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PREPARED FOR THE
UNITED STATES DEPARTMENT OF ENERGY
UNDER CONTRACT NUMBER DE-AC06-76RL01857

Document No. UNI-3855

Date July 24, 1986

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116-C, -F, and -H REACTOR EXHAUST VENTILATION STACK DEMOLITION HANFORD SITE INDIVIDUAL FACILITY REPORT

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# 116-C, -F, AND -H REACTOR EXHAUST VENTILATION STACK DEMOLITION HANFORD SITE INDIVIDUAL FACILITY REPORT

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## SUMMARY

The 116-C, -F, and -H Reactor Exhaust Ventilation Stacks were successfully demolished and buried in place and the area was returned to natural terrain in September 1983. The work was accomplished by a subcontractor under the administration and technical control of UNC Nuclear Industries' Decommissioning Services.

There were no personnel injuries or safety infractions during this contract. The subcontractor finished the work at cost and five days ahead of schedule.

All demolition activities were performed with the utmost regard to the personnel involved. Special procedures, equipment, clothing, respirator equipment, gloves, safety glasses and face shields were provided. Personnel working in the demolition zone used the equipment and clothing throughout the drilling and demolition phases.

The Allowable Residual Contamination Level (ARCL) methodology was used in the 100 Areas for the first time on this decommissioning project. The ARCL reports are being prepared for each stack to document the final characterization and to specifically assure that decommissioning methods were sufficient to prevent future inhabitants of these sites from receiving doses greater than 25 mrem/year to the whole body or to any organ.

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## 1.0 INTRODUCTION

This report documents the decommissioning of three reactor exhaust stacks on the Hanford Site in the state of Washington. Each of the eight retired reactors had an exhaust stack designated as the 116 building or stack. This report covers the demolition of the 116-C, -F, and -H stacks. The other five reactor stacks, 116-B, -D, -DR, -KE, and -KW, will be decommissioned at a later date according to UNC Nuclear Industries Decommissioning Services' long-range planning.

Demolition involved drilling and felling the stacks; drilling, blasting and excavating the bases; and excavating, backfilling, and contouring the burial trenches to a condition compatible with the surrounding terrain. Demolition of the three 116 stacks was subcontracted to Blasting and Vibration Consultants, Inc. (BVC) and administered by UNC Procurement, Subcontracts, under the technical direction of UNC Decommissioning Services.

## 2.0 DESCRIPTION OF 116 STACK FACILITIES

### 2.1 HISTORY

The 116-F, -H, and -C reactor exhaust ventilation stacks were all constructed between 1943 and 1951. These stacks dispersed the unfiltered reactor building exhaust air into the atmosphere until the filter buildings were constructed in the late 1960's and early 1970's. Each stack was constructed with its associated reactor and operated until the reactor facilities were gradually phased out and retired from service.

| | CONSTRUCTION | OPERATION | |
|---|---|---|---|
| STACK | START | START | SHUT DOWN |
| 116-F | Dec. 1943 | Feb. 1945 | June 1965 |
| 116-H | Mar. 1948 | Oct. 1949 | April 1965 |
| 116-C | June 1951 | Nov. 1952 | April 1969 |

### 2.2 LOCATION

The stacks were located in three reactor areas situated along the south shore of the Columbia River where it traverses the northern part of the Hanford Site. The 100-F, -H, and -B/C Areas are shown on the Hanford Site map, Figure 1. The area boundaries and the location of the stacks within each of the respective areas are shown in Figures 2, 3, and 4.

### 2.3 PHYSICAL DESCRIPTION

The 116 stacks were part of the reactor building ventilation system, which was designed to provide clean air to the various work sites within the reactor building. The clean air entered the noncontaminated portions of the reactor building, then moved through zones with increasing levels of contamination, and finally entered the filter building where the air passed through

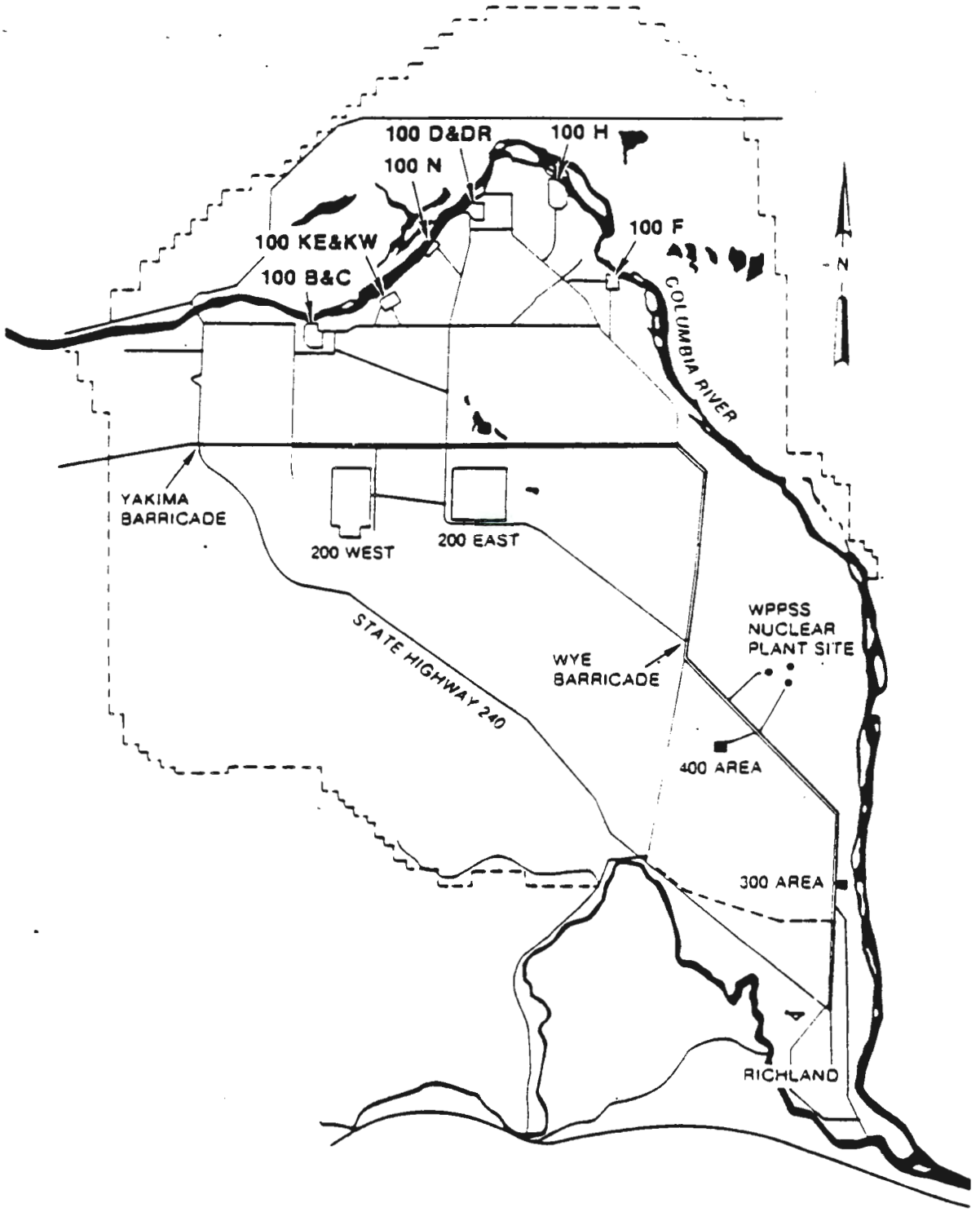


Figure 1. Hanford Site Map.

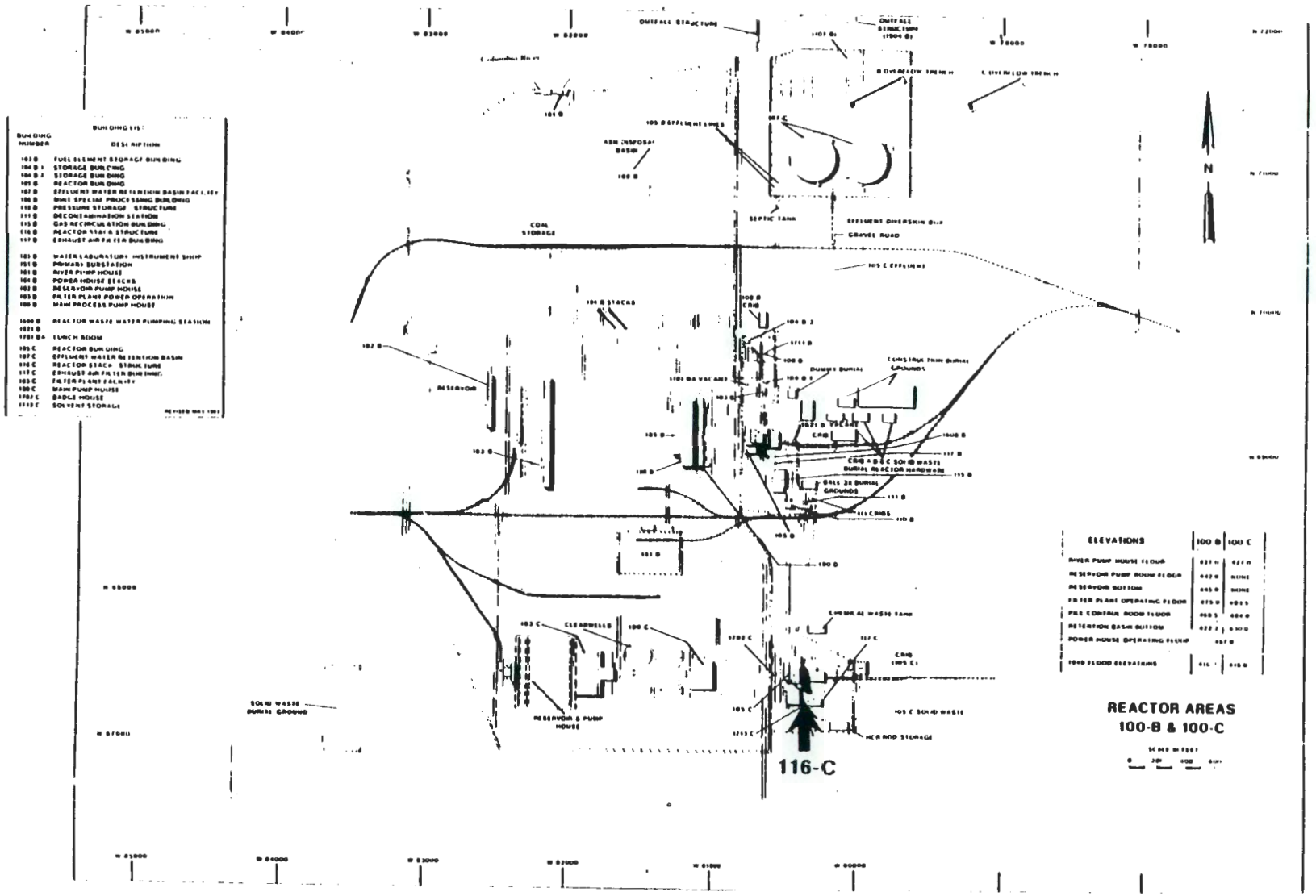


Figure 2. Location of 116-C in 100-B/C Area.



