP LEGEND

- ROADWAYS
- 991 — BUILDINGS AND NUMBERS
- 137 — INDIVIDUAL HAZARDOUS SUBSTANCE SITES (IHSS) AND NUMBERS
- EVAPORATION PONDS
- OU8 BOUNDARY

INDEX TO IHSS LOCATION MAPS

- FIGURE 6-5
- FIGURE 6-6
- FIGURE 6-7
- FIGURE 6-8
- FIGURE 6-9
- FIGURE 6-10
- FIGURE 6-11
- FIGURE 6-12
- FIGURE 6-13

SCALE IN FEET

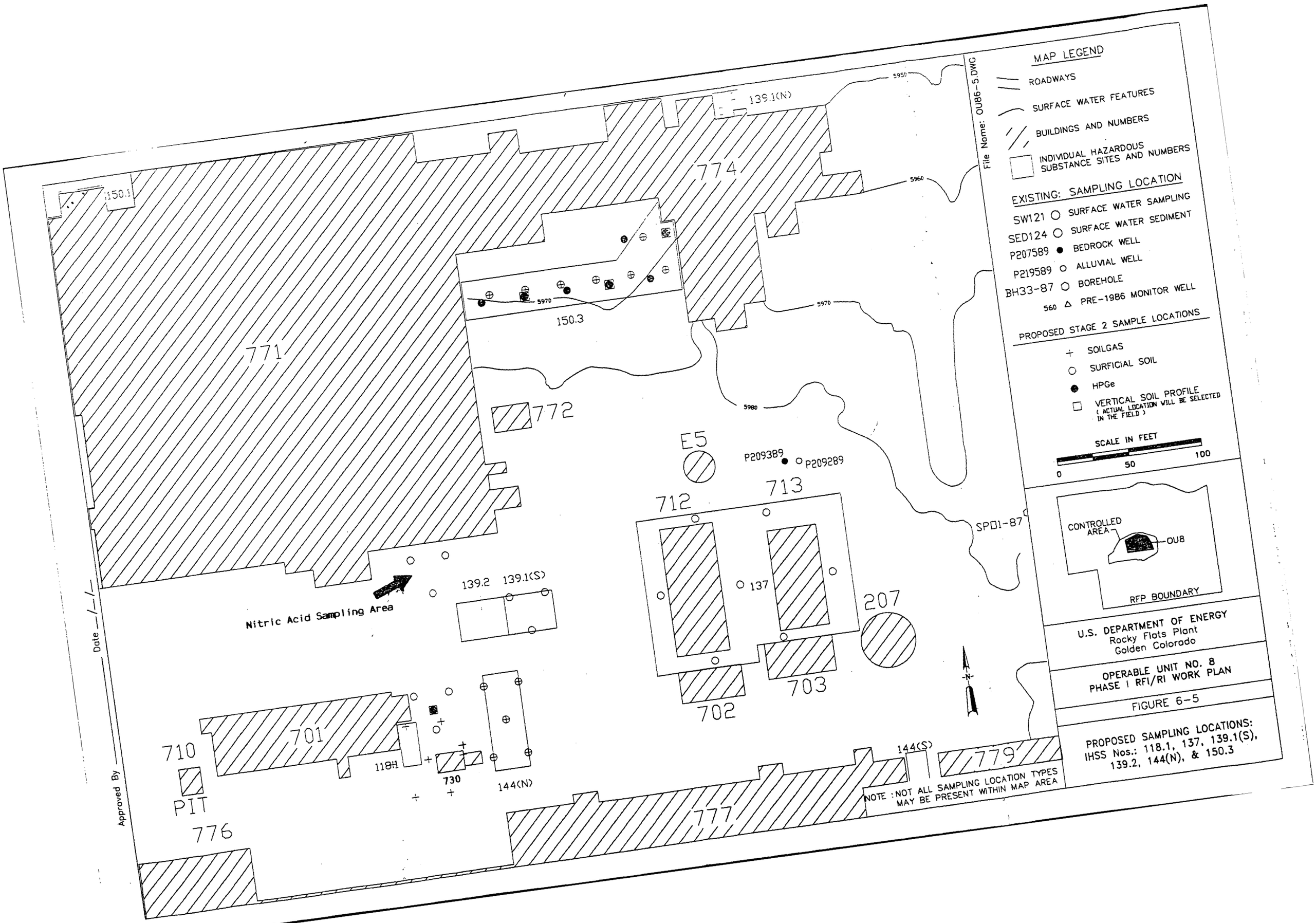
0 300 600

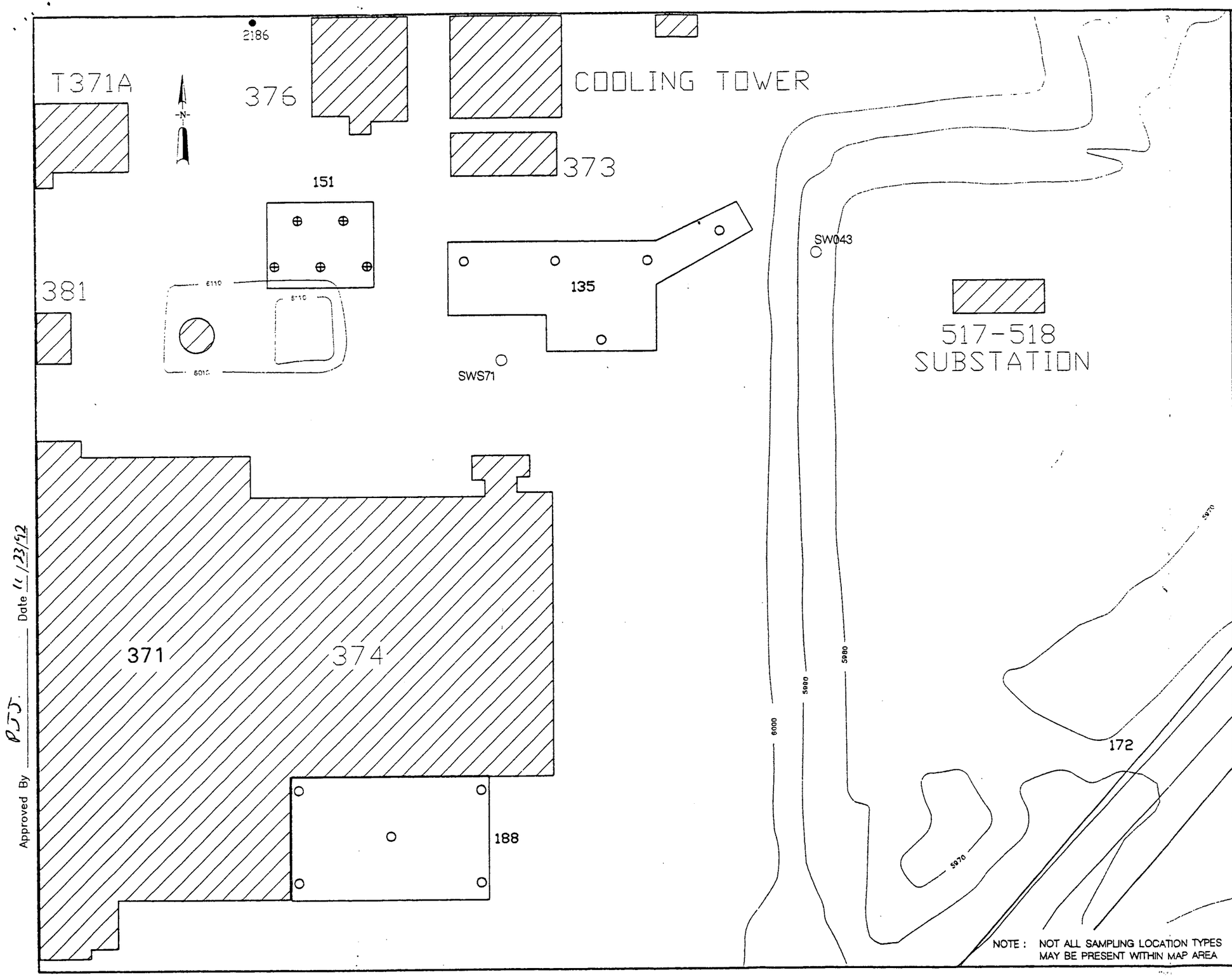
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