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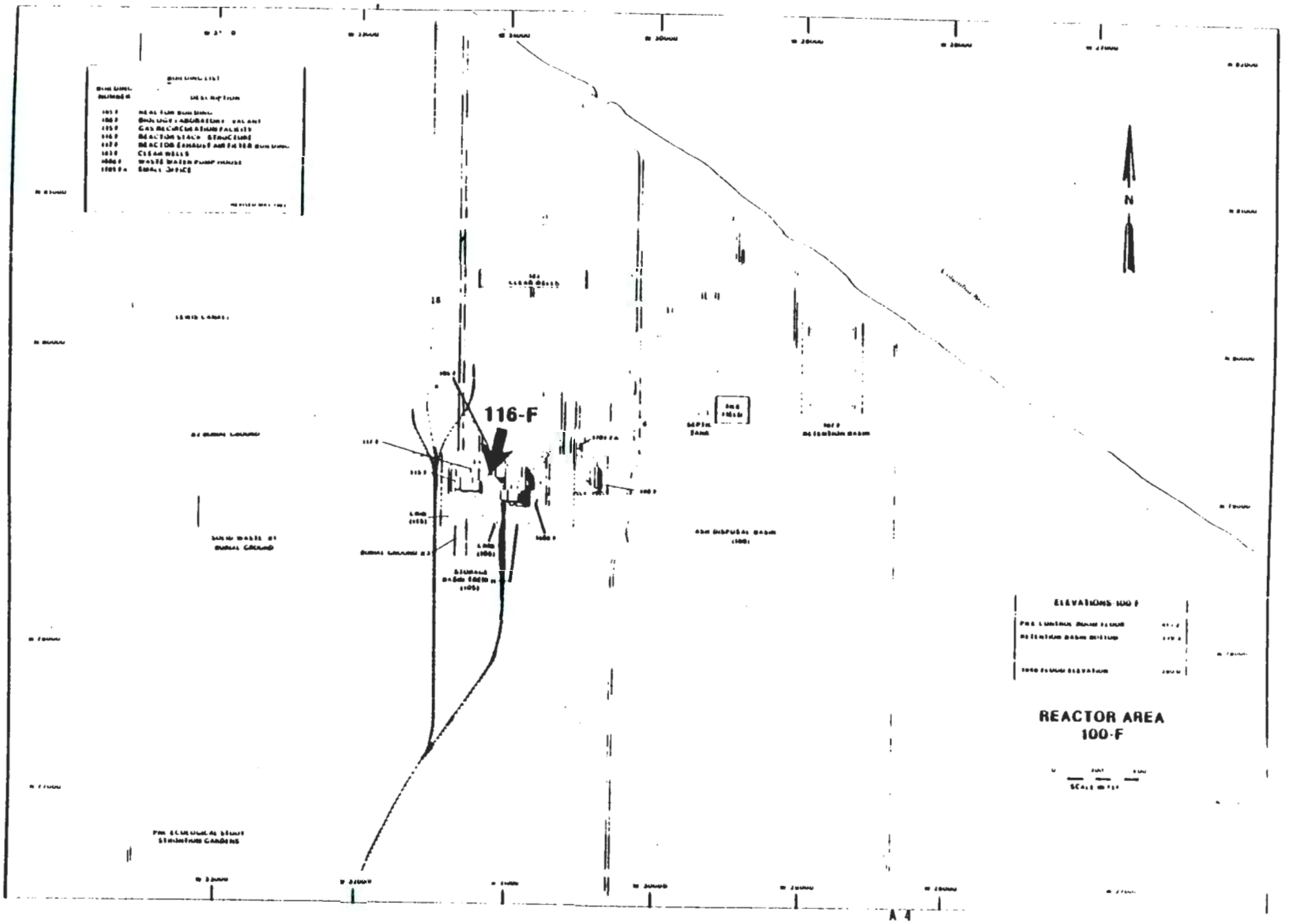


Figure 3. Location of 116-F in 100-F Area.



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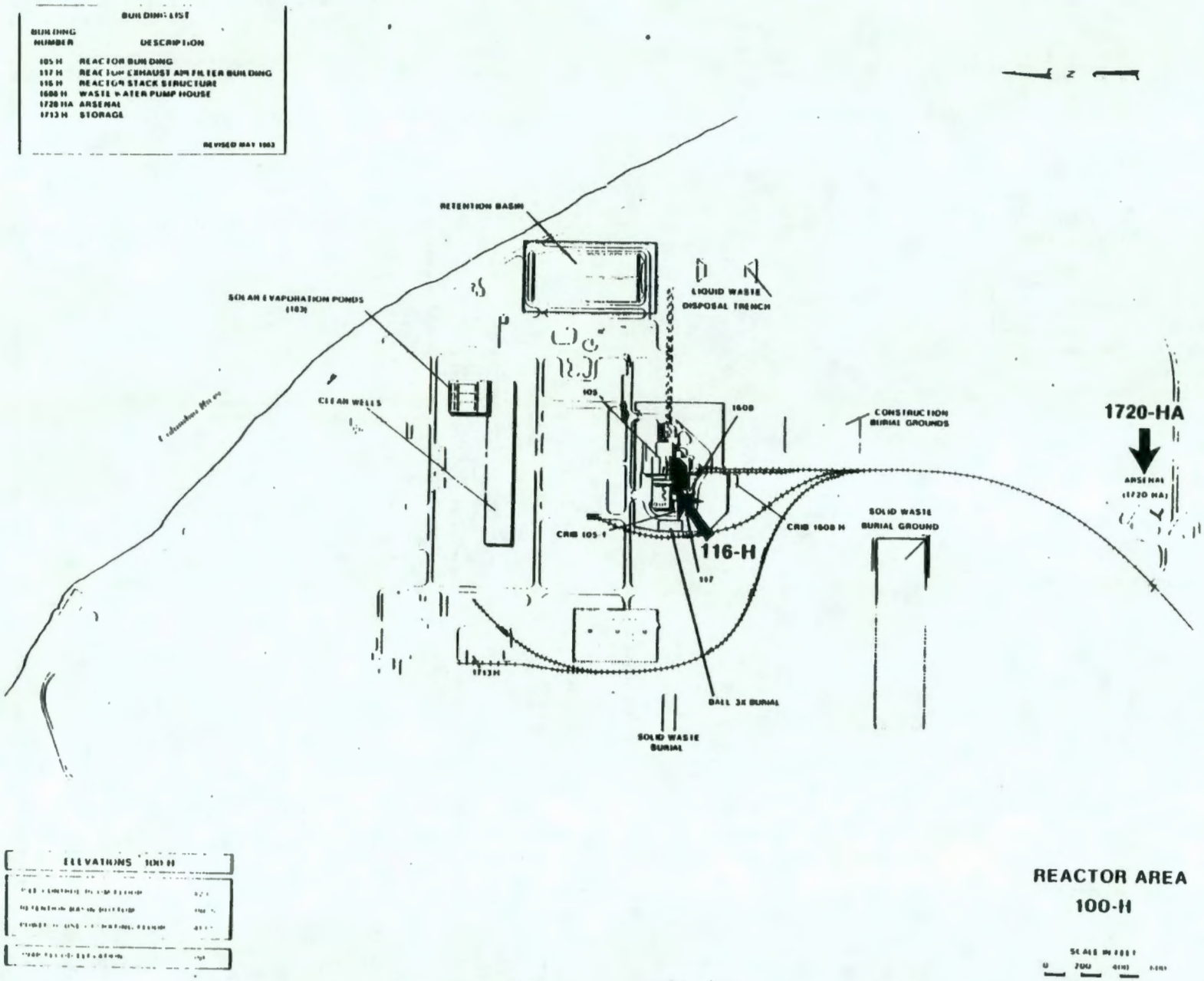


Figure 4. Location of 116-H in 100-H Area.



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"absolute" (particulate) and "halogen" (activated charcoal) filters. The filtered air then vented through the 200-ft stacks and discharged into the atmosphere.

The 116-C, -F, and -H stacks (Figures 5, 6 and 7) were similar, 200 ft high, round, reinforced concrete structures, with a base diameter of 16 ft-7 in. Maximum wall thickness of concrete was 18 in. at the stack base. Each stack rested on a double octagon-shaped base which extended 17 ft-6 in. below grade. The upper octagon measured 18 ft-6 in. across the flats and was 11 ft-6 in. thick; the lower octagon was 27 ft across the flats and 6 ft thick. A 6-in. drain pipe was installed in the bottom of each stack.

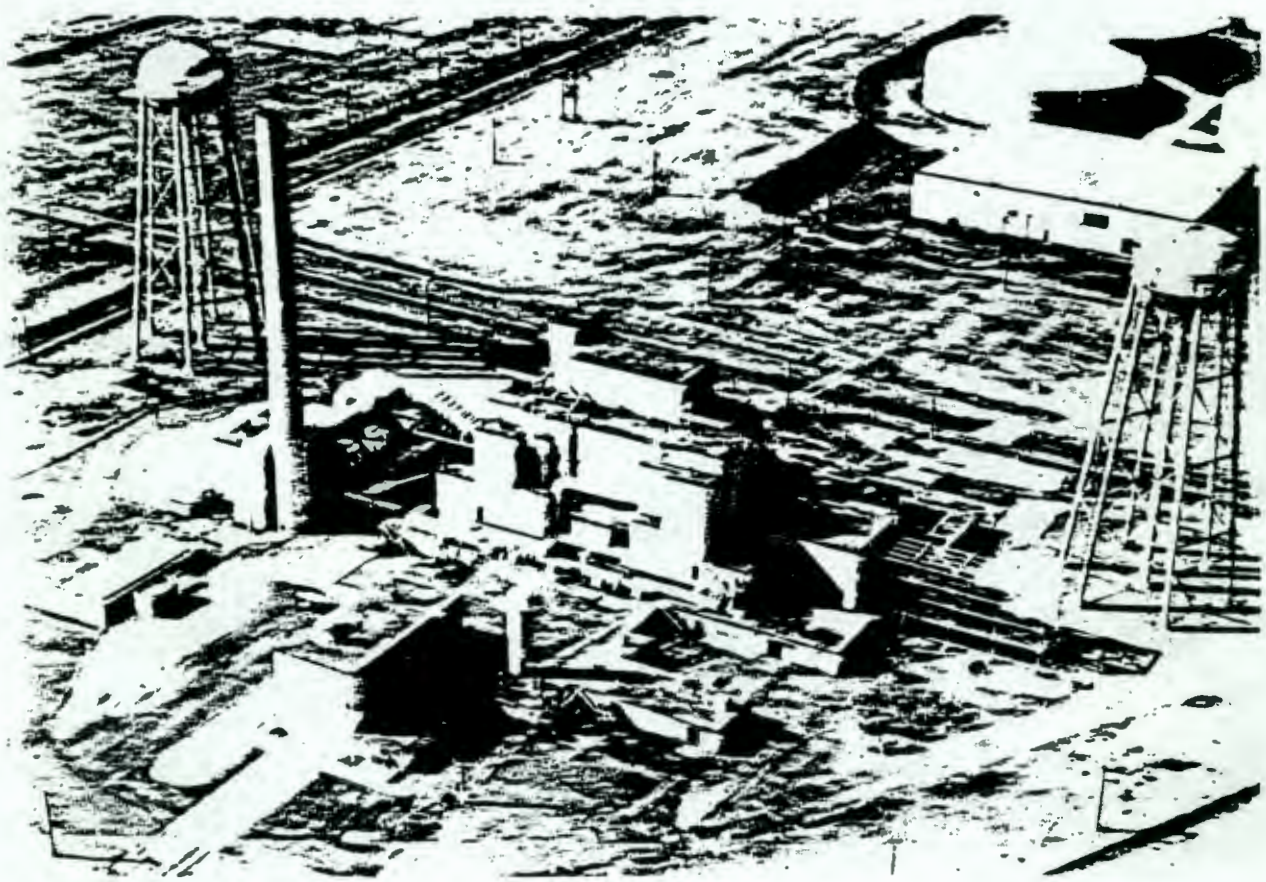

Figure 5. 116-C Stack.

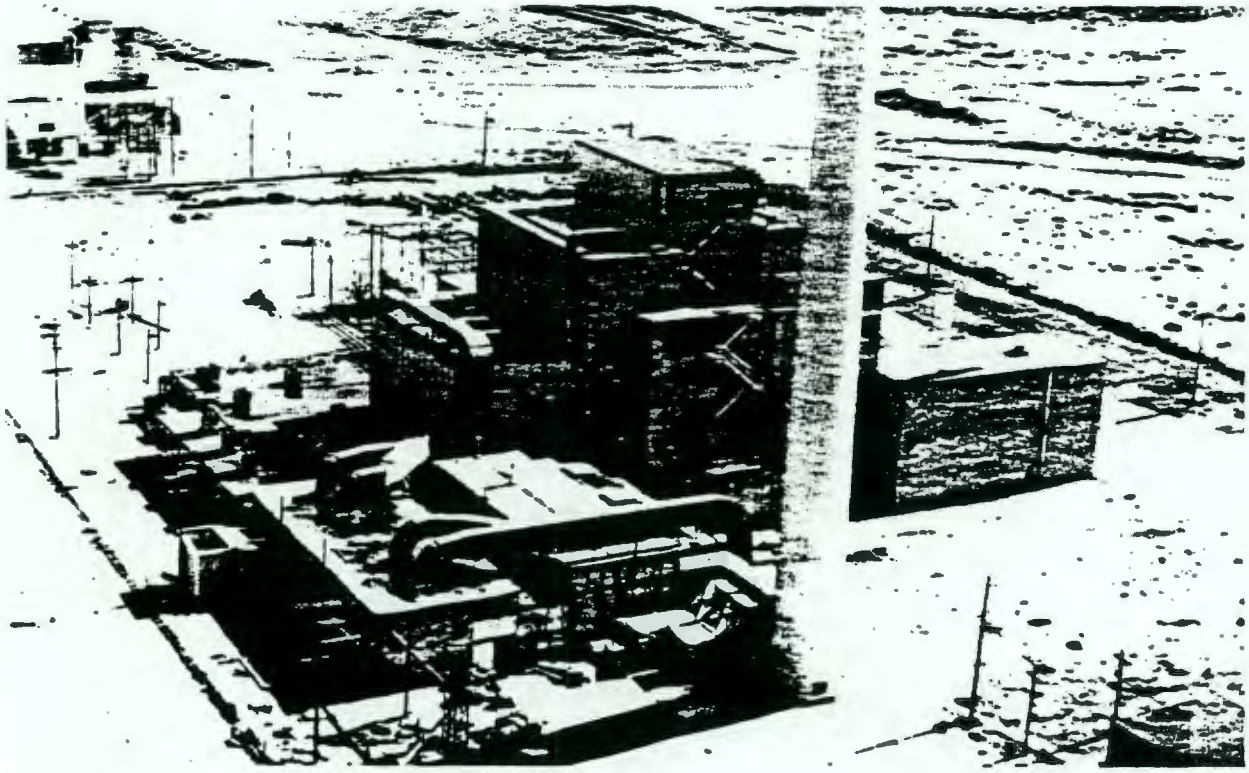

Figure 6. 116-F Stack.

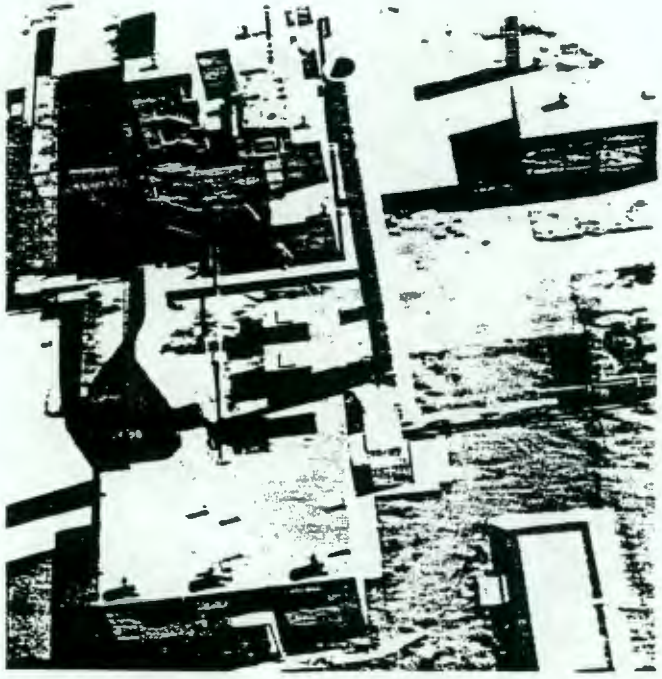

Figure 7. 116-H Stack.

## 2.4 RADIOLOGICAL DESCRIPTION

The radiological description of the 116 stacks was based on a comparison of information found in Radiological Characterization of the Retired 100 Areas, UNI-946 (Reference 1), and sampling and surveys completed before the stacks were felled.

Dose rates measured at the base of the reactor stacks were less than 1 mR/hr. The general background level inside the bottom of the stacks was approximately 1,000 cpm, as measured with a GM probe. Smearable alpha contamination was present up to 130 dpm/100 $cm^2$, and averaged about 30 dpm/100 $cm^2$. Smearable beta contamination ranged from 100 to 5,000 dpm/100 $cm^2$. The inlet duct leading to the 116-C stack had smearable beta contamination of 15,000 dpm/100 $cm^2$.

In 1966 the interior of the 116-C stack was coated with a 1/8-in. tar layer. Before demolition the tar was analyzed for radioactivity and depth of penetration.

Prior to demolition each stack was surveyed for direct and smearable activity. Concrete samples were taken for isotopic analyses to determine depth of penetration and concentrations of dispersed activity.

The estimated radionuclide inventory for the 116-F stack, for example, was 5.0 pCi/g. This amount was calculated from the concentration of nuclides over the interior surface of the stack to a depth of 1 cm. The radionuclides found were tritium, carbon-14, cobalt-60, strontium-90, cesium-137, europium-152, and plutonium-239. The ARCL report for each stack contains a more detailed radiological description.

The stack burial sites are considered to be unrestricted, released sites under the ARCL methodology as described in Allowable Residual Contamination Levels for Decommissioning Facilities in the 100 Areas of the Hanford Site, UNI-2522,

and as authorized by DOE in a letter to Hanford contractors, dated July 3, 1984, from the Manager, Department of Energy, Richland Operations (DOE-RL)(References 2 and 3). The release conditions for each stack can be found in the following reports: ARCL Report for Decommissioning the 116-C Stack, UNI-3826; ARCL Report for Decommissioning the 116-H Stack, UNI-3827; and ARCL Calculations for Decommissioning the 116-F Stack, UNI-3492 (References 4, 5, and 6).

## 3.0 OBJECTIVES

The objectives of this project were to demolish the three reactor stacks, bury the debris in situ, and return the site to a near-natural condition, which would be free of radiological control. An analysis of the methods available for demolishing the exhaust stacks, either by conventional heavy equipment or by explosives, was performed. It was determined that the safest and most economical method was by explosive demolition. The explosives subcontractor was selected through competitive bidding, thus gaining an additional cost-saving for the project.

## 4.0 PROJECT MANAGEMENT

The Decommissioning Services Section was created as a part of UNC Nuclear Industries' Decommissioning Programs Department in 1983. The Decommissioning Planning and Operations Subsections were responsible for planning and completing decommissioning projects in a safe and cost-effective manner. The Surveillance and Services (now Surveillance and Maintenance) Subsection was given the responsibility for maintaining the retired Hanford 100 Areas in a safe condition prior to demolition activities.

Before work began on the project, documents were prepared by a project engineer to acquire a subcontractor and outline the safety requirements of the job. Once these documents were prepared and reviewed, and the subcontractor chosen, work was started under the supervision of the project engineer. These documents are listed in Section 4.1. A technical review process used to assure that all elements of safety, QA, and procurement were addressed is discussed in Section 4.2.

The progress of the decommissioning project was tracked and reported through the weekly subsection highlights, monthly status reports, and monthly schedule statusing. Weekly meetings were also held to discuss problem areas and progress, and to assign responsibilities for action items.

To document the physical work, photographs are taken before, during, and after the project and become part of the permanent project record. The photographs are also used for reports and presentations.

## 4.1 PROJECT DOCUMENTATION

The documents prepared to decommission the 116-C, 116-F, and 116-H exhaust ventilation stacks are listed and briefly described below.

Pre-procurement Plan, Demolition of the 116-F, H, and C Exhaust Stacks

This document provided the estimated cost and pre-procurement engineering and planning for DOE review and approval.

Purchase Requisition, R-127445, Demolition of the 116-F, H, and C Exhaust Stacks

This document provided the technical direction to UNC Procurement, Subcontracts, for preparing the Request for Proposal (RFP) to interested bidders.

UNI-2506, Safety Assessment Study of the 100-B, D, F, DR, H, and C Hanford Reactor Ventilation Stacks, July 1, 1983

This document provided a detailed safety review for the proposed explosive demolition of the exhaust stacks.

Request for Proposal, R-127445-RH, Exhaust Stack Demolition

This document (RFP) provided the administrative controls and technical criteria required by UNC from the prospective contractors to submit a competitive proposal.

*Proposed Use of Explosives*

The letter, T. E. Dabrowski (UNC) to R. E. Gerton (DOE-RL), dated August 18, 1983, addressed the requirements stated in DOE-RL Order 5480.1, "Explosive Safety", and requested DOE-RL approval to use explosives.

The letter, R. E. Gerton to President, UNC Operations Division, dated August 25, 1983, authorized the use of explosives for demolishing the 116 exhaust ventilation stacks.

Special Procedure DO-1, Demolition of the 116-F, H, and C Stacks and Foundations

This document provided the administrative and technical directions in checklist form to be used as the work was performed by the subcontractor and Project Engineer.

Special Agreement - SA-00110

This document was the final contract signed by the subcontractor and UNC. It provided the statement of work, terms, and conditions under which the subcontractor would receive payment for work completed in compliance with the contract requirements.