FIGURE 6-4

INDEX MAP TO
FIGURES 6-3 TO 6-13


File Name: OU8G-5.DWG
Date __/__/__
Approved By
MAP LEGEND
ROADWAYS
SURFACE WATER FEATURES
BUILDINGS AND NUMBERS
INDIVIDUAL HAZARDOUS SUBSTANCE SITES AND NUMBERS
EXISTING: SAMPLING LOCATION
SW121 SURFACE WATER SAMPLING
SED124 SURFACE WATER SEDIMENT
P207589 BEDROCK WELL
P219589 ALLUVIAL WELL
BH33-87 BOREHOLE
560 PRE-1986 MONITOR WELL
PROPOSED STAGE 2 SAMPLE LOCATIONS
SOILGAS
SURFICIAL SOIL
HPGe
VERTICAL SOIL PROFILE
(ACTUAL LOCATION WILL BE SELECTED IN THE FIELD)
SCALE IN FEET
0
50
100
CONTROLLED AREA
OU8
RFP BOUNDARY
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado
OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN
FIGURE 6-5
PROPOSED SAMPLING LOCATIONS:
IHSS Nos.: 118.1, 137, 139.1(S), 139.2, 144(N), & 150.3
NOTE : NOT ALL SAMPLING LOCATION TYPES MAY BE PRESENT WITHIN MAP AREA
118.1
139.1(N)
150.3
774
771
772
5950
5960
5970
5980
E5
P209389
P209289
712
713
SPD1-87
137
207
703
702
139.2
139.1(S)
Nitric Acid Sampling Area
710
701
PIT
776
118H1
730
144(N)
144(S)
779
777
N



File Name: OU86-8.DWG

Approved By PJS. Date 11/23/92

MAP LEGEND

- ROADWAYS
- SURFACE WATER FEATURES
- BUILDINGS AND NUMBERS
- 137 — INDIVIDUAL HAZARDOUS SUBSTANCE SITES AND NUMBERS

EXISTING SAMPLING LOCATION

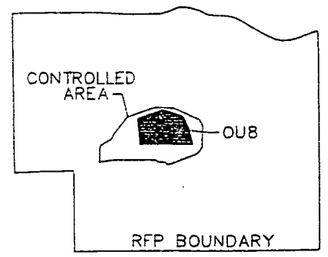
- SW121 ○ — SURFACE WATER SAMPLING
- SED124 ○ — SURFACE WATER SEDIMENT
- P207589 ● — BEDROCK WELL
- P219589 ○ — ALLUVIAL WELL
- BH33-87 ⬡ — BOREHOLE
- 560 △ — PRE-1986 MONITOR WELL

PROPOSED STAGE 2 SAMPLE LOCATIONS

- \+ — SOIL/GAS
- ○ — SURFICIAL SOIL
- ● — HPGe
- □ — VERTICAL SOIL PROFILE (ACTUAL LOCATION WILL BE SELECTED IN THE FIELD)