## 4.2 TECHNICAL REVIEW

Proposals received for the demolition of the exhaust stacks were reviewed independently by an evaluation committee consisting of members from Procurement Quality Assurance, Industrial Safety, and Decommissioning Operations. Evaluations were based upon technical responsiveness to requirements listed in the Request for Proposal (RFP).

Although they were not the lowest bidder, Blasting and Vibration Consultants, Inc. was considered to be the highest rated subcontractor, based on the reviewers' independent evaluation of their safety plan and their technical responsiveness.

After UNC Procurement reviewed and concurred with the Cost/Price Analysis, the notice to proceed was issued and the Special Agreement SA-00110 was finalized August 16, 1983.

Final approval was given to bring explosives onto the Hanford Site after a special joint safety meeting was held September 2, 1983 for Decommissioning Services and DOE to assure that all safety requirements were met to use explosives on the Hanford Site.

## 5.0 PROJECT ACTIVITIES

### 5.1 SITE PREPARATIONS

The subcontractor started work by setting up an office facility at 100-F Area on September 1, 1983. Crews and equipment, such as wagon drills and earth-moving equipment, were transferred to the Hanford Site from the subcontractor's home office. Phones and power were provided.

Explosives were delivered to the site in accordance with special procedures. The materials arrived September 2, 1983, and were moved across the site to the 1720-HA Powder Magazine located in the 100-H Area.

The subcontractor first felled the 108-B and 184-B stacks, which were included in the contract. Preparation work for the 116 stacks began during the week of September 15, 1983.

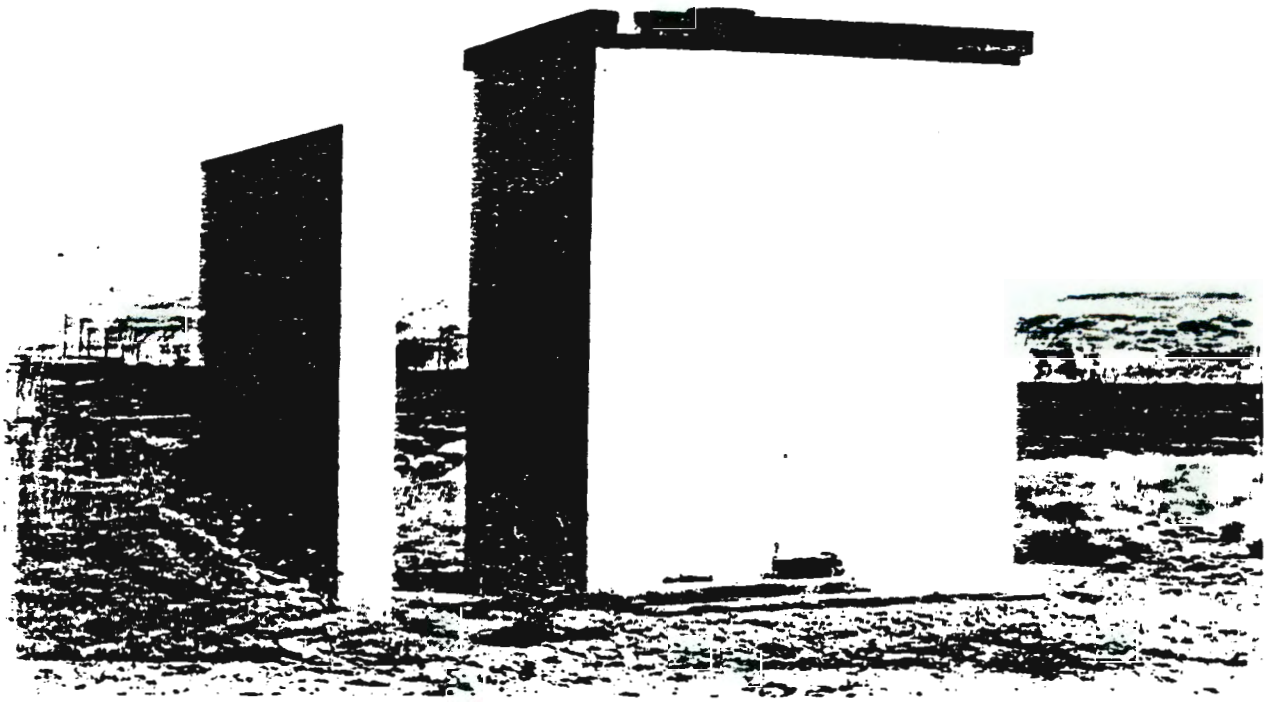

Figure 8. 1720-HA Powder Magazine.

## 5.2 PROJECT WORK SEQUENCE

Work was started in September 1983 and progressed from the 116-C stack and base to the 116-H stack and base and then to the 116-F stack and base. The interior surfaces of the three stacks were coated with ALARA Coat to a height of 8 ft to provide a nonradiologically controlled working area for the subcontractor. The unrestricted release criteria specified in Table 5-1, Radiation Control Manual (Reference 7), were used to release the working area, although the ARCL method was used to ultimately release the remainder of the stack and the stack burial sites.

Depending on the individual site conditions, the work sequence generally followed these steps: hole pattern layout and drilling, duct removal, trench excavation, stack blasting and cleanup, base blasting and cleanup, and finally trench contouring.

### 5.2.1 Hole Pattern Layout

The hole pattern layout resulted from the subcontractor's engineering analysis made to determine the placement and correct amount of explosive necessary to drop the stack in the required direction. The engineering analysis took into account the direction of fall, thickness of the walls, other influencing structures or substructures, and the concrete reinforcement pattern. To avoid interference with drilling, the vertical and horizontal reinforcement bars were located. The drop cut hole pattern was a wedge on the side of the felling direction, similar to the notching method used when felling a tree (Figure 9). The side opposite the notch became the hinge area. The reinforcement bars in this area acted as a hinge for maintaining the alignment of the stack as it fell. This was the method used for both the 116-C and 116-H stacks (Figure 10). However, the 116-F stack had a large, reinforced concrete exhaust inlet duct where the hinge area would normally be. Therefore, it was necessary to locate the drop cut (notch) immediately above the opening. This would allow the wedge to be cut out with the 45° angle line below the horizontal line. It was also decided to drill this hole pattern from the inside by hand (Figure 11).



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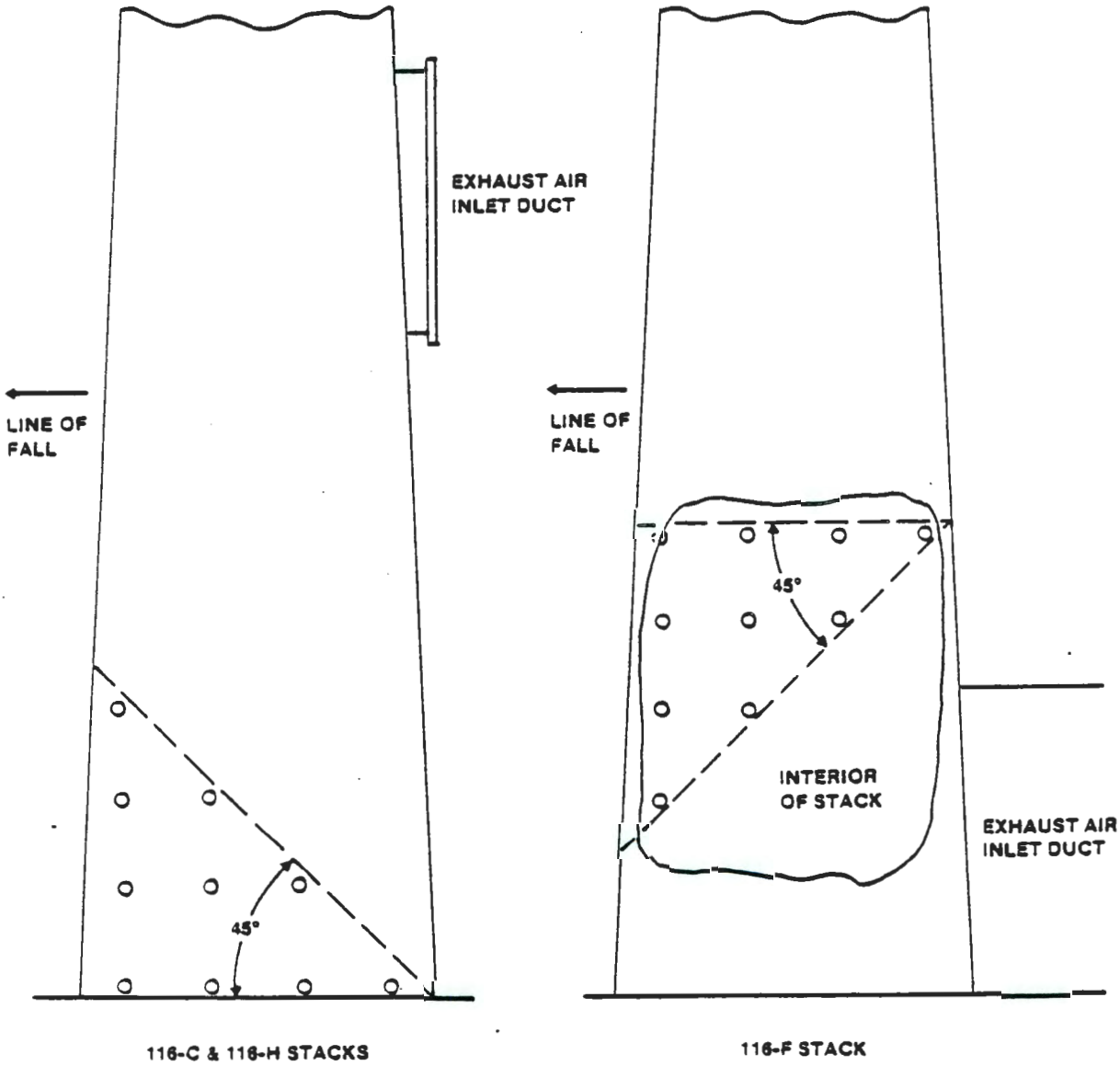


Figure 9. Drop Cut Hole Pattern.

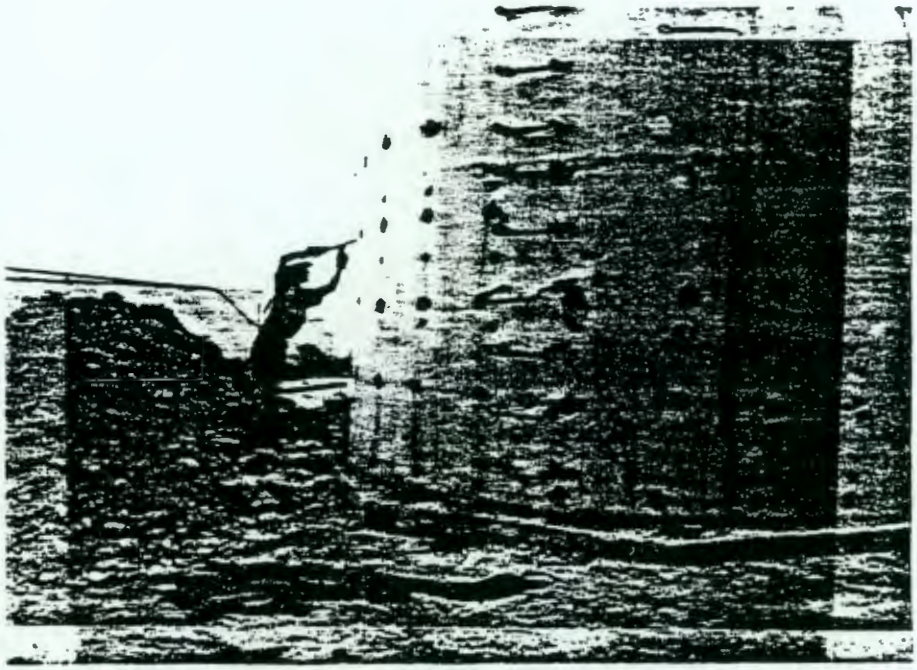

Figure 10. Drop Cut Hole Drilling on 116-C Stack.

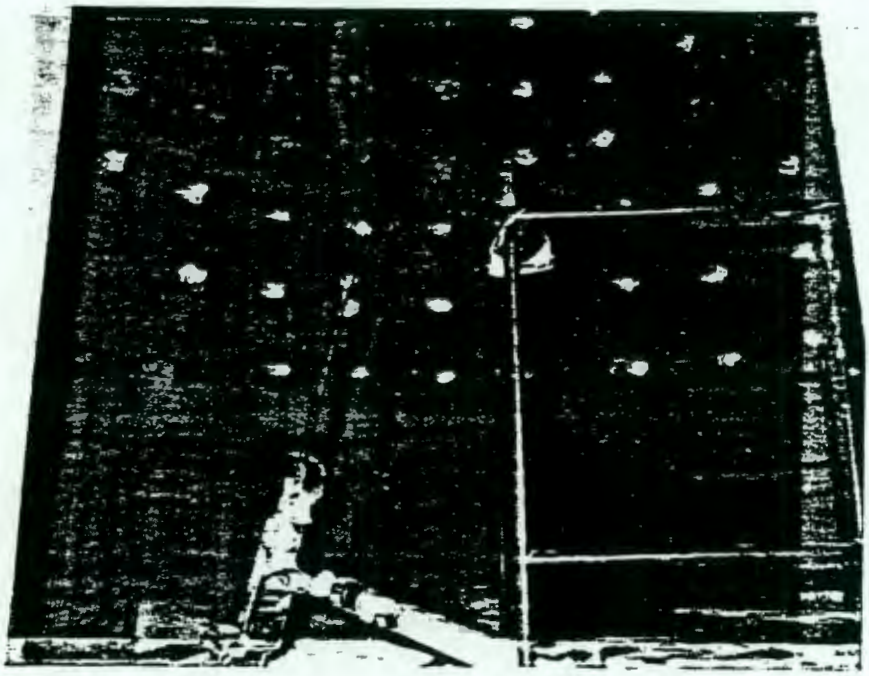

Figure 11. Hand Drill and Scaffold Inside 116-F Stack for Drop Cut Hole Drilling.

### 5.2.2 Drilling of Hole Pattern

After the layout of the hole pattern, the contractor used a wagon drill to drill the holes to the exact depth required to produce the maximum needed effect from the explosive charge.

The wagon drills are air-operated, track-driven, diamond bit drills operated by an experienced driller. A self-contained water source was incorporated to provide coolant for the drill bits and to flush out the hole after the required depth was reached.

### 5.2.3 Ductwork Removal

The 116-C and 116-H stacks had exhaust ventilation ductwork attached approximately 20 ft above the stack base (Figures 12 and 13). The subcontractor was responsible for disconnecting the ductwork from the stack and sealing the opening.

When low-level contamination was found inside the 116-H ductwork, the work was stopped because the subcontractor's workers had not been trained in radiation zone work. A decision was made to use decommissioning personnel who had been trained in radiation zone work to complete the ductwork removal.

The 116-F stack exhaust inlet ductwork was constructed of concrete and was an integral part of the stack (Figure 14). As it was slightly contaminated, decommissioning personnel coated the interior surface of the inlet duct with ALARA coat. When the surfaces were assured to be smear-free, the subcontractor was permitted to enter the duct for the purpose of drilling the hole pattern.

Each of the 116 stacks had the interior surfaces of the base portion coated with ALARA Coat to prohibit the spread of contamination during the blasting.

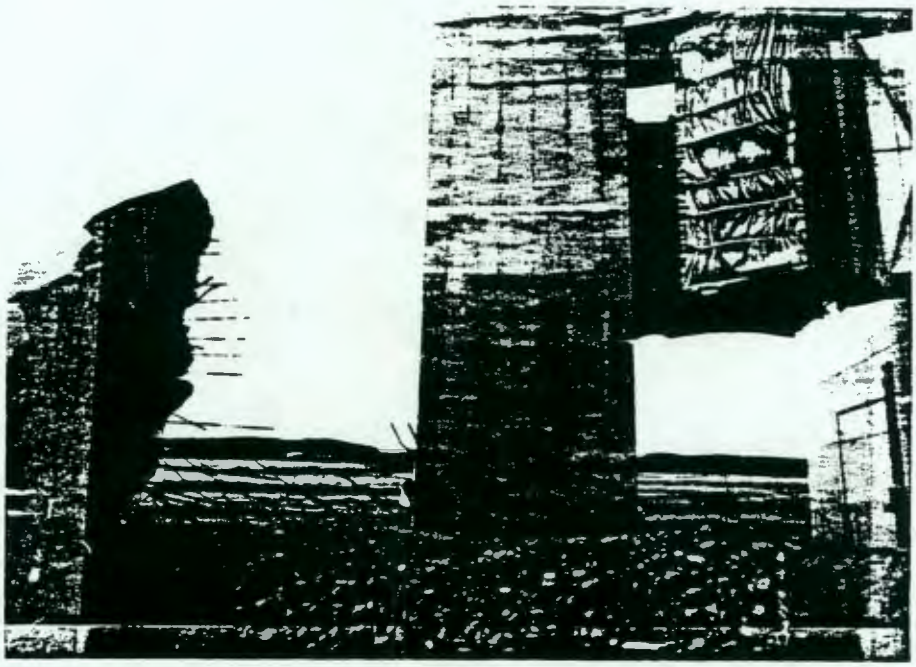

Figure 12. Exhaust Air Inlet Ductwork, 116-C Stack.

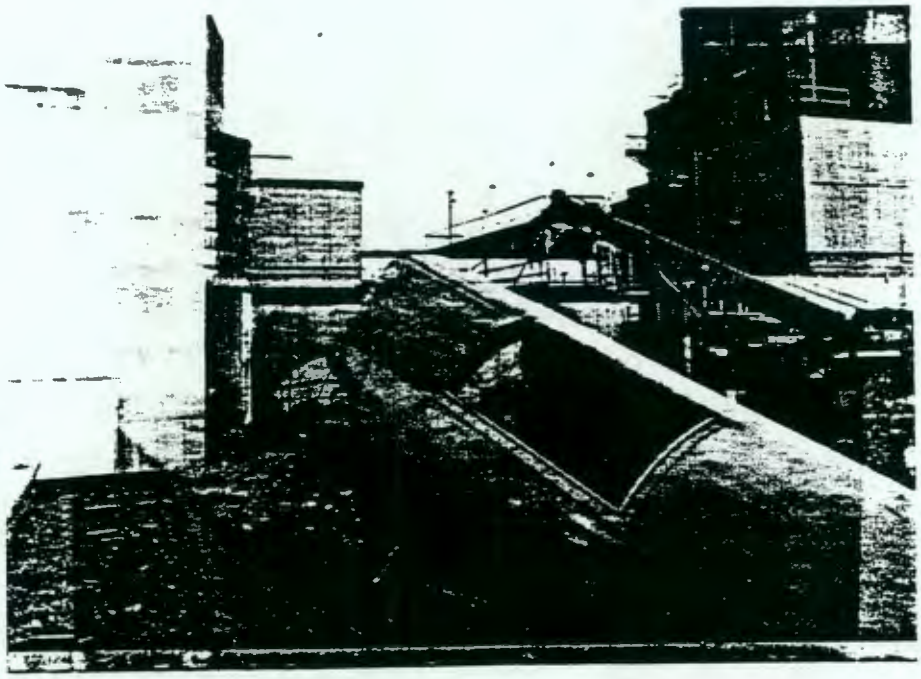

Figure 13. Exhaust Air Inlet Ductwork, 116-H Stack.

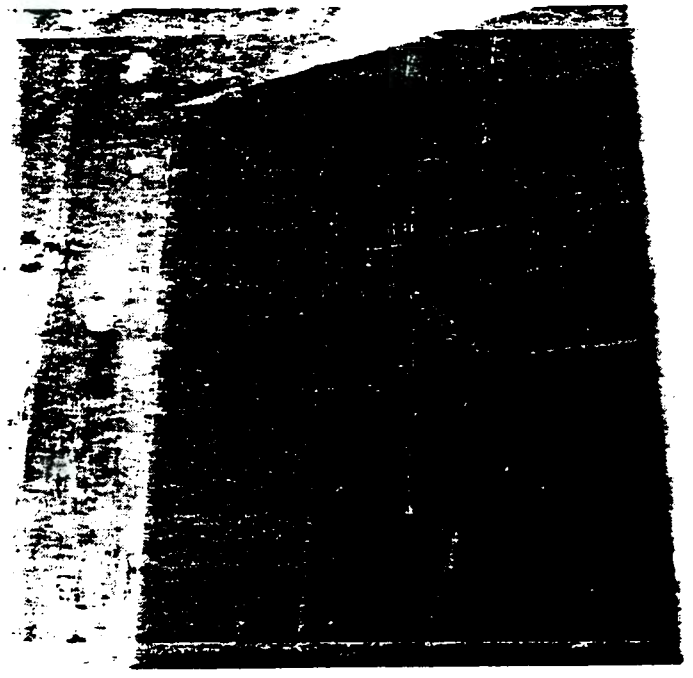

Figure 14. Coated Interior of Exhaust Air Inlet Ductwork, 116-F.

5.2.4 Burial Trenches

The subcontractor excavated a burial trench along the line of fall for each of the 116 stacks. These trenches were approximately 18 ft deep, 30 ft wide, and 200 ft long. The trenches were excavated using a Case 235 backhoe and Euclid bulldozer. The excavated material was mounded on both sides of each trench to act as a berm or safety barricade to prevent the spread of rubble or debris when the stack collapsed.

The coordinates for the centerlines of each stack in the following table were determined by drawings and conversion equations and should not be used for future calculations.

TABLE 1

STACK LOCATION COORDINATES

| Stack | Drawings | Plant Grid Coordinates North | Plant Grid Coordinates West | Lambert Grid Coordinates North | Lambert Grid Coordinates East |
|---|---|---|---|---|---|
| 116-C | H-1-19806<br>H-1-5122 | 67,284.42 | 80,335.0 | 472,380 | 2,214,818 |
| 116-F | W-73174<br>H-1-5123 | 79,112.5 | 31,100.85 | 484,334 | 2,264,021 |
| 116-H | P-1008<br>P-4675 | 95,210.00 | 39,750.58 | 500,410 | 2,225,300 |

The 116-C stack trench was excavated on the east side of the stack and alongside the 117-C Filter Building (Figure 15). The 116-F stack trench was excavated on the west side of the stack between the 117-F Filter Building burial site and the 115-F Gas Recirculation Building (Figure 16). The 116-H stack trench was excavated on the south side of the stack between the 117-H Filter Building and the 1608-H Lift Station (Figure 17).