SCALE IN FEET

0 50 100

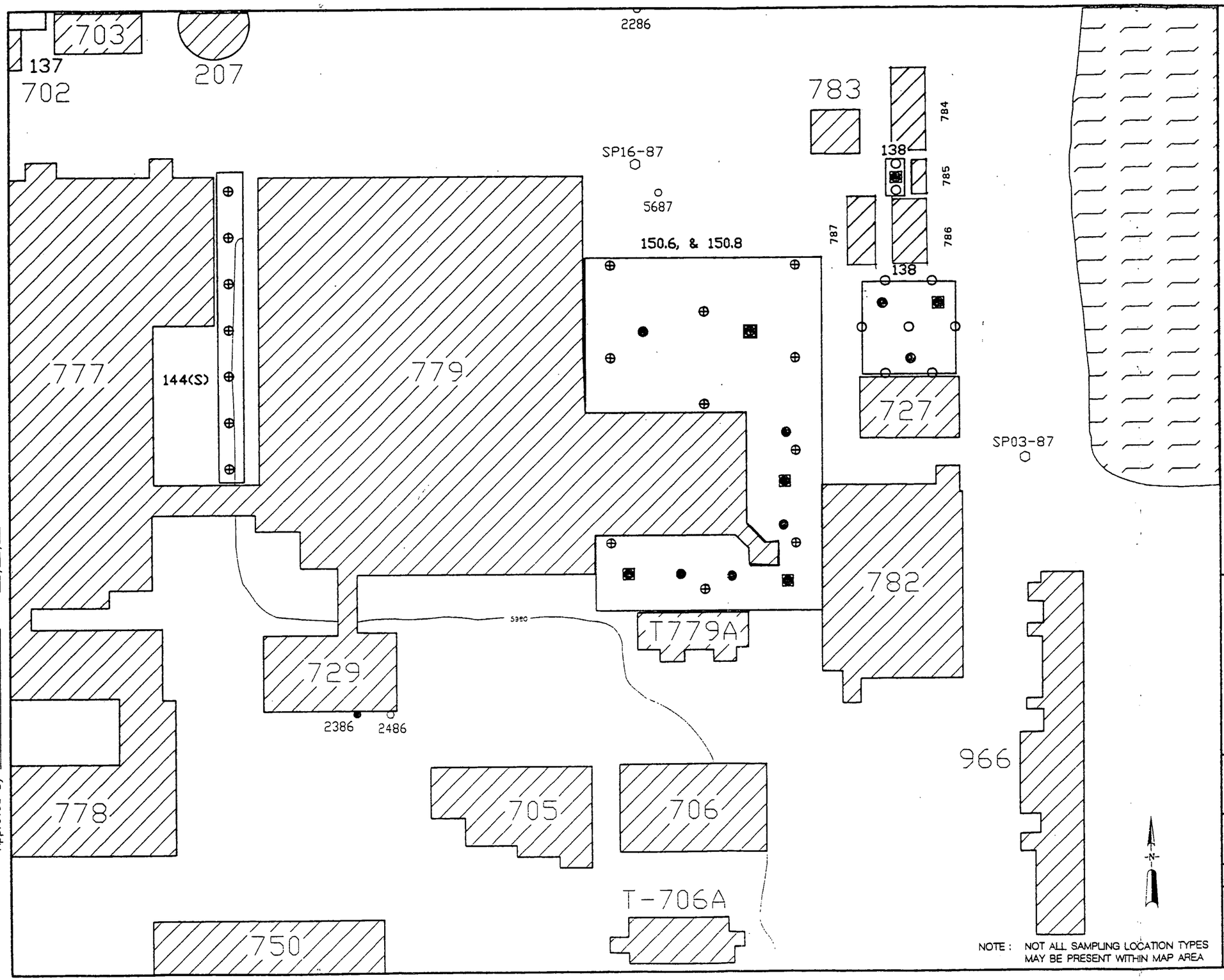


U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

FIGURE 6-8

PROPOSED SAMPLING LOCATIONS:
IHSS Nos.: 135, 151 & 188



Approved By PJT Date 11/23/92

MAP LEGEND

- ROADWAYS
- SURFACE WATER FEATURES
- BUILDINGS AND NUMBERS
- 137 INDIVIDUAL HAZARDOUS SUBSTANCE SITES AND NUMBERS

EXISTING SAMPLING LOCATION

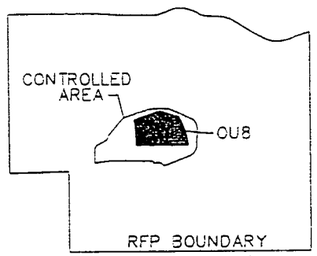
- SW121 ○ SURFACE WATER SAMPLING
- SED124 ○ SURFACE WATER SEDIMENT
- P207589 ● BEDROCK WELL
- P219589 ○ ALLUVIAL WELL
- BH33-87 ○ BOREHOLE
- 560 △ PRE-1986 MONITOR WELL

PROPOSED STAGE 2 SAMPLE LOCATIONS

- + SOILGAS
- ○ SURFICIAL SOIL
- ● HPGe
- □ VERTICAL SOIL PROFILE (ACTUAL LOCATION WILL BE SELECTED IN THE FIELD)