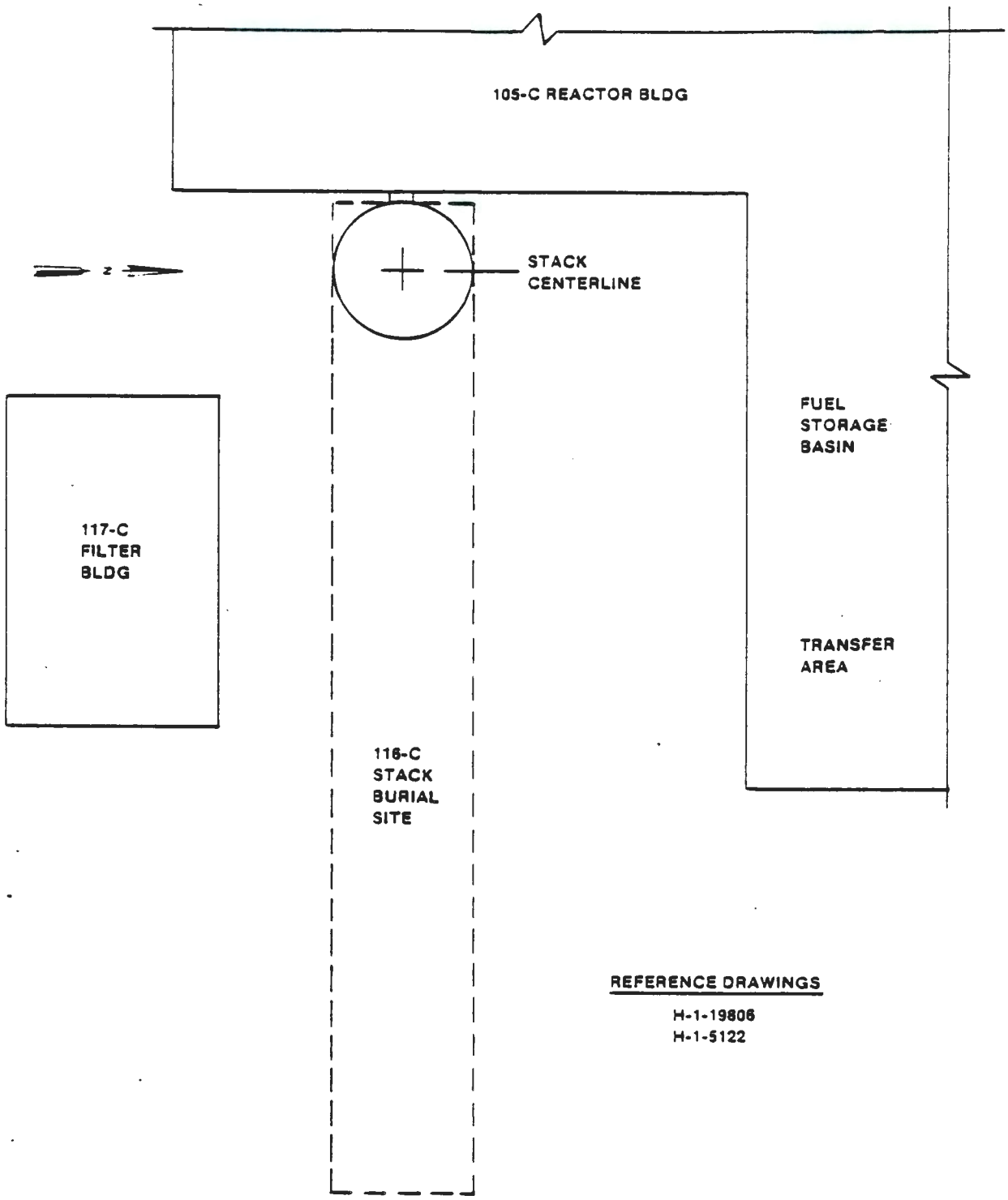


Figure 15. 116-C Stack Burial Site Location.

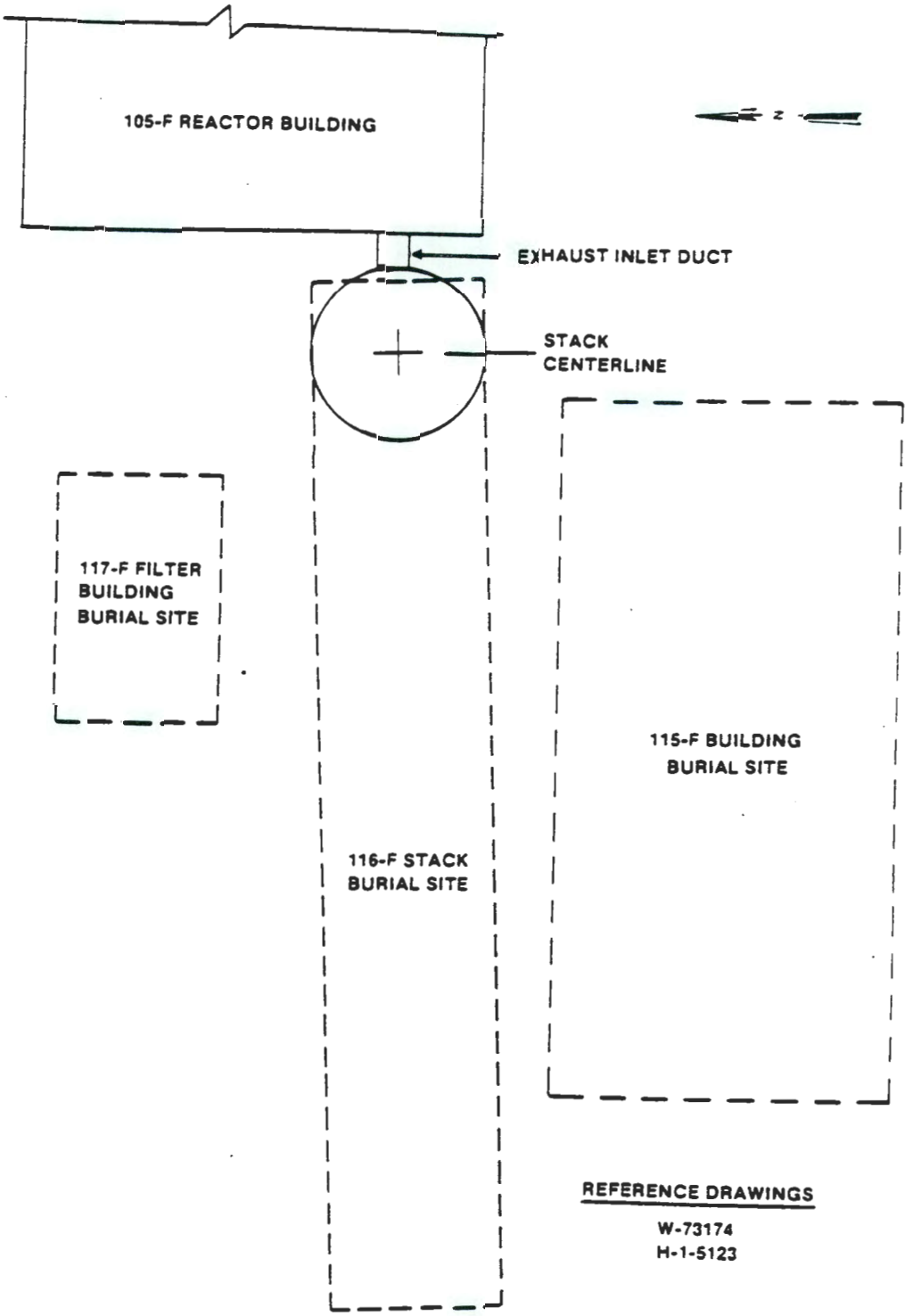


Figure 16. 116-F Stack Burial Site Location.

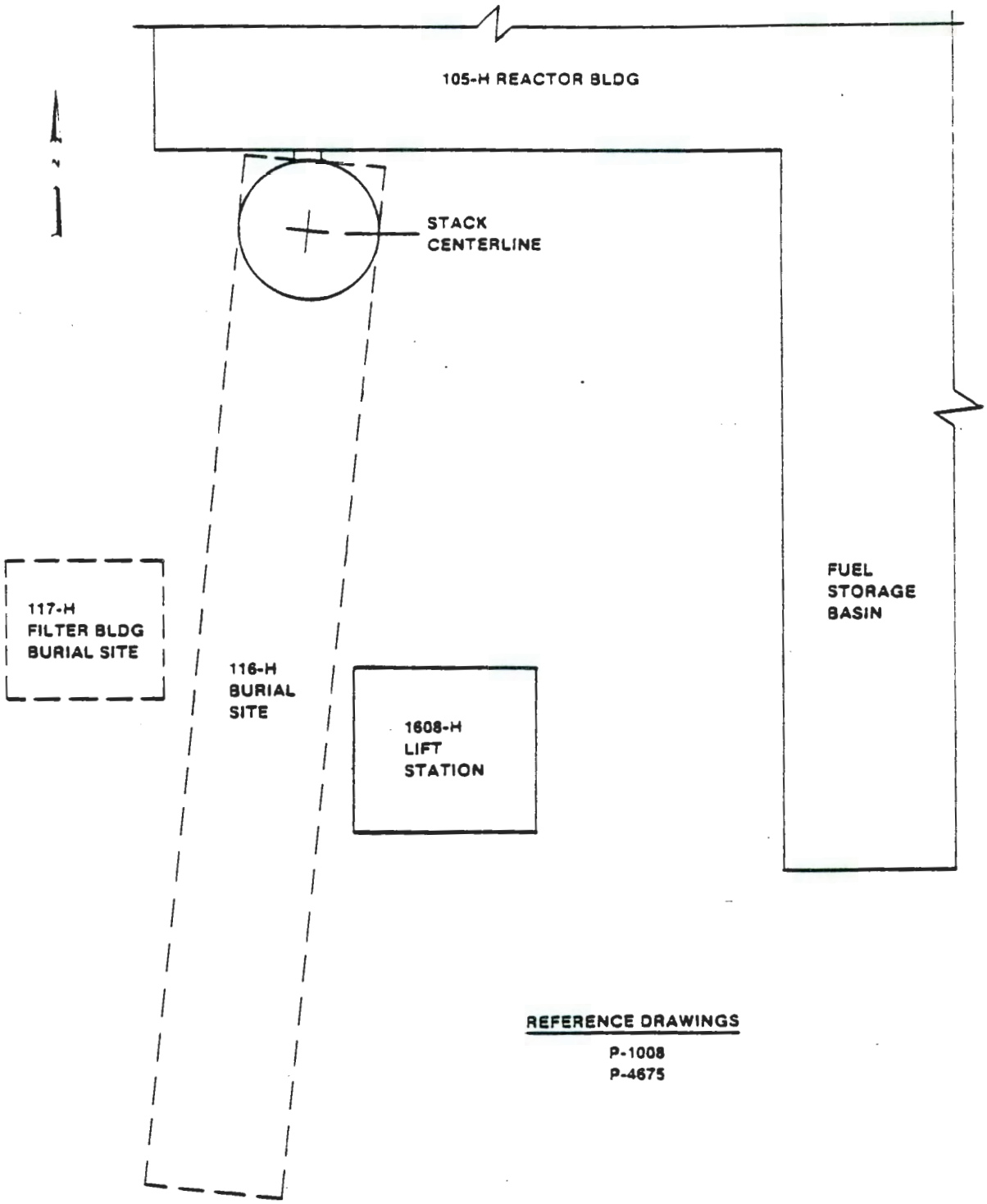


Figure 17. 116-H Stack Burial Site Location.