SCALE IN FEET

0 50 100



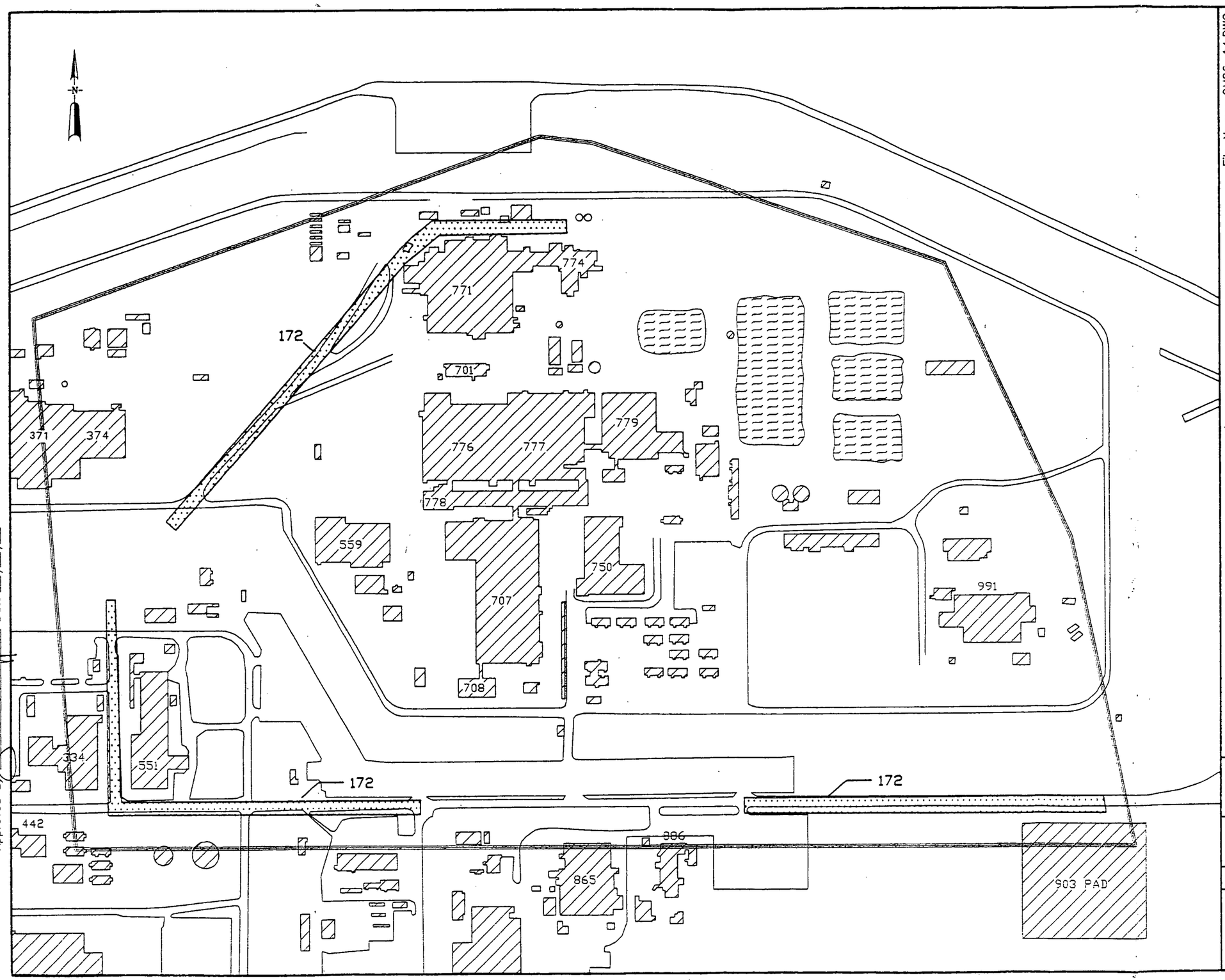
NOTE : NOT ALL SAMPLING LOCATION TYPES MAY BE PRESENT WITHIN MAP AREA

U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

FIGURE 6-9

PROPOSED SAMPLING LOCATIONS:
IHSS Nos.: 138, 144(S),
150.6 & 150.8



File Name: OU86-14.DWG

MAP LEGEND

ROADWAYS

991 BUILDINGS AND NUMBERS

137 INDIVIDUAL HAZARDOUS SUBSTANCE SITES (IHSS) AND NUMBERS

EVAPORATION PONDS

OU8 BOUNDARY

SCALE IN FEET

0 300 600

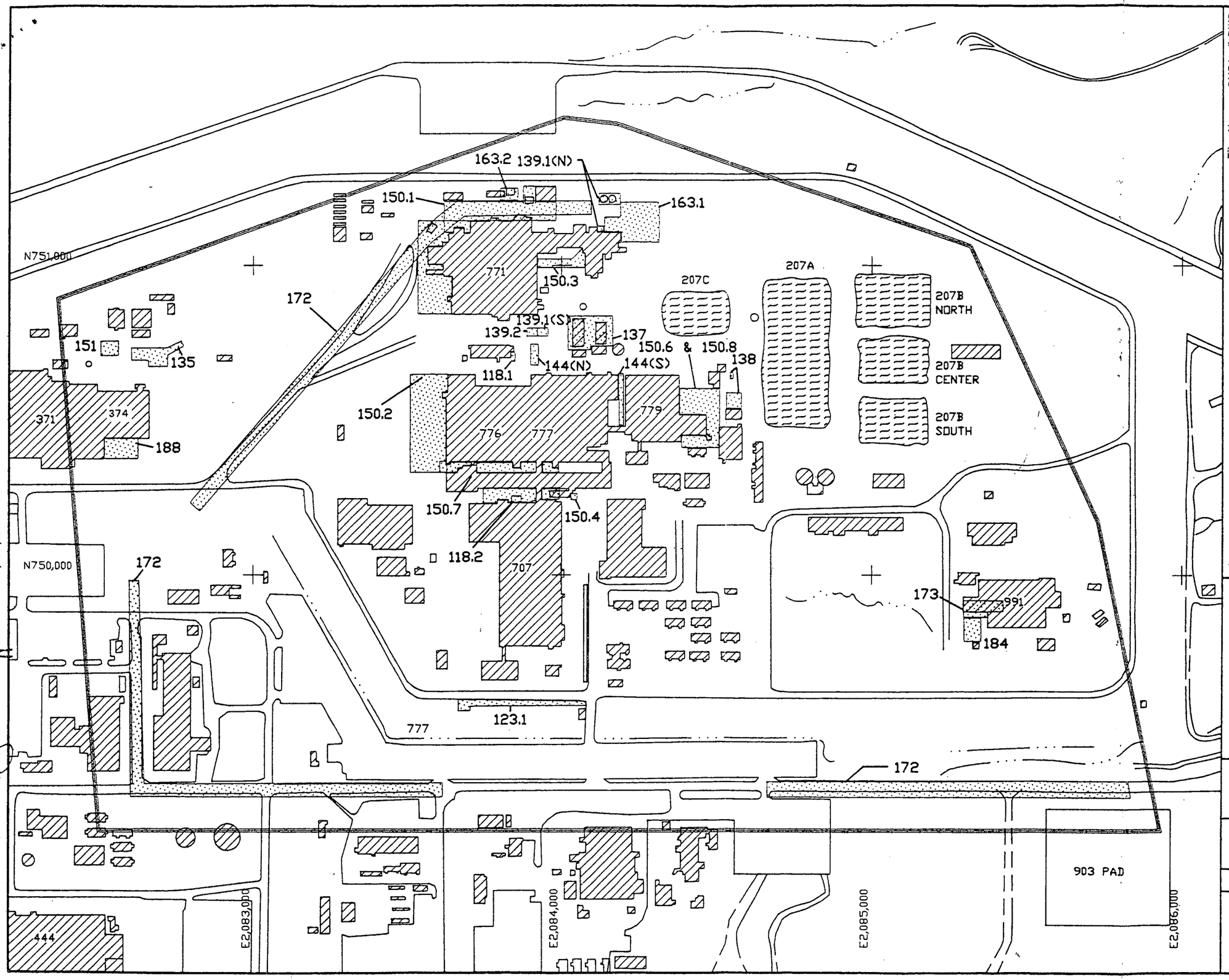
U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

FIGURE 6-14

PROPOSED INVESTIGATION AREA
IHSS No.: 172

Approved By: James D. Allen Date 11/23/92



File Name: OU81-3.DWG

Approved By: [signature] Date 11/20/92

MAP LEGEND

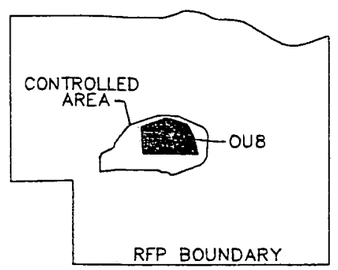
- OPERABLE UNIT 8
- STREAMS DITCHES DRAINAGE FEATURES
- PAVED ROADS
- DIRT ROADS
- SURFACE WATER IMPOUNDMENTS
- BUILDINGS
- INDIVIDUAL HAZARDOUS SUBSTANCE SITES

N

SCALE IN FEET

0 300 600

Source: Groundwater Protection and Monitoring Program Plan. ASI Nov. 1991



U.S. DEPARTMENT OF ENERGY
Rocky Flats Plant
Golden Colorado

OPERABLE UNIT NO. 8
PHASE I RFI/RI WORK PLAN

FIGURE 8-1

LOCATION OF INDIVIDUAL HAZARDOUS SUBSTANCE SITES OPERABLE UNIT 8 700 AREA