### 5.2.5 Main Blast for Felling the 116 Stacks

The following description details the felling of the 116-C stack, but is also typical for 116-F and -H. Specific times, explosives, and differences are covered in subsequent sections.

The contractor obtained the required amount of explosives from the magazine (1720-HA) and transported them to 100-C Area in accordance with Chapter 296-52, WAC Standards. After loading the drill pattern holes and stemming, the series was checked and stray and induced current checks were made. When all was acceptable, the face of the stack was covered with plywood sheeting and backfilled with dirt to further control flying projectiles (Figure 18).

The Project Engineer posted perimeter guards. These guards were UNC/Rockwell personnel individually instructed by the Project Engineer to carry out specific duties prior to, during, and after detonation of the main blasts.

Prior to the actual blast, special procedures and checklists were completed by the subcontractor and the Project Engineer. The final security and safety checks were made, according to the subcontractor's procedures and UNC's special procedures, then the blast was detonated.

#### 5.2.5.1 116-C Stack Blast

The 116-C stack was blasted at 7:10 p.m. Tuesday, September 13, 1983 (Figure 19). There were 72 holes drilled into the base of the stack, which were loaded with 65.4 pounds of explosives, with a 5.0 pound maximum/delay. Two transducers were set out for recording the blast and impact vibrations. One was located 50 ft south of the stack centerline on a concrete pad in front of the 1714-C solvent storage building, and one was located 150 ft south of the stack centerline on bare gravel soil. The highest recorded peak particle velocity from the blast was 0.20 fps (feet per second) and from the impact of the stack it was 0.40 fps. The vibration levels at the 105-C reactor building

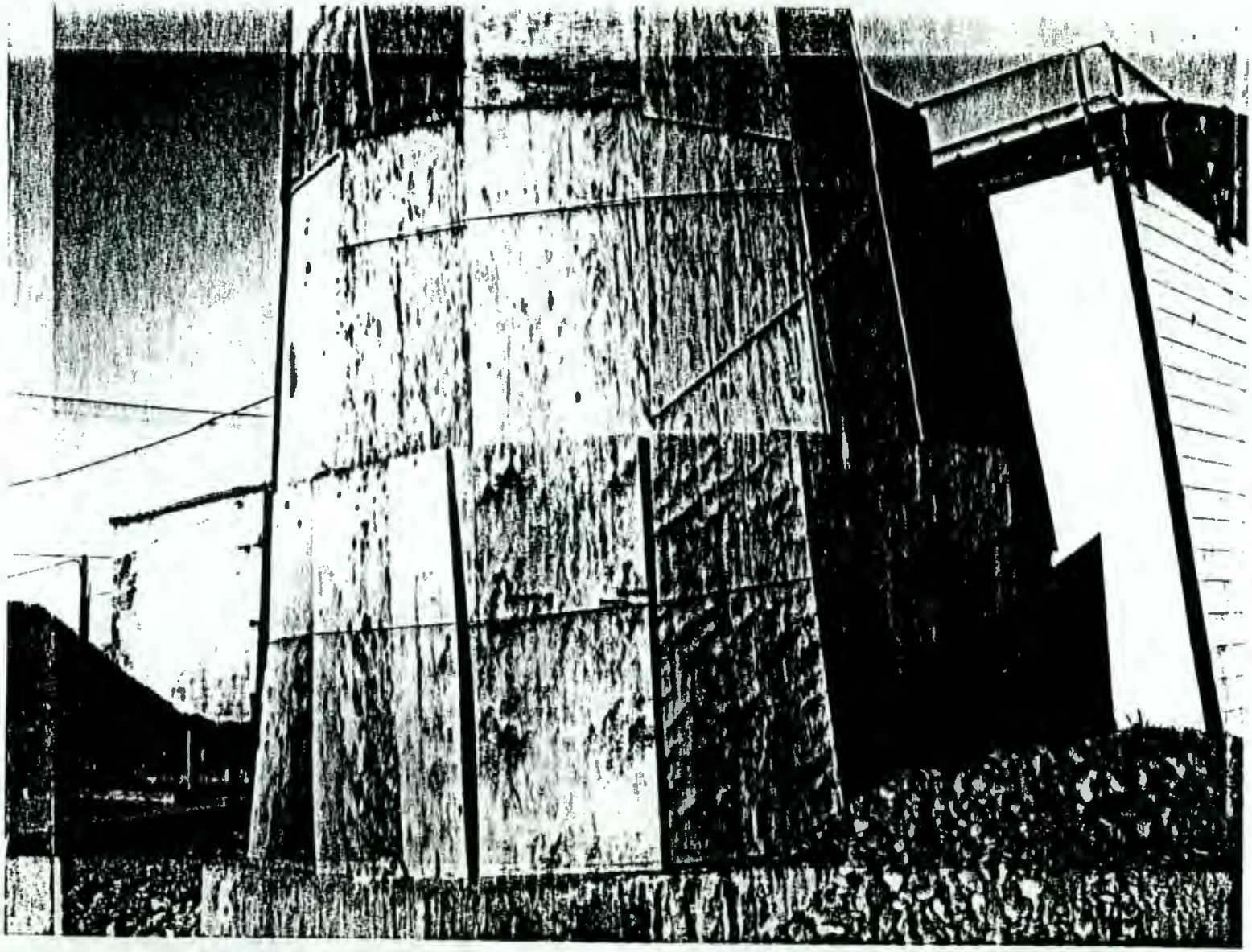

Figure 18. Plywood Installed on 116-C Stack to Control Flying Projectiles.



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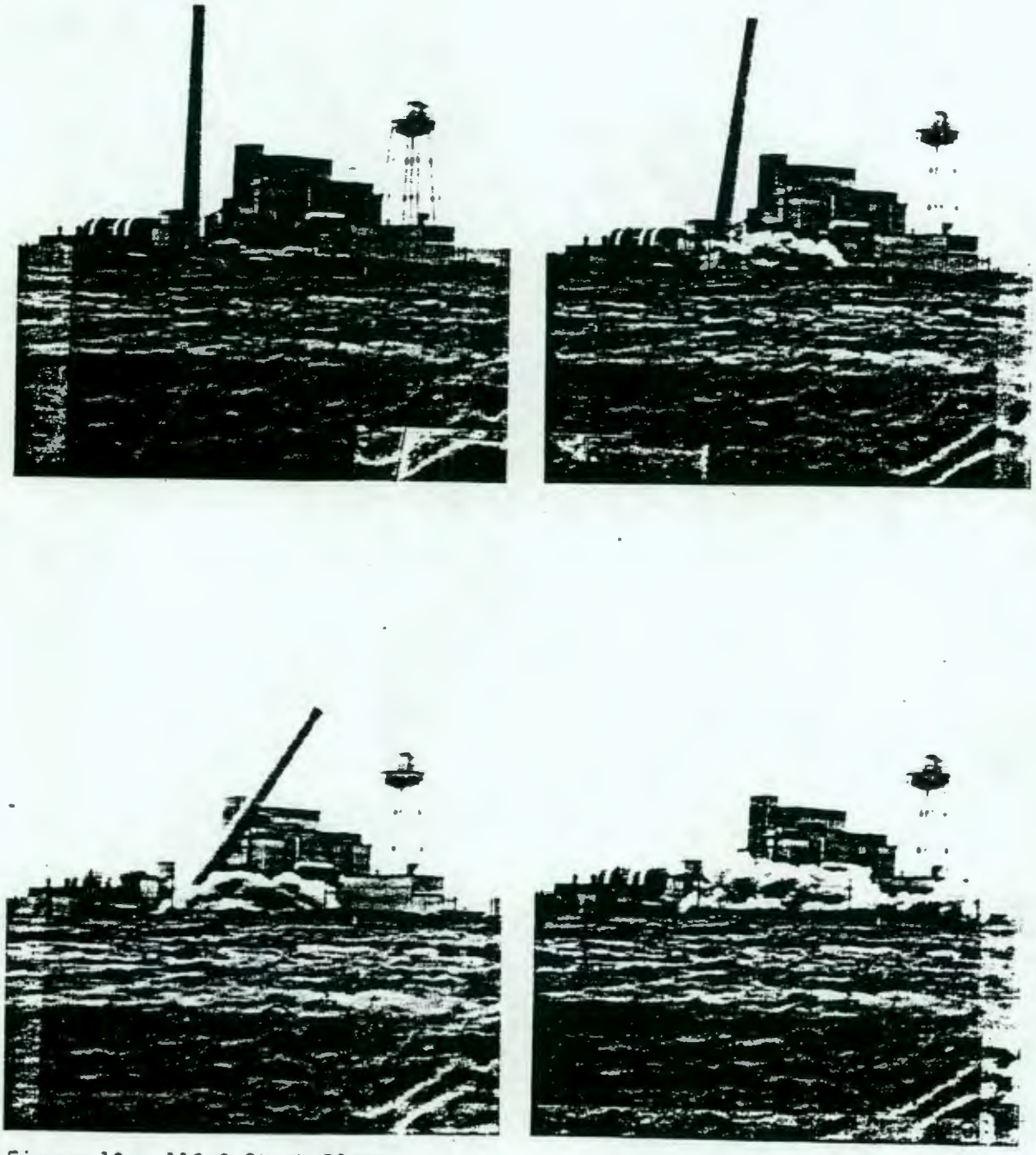

Figure 19. 116-C Stack Blast.



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were 20% of these values and for the impact about 50% of stated values. Such vibration levels are not capable of causing structure damage to nearby buildings such as the reactor building.

5.2.5.2 116-H Stack Blast

The 116-H stack was blasted at 6:20 p.m., Friday, September 16, 1983. There were 31 holes drilled into the base of the stack, which were loaded with 99.7 pounds of explosives, with 9.3 pounds maximum/delay. Two transducers were set out: one 45 ft east of the stack centerline on a concrete slab alongside the 105-H Reactor Building wall and one located 110 ft east on a concrete slab in the corner of the 105-H Reactor Building and the 105-H Fuel Storage Basin walls. The highest recorded peak particle velocity from the blast was 2.70 fps and 0.60 fps from the impact of the stack. Vibration levels at the 105-H reactor block were less than half of these recorded readings and well below any vibration level that could cause damage to surrounding buildings. The fallen stack required two additional holes drilled longitudinally and loaded with 3.4 pounds per hole to break up the large, intact portion of the stack.

5.2.5.3 116-F Stack Slot Cut Blast

Only the 116-F stack required a slot cut, which was blasted at 6:10 p.m., Monday, September 19, 1983. The slot was blasted in the 116-F stack to assure the correct direction of fall. This consisted of loading and blasting the center vertical run of holes of the drop cut hole pattern. The slot opened up the center area of the notch to relieve pressure from the felling blast sequences, and also controlled the amount of flying projectiles by directing the force of the blast to the slot opening and downward.

There were six holes on 18-in. centers, loaded with 7.65 pounds of explosives and 3.05 pounds maximum/delay. The vibration anticipated from such a small blast would be very small and, therefore, was not recorded. This slot was cut from the interior of the stack; whereas in most cases it is cut from the

exterior of the stack. The drilling was done from inside the stack because the large inlet duct provided easy access into the stack interior from the reactor building (Figure 20).

5.2.5.4 116-F Stack Blast

The 116-F stack was blasted at 6:33 p.m., Tuesday, September 30, 1983. Eighty undercut holes were drilled into the interior surface of the stack and were loaded with 97.6 pounds of explosives with 7.3 pounds maximum/delay. Slow delays were used on the stack below the undercut, with 40.4 pounds of explosives. The two transducers were located 70 ft east of the stack centerline on the concrete slab alongside the 105-F ventilation plenum walls and 105 ft east of the stack on concrete alongside the 105-F Reactor Building wall. The peak particle velocity of 0.35 fps was from the slow delay and well below any hazardous vibration level. The stack hit the trench in 8.0 seconds with no missile damage to surrounding buildings.

Figure 20. Slot Cut to Relieve Pressure of 116-F Main Blast.

### 5.2.6 Cleanup of Felled Stacks

After felling a stack into the trench, the subcontractor started breaking up the larger portions of the stack to meet the contract requirement that no pieces should be larger than three feet in diameter. All three stacks were dropped directly into the trenches. In most cases, the fall broke up the stack, except for a short section of the thicker, lower portion of each stack (Figure 21). The subcontractor then pushed all loose rubble into the pit and proceeded to backfill the trench (Figure 22 and 23). When it was completely filled, the site was graded to match the surrounding terrain.

### 5.2.7 Drilling and Blasting of the Stack Bases

The stack base was cleaned off in preparation for drilling and blasting. The hole pattern then was laid out and drilled, loaded with explosives, covered with plywood and four feet of fill, and then detonated.

The contract required that the stack base had to be broken to allow adequate drainage and had to be excavated a minimum of three feet with no remaining pieces larger than three feet in diameter.

The 116-C stack base was blasted at 6:15 p.m., Wednesday, September 14, 1983, using delays. There were 22 holes, 12 around the perimeter of the base loaded with 2.12 pounds each of explosives spaced with detonating cord, and 10 holes in the center loaded with 1.22 pounds each of dynamite, for a total of 41.3 pounds with a maximum 4.24 pounds per delay. Two transducers were set out in the same locations as for the stack blast to record the blast. In each case the vibration levels were well below the levels capable of causing damage to surrounding structures.

The 116-H stack base was blasted at 3:05 p.m., Saturday, September 17, 1983. There were twenty-one 10-ft deep holes, 12 around the perimeter loaded with 7.42 each pounds of explosives, and nine holes in the center of the base,

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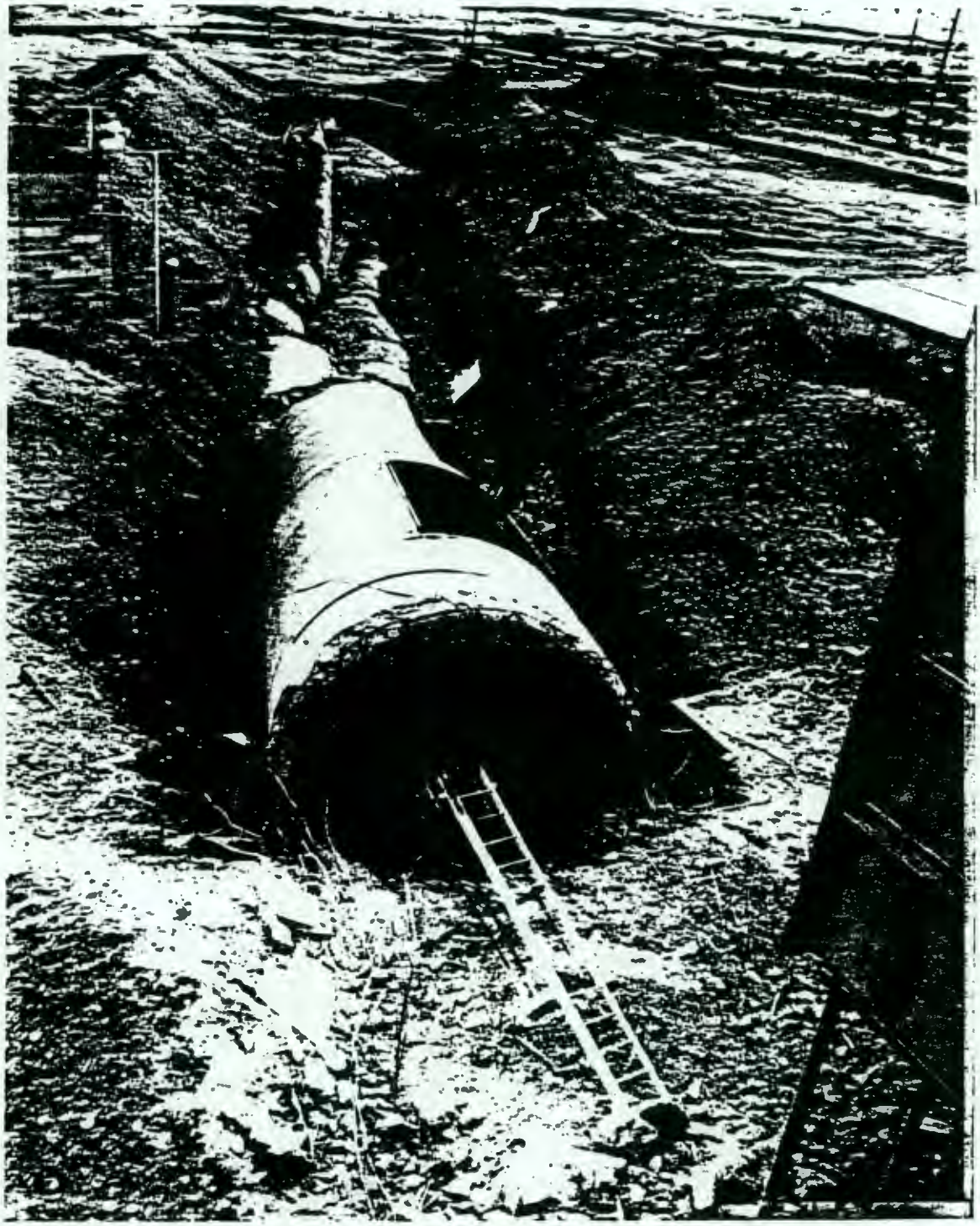

Figure 21. The 116-H Stack and Trench After the Felling Blast.

Figure 22. Large End of 116-H Stack Before It was Broken Up and Placed in Trench.

Figure 23. Heavy Equipment Breaking Up Stack.

loaded with 8.48 pounds each. The recorded vibration from this blasting was also well below any hazardous vibration levels.

The 116-F stack base was blasted at 6:10 p.m., Wednesday, September 21, 1983. There were 21 holes 9-1/2 ft deep, 12 around the perimeter and 12 in the center of the base. There were 28 holes in the inlet air plenum and stack wall remnants and 4 holes in the solid portion of the fallen stack. These were all loaded with a total of 211 pounds of dynamite with a maximum of 10 pounds per delay.

The 116-F stack base was the final blast of the exhaust stack demolition project. The 45 pounds of dynamite, 7500 ft of detonating cord, and all EB caps remaining in the storage bunker were removed under escort from the Hanford Reservation at 7:30 p.m., Wednesday, September 21, 1983.

### 5.2.8 Backfill and Contour of Stack Bases

When the excavation of the stack base was complete, the UNC Project Engineer inspected the work to assure that contract requirements were met and then approved backfilling of the excavation.

The backfill was clean dirt from previous or subsequent excavations, or from an established borrow pit.

The filled trenches were contoured to match the existing terrain.

## 6.0 PROJECT COSTS AND SCHEDULE SUMMARY

The budgeted amount for the exhaust ventilation stack demolition project was $288,000. Actual costs attributable to the project were $288,000. Costs for the three stacks are broken down in Table 2.

TABLE 2

ACTUAL COSTS FOR THE 116 EXHAUST VENTILATION STACK
DECOMMISSIONING PROJECT
($000)

| Item | 116-C | 116-F | 116-H |
|---|---|---|---|
| Project Management | 1 | 1 | 1 |
| Engineering | 1 | 1 | 1 |
| Characterization | 7 | 7 | 7 |
| Decontamination | 0 | 0 | 0 |
| Demolition-UNC Support | 10 | 9 | 9 |
| Demolition-Subcontractor | 45 | 50 | 47 |
| Direct Material | 0 | 0 | 0 |
| Waste Disposal | 0 | 0 | 0 |
| Program Support | 3 | 26 | 27 |
| G&A, Department Overhead | 9 | 13 | 13 |
| | 76 | 107 | 105 |

TOTAL - 288

The stack demolition was originally scheduled to begin early in FY 1983 and to be finished at the end of the fiscal year. Because of "continuing resolution" of the FY 1983 budget by Congress until almost mid-year, engineering work did not begin until May. Actual demolition activity began in September. Nonetheless, because the subcontractor accelerated the work, the project was completed on the scheduled date.

## 7.0 SUMMARY AND CONCLUSIONS

The decommissioning of the remaining 100-B/C Area ancillary structures and eventually the reactor and reactor building is part of the long range strategy for the disposition of the Hanford Site retired production reactor areas. The demolition of the 116-C, 116-H, and 116-F exhaust stacks was part of a site cleanup effort funded by operating monies.

The demolition of the 116 stacks did not compromise the structural integrity of the 105 Reactor Buildings.

The 116-C, 116-F, and 116-H exhaust ventilation stacks were successfully demolished and the area restored to natural terrain. This effort required the use of 775.44 pounds of explosives to fell the stacks and break up the stack bases. This work was accomplished by using a subcontractor under the administration and technical control of UNC Nuclear Industries' Decommissioning Services Section.

An excellent safety record was established in performing this task. There was no detectable release of radioactive material into the atmosphere resulting from the impact of the stacks into the burial trenches. In addition, no detectable levels of radioactive material were found in the soil around the burial trenches. Even though the use of explosives and a variety of support equipment were required, the industrial safety performance was excellent. There were no lost time injuries reported, no OSHA recordable injuries sustained, and no minor first aid treatment injuries. The stack demolition project was completed as planned, at cost, and five days ahead of schedule.

The project demolished the exhaust ventilation stacks with explosives, thus demonstrating the cost-effective use of a subcontractor.

The 116 stack project used the Allowable Residual Contamination Level methodology for the first time in the 100 Areas. Disposal of low levels of radioactivity by this method saved occupational exposure and thousands of dollars. The alternative would have been to decontaminate three 200-ft stacks and to package and ship the waste to the 200 Area low-level burial site. The safety hazards of working at those heights with the added handling of the contaminated materials would have added significantly to the danger of the project.

## 8.0 REFERENCES


